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BRIAN FREEMAN, MD

THE ULTIMATE GUIDE TO CHOOSING A MEDICAL SPECIALTY

- WRITTEN BY RESIDENTS FOR STUDENTS
- SALARY INFORMATION, EMPLOYMENT DATA, AND MATCH STATISTICS
- ALL MAJOR MEDICAL SPECIALTIES
- LIFESTYLE ISSUES AND PRACTICE CONSIDERATIONS
- HOW TO ENHANCE THE PROSPECTS FOR OBTAINING A RESIDENCY IN YOUR CHOSEN FIELD

CELP
CareerMed

a LANGE medical book

THE ULTIMATE GUIDE TO

CHOOSING A MEDICAL SPECIALTY

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For Rebecca

Without you, this book would never have been conceived. You are my inspiration—each and every day—for all that I do and all that I hope to achieve. Thank you for your love, for your never-ending support and devotion, and for always being there with a soft "pet" whenever I need one. I am yours forever.

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Preface

Three years ago I was a confused third-year medical student, not having any idea about the next step in my education and professional training. Deciding on a career in medicine was easy; choosing a specialty, on the other hand, was agonizing. Like my classmates, I felt overwhelmed by the number of choices. I imagined myself as a future surgeon or emergency medicine physician, but after extensive research and clinical experiences, I soon discovered that anesthesiology was the perfect fit. I realized at the time that medical students need a good written resource to guide them through this difficult career-defining decision. This is when the idea for *The Ultimate Guide to Choosing a Medical Specialty* was born. Today's doctor-in-training requires as much information as possible to make a confident decision, but has little time to gather it. A single comprehensive resource, this book provides detailed insight into each field and allows students to quickly and easily compare specialties under consideration.

SPECIAL FEATURES

- An "insider's look" into different areas of medicine—specialty chapters written by residents who recently made their career decisions
- Candid and revealing descriptions of each specialty, including the pros *and* the cons, plus salary information, employment data, match statistics, and much more
- Profiles of the major medical specialties, including those to which medical students may receive little exposure, such as radiation oncology
- A concise up-to-date guide to the residency application and matching process, including a separate chapter dedicated to the "Couples Match"
- A special chapter with explicit advice to help medical students maximize their success in obtaining a residency position in each field

ORGANIZATION

This book is organized into two major sections. Part 1, "Planning Your Medical Career," delves into the main issues surrounding the choice of one's medical specialty. These 12 chapters provide everything you need to begin making this major decision—how to research each specialty, what to do if you remain undecided, how to apply for a residency position, and much more. This section is especially

valuable if read early during your medical education. In Part 2, "Specialty Profiles," a chapter is devoted to each of the 20 major medical disciplines, all following a similar format and exploring common themes. Interspersed throughout the text are special inserts—"Vital Signs" and "The Inside Scoop"—that provide easy-to-read factoids like salary information and match statistics.

AUDIENCE

Most readers interested in this book are current medical students—allopathic and osteopathic, and those who attend medical school in the U.S. and abroad. But you do not have to be a medical student in order to get something out of this book. Many residents have second thoughts about their chosen specialty and wish to change fields. In addition, pre-medical college students, as well as anyone considering medicine as a possible career, will find this book helpful.

FEEDBACK

For comments and suggestions about the book, you are invited to contact the author by e-mail (*nerveblock1@yahoo.com*) or by regular mail:

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Your feedback is invaluable for continuing to make this book a must-have resource for future medical students. If you have questions regarding specific areas of medicine, you may e-mail the contributor of that specialty chapter. Their biographical and contact information can be found at the end of each chapter.

ACKNOWLEDGMENTS

Many people helped make this book a reality. I first would like to acknowledge my mother, Ellen, for all her guidance, love, and support throughout my life. I also owe a huge debt of gratitude to the following people who shared their encouragement and advice: Eric Freeman, Gertrude Eichschlag, Victor Osinaga, Derek Fimmen, and Dr. William McDade, who graciously spent time reviewing my own specialty chapter. A special "meow" goes out to Foo and Casper, our two

Cornish Rex cats who kept my lap warm on cold winter nights while writing this book.

In the medical publishing division of McGraw-Hill, a fantastic team of editors helped bring this book into creation. Shelley Reinhardt, the editor-in-chief, went out of her way to nurture a new author. Susan Meigs offered unparalleled editing expertise and countless useful suggestions that were right on target. The entire copyediting and production team turned words and thoughts into a reader-friendly and fun package.

I especially thank the extraordinary writers who contributed chapters on their specialties for this book. Even while under the stress and hardship of being a resident, their passion for their chosen careers shines through in their work. This special group of physicians includes Jafer Ali, Vicki Anderson, Kathleen Ang-Lee, Gregory Borschel, Kelly Elmore, Amy Farmer, Derek Fimmen, Jeremy Graff, Danagra Ikossi, Jennifer Lamb, John Langland, Jonathan Le, Daniel Lee, Jane Lewis, Michael Mendoza, Aaron Miller, Andrew Schwartz, Ian Tong, Lisa Vargish, Stephanie Weiss, Lisa Yerian, and Tomasz Zabiega.

Brian Freeman, MD

Chicago, Illinois
December 2003

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1 PLANNING YOUR MEDICAL CAREER

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1

CHOOSING A SPECIALTY: THE MOST DIFFICULT DECISION OF YOUR CAREER

"Is it true that gynecologists have the worst sex lives of all doctors?"

"Are you going to be a neurosurgeon like your mother?"

"Why don't you look into dermatology? It's got easy hours and you'll make good money."

Throughout their education, medical students never stop hearing these kinds of comments. Starting from the moment of acceptance into medical school, these questions continue well into the final year of earning the MD. As they undertake the first major professional decision of their career, medical students often struggle to come up with a good answer. After all, it seems like just about everyone has a strong opinion on the "best" specialty for a future doctor. That person could be an advisor, parent, supervising physician, or even Aunt Betty at the annual family reunion. From anesthesiology to urology, there are over 60 specialties and subspecialties (Table 1–1). How will a medical student make an educated decision?

"MD" REALLY STANDS FOR "MAJOR DECISIONS"

Medicine is a profession that requires overwhelming sacrifice and commitment. You have to spend over $200,000 for four years of rigorous education, followed by many long, tough years of on-the-job training. Like life in general, many important decisions line the road to becoming a doctor. Think back to the day when

TABLE 1–1

RECOGNIZED MEMBERS OF THE AMERICAN BOARD OF MEDICAL SPECIALTIES (ABMS)

Specialty Board	Year of Founding
Allergy and immunology	1971
Anesthesiology	1941
Colon and rectal surgery	1949
Dermatology	1932
Emergency medicine	1979
Family practice	1969
Internal medicine	1936
Medical genetics	1993
Neurological surgery	1940
Nuclear medicine	1971
Obstetrics and gynecology	1930
Ophthalmology	1917
Orthopedic surgery	1935
Otolaryngology	1924
Pathology	1936
Pediatrics	1933
Physical medicine and rehabilitation	1947
Plastic surgery	1941
Preventive medicine	1949
Psychiatry and neurology	1935
Radiology	1935
Surgery	1937
Thoracic surgery	1970
Urology	1935

Source: American Board of Medical Specialties.

you decided on a career in medicine. Whether you were a college student, trying to pick between medicine, engineering, or public policy or perhaps an older, nontraditional applicant who chose to leave a well-paying—but unrewarding—job for a new calling in medicine, it was one of life's biggest decisions. After slogging through tedious premedical courses and the application process, you then made the choice of where to attend medical school.

Now, another career-defining challenge awaits. The medical school experience is more than just memorizing the arteries of the arm, holding retractors during surgery, and learning how to use a stethoscope. Each and every medical student has to go through four years of grueling examinations, sleepless nights on call, and tough clinical rotations. Despite these hurdles, most medical students see eye to eye on what is really the greatest challenge of all—choosing one's medical specialty. Figuring out what type of doctor to be is, in many ways, more difficult than deciding to become a physician. Once medical students settle on a specific niche within medicine, they become more than just future doctors. They start to take on a new identity—that of a pediatrician, forensic psychiatrist, endocrinologist, orthopedic surgeon, or interventional neuroradiologist.

The specialties themselves are quite diverse. Graduating doctors have the freedom to choose from a wide variety of medical fields. Some are based strictly on an organ system, like the brain (neurosurgery and neurology), the heart (cardiology), and the male genitourinary system (urology). Others provide comprehensive medical care for specific population groups, such as women (obstetrics and gynecology) and children (pediatrics). Another set of specialties share in common the fact that they are hospital-based services. Its members include radiology, pathology, anesthesiology, and emergency medicine. Medical specialties can also generally be divided into two main groups: primary care (long-term comprehensive care) versus secondary/tertiary care (referral-based care). Generalist specialties like family practice, internal medicine, and pediatrics are considered primary care fields. More specialized areas such as gastroenterology, dermatology, and cardiothoracic surgery fall into the latter category.

Everyone knows that medical school has many rigorous demands: patient care, lectures, rounds, examinations, and call schedules all compete for a medical student's time, often crowding out sleep and a personal life. As a result, most students have even less time for the proper self-assessment, research, and exploration required to choose the right specialty. Every medical student agrees that it is the most difficult professional decision that they will have to make. Yet most will probably spend more time researching what kind of car to buy! In the end, many hastily choose their lifetime careers without having all the information they need to make an educated decision.

This book is designed to help medical students make an informed choice by the time senior year rolls around. Deciding on a field of medicine is often described as matching oneself with the characteristics of a particular specialty, such as lifestyle, intellectual challenge, technological focus, and research potential. Because of these factors, there is much confusion, frustration, and uncertainty

involved in this defining moment of a young physician's career. Poor decision-making can have considerable implications for one's professional happiness later in life.

INTERNSHIP, RESIDENCY, AND FELLOWSHIP

Medical school is only the first step in learning how to become a competent, caring physician. There are three different types of on-the-job training that commence immediately following graduation from medical school. These avenues take young, inexperienced doctors and turn them into well-trained specialists, ready to cure disease and save lives. Choosing a specialty determines what form of further professional training is required after medical school. Today's medical student, therefore, needs a clear understanding of the structure of postgraduate medical education.

Medical students have to commit to their specialty to begin the next phase in training: *residency*. During the past 60 years, rapid advancements in medical science created a greater demand for specialists, which residency programs expanded to meet. Depending on the specialty, residency consists of 3 to 7 years of additional formal training and study (under physician supervision). Medical school only provides a broad clinical foundation. Residency takes it one step further and confers the skills, knowledge, and experience necessary to practice medicine unsupervised in a given specialty. Being a resident physician is kind of like working as an indentured servant. You work long hours for little pay and spend many nights sleeping in the hospital. In fact, *residency* earned its name from the old days when house staff physicians actually lived on hospital grounds, as residents.

Through the National Resident Matching Program, graduating medical students may enter residency training in 20 different specialties. You actually have even more options. Here is why. The American Board of Medical Specialties (ABMS) recognizes 24 official specialty *boards*. But every year, statistical data from the residency match show that nearly all medical students enter 1 of only 20 areas. What about the remaining four? Three of the specialties—medical genetics, preventive medicine, and nuclear medicine—offer such a small handful of residency positions (16 total in 2002) that few students really consider them as options. The other disciplines—allergy medicine and thoracic and colorectal surgery—are really considered *sub*specialties of internal medicine and surgery, respectively. (Psychiatry and neurology both share the same specialty board, and radiation oncology falls under the jurisdiction of radiology). In addition, students

may also select more than one specialty through the combined residency programs described in Chapter 7. Doing the math, these 14 available options bring the grand total to 34 choices.

After deciding on a specialty for residency, many physicians later choose to subspecialize further by obtaining a *fellowship*, which can last any number of years. Subspecialties exist for nearly every specialty. Examples include rheumatology or infectious disease (internal medicine), vascular surgery (general surgery), pain management (anesthesiology), and retinal surgery (ophthalmology). Because of all the subspecialties, there are over 60 different kinds of doctors out there! You can be an adolescent medicine specialist, critical care physician, or interventional radiologist. The choices seem endless. Because areas of subspecialization are primarily of interest to current *residents*-in-training, they will not be a major focus of this book. It is important to remember, however, that these fields are all potential career paths. Do not exclude them from your mind while you are contemplating and exploring the 20 basic specialties. Having so many additional options just means the decision gets even tougher.

Where does *internship* fit into all this? In the old days (prior to 1970), all graduating medical students completed a 1-year rotating internship before entering residency. This busy year consisted of all the core specialties: internal medicine, surgery, pediatrics, obstetrics and gynecology, and psychiatry. The goal was to provide broad hands-on training that would enable a new physician to work in the community as a general practitioner. After the demise of the formal internship in 1970, only the lingo lives on today. Internship is now simply considered the first postgraduate year (PGY-1) of residency. In most hospitals, newly minted MDs, fresh out of medical school, are usually known as *first-year residents* rather than *interns*. The old internship does still exist in a disguised form: the transitional year residency. This track (along with other 1-year programs) is discussed further in Chapter 9.

WHY HAS CHOOSING A SPECIALTY BECOME SO DIFFICULT?

Medical Students Are Faced With More Choices Than Ever

Back in the old days of medicine, the career options for a graduating medical student were pretty simple: become a general practitioner, or . . . become a general practitioner. Medicine has changed quite a bit since that era. New discoveries in science, advancements in medical care, and high-tech innovations paved the way

for the growth of more specialties. Radiology, for instance, prospered greatly from the introduction of CT and MRI scans. The discovery of inhalation anesthetics gave birth to anesthesiology, progress in drug therapy revolutionized psychiatry, and the development of the colonoscope created gastroenterology. The list goes on and on. Today, with nearly 60 specialties and subspecialties of medicine, narrowing the choices down to one is more challenging than ever.

Clinical Clerkships Have Many Limitations

After making it through 2 hard years of basic sciences, medical students have to complete a series of clinical clerkships (rotations). The purpose of this hospital experience is twofold: (1) to acquire a basic fund of clinical knowledge in that specialty, and (2) to explore whether or not that field of medicine may be one you want to pursue. For the latter goal, clerkships prove inadequate for many reasons. Most rotations only last from 2 to 8 weeks. During this short period of time, medical students get limited exposure to that specialty. It feels more like an overview or introduction.

Anxiety over clerkship examinations and grades takes both time and mental energy away from focusing on the merits of the specialty. During a rotation, many students spend more time studying for the test or worrying about their daily performance on rounds instead of discussing the pros and cons of that specialty with residents and attendings. When the clerkship ends, the evaluations and grades often subjectively influence a medical student's final impressions. More often than not, your enjoyment of a particular *rotation* does not correlate with what you really think and feel about that *specialty*. This usually happens because bad evaluations from bitter residents or tough attendings leave a negative lasting impression, making a student less inclined to choose that specialty. Having a rough experience in a single month-long rotation, however, should not influence your decision. It is possible to have a bad rotation but still end up choosing that specialty for a career.

Most clinical rotations are completed within the setting of an academic medical center or teaching hospital. Here you receive an unbalanced, biased view of that particular specialty. The academic environment is vastly different than the private practice setting of most doctors. Take the internal medicine clerkship, for example. Most medical students spend weeks gaining internal medicine experience by seeing sick patients admitted to the medicine wards. They primarily get a solid grasp of the inpatient side of this specialty. In reality, most private practice internists, whether generalists or specialists, spend the majority of their time

in clinic. Here they practice ambulatory medicine, seeing a large number of patients a day. They complete tons of paperwork and haggle with insurance companies. Thus, the internal medicine clerkship does not give you a good sense of what a typical day is really like for an office-based internist.

Medical Students Have Little First-Hand Experience

It is hard to know whether a specialty is the right fit until you have a chance to immerse yourself completely in it. In a typical clerkship, medical students—who possess little practical knowledge—act more as observers than they do as physicians. They write notes in the chart that no one really reads and spend long hours in the operating room holding retractors during surgery. Many future surgeons, for example, commit to a career of slicing and sewing without ever having the chance to operate. (Retracting organs for the surgeon does not count as operating). Of course, there are good reasons to prevent medical students from writing medication orders, performing anesthesia, operating on patients, and delivering babies alone. But these constraints make it harder to figure out if you would actually like doing those things for the rest of your working life.

In the old days, medical students did not have this problem. They were able to gain first-hand experience in different specialties through the rotating internship. During this time, they actually used their newly earned MD to work as a doctor and could perform more tasks and procedures unsupervised. The internship year also allowed more time to choose a specialty, building on the 2 years of clinical exposure in medical school. This was the year when interns had to apply to residency programs. The formal rotating internship was eliminated in 1970, when residency training swallowed up PGY-1.

There Is Not Enough Time to Explore Every Specialty

Because of the overwhelming number of specialties, it is impossible for medical students to gain exposure to all of them. This failing is a direct result of the structure of American medical education. After briefly rotating through different specialties (both required and elective), students have to decide early on a field of medicine—after just over a year! Hypothetically, being a diligent student and doing month-long rotations in *every* specialty would take almost 2 years. So new doctors necessarily commit to a specialty without having rotated through all of them. Many students graduate without having any idea of what physical medicine and rehabilitation is all about, for instance, or what

radiation oncologists do on a daily basis. They end up making hasty, ill-informed decisions.

To meet federal accreditation requirements and maintain high standards, medical schools have to ensure that their students obtain basic clinical knowledge in several core disciplines. Whether they like it or not, all third-year students spend their entire year rotating through seven fundamental specialties: internal medicine (12 weeks average length), surgery (12 weeks), pediatrics (8 weeks), obstetrics and gynecology (6 weeks), psychiatry (6 weeks), family practice (6 weeks), and neurology (4 weeks).[1] Some schools have additional requirements, such as emergency medicine and anesthesiology. All these requirements mean that there is little to no elective time during the crucial junior year. In the end, you will definitely not have clerkship experiences in every specialty that you might possibly consider for residency training.

Having so many required third-year rotations leaves just a few months in the senior year for electives in other specialties before applying for residency. Students have to commit to their desired specialty early (by late summer) in the senior year. Residency applications are typically submitted in September and October of the final year. This time frame gives medical students only a year or so to explore different specialties and make the big decision. Once fourth year begins in July, it is time to start thinking about subinternships, collecting letters of recommendation, writing the personal statement, and researching residency programs. Students who use the beginning of fourth year for additional career exploration may find themselves rushed during the application process. The stressful time crunch is even worse for medical students interested in checking out one of the "early match" specialties, like ophthalmology or otolaryngology. For them, applications are due even earlier (around mid-summer)!

With only 1 year to make up their minds, the pressure is intense for many medical students. The need to make such an early (and important) commitment creates high levels of stress, frustration, and anxiety. It has progressed to the point where first- and second-year students are now worrying about this decision, too. Instead of focusing their energy on mastering the basic sciences, they rack their brains over what specialty lies in the not-so-distant future.

Medical Schools Offer Little Career Planning

Some students enter medical school certain of the type of doctor they want to become. "I was born to be a neurosurgeon," they insist. Perhaps they want to follow in the footsteps of a parent and feel ordained to live up to their expectations.

Other medical students have vague ideas about their careers, such as knowing they want to perform procedures or have an office-based group practice. A third group (probably the largest) declares itself undecided. Its members are the students who are always changing their minds during medical school about their future specialty. One day they wake up thinking about psychiatry, and the next month a career in dermatology begins to sound appealing.

No matter which group you feel you belong to, not many medical schools have adequate resources to help you make this decision. Many students go for 4 whole years without anyone ever sitting down with them to offer career advice and information on specialty selection. Some schools just leave a dusty box of outdated printed information in some unused closet. Students are left on their own to do independent research and to seek out medical professionals for advice.

A few medical schools, however, are better when it comes to career planning. These rare exceptions hold workshops, career fairs, presentations, private counseling sessions, and "Q&A sessions" sponsored by different departments. But too many students fail to take advantage of these resources because of the more immediate demands of medical school—taking overnight call, studying for examinations, and preparing presentations for teaching rounds. Without good career advice, today's medical students have even less information on which to base their specialty decision.

WHAT ABOUT CHOOSING THE "WRONG" SPECIALTY?

Is there really such a thing as *the* perfect specialty? Most doctors would probably argue against that idea. After rotating through various areas of medicine, most medical students find themselves drawn to a number of them. In their decision-making process, students typically first rule out the list of disciplines that they are sure they are not interested in, for whatever reason. The remaining options under consideration, though, would probably all lead to a rewarding, intellectually stimulating medical career. Because of the similarities among certain groups of specialties, there is almost always more than one potential choice that might meet your criteria. If you want to be a behind-the-scenes doctor's doctor, consider radiology or pathology. If you want to know a little bit about everything in medicine, consider family practice or emergency medicine. If lots of procedures are more your style, think about cardiology, interventional radiology, or surgery.

You cannot choose a medical specialty without taking a closer look at career satisfaction among today's doctors. In the United States, the majority of physicians are basically satisfied with their medical careers. However, a recent study

of over 12,000 doctors found that only 40% of physicians are very satisfied with medicine, with a significant proportion (20%) feeling completely dissatisfied.[2] Why such negative feelings toward medicine? Many cite the encroachment of managed care on their practices as a major influence. Others are less satisfied because of their long work hours, declining income, practice location, or for other personal reasons.

One of the most significant factors contributing to physicians' satisfaction is their choice of specialty. Ill-informed decision-making can lead to a lifetime as an unhappy doctor. The same study, therefore, looked at differences in physicians' satisfaction across the medical specialties, and came up with important conclusions. Surprisingly, the highest proportions of dissatisfied doctors are those practicing some of the procedure-oriented specialties, like obstetrics-gynecology, otolaryngology, ophthalmology, and orthopedic surgery. These are areas of medicine with traditionally high income and prestige. They may have lost their luster due to years of managed care and Medicare reimbursement reform, which led to less autonomy, higher liability insurance premiums, and declining income. On the flip side, more cognitive-oriented specialties—pediatrics, geriatrics, infectious disease, and neonatology—are filled with very satisfied physicians. Perhaps these fields gained the most benefits from all the recent changes in health care in the United States.

The results of this survey reiterate an important concluding point: choose your medical specialty thoughtfully and carefully. Finding the right area of medicine for you will have a huge bearing on your future career satisfaction. Moreover, physicians' contentment correlates strongly with patients' satisfaction and their outcomes.[3] It goes without saying, then, that *happy* doctors end up being *better* doctors for their patients.

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2
THE SPECIALIZATION OF MEDICINE

For all medical students, the area of specialization they choose will shape the nature of their careers. Some will become pediatricians or neurologists. Others may find themselves drawn to callings in orthopedic surgery, emergency medicine, or family practice. But over time, the popularity of any given specialty follows a cyclical pattern among medical students. One year it seems like everyone is clamoring for internal medicine; the next year, radiology becomes the hot field. Today, nearly all doctors identify themselves in terms of their specialties first and as physicians second.[1] When did medicine become specialty oriented? Is it possible anymore for a doctor to be, well, just a doctor? Why are there so many options for today's medical student?

The answers to these questions are complicated. Unlike other professions, medical education has shifted from general training to a fractionated system of specialties and subspecialties. Throughout the twenty-first century, the rapid growth of new scientific knowledge led to a steady rise in the number of medical specialties. Amazing new drugs or fancy MRI scanners, however, do not protect any specialty from the economic, political, and social forces that have changed the delivery of health care. The current managed care climate has particularly affected certain areas of medicine. So before choosing a specialty, every future physician needs a solid appreciation of how medicine became a fragmented profession. In consideration of the busy lives of premed and medical students, this history lesson will be kept short and concise.

IN THE BEGINNING THERE WAS GENERAL MEDICINE

During the first half of the twentieth century, almost every doctor practiced general medicine. At the time, aspiring young physicians entered medical school in-

tending to become general practitioners (GPs). Very few completed much postgraduate training. After graduating from medical school, they spent 1 to 2 years in an apprentice-like internship with a more experienced physician. Just like today's family practitioner, the GP took care of patients of all ages, from infants to the elderly. They treated medical problems, delivered babies, and performed surgery. As respected members of the community, they even made house calls on their patients. Because there was a limited amount of clinical knowledge to master, general practitioners could capably manage most medical and surgical problems.

Although GPs dominated the medical scene, several specialties were in the early stages of development. But additional formal training in these areas—like ophthalmology and otolaryngology—was practically nonexistent. The postgraduate internship prepared new physicians for general practice only. If an American doctor wanted to gain more expertise in a narrow field of medicine, a few nonstandardized options were possible. Some worked as apprentices to the small number of established specialists. Others took formal coursework at freestanding graduate medical schools or entered one of the few available residency programs. This path represented the culmination of training through the pursuit of specialized knowledge. The majority, however, went to Europe, where they learned the latest skills in established medical centers, particularly those in Germany. Because there was no uniformity or consistency across the different forms of specialty training, some specialists received better preparation than others.

Specialists were initially met with a great deal of skepticism by the well-established GPs, who viewed them as "quacks." Although GPs outnumbered the small but growing cadre of specialists, more doctors were returning from abroad with new knowledge and technology. They also brought with them the research skills for making life-changing medical discoveries, which further hastened the trend toward specialization. Patients now had new drugs, chemotherapy, insulin, and vitamins in their treatment regimens, which meant that general practitioners were competing with specialists for mastery of these agents. By the early 1930s, there were roughly 10 areas of specialization within medicine: general surgery, orthopedics, otolaryngology, internal medicine, pediatrics, psychiatry, dermatology, urology, ophthalmology, and obstetrics-gynecology.[2] The growing use of x-rays, electrocardiography, and blood transfusions added to the tension between specialists and GPs. Making matters worse for the GP, new surgical specialties and procedures developed with the introduction of anesthesia and sterile operating conditions.

As the United States prepared to enter World War II, the medical commu-

nity was still centered on the GP. In the 1940s, only 24% of physicians officially considered themselves to be specialists.[3] In fact, the average American citizen regarded his or her doctor as a "trusted bedside physician"—not a high-tech hospital-based specialist.[4] Despite the growing popularity of specialties, medical schools continued extolling the virtues of general practice. But with more scientific innovations on the horizon, there was no stopping the trend toward specialization. The start of World War II added even more fuel to this movement, leading to a dramatic change in the medical landscape.

WHO WANTS TO BE A SPECIALIST?

American physicians drafted into the military in 1942 were responsible for the first great surge of interest in specialty medicine. Soldiers with wounds inflicted during conflict required the latest medical care, and only specialists could best meet this crucial need. Accordingly, being a specialist became associated with higher prestige. Board certification in a medical specialty led to higher pay, higher ranks, and better war assignments than the GP. This disparity in the armed forces widened the already growing rift between the two types of physicians. Treating severely wounded soldiers gave the GPs exposure to new techniques and skills. For instance, those who worked alongside specialists in orthopedic surgery were inspired to pursue their own careers in orthopedics after the war. Back home, there was also a developing need for all types of specialists, like rehabilitation doctors and plastic surgeons, to care for the returning wounded veterans.

The high volume of specialized medicine practiced in the military had a noteworthy influence on the postwar career decisions of many medical officers. After release from active duty, most of the doctors (even the older ones) wanted to go straight into residency for specialty training, rather than returning to general practice. The GI Bill, which considered residents as students, made it easy to go back for training by providing living expenses, tuition stipends, and hospital subsidies. The demand greatly exceeded everyone's estimates. Hundreds of recently discharged physicians applied for residency positions. In response, residency programs in the 15 specialties expanded greatly, eventually to the point where the number of positions outnumbered the number of applicants. After 1945, higher enrollments in *existing* specialties, rather than from the approval of new specialties, shifted the interest of physicians to specialization.

After the war veterans returned home, the acute demand for residency positions did not drop off. Instead, it seemed like every doctor wanted to specialize in something. The war effort had directed millions of dollars into biomedical and

clinical research, which eventually yielded substantial improvements in medical technology and new discoveries in the basic sciences. Wanting to be a part of this high-tech side of medicine, graduating medical students stampeded from general practice to specialty medicine. They believed that GPs could no longer master the wealth of new information and therapies, so they turned to specialization as a means of gaining expertise. To them, the future of medicine lay in the direction of their specialist role models. In their minds, specialists were the ones who cured rare diseases, treated complicated conditions, and became experts at performing difficult procedures.

THE NEED FOR BOARD CERTIFICATION

The explosive growth of medical specialties also presented the challenge of developing a system to confirm—and to assure patients—that a specialist was actually a qualified physician. After all, would you want abdominal surgery performed by untrained hands? Some areas—like general surgery and obstetrics-gynecology—were not as well defined as others. To address this problem, each specialty formed its own examination and certification board. These organizations promoted cohesion among their physician members by raising standards and setting qualifications. Based on their success, leaders among the specialties got together to form a national system of standardization—the American Board of Medical Specialties (ABMS). This association has the final say in approving any new specialties (and subspecialties) to its 24-member group.

With a standardized system of board certification in place, more medical students began entering fields of specialization. For newly trained specialists, becoming certified means successfully joining the ranks of their peers. After finishing residency, candidates for certification submit their credentials to the respective specialty board, which then rules whether a physician is "board eligible." If he or she meets the requirements of the certifying board, the physician may sit for the certification examination. A passing score leads to full certification as a *"diplomat"* of that specialty board. Although certification is not required to practice medicine, this accomplishment adds prestige and confers the professional status of expert. Depending on the specialty, board certificates last from 6 to 10 years, after which recertification via examination is necessary.

SPECIALISTS VERSUS GENERALISTS

Over the next several decades, medicine continued to diversify. Bucking tradition, new physicians wanted their specialty training, and residency programs were more than happy to oblige. Soon, however, even 3 to 5 years in residency were not enough to prepare young doctors in an area of expertise. To make matters worse, the ABMS began strictly limiting the approval of new specialty boards. The end result? A proliferation of more narrowly defined *sub*specialties. These areas of medicine, like rheumatology and pediatric cardiology, required additional training through fellowships. Although the focus of residency shifted to clinical learning and patient care, fellowships placed more of an emphasis on reading, research, and scholarly work (which was the purpose of residency back in the old days). Along with learning new diagnostic tests and procedures, taking care of patients was still an integral part of a fellowship.

Medicine continued to give birth to new specialties and even more subspecialties. Since the dawn of modern anesthesiology in the 1930s, anesthesiologists have advanced the limits of surgery by permitting operations that were scarcely conceivable before. As a result, surgery flourished. Much of the original domain of the general surgeon was subjugated to board-certified specialists in otolaryngology (ear-nose-throat-neck), neurosurgery (brain), orthopedic (bone and joint), and cardiothoracic (heart and lungs) surgery. Internal medicine, now considered a specialty, acquired a slew of subspecialties as new technical procedures were devised in the 1950s. Medical centers began training gastroenterologists to perform endoscopy and colonoscopy, pulmonologists to master bronchoscopy, and cardiologists to implant pacemakers and perform catheterization. The hospital-based specialties also expanded. The explosion of imaging techniques overwhelmed the field of radiology, which then split into diagnostic radiology, nuclear medicine, and radiation oncology. Improvements in molecular techniques and histologic stains led to the division of pathology into over a dozen subspecialties. In more recent years, new specialties like medical genetics and emergency medicine have also come into being.

Twenty years after veterans of World War II raced to residency training, the passage of Medicare in 1965 inspired another surge of interest in specialized medicine. This historic initiative enabled the nation's elderly to receive government-funded medical insurance and benefits for expensive health services, thus protecting their limited savings. By influencing decisions regarding health care for the first time, the American public helped to pave the way for more professional flexibility among physicians. With Medicare, doctors could now treat their eld-

erly patients without worrying about either bankrupting them or not getting paid for their expensive specialist services. With their salaries assured from treating so many sick patients with multiple medical problems, graduating physicians continued to enter specialties and subspecialties. Fewer medical students were attracted to a noble career in general practice, and residency programs ballooned to meet the demand for specialty training. Specialists became influential within the American Medical Association, pushing out GPs from positions of power. Now that medical students no longer headed out into general practice after internship, most residency programs began incorporating internship into the first postgraduate year of training. By 1970, all rotating internships were finally eliminated.

Why were students no longer interested in becoming GPs? Most began to realize that the staggering amount of new medical knowledge made specialty training a necessity. Despite the increased length of training, they wanted to become experts in a particular organ system or disease area. Higher social prestige and increased compensation (from performing lots of procedures) attracted many graduates to careers of cardiology, surgery, and gastroenterology. New technology like colonoscopes, respiratory ventilators, and MRI machines fell under the expertise of the specialty-trained physician. At the same time, the National Institutes of Health began granting tons of money to the university-based specialists, not GPs, for biomedical research projects. Despite the tension between the two physician groups, these advancements in medical science helped to improve the lives of every patient suffering from illness.

THE GENERALIST STRIKES BACK: PRIMARY CARE IN THE 1990s

Although the number of GPs rapidly dwindled after World War II, as medical school graduates went into the specialty disciplines, a core group of dedicated physicians continued to believe in the merits of general medicine and its wider scope of practice. In 1969, they achieved partial victory through their newly defined specialty—*family practice*—and its corresponding specialty board. Additionally, internists and pediatricians (who were also considered generalists) came together in 1967 and agreed to sponsor certification of combined residency training in both internal medicine and pediatrics. Many years later, generalists finally got their much-deserved moment in the limelight. In the 1990s, health care reform was at the top of the political agenda, and generalists were an important part of this movement.

First, experts in the health care industry accepted the conclusion that there was an oversupply of specialists. Several powerful organizations, including the Graduate Medical Education National Advisory Committee and the Bureau of Health Professions, predicted that specialists would continue to outnumber generalists, leading to a massive specialist glut by the turn of the century. To improve the skewed distribution, they recommended increasing the ratio of generalists to specialists to an equal 50:50 proportion. This would also alleviate the tight job market that existed for specialists at the time. Believing that more patient care by generalists would improve access to health care, many politicians, bureaucrats, and lobbyists agreed with this assessment.

Specialists were also assigned the blame for rising health care costs. They prescribe fancier (and more expensive) drugs and perform costly procedures. Many felt that specialists drive up the cost of health care, rapidly increasing its percentage of the gross national product. But patients with insurance were also held responsible, because they took advantage of the lack of regulation over specialist services. Many went shopping for specialists based on self-diagnosis and referral, such as the middle-aged woman with chronic migraines who went straight to a neurologist instead of first seeing her generalist. Combined with high inflation, these factors contributed to escalating health care costs. What was the solution? Managed care. This movement sought to reduce medical expenditures by deferring the bulk of health care to generalists rather than specialists.

The encroachment of managed care led to renewed efforts to produce more generalist physicians—internists, pediatricians, and family practitioners. (Psychiatry and obstetrics-gynecology are also sometimes considered primary care specialties). Health maintenance organizations (HMOs) are among the most common forms of managed care because employers like their lower rates and broader coverage. But these groups attempt to reduce medical costs by limiting patients' access to specialists. Patients have to see their primary care physician (PCP) first for diagnosis and treatment. If the generalist cannot handle the problem, he or she refers the patient to a specialist. Patients belonging to an HMO essentially have to get permission from their PCP to see a specialist. Generalists, therefore, were assigned the new role of *gatekeeper*.

With support thrown behind it, managed care did, at first, achieve its goals. Combined with the fear of there being an oversupply of specialists, the managed care health system was a boon for generalists. In the mid-1990s, medical schools nationwide began encouraging their graduates to choose careers in primary care. Seeking to fulfill the 50:50 ratio, their efforts kindled renewed interest in family practice, internal medicine, and pediatrics. Driven by the need for more primary

care gatekeepers, medical students raced to these generalist specialties. At the same time, medical schools were discouraging students from entering fields like anesthesiology, cardiology, and pathology. Many deans believed that the current glut of specialists, as well as all the talk about primary care, meant that future employment prospects were dismal. Specialists began to lose more than just autonomy and income; they also lost promising new medical school graduates.

THE CYCLE TURNS AGAIN: WHO WANTS TO BE A SPECIALIST? (PART II)

The resurgence of the generalist physician that managed care sparked only lasted for a short time, however. In response to the hype about greater opportunities, medical students' interest in primary care peaked by the late 1990s, but then declined. Managed care systems quickly fell out of favor among health care consumers as their restrictions began to affect patient care. The PCP gatekeeper was now seen as a barrier to the best medical care. To increase physician productivity in primary care, managed care groups hired hundreds of nurse practitioners and physician assistants. This led to subtle discussions among prospective candidates about the intellectual stature of primary care. Reading between the lines and keenly aware of the problems facing primary care, more medical students entered specialized areas again in the new millennium. In fact, in 2002, there was a 5.6% decline in primary care residency matches.[5]

Once again, newly minted MDs are choosing careers in highly specialized areas of medicine, and the trend to specialization will likely continue. In fact, many academicians believe that there currently is a significant shortage of specialists.[6] Despite new formulas that lowered the incomes of specialists and raised generalists' salaries, insurance reimbursements still favor the specialist, who make much more money. Specialists are also back in demand because of the problems of the aging baby boomers. Who is going to perform their screening colonoscopies, stent their hearts, look at their suspicious moles, and replace their hips and knees? This is why there is a pressing need for more gastroenterologists, cardiologists, dermatologists, and orthopedic surgeons. The general fields of medicine face many challenges in the face of scientific advances in the more technical specialties. Perhaps discouraged by the daunting amount of information there is to master in general practice, most internal medicine residents (over two thirds) pursue fellowship training, especially in procedure-oriented fields like cardiology and gastroenterology.[7]

Although specialization (and subspecialization) is inevitable, not every physi-

cian supports it. Some doctors see this phenomenon as "both a prerequisite and a logical outcome of human ingenuity in understanding and combating disease; others attack it as unnecessarily fragmented, expensive, dehumanizing, and confusing for patients."[8] Whatever one's perspective, patients still receive the highest quality of medical treatment possible within this fragmented system. For example, a subspecialist (e.g., endocrinologist) may now assume care of a patient with complicated clinical material (e.g., hyperthyroidism) rather than the appropriate specialist (general internist). With better coordination between these types of doctors, medicine may finally become well integrated once again.

Many uncertainties surround the rate of specialization in the future. Fueled by the pace of scientific research in medical diagnosis and treatment, more subspecialties will likely continue to form. There is, however, one certainty: with all the choices that lay before them, today's medical students have a much more difficult decision to make.

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3
TEN FACTORS TO CONSIDER IN SPECIALTY SELECTION

The proliferation of specialties (and subspecialties) means that every physician practices a different type of medicine. Even within the same specialty, no two doctors are alike. Faced with all this diversity, how do medical students commit to a single specialty? Many go through a "process of 'trying on possible selves' (i.e., projecting themselves into hypothetical career and personal roles)."[1] Others prefer to choose through a process of elimination—tossing out specialties that do not meet their predetermined criteria.

No matter how each medical student goes about picking a specialty, *everyone* takes into account a long list of variables. An analysis of the 1993 graduating medical school class found that the following factors were the most influential in choosing a specialty:

- the type of patient problems encountered,
- the opportunity to make a difference in people's lives and to help others, and
- the intellectual content of the specialty.[2]

Further down on the list, some students look closely at malpractice insurance costs, or worry about overcrowding in a given field, and others seek specialties that offer the opportunity to pursue research. One of the most unifying variables, ranking at the top of the list, is a good personality match between student and specialty (see Chapter 4). The relative weight of any of these factors, of course, varies for each student.

When it comes down to the final decision, young physicians often choose

their specialty based on less noble factors than the ones the study cites. Today's debt-ridden medical student—who experiences first hand the economic and legal domination of medicine—ascribes more value to practical variables. This chapter examines some of these less idealistic factors, such as quality of life, income potential, and job opportunities. Although they are less influential, each factor may still make a student think twice about committing to one specialty or another. When contemplating a possible specialty, keep the following 10 variables in mind, determine their order of importance, and apply them to each field you are considering.

GENERALIST, SPECIALIST, OR NONE OF THE ABOVE

The 20 medical and surgical disciplines can be further subdivided into three major specialty groups: generalist, specialist, or supportive. Before committing to a specialty, future physicians first need to decide what *type* of doctor they would like to become.

The *generalist* specialties are those in which physicians practice primary care medicine. Classically, these have always included family practice, internal medicine, and pediatrics. For many, psychiatrists and obstetrician-gynecologists also fall within this category. All generalists have broad medical knowledge, encompassing a variety of common (and often chronic) problems in their community. An integral part of their patients' lives, they provide long-term continuous care in a single setting, referring their patients to specialists only when necessary. Preventive medicine—a major part of their job—can catch early signs of disease and keep patients from ending up in the emergency room with serious problems. As the first doctor to see a patient, a generalist must have greater tolerance for the unknown, especially when dealing with signs and symptoms that may not fall into a neat diagnosis. Generalists also have to cope with the pressure to know just about everything. Swamped with dozens of medical journals, they need to read daily to keep up with the latest advances in their fields.

Although pediatrics, for instance, is still considered a specialty, a true *specialist*, by definition, cares for a specific region of the body or a narrowly defined area of medicine. Ophthalmologists, cardiologists, urologists, and neurologists—just to name a few—all fit this description. As practitioners of *secondary* or *tertiary care medicine*, specialists prefer action-oriented patient interactions. Within their narrow scope of practice, they perform many technical procedures, like cataract surgery or cardiac catheterization. As consultants, nearly all practice on

the basis of patient referrals from primary care physicians. After solving the clinical problem at hand (e.g., left hip replacement), specialists usually schedule infrequent follow-ups, leading to less long-term involvement in their patients' lives. Most practice in the clinic and the hospital. Many are affiliated with large medical centers.

Several specialties are neither medical nor surgical—they function independently as the *supportive* disciplines of medicine. Radiology, physical medicine and rehabilitation, pathology, anesthesiology, radiation oncology, emergency medicine, and nuclear medicine fall within this category. They are all hospital-based specialties. Although not front-line doctors, these physicians still play a crucial role in patient care. Without them, patients would not make it through surgery alive, receive accurate diagnoses from imaging and biopsy studies, or receive the correct doses of radiation therapy to treat their cancer. Because of their anonymous roles and minimal patient contact, these behind-the-scenes doctors tend not to get the recognition they deserve from their patients. Without external rewards, they instead have to derive their professional satisfaction from within.

INTELLECTUAL CONTENT AND CLINICAL ISSUES

Radiologists cannot operate on a patient's heart, dermatologists cannot administer general anesthesia, and neurosurgeons should not be delivering babies. Because the subject matter and type of patient care differs quite a bit across the specialties, every doctor practices a distinctive brand of medicine. Take ophthalmology and rehabilitation medicine, for instance. Lying on the opposite ends of the specialty content/patient care spectrum, these two fields almost seem like completely different professions!

At the most fundamental level, with all other factors aside, medical students should love the intellectual content of their specialty. Students with a genuine interest in the underlying clinical material and basic science of a certain discipline will find themselves voraciously reading its textbooks and journals, wanting to know more about the specialty's diagnostic challenges. To gauge the appeal of the clinical problems found in a specialty, read the current literature for 1 week. If you love clinical pharmacology and physiology, then perhaps a career in anesthesiology is your destiny. If studying anatomy brings up bad memories from your first year of medical school, then stay away from surgical specialties, radiology, and pathology. Above all, you should *never* have to force yourself to love an area of medicine.

Making a good match depends on the "discovery and comparison of information about three distinct domains: one's self, the others practicing in a specialty, and the content of that specialty."[3] When it comes to the third domain, nearly all students rely heavily in the end on their gut feelings. After much deliberation, you will become aware of feeling at home in certain fields of medicine. Those that like immediate interventions, technical skills, and urgent problems find themselves drawn to surgical specialties or medical subspecialties. Students who prefer lots of interpersonal contact, a diverse patient population, and preventive medicine usually select a primary care specialty.

AMOUNT OF PATIENT CONTACT

All physicians-in-training choose careers in medicine, perhaps the noblest of all professions, because they want to help people—to take care of sick patients, cure disease, and make a difference in people's lives. Yet until medical students finally spend hours with patients in the hospital while on clinical rotations, they really have no idea what this experience is like. Most love talking with patients, forming relationships with them, and examining them for signs of disease. Others, however, find that interacting with sick people is less appealing than they had imagined. They do not like performing physical examinations, for example, or dealing with gushes of body fluids or the smell of infected wounds.

No matter what your colleagues might say, wanting a specialty with more (or less) patient contact has no bearing on how good a physician you will be. There is a place for everyone in medicine—even for those who decide to work behind the scenes. Radiologists and pathologists, who have basically no contact with patients, are equally as righteous doctors as internists, who interact with and examine patients in every single encounter. Every specialist or subspecialist has an important role in patient care; some just have more face time with patients than others.

You should decide how much patient contact you want in your career and rule out specialties that may not meet your needs. If long-term relationships and continuity of care are important, consider areas like internal medicine and family practice. If you like getting down and dirty, think about careers in emergency medicine, obstetrics-gynecology, and surgery. In some specialties, like urology and orthopedic surgery, doctors only have to perform focused physicals (instead of examining everything). Cleaner specialties—those with lots of patient interaction but not much physical contact—include psychiatry, ophthalmology, and

radiation oncology. In fields like emergency medicine and anesthesiology, contact with the patient is typically short and to the point.

TYPE OF PATIENTS ENCOUNTERED

Every physician—including pathologists working in the laboratory—interacts with patients in some way. (One cannot practice any form of medicine without patients!) Many aspiring doctors forget to factor the different types of patients into their specialty decision. Take a closer look at the typical patient in the specialty you are considering. Ask yourself whether or not you could thrive both emotionally and professionally in that type of doctor–patient relationship. Emergency medicine physicians, for instance, are always dealing with many angry patients with nonemergent complaints who have been kept waiting for hours on end. Pediatricians have to interact with demanding, concerned parents in addition to sick infants and children. Oncologists (medical, surgical, and radiation) have patients with mortal diseases that typically lead to poor outcomes despite aggressive treatment. Obstetricians manage a highly litigious group of patients who could slap them with a malpractice suit for any minor defect in their baby. Although these examples seem like stereotypes, the maxim that all doctors are not equal also holds true for their patients.

PRESTIGE, STATUS, AND SOCIAL EXPECTATIONS

The selection of a specialty should be your *own* choice. Think about the areas of medicine in which you are the happiest and forget about how others (family, friends, and colleagues) might view your chosen specialty. Always remember that every type of doctor has an important role in the big picture of medicine, and the idea that one specialty garners more respect and prestige than another is really just a matter of personal opinion. Because all medical students have excelled academically their entire lives, those who subscribe to these beliefs find it hard at this point to stop being the best. For them, a career in family practice or psychiatry may not carry as much social status as being a world-renowned neurosurgeon or earning a position in ophthalmology, an ultracompetitive specialty. Yet as a soon-to-be-physician, it is no longer necessary to prove yourself. By putting aside external influences such as social prestige and others' expectations, you will likely choose the right specialty and end up a much happier doctor.

LIFESTYLE CONSIDERATIONS

Medicine has always been a demanding profession. After working long hours in the hospital or clinic, physicians end up taking calls in the middle of the night to deliver a baby, remove an appendix, or admit a patient. Tired of delayed gratification and ungodly schedules, many of today's doctors-in-training want careers that leave room for other interests or allow more time for their families. Compared to previous generations of physicians, the millennium medical student seeks a much better balance between life and work. They desire less night call, fewer hours spent in the hospital, and more control over their work schedules. Many are even willing to give up income and professional aspirations to have better personal lives and more free time. The current focus is now shifting to specialties with more controllable lifestyles and higher incomes relative to the length of training.

What accounts for the higher priority of quality-of-life issues in a medical career? The dean at one prestigious medical school believes that the change mirrors a general shift in societal values and professional goals. "Residency program directors were brought up to honor the Christian work ethic. Delayed gratification and unremitting toil were the rules of the day, and residency programs were built on that model. But young people coming through now want to spend more time with their families," she commented.[4]

Perhaps this change reflects the composition of the current generation of medical students. Today nearly half of all graduating doctors are women, most of whom want flexible careers with time to raise children and maintain a normal family life. Additionally, the average age of entering medical students has increased. Many older students left behind careers in business and technology, where they could have earned more money with much less stress. For them, "medicine, once aspired to as both a noble profession and a guarantee of financial security, strikes many current students as simply a stressful and poorly-paid job."[5] Instead of focusing solely on good patient care, today's physician has to cope with more insurance paperwork, lower reimbursements, overnight phone calls from patients, loss of autonomy due to managed care, and the ever-growing threat of malpractice litigation. Certain areas of medicine, particularly the primary care specialties, have more of these problems than others. Medical students, therefore, are turning to specialties that afford better lifestyles and minimal hassles. As medical students reject fields with more grueling lifestyles (like internal medicine and obstetrics-gynecology), one workaholic specialty is particularly suffering: general surgery. In the past, only the most elite students—

those within the upper tier of their class—went into surgery. A highly competitive specialty for decades, general surgery is the gateway to high-status careers in vascular, cardiothoracic, oncologic, and plastic surgery, among others. But the current generation of students seems less concerned with prestige. The poor quality of life and years of personal sacrifice are discouraging many top medical students from surgical careers. These shrewd students "do their cost-benefit analysis and surgery is the loser."[6] General surgery is now hurting for qualified students. In 1981, 12.1% of all US seniors went into general surgery; by 2005, the numbers are predicted to decline to just 4.8%, with only 76.6% of available positions filled by American medical graduates.[7] Unless surgery programs accommodate these lifestyle concerns, the best and brightest US seniors will continue to commit to other specialties.

So which are the so-called lifestyle specialties that the most academically successful students are selecting? They include radiology, dermatology, emergency medicine, anesthesiology, pathology, ophthalmology, physical medicine and rehabilitation, and neurology (among others), all of which allow you to control the number of hours you devote to your practice. You could potentially have a career with adequate family and leisure time, less stress, a more regular schedule, and an income commensurate to the workload. Although any specialty can offer job satisfaction, today's medical student believes that only certain specialties allow enough time for family and recreational activities (instead of an overly taxing workload). The evidence is in the numbers: in 2002, the fill rate of programs in anesthesiology and physical medicine and rehabilitation increased by 7% and 13%, respectively.[8] Diagnostic radiology added 44 new positions (a 6.3% increase) and filled all of them.

LENGTH OF RESIDENCY TRAINING

Keep in mind that certain specialties require more years of residency training than others. In general, the shortest programs (3 years) are fields of primary care—internal medicine, pediatrics, family practice, and certain emergency medicine programs. Surgical specialties require much longer training, anywhere from 5 to 8 years. Within this spectrum, 4 to 5 years of residency training are necessary for careers in anesthesiology, pathology, dermatology, and radiology, for example. If you want to become a subspecialist, plan on adding even more years of training in a fellowship. Cardiologists, for instance, spend a total of 6 years learning the discipline before entering practice (a 3-year internal medicine residency plus a 3-year fellowship). Some doctors even "super-subspecialize," such as the cardiol-

ogist who undertakes an additional fellowship year to master echocardiography. You could potentially be a physician-in-training forever!

This variable should only have limited influence on your choice of specialty. Yet some medical students are more concerned than others about the number of years residency training requires. Tired of delayed gratification, these students are quite anxious to finish training, practice medicine unsupervised, and start earning a real salary. Older, nontraditional students—especially those with children—often fall into this group. Others simply want to finish training so they can devote time to outside interests. In any case, never forget that the arduous, low-paying years of residency and/or fellowship are only temporary. Medical students should not select a less-preferred specialty just because the residency training is shorter. Otherwise you may spend a lifetime as a rather dissatisfied physician. Is it really worth it?

DIFFICULTY OF OBTAINING A RESIDENCY OR FELLOWSHIP POSITION

The increasing competitiveness of many fields of medicine has become a daunting obstacle. Because entrance into certain specialty programs is much more difficult than others (see Chapter 11), medical students must be well aware of their chances. Unfortunately, just because your heart is set on becoming a plastic surgeon or an ophthalmologist does not necessarily mean it will be possible. But medical students should not base their decisions on predictions such as, "I can only match into pediatrics," or "I'm not going to bother with radiation oncology because I know I won't get into it."

Before contemplating any specialty of choice, take an honest assessment of your academic competitiveness. Compare the difficulty of obtaining a training position in that specialty with your chances of matching into it. Medical students interested in highly competitive specialties need a great deal of flexibility when making these choices. You might need a backup specialty (second or third choice option) if the field you want is slightly beyond your academic reach. By factoring in this less influential variable, future physicians will match with the most appropriate specialty.

FUTURE INCOME AND EARNING POTENTIAL

According to the Association of American Medical Colleges, the average educational debt of a 2002 medical school graduate was $103,855. In fact, 21% carried

loans of over $150,000. The issue of financial rewards, therefore, becomes very important during the senior year when it comes time to select a specialty. At this point, the amount of debt has reached its peak. After 4 years of paying exorbitant tuition, coupled with the prospect of many low-paying years of residency training, graduating physicians are very concerned about their future income potential. With massive amounts of debt, they often put their altruistic motives aside and focus instead on economic realities.

As a result, future reimbursement is an influential factor in some students' decisions to enter a given specialty. New physicians with huge amounts of indebtedness are shunning the primary care fields because of their low earning potential. Others want to pay off their loans right away, so they lean toward specialties that shell out high starting salaries, like radiology, anesthesiology, and orthopedic surgery. But once loans are out of the picture, remember that you will practice in that specialty for the rest of your professional life. For that reason, financial remuneration should be only a less influential variable. No amount of income can make up for a lifetime of miserable days in the wrong specialty.

JOB OPPORTUNITIES AND PREDICTIONS ABOUT THE SPECIALIST WORKFORCE

There is plenty of erroneous information out there about physician workforce projections and employment patterns. One day students hear rumors about pathologists having trouble finding jobs; the next week they read an article in the newspaper about significant shortages of cardiothoracic surgeons. Many of the published expert workforce studies have significant flaws in their methodology. Who, then, should everyone believe? Because it is impossible to predict the nature of the specialist job market, medical students should not base their specialty choice on any workforce projections. This ill-advised approach is full of inherent problems.

The challenges anesthesiologists faced in the 1990s, when this specialty lost some of its allure, serve as a word of warning. In this case, medical students heeded the wrong advice of supposed experts, leading to drastic changes within the specialty. In response to national discussions about an oversupply of specialists, the American Society of Anesthesiologists commissioned an outside consulting group to evaluate the relative glut of new anesthesiologists and their future manpower needs. Patterned after other flawed studies, their report recommended decreasing the number of anesthesiologists entering the workforce. Private practices immediately reacted by dropping their starting salaries and hiring fewer partners.

Discouraged by their advisors and by reports about the specialty's economic future in newspapers like the *Wall Street Journal*,[9] medical students responded by shunning anesthesiology.

With fewer applicants, and underestimating the future need for anesthesiologists, residency programs drastically slashed the number of training positions. Today there is nearly an 11% shortage of anesthesiologists, a substantial deficit that will continue for years to come.[10] Private practice groups are fighting over residents by offering incredibly lucrative salaries. Because of the aging population, greater involvement in the intensive care unit and pain clinic, and advancements in surgical technology, anesthesiology is rapidly returning to its competitive status.

The recent changes within anesthesiology illustrate an important take-home point. In this case, the miscalculation of demand in an influential study, combined with declining incomes, left students fearful of selecting this field. It is hard to make career plans in an uncertain economic world. Even the supposed experts—who have been wrong many times before—cannot predict these kinds of changes, whether in the scope of practice of competing mid-level health providers or in the turf wars between specialists over shared procedures and tests. When choosing their dream specialty, students should pay little heed to its current or projected state of job opportunities. Shortages and surpluses can change rapidly by the end of residency training, so place this variable low on your list of influential factors. After all, have you ever heard of any unemployed, starving physicians?

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4

PERSONALITY ASSESSMENT: ARE YOU MY TYPE?

"Orthopedic surgeons are all jocks."

"Only nerds become internists."

"Psychiatrists are as crazy as their patients."

"Pathologists are so socially inept that they only like working with dead people."

These are just a few of the stereotypes that abound in the world of medicine. During your hospital clerkships, you will overhear these and many more statements from residents and attending physicians. Underlying each caricature is a common theme: *personality type*.

As you learned from Chapter 3, there are many important factors to take into account when choosing a medical specialty. Yet one very decisive variable—personality types within each discipline—was left out because it deserves a separate in-depth discussion. In fact, most medical students say they chose a particular specialty based on their gut feeling—meaning, often, how comfortable they feel with the doctors in that field. Each specialty requires a set of skills, a circle of qualities, and a certain type of disposition. Some of these intangibles are unique to that area of medicine; others overlap across many disciplines. But these traits and affinities define a physician's personality—the factor that is perhaps the single most important consideration in choosing a medical specialty.

Unfortunately, most students do not spend much time thinking about their

own personality type or considering how it might match with the specialties that interest them. Lectures, studying, and patient care all place huge demands on a medical student's time. But at some point during medical school, take some time out for an honest assessment of your values, character, and temperament. By taking a closer look at the specialties that best match your personality type, you will gain valuable information to help you make your decision.

PERSONALITY TYPE AND MEDICAL SPECIALTY

What makes you tick? How do you handle stress? What gives you satisfaction and fulfillment? How do you interact with your peers? These are all dimensions of a doctor's personality. Discerning your personality type is not simply finding a stereotype that fits. Instead, it means identifying your distinctive attributes, values, and affinities and finding the natural comfort zone where your true preferences lie as a physician.

Although it is especially important for doctors-in-training to select a specialty that is the best match with their personality, *best* match does not mean it has to be perfect. Take a hard look at the physicians you have met and make sure that your personality type is well represented (rather than underrepresented) in the specialty that interests you. The notion that opposites attract will probably not lead to a long, satisfying medical career. For instance, most physicians would not dispute the idea that empathic, laid-back medical students make better psychiatrists, and strong-minded, authoritarian, no-nonsense ones should become surgeons. In these examples, students find themselves most comfortable working side-by-side with other physicians who share their personality traits. When you get along well with your colleagues, patients end up receiving the best medical care possible.

Many physicians have studied the relationship between a doctor's personality and chosen specialty. A group of surgeons sought to determine whether there were differences in the characteristics and temperament of physicians in three types of medical careers: surgical, primary care (family practice, internal medicine, and pediatrics), and controllable lifestyle specialties (anesthesiology, dermatology, emergency medicine, neurology, ophthalmology, pathology, psychiatry, and radiology).[1] Most students think of surgeons as dominant, uninhibited, and aggressive. They tend to overlook the fact that surgery requires a certain type of person who can handle its tasks and challenges. Are you one of them? Their study found that surgeons tend to score higher than other specialists on being ex-

troverted, practical, social, competitive, and structured. At the same time, however, surgeons were less creative than their colleagues in controllable lifestyle specialties (who were found to be the most withdrawn and rebellious). Neither group differed significantly from the primary care physicians. This particular study, therefore, helps to support the idea that a physician's satisfaction in a given specialty has a lot to do with personality factors, like temperament and sociability.

Another landmark study surveyed a group of medical students to determine any relationships between personality type and specialty choice.[2] Students entering the hospital-based specialties (anesthesiology, radiology, or emergency medicine) had less tolerance for ambiguity and preferred highly structured environments with fixed guidelines and immediate closure to every patient encounter. Future obstetrician-gynecologists saw themselves as warm and helpful, but they were also emotionally vulnerable, uncomfortable around others, and very concerned about appearances and making a good impression. Future pediatricians, who sought warm and close interactions with their patients, were the most extroverted and sociable people. In contrast, the introverted students with fewer social connections—particularly the ones who had been in psychotherapy themselves—became psychiatrists. The study also found that students interested in surgery were more likely to be competitive, aggressive, and highly confident. They were the doctors-to-be who carried a strong conviction that their actions could rapidly influence the course of events.

When checking out all the different choices, medical students should keep in mind that more than one specialty could meet their preferences. For every personality type, it is possible to find a satisfying match with more than one area of medicine. If you are a visually oriented person, consider specialties like pathology, dermatology, and radiology. For students who want to speak only the language of medicine every day as a doctor's doctor, radiology and pathology are ideal choices. Primary care specialties, like internal medicine and family practice, are great opportunities to have long-term, intimate patient relationships. If you prefer an action-oriented specialty that gives immediate gratification, then consider anesthesiology, any surgical subspecialty, and emergency medicine. Some areas overlap considerably—like the great variety of medical problems encountered in both family practice and emergency medicine. But at the same time, they can have significant differences—like the long-term follow-up nature of family practice versus the acute, stabilize-the-patient-and-move-on style of emergency medicine. Thus, to make the best decision, you have to know yourself and your desires well.

THE MYERS-BRIGGS TYPE INDICATOR

First developed in the 1950s by Isabel Briggs Myers and Katherine Briggs, the Myers-Briggs Type Indicator (MBTI) has become the most popular and widely used psychological test in the world. Based on Carl Jung's theory of personality types, the MBTI was designed to analyze personality in a systematic, scientific manner. Where other questionnaires (type tests) only illustrate type, the MBTI precisely identifies a person's personality type preferences.

The MBTI can help medical students to choose the right specialty for their personality and temperament. The test enables you to learn more about how you perceive and judge others, whether in an occupational or social situation. It identifies your strengths and weaknesses and shows whether you value autonomy or prefer interdependence.

Medical students usually take the MBTI at some point during the first 2 years of medical school. It is a very understandable and useful test for health professionals. Your Dean of Students Office will use the valuable information for career planning and development purposes—especially when it comes time to figuring out which specialty might be the best one for you. For those who have not yet taken the MBTI, now is the perfect time to do so in conjunction with reading this book. Many web sites offer different versions of the MBTI. You can do an Internet search for these, or simply log on to the official site of the Center for Applications of Psychological Type at <http://www.capt.org>. For a fee, they will send you the official test and provide personalized expert feedback over the telephone about your results and how to use their interpretation. When taking the test, be sure to answer every question truthfully; honesty is the only way to yield the most accurate results and help you pick the most appropriate specialty.

Breaking Down the MBTI: Sixteen Personality Types

According to the theory behind the MBTI, every individual falls into one of 16 types of personality. These personality types are derived from the four main indices of the MBTI. Each index represents one of the four basic preferences (described by Jung) about how every individual perceives and processes external stimuli and then uses that information to make some kind of cognitive judgment. As part of one's overall personality, this judgment guides behavioral preferences in any situation involving other people—like colleagues or patients. The four dimensions measured by the MBTI are:

1. ***Extroversion (E) versus Introversion (I):*** How do you relate to others? Where do you best derive your energy—from yourself or from others? *Introverts* prefer to focus their interest and energy on an inner world of ideas, impressions, and reactions. Being introverted does not mean being asocial. Instead, introverts prefer interactions with greater focus and depth, with others who are also good listeners and who think before they act or speak. *Extroverts*, on the other hand, derive their energy from external stimuli and tend to focus their interest on the outside world. They prefer dealing with facts, objects, and actions. Not all extroverts are the life of the party, however. They simply prefer being engaged in many things at once, with lots of expression, impulsivity, and thinking out loud.
2. ***Sensing (S) versus Intuition (N):*** What kinds of stimuli do you prefer when collecting, processing, and remembering information? *Sensors* are the ones who are drawn to the hard, immediate facts of life—practical details and evidence that can be taken in through one of the five senses. They are sensible, matter-of-fact people who look at the reality of the world around them, rely on prior experiences, and take things literally. *Intuitives*, on the other hand, look beyond the facts and evidence for meanings, possibilities, connections, and relationships. They are more imaginative and creative people who like to see the big picture and abstract concepts. Using intuition often means relying on a hunch or gut feeling rather than past experience. They eschew facts for theories and look beyond simply the obvious.
3. ***Thinking (T) versus Feeling (F):*** How do you make decisions and come to conclusions? This index concerns the kind of judgment you trust when you need to make a decision. *Thinkers* make their decisions impersonally, based mainly on objective data that makes sense to them. As analytical people motivated by achievement, they always consider the logical consequences of their decisions. Unlike thinkers, *feelers* rely on personal, subjective feelings in their decisions. As empathetic, compassionate, and sensitive people, they take the time to consider how their decision might affect others. Feelers like pleasing others and tend to get their feelings hurt rather easily.
4. ***Judgment (J) versus Perception (P):*** How do you order your life? What kind of environment makes you the most comfortable? This index describes how a person deals with the outside world. Those who prefer *judgment* are serious, time-conscious individuals who live by schedules. They like things orderly, planned, and controlled. Judgers need a world of structure and predictability to have a sense of control over their environment and to be their

most organized and productive. Judgers work hard, make decisions quickly and decisively, and sometimes can be closed minded. On the other hand, *perceivers* are much more open minded, relaxed, and nonconforming. They are much more aware of ideas, events, and things. Their flexibility and spontaneity, however, can sometimes lead to irresponsibility. Although judgers need to finish projects and settle all issues, perceivers tend to gather information in a leisurely way before making a final decision. Perceivers prefer to experience as much of the world as possible, so they like to keep their options open and are most comfortable adapting.

According to the theory behind the MBTI, personality type indicates an innate preference (similar to hand dominance) toward one of the two poles in each index, meaning that a person is probably never a 100% introvert, but may lie closer to the introversion pole (the dominant or leading process) on a continuum scale, while still having some qualities of extroversion (which in this case would be considered the *nondominant* or *auxiliary trait*). When you take the MBTI, you receive a score that shows the strength and consistency of your natural tendency in each of these four dimensions. It is the interplay between the four poles that ultimately gives us our individual personality and temperament. Thus, the test classifies you as one of 16 different personality types combinations: INTP, ESTJ, ENFJ, ISTP, and so on. A complete description of the 16 personality types can be found on the web site of the Center for Applications of Personality Type.

How the MBTI Can Work for You

At this point, you are probably thinking "Enough with all this psychology stuff! How does this help me choose a specialty?" The best approach is to take the MBTI and identify your specific personality type. Use the expert feedback and interpretation of your results to learn more about the types of people with whom you work best. Then, as you rotate through the different fields of medicine during the junior year, look closely at each specialist and try to discern their personality type. Do pediatricians seem more like introverts? Are surgeons judgers or perceivers? What do specialties chosen by your personality type have in common? The overall goal is to make sure you know yourself well *before* determining which specialty is right for you.

Ideally, medical students should think about taking the MBTI more than once, because personality type may change over time (especially in young people). Personal growth and new experiences can often change the way a per-

son interacts. Introverts may become more extroverted, or thinkers might become feelers from one year to the next. In fact, one study compared MBTI results in a group of medical students who took the test during their first and fourth years of school.[3] The authors found that nearly 57% of students had changed their personality type preferences on one or more of the MBTI indices.

The MBTI has been studied quite extensively within the medical profession to draw conclusions about the relationship between personality type and career choice. One study examined whether the results of the MBTI taken in the first year of medical school accurately predicted the choice of medical specialty in the postgraduate year.[4] The authors found that three out of the four type indices (S-N, T-F, J-P) were predictive of future specialty choice: Students who were sensing, feeling, and judging types selected family practice. Students who were sensing, thinking, and judging types chose obstetrics and gynecology. Students who were intuitive, feeling, and perceiving types undertook careers in psychiatry.

Another study looked closely at the association between these two variables for medical students deciding between primary care and non-primary care specialties.[5] The authors found that the extroversion-introversion (E-I) and thinking-feeling (T-F) axes were the most statistically significant MBTI predictors with regard to specialty selection. Introverts and feelers were more likely to choose primary care, a highly service-oriented area of medicine with the rewards of long-term patient relationships. For graduates who chose non-primary care fields, extroverted thinkers preferred surgical specialties, which is to be expected given the nature of surgical practice—high patient volume, less long-term continuity of care, and clinical situations that require rapid decisions based on facts.

Recently, researchers at Louisiana State University updated the original longitudinal study done by Myers in the 1950s (see Table 4–1) with new data on doctors graduating between 1988 and 1998.[6] They, too, found that I-N types are more drawn to fields like internal medicine and neurology, whereas surgical specialties attract E-S types. Introverts and feeling types are more likely to choose primary care because of its nurturing, compassionate aspects. Within primary care, feeling types are more likely to choose family practice over internal medicine (which has a more technological focus). Anesthesiology seems to attract more ISTPs and ISFPs, and pediatrics appeals more to ESFJs and ESTJs. Sensors—who love more technological, direct approaches with well-learned skills—are more common in surgery (general and orthopedic) as well as obstetrics-gynecology. Intuitives prefer complex diagnostic challenges and problems with subtle nuances, so they are more likely to become psychiatrists. INT types, who enjoy the challenge of medicine without ever seeing a patient, are attracted to pathology and research due

TABLE 4-1

MEDICAL SPECIALTIES BY TEMPERAMENT

Introverted–Sensing–Thinking–Judging (ISTJ)
- Dermatology
- Obstetrics-gynecology
- Family practice
- Urology
- Orthopedic surgery

Introverted–Sensing–Feeling–Judging (ISFJ)
- Anesthesiology
- Ophthalmology
- General practice
- Family practice
- Pediatrics

Introverted–Sensing–Thinking–Perceptive (ISTP)
- Otolaryngology
- Anesthesiology
- Radiology
- Ophthalmology
- General practice

Introverted–Sensing–Feeling–Perceptive (ISFP)
- Anesthesiology
- Urology
- Family practice
- Thoracic surgery
- General practice

Introverted–Intuitive–Feeling–Judging (INFJ)
- Psychiatry
- Internal medicine
- Thoracic surgery
- General surgery
- Pathology

Extroverted–Sensing–Thinking–Judging (ESTJ)
- Obstetrics-gynecology
- General practice
- General surgery
- Orthopedic surgery
- Pediatrics

Extroverted–Sensing–Feeling–Judging (ESFJ)
- Pediatrics
- Orthopedic surgery
- Otolaryngology
- General practice
- Internal medicine

Extroverted–Intuitive–Feeling–Perceptive (ENFP)
- Psychiatry
- Dermatology
- Otolaryngology
- Psychiatry
- Pediatrics

Introverted–Intuitive–Thinking–Judging (INTJ)
- Psychiatry
- Pathology
- Neurology
- Internal medicine
- Anesthesiology

Introverted–Intuitive–Feeling–Perceptive (INFP)
- Psychiatry

Cardiology
Neurology
Dermatology
Pathology

Introverted–Intuitive–Thinking–Perceptive (INTP)
Neurology
Pathology
Psychiatry
Cardiology
Thoracic surgery

Extroverted–Sensing–Thinking–Perceptive (ESTP)
Orthopedic surgery
Dermatology
Family practice
Radiology
General surgery

Extroverted–Sensing–Feeling–Perceptive (ESFP)
Ophthalmology
Thoracic surgery
Obstetrics-gynecology
Orthopedic surgery
General surgery

Extroverted–Intuitive–Thinking–Perceptive (ENTP)
Otolaryngology
Psychiatry
Radiology
Pediatrics
Pathology

Extroverted–Intuitive–Feeling–Judging (ENFJ)
Thoracic surgery
Dermatology
Psychiatry
Ophthalmology
Radiology

Extroverted–Intuitive–Thinking–Judging (ENTJ)
Neurology
Cardiology
Urology
Thoracic surgery
Internal medicine

Source: Data adapted from: McCaulley, M.H. *The Myers Longitudinal Medical Study* (Monograph II). Gainesville, Fla: Center for Applications of Psychological Type; 1977.

to their ability to detach personally. Thinking types prefer caring for patients where impartiality and stamina are required. They also flock to the surgical specialties, where rapid decisions are needed based on hard evidence and facts.

LOOKING AT THE BIG PICTURE

The MBTI is a useful tool for identifying aspects of your personality, which can help you to find a compatible medical specialty. Remember—the more you understand your temperament and motivations, the less likely you will allow other variables (such as those discussed in Chapter 3) to overshadow them. At the same

time, medical students should not rely too heavily on personality type. Simply be aware that working with people with the same personality preferences is an important variable to consider. Typically, a physician who switches to a new specialty chooses one in which his or her own personality type is much more common. After all, medicine is a wonderfully broad profession in which there is an appealing specialty for *every* personality type!

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5 FINDING THE PERFECT SPECIALTY

Medical students often make the mistake of believing that they will find the perfect specialty out of sheer luck or good fortune. Unfortunately, it is not always so easy. Choosing the ideal field of medicine requires time, research, and a great deal of thought and investigation. It should be an active process—almost like shopping, in a way. Whether you are a first-year or fourth-year medical student, you need to put in the time to research every specialty under consideration. Hard work and effort forms the path to success and happiness. Procrastination will only lead to a more stressful (and ill-informed) decision—one that may end up being the wrong specialty!

This chapter addresses the potential opportunities for students to go about researching medical specialties. Use the different resources and options available to immerse yourself fully in a specific area of medicine. By interacting with other clinicians, you will find out whether that specialty makes good use of your interests, preferences, talents, and values. The list may seem daunting, but every student has 4 years in which to take advantage of the many sources of information. These are the only means by which doctors-to-be can figure out answers to many questions: What types of patients do you prefer? Can you handle diagnostic ambiguity or do you require absolute certainty? What kind of lifestyle do you want? Do you need to be an expert in your field? By pursuing as many of these options as possible, medical students will better determine their needs and preferences regarding each important variable in specialty selection.

This discussion is particularly beneficial for first- and second-year (preclinical) medical students. Compared to their upperclass peers, these medical students' exposure to patients, doctors, and the hospital is extremely limited. Instead, they are immersed in the rigorous demands of studying anatomy, pathology, microbiology, and other basic sciences. Although preclinical students gain little

practical knowledge or clinical exposure, they have ample opportunity outside the classroom and laboratory to explore different specialties.

Yet, first- and second-year medical students, just like juniors and seniors, also agonize greatly about what type of doctor to become. Most of them mistakenly believe that there really is no way to start learning about the different specialties until they start clinical rotations in the hospital. This is a misconception. By actively engaging in each of the following opportunities, *all* medical students—whether first-year or fourth-year—will help alleviate some of their apprehension about specialty choice as the time to make the decision approaches.

BASIC SCIENCE (PRECLINICAL) COURSES

The first 2 years of medical school consist of courses designed to provide a solid foundation in the scientific basis of medicine. You spend long days in the classroom and laboratory, memorizing anatomic terms, studying biochemical pathways, and reading about bugs, drugs, and diseases. During these years, students rarely step foot inside the hospital (except to learn how to take patient histories and conduct physical examinations under resident supervision).

Without direct clinical experience and exposure, is it possible to figure out which specialty may be right for you? Yes. Believe it or not, the basic science courses also give you insight into areas of medicine that may be a possible match for you. Every specialty represents a clinical discipline that draws upon a particular group of basic sciences as its scientific foundation. Some of the broader fields of medicine—like emergency medicine, family practice, and internal medicine—make use of nearly all of the basic sciences in the diagnosis and treatment of disease. Other specialties focus on one or two fundamental sciences within their clinical spectrum. For instance, if you thoroughly enjoyed the course in neuroscience and neuroanatomy in the first year of medical school, there are many ways to study the diseases of the brain as a clinician. You could become a neurologist, neurosurgeon, psychiatrist, or physical medicine/rehabilitation specialist. If you absolutely thrived on the study of gross anatomy, then specialties like diagnostic radiology and surgery are perfect for you. Take a closer look at Table 5–1.

By the end of the second year of medical school, you will have a much better idea of which basic sciences thrill you—and which ones bore you to death. During the clinical years, pay close attention to how each specialty makes use of the basic sciences. This will reinforce whether or not that field of medicine is right for you.

TABLE 5–1

SUBJECTS AND SPECIALTIES

If You Loved . . .	. . . Then Consider
Anatomy	Surgery, radiology
Histology	Pathology, dermatology
Biochemistry	Internal medicine
Neuroscience	Neurology, Neurosurgery, Psychiatry, Physical medicine and rehabilitation
Immunology	Pathology, Infectious disease
Physiology	Surgery, Internal medicine, Anesthesiology
Behavioral science	Psychiatry
Genetics	Pediatrics
Molecular biology	Pathology
Microbiology	Infectious disease
Pathology	Pathology
Pharmacology	Anesthesiology, Internal medicine

"CAREERS IN MEDICINE"

To help medical students choose their specialty, the Association of American Medical Colleges (AAMC) offers a web-based self-evaluation program titled "Careers in Medicine" (formerly known as "MedCareers"). This excellent career planning tool allows medical students to assess their skills, interests, talents, and personality characteristics. Starting right from the beginning of medical school, you can access it at <http://www.aamc.org/careersinmedicine>. Students will get the most out of this program if they use it repeatedly (ideally once or twice per year) as they refine their decision. After all, each educational experience during medical school can shape your ideas about which specialty is the perfect one. For this reason, "Careers in Medicine" is a superb way to create an honest and interactive self-assessment.

The actual program consists of four components: (1) *personal career assessment*—figuring out your values, interests, and long-term career aspirations; (2) *career exploration*—collecting information and learning about the different medical specialties and career options; (3) *decision-making*—applying the results of

your personal assessment with the information gathered about career options to select a single specialty; and (4) *implementation*—explaining how to go through the residency application, interview, and matching process. In essence, the entire system is an interactive questionnaire full of easy-to-use tools.

As you complete the different structured steps in the "Careers in Medicine" workshop, the AAMC recommends reassessing and reviewing previously answered questions. In fact, the system allows the user to store and update his or her personal profile and answers to different aspects of the program at any time. Using its decision-making tools, students can approach their choice in a systematic manner. To log in to the system and begin the program, medical students must obtain an access code from the appropriate AAMC liaison at their medical school.

CLINICAL ROTATIONS

Nearly every medical student bases their choice of specialty on their third- and fourth-year clinical experiences. These are the years during which students complete their required clerkships, elective rotations, and subinternships in different medical and surgical specialties. Most schools require a set of core rotations in the basic areas of medicine in which all students must gain solid knowledge: internal medicine, pediatrics, surgery, obstetrics-gynecology, psychiatry, family practice, and neurology. The rotations last anywhere from 2 weeks to 3 months. During the surgery and internal medicine clerkships, you will have an opportunity to spend time in some of the relevant subspecialties, like cardiology, orthopedic surgery, and neurosurgery.

Unlike the basic science courses, clinical rotations allow students to gain firsthand experiences and inside looks into a medical specialty. As full members of teams in each department, medical students have the important responsibility of knowing in detail every single aspect of their assigned patients' medical care, such as their test results and medications. As a subintern, a fourth-year medical student receives even more responsibility by functioning at the level of a first-year resident (or intern) in that specialty. These are the only times in medical school when you will immerse yourself in what specialists do on a daily basis—the kinds of problems they face, the tests they order, the procedures they perform, and the kinds of patients they treat.

During each clinical rotation, take the time to talk in depth with your attending physicians and residents. Find out what made them choose their specialty. As you meet new physicians, ask them a lot of tough probing questions

like, "Would you pick your field again if you had the option?" "What do you dislike about your specialty?" Write everything—especially your own impressions and thoughts about these experiences—down in a journal that you can refer to once the third year is over and it is time to choose a specialty. Hospital rotations are your only opportunity to gain a real-world perspective about the many different areas of medicine. Medical students, therefore, should use their limited elective time wisely to explore a specialty if they feel their previous exposure to it was inadequate.

Although clinical rotations are the best way to learn about the options available for every medical student, they are certainly not perfect. Take this time to review the section in Chapter 1 that discusses the limited value of the clinical clerkship in specialty selection.

GLAXO PATHWAY EVALUATION PROGRAM

Similar to "Careers in Medicine," the Glaxo Pathway Evaluation Program (cosponsored by Duke University and GlaxoSmithKline, a major pharmaceutical company) is designed to help medical students undergo the specialty selection process. This innovative career planning program—endorsed by both the American Medical Student Association and the US Department of Health and Human Services—is an important part of medical education. The program consists of an interactive workshop, self-assessment exercises, and CD-ROM resources (like specialty surveys and profiles). Diligently taking part in each component allows students to carefully evaluate their many options and to make a better-informed decision about their future career direction. Medical students who are completely clueless about what specialty to choose (or who are deciding between multiple specialties) find this program particularly helpful. It can give them an excellent start on the whole decision-making process.

The main component of the Glaxo Pathway Evaluation Program is a 3½-hour workshop for third-year medical students. The program facilitator is a faculty member from your medical school. The program consists of a series of discussions, lectures, and interactive exercises, with an emphasis on informed, educated decision-making, You will also interact with your peers while participating in both small and large discussion groups. Topics include factors in your decision such as the skills and talents a specialty requires, the type of patient population, lifestyle issues, and so on. You will learn much about yourself and the specialty in which you are best suited.

Not everyone can participate in the Glaxo Pathway Evaluation Program.

Your medical school has to set it up for you, so get a group of students together and petition your Dean of Students Office to bring the program to campus. To obtain more information about the program, call 1-800-444-PATH or talk with any faculty advisor at your medical school.

GRAND ROUNDS

Throughout all 4 years of medical school, attending grand rounds is yet another way to check out what different specialties are like. Every department holds these hour-long meetings, typically once per week. They bring in a very prominent physician who gives a lecture about the latest advances in medical science related to his or her subject. Food is often served. Do not be bashful about showing up to listen to the talk. Everyone in the medical center is invited, and almost every member of that department—faculty, residents, staff—makes a concerted effort to attend.

By going to grand rounds, medical students (particularly first- and second-years) will begin to expose themselves to new fields of medicine. It is a chance to hear about interesting cases, follow the thought processes of different specialists, and observe the interactions among faculty members and resident physicians. These talks are a great way to learn about a specialty by hearing about the newest research and other updates in the field. Although some topics may be technically overwhelming, grand rounds can give you an excellent sense of a discipline's clinical subject matter. If you find yourself nodding off, maybe that specialty is not the right one. If you find yourself excited and keenly interested in the discussion, perhaps that field should move to the top of your list.

INTERNET RESOURCES

Through the World Wide Web, medical students can obtain a wealth of information on any topic in medicine—especially the important issues related to any medical specialty under consideration. Want to know what the job market is like for anesthesiologists? Check out <http://www.gaswork.com>. What are today's practicing radiologists talking about? Check their discussion forums and chat groups on <http://www.auntminnie.com>. Wondering about the state of burnout among emergency medicine physicians? Then take a look at studies published in the online version of *Academic Emergency Medicine*. To find the specific piece of information you are looking for, simply run a keyword search on one of the many Internet search engines, like the popular <http://www.google.com>.

One of the best starting points for gathering information about a particular medical specialty is its national professional association. For example, the American College of Surgery is the main entity for surgeons; their colleagues in anesthesiology belong to the American Society of Anesthesiologists. The web sites of these organizations contain a wide variety of medical, professional, educational, and patient-related information. You could spend hours reading the articles and newsletters posted on these pages. It is an excellent way to learn about the latest issues and debates within that specialty. In addition, becoming a student member of these societies entitles you to a subscription to their monthly journals as well as invitations to national meetings. A complete list of the national specialty associations and their respective websites (as well as other highly recommended Internet resources) can be found at the end of this book.

MEDICAL JOURNALS

Each medical school has its own library that is stocked with nearly every single medical journal that exists. In your spare time, take a look at some of them. You are probably thinking, "What spare time?" From cramming for biochemistry examinations to preparing presentations for morning pediatrics rounds, the intense workload of medical school leaves little time for outside reading. However, reading the journals of different medical specialties can provide a nice flavor of the subject matter in that field—but on the same level that a practicing specialist would read. Instead of reading that surgery review/outline book, flip open *The American Journal of Surgery*. Do not be concerned about understanding every single word or unfamiliar topic. The point of this endeavor is to get an overall sense of the current research in each of the many specialties. These issues, in general, will have a different focus than the topics that students read about in their texts or outline books.

To help you choose a specialty, there are several noteworthy publications within every library's collection. Several times per year, the *Journal of the American Medical Association* (JAMA) publishes a series of articles of particular relevance to medical students and residents in its "msJAMA" section. Previous topics have included specialty selection, the match process, and women in medicine. The American Medical Student Association (AMSA) publishes a monthly magazine called *The New Physician*, which typically has features on choosing a specialty. Many faculty members read *Academic Medicine*, a well-respected publication that has featured many articles and studies about residency, medical school, specialty selection, and the match. These journals and others can provide

illuminating information that most medical students might not otherwise come across.

MEETINGS: NATIONAL AND LOCAL

Attending national and local meetings is another excellent opportunity for medical students (especially first- and second-years) to meet physicians in various specialties. These conferences generally consist of lectures, discussions, poster presentations, and social events. Every national specialty association holds an annual, multiday meeting in a major US city—possibly one in which you currently attend medical school. For instance, every December, the meeting of the Radiological Society of North America draws radiologists and radiation oncologists from all over the country to Chicago. Interested in a career in internal medicine? Try to make it to the annual meeting of the American College of Physicians. Some meetings occur locally, such as the annual get together of the Massachusetts Society of Anesthesiologists. Others are even more specific, like the National Conference of Family Practice Residents and Medical Students, sponsored by the American Academy of Family Physicians. Although some events may require an entrance fee, medical students are generally welcomed at each of them. By going to these meetings, you will see the specialty from a different perspective—similar to that of a private practitioner attending their annual continuing medical education conferences. Specialties hold their national meetings in different locations each year, so you will have to look them up on their respective web sites.

MENTORS AND COLLEAGUES

It goes without saying that the physicians and future doctors-to-be with whom you interact on a daily basis are some of the best sources of information and advice. All medical students should make good use of any formal (and informal) career advising at their institution. Cultivate relationships with faculty members in various specialties and ask them questions about their areas of interest. Explore various specialty areas by establishing relationships with at least two mentors who will take a professional interest in you. Sharing in their professional, community, and family lives will provide great insight into what being a physician is like in their particular specialty of medicine. Of course, do not forget about your fellow upperclass students. They are also invaluable sources of inside information and

personal experiences. Seek out these informal advisors and ask them a lot of questions about their specialty interests.

RESEARCH PROJECTS

Clinical and basic science research are fundamental components of the medical profession. Many aspiring physicians enter medical school with varying degrees of research experience from college or other positions prior to beginning their medical education. Once in medical school, a fair number of students engage in research projects outside of their classroom and clinical work requirements. There are two types of research you can pursue—in the basic sciences (e.g., microbiology, biochemistry) or clinical disciplines (e.g., radiology, surgery).

Engaging in clinical research is a wonderful way to learn about a specialty. You will immerse yourself in the department, interact with faculty members, and have a chance to see their clinical and nonclinical activities every day. Moreover, you can become familiar with the subject matter of that discipline. If you are undecided about a specialty, then seek out research projects that deal with topics that cross multiple specialties, like diabetes, asthma, or hypertension. For instance, many students conduct clinical research projects in the emergency department, where they get to talk to patients, take surveys, and see what emergency medicine specialists do down in the trenches. The early exposure to specialties through research projects may help you rule in or out particular ones. In the end, even if taking part in research does not help you select a specialty, it is still a valuable experience. You will learn how to critically interpret the scientific literature and ask probing questions—skills essential for all types of specialists.

On a specialty-related side note, getting involved with medical research has the potential to strengthen your application. A few residency programs will only invite those applicants who completed extensive research for an interview, so carefully consider your options (see Chapter 11 for specifics). Residency selection committees like to see students with excellent achievement—and nothing looks better than a publication in a major medical journal. This is particularly true for the most competitive specialties, where anything that helps you stand apart from the crowd is helpful. In fact, some specialties—like radiation oncology—almost require students to have completed research projects. (Keep in mind, however, that it looks best to continue any research started during the summer following first year. One-time projects have less influence.)

Most medical students initiate the pursuit of research during the summer be-

tween the first and second years of medical school. By this point, they have become familiar with their university, its departments, and its faculty members. Many medical schools offer funding or generous stipends for their students to stay at their institution and conduct research within one of the departments. Some students leave for other medical centers. There are several sources of outside funding for medical students through a competitive application process. These include the National Institutes of Health, the Howard Hughes Medical Institute, and AMSA. See your Dean of Student Affairs Office for more information.

SHADOWING RESIDENTS AND ATTENDING PHYSICIANS

First- and second-year medical students spend very little time in the hospital and clinics. Aside from learning how to take patient histories and perform physical examinations, you rarely interact with many specialists during these 2 years. For this reason, get a head start in checking out different areas of medicine by spending your free time shadowing physicians—either residents or attendings. Many hold weekend clinic hours in which you can tag along with them as they see patients. Most residents will not mind if you want to attend daily rounds in the hospital, too. Get some practical volunteer or work experience in the hospital or neighborhood clinic. Hang out in the emergency department, where the doctors will teach you how to suture wounds and perform other minor procedures. The time you spend with specialists in different areas of medicine may ultimately give you the necessary exposure to help make a final decision in the next year. Moreover, you will begin to get to know physicians who may write letters of recommendation in support of your residency applications.

SPECIALTY INTEREST GROUPS

During medical school (especially in the preclinical years), almost every student gets involved in many kinds of medically related extracurricular activities. There are lots of options from which to choose—giving tours to prospective applicants, teaching elementary school students about how the heart works, or coordinating the delivery of medical supplies to third-world countries. To help you to figure out what specialty might be the best match (before you head out on the wards in third-year), consider taking part in a specialty interest group as one of your extracurricular activities.

Medical students often get together and form an interest group based on a

particular specialty, such as the Emergency Medicine Interest Group or Pediatrics Interest Group. The purpose of these unique and valuable groups is to bring together medical students, residents, and faculty physicians who share the same interest in that specialty. As a member, you can set up time to shadow physicians, attend special lectures, get ideas and make contacts for research projects, meet with clinicians outside of the hospital in social situations, perform services for the local community, and much more. This educational resource provides time to ask more experienced physicians questions. Because there is no pressure to perform well and obtain a good evaluation, specialty interest groups are excellent ways to learn informally about a specialty before hitting the wards as an upperclass medical student.

Some specialty interest groups have even established an national presence on the Internet. Future family practitioners, for example, can take advantage of one of the best ones—the Virtual Family Medicine Interest Group. Modeled after successful campus specialty groups, this web site provides information and resources to help students explore the specialty of family practice and all of its related topics (like residency training and the match process). You can take a look for yourself at <http://fmignet.aafap.org>.

SUMMER BETWEEN MS-I AND MS-II

Unlike the best years of your life in college, medical school only provides a single summer vacation—between the first and second years. Most medical students agonize over what to do during this last free summer. They are not sure whether to work to make money, pursue research, read up before second year (!), hang out and relax, or do something that looks good on their resume—like vaccinating all the children of Africa. After all, students are generally worried about what those residency program selection committees might think about how exactly they spent their summer vacation.

Your goal during this summer should be to attach yourself to clinicians (while at the same time taking a rejuvenating break from all the lecture and laboratory work from the first year). In these formative years of training in medical school, future doctors should seek out any and all experiences and chances to build a solid foundation on which to be the best physician that they can be. So take this summer break seriously and do something productive at least the majority of the time. Early clinical exposure during this summer will give you a jump-start to specialty decision-making before the crucial third year. By pursuing a structured

activity, you can start thinking and learning about different areas of medicine, particularly the ones you might not have time to rotate through during third-year, like dermatology or ophthalmology.

There are a number of summer opportunities for career exploration, such as clinical externships, research programs, and community preceptorships. All of these paths can help you check out different medical specialties and start figuring out your preferences, likes, dislikes, and values when it comes to career options. Some medical students make informal arrangements to volunteer in community health clinics or shadow physicians (while also earning money through part-time jobs like waiting tables). For motivated students who do not mind another round of applications, there are formal programs that provide more structured clinical experience. Some examples include:

- The National Health Service Corps, a federal agency, offers a month-long rotation (funded with a stipend) to expose students to the practice of rural medicine and primary care in underserved areas. You might be placed in Alaska, Nevada, North Dakota, West Virginia, or other exotic locales. This program (called Student/Resident Experiences and Rotations in Community Health [SEARCH]) allows preclinical students to get a taste of clinical medicine, practice taking patient histories, and get a head start on their physical examination skills.
- On a more local level, many states offer summer externship programs. For instance, the Illinois Academy of Family Practitioners has a program for rising second-year students in which they are paired with a family practitioner for a month-long one-on-one preceptorship.
- You can obtain funded externships directly from medical centers. For instance, Thomas Jefferson University Hospital in Philadelphia sponsors a 6-week experience in radiation oncology (The Simon Kramer Society Externship) for interested medical students.
- Want to get some clinical experience *and* learn how to speak Spanish? AMSA offers a summer program in many Latin American countries called *SALUD*—a Medical Spanish program abroad. Through classroom and practical clinical work, you learn about another country's health care needs and become proficient in another language.

Although not every specialty has its own organized clinical summer program, many do exist and more are established every year. Either conduct searches in the Internet or contact your Dean of Student Affairs Office to find out more in-

formation on these externship programs. Above all, make every effort to use this summer to gain early exposure to different specialties without having to commit yourself to any of them. It will help you to begin prioritizing some of the many factors that go into deciding on a specialty (and on what you want out of your medical career in general). Even if your heart has always been set on orthopedic surgery, use this last summer to check out primary care or family practice. You never know what kind of meaningful clinical experience may end up changing your mind.

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6 SPECIAL CONSIDERATIONS FOR WOMEN

Not too long ago, women only made up a tiny minority of physicians and medical students. Today that has changed dramatically. Medicine is no longer a profession heavily dominated by men. Instead, women now make up 45% of the average medical school class. During the past two decades the number of female doctors has nearly quadrupled.[1] In fact, by 2010, more than one third of all practicing physicians will be women.[2]

The influx of so many women into medicine slowly changed the traditional take on doctors. The public no longer thought of physicians as wise, gentle men who made house calls. Instead, they began to have female doctors of their own—women who treated hypertension, performed cardiac bypass surgery, interpreted chest radiographs, and delivered babies. For many of these women physicians, their gender had an important role in their final choice of medical specialty.

CHALLENGES FOR TODAY'S FEMALE PHYSICIAN

Despite the encouraging numbers, gender inequality remains a fact of life in medicine. Across the medical specialties, the distribution of women is somewhat unbalanced. In 2001, for example, women made up only 9% of orthopedic surgery residents, compared to 71.4% in obstetrics and gynecology and 65.8% in pediatrics.[3] In general, a much smaller proportion of women enter the highly technical specialties (such as surgery and radiology); the majority gravitate toward primary care fields like pediatrics, family practice, internal medicine, and psychiatry (Table 6–1).[4]

Why are women more likely than men to select a career in primary care? After all, many medical students think of these specialties as having lower status,

TABLE 6–1

PERCENTAGE OF FEMALE RESIDENTS BY SPECIALTY

Anesthesiology	28.0
Dermatology	55.5
Emergency medicine	28.4
Family practice	49.1
General surgery	23.7
Internal medicine	40.2
Neurology	38.2
Neurosurgery	10.6
Obstetrics and gynecology	71.4
Ophthalmology	32.4
Orthopedic surgery	9.0
Otolaryngology	18.6
Pathology	48.2
Pediatrics	65.8
Physical medicine and rehabilitation	38.3
Plastic surgery	23.3
Psychiatry	51.1
Radiation oncology	29.4
Radiology	24.7
Urology	12.7

Source: Appendix II—Graduate Medical Education. *JAMA.* 2002;288(9):1151–1152.

perhaps because of the lower income and lack of emphasis on procedures. Typically more women seem to be drawn to the primary care specialties because they are compatible with their practice styles. In general, women physicians perform more preventive medicine services, show more compassion and empathy, and spend more time with their patients, especially when it comes to just simply listening. One prominent female physician believes that "pediatrics and obstetrics-gynecology are related to mothering and child-bearing, which are very important for women in our society, and may be why these specialties seem consistent with the personality of women."[5] Another study agreed with the assessment that women are overrepresented in primary care specialties because of their maternal and nurturing qualities. The authors looked at variables influencing the decision to en-

ter primary care and concluded that "it is possible that the emphasis on family values and needs that in our culture affect women as a group more than men would have a larger influence on a woman's decision to become a primary care doctor than would other factors."[6]

Even so, more women today are forging into areas of medicine that have been exclusively occupied by men in the past. By demanding equality, these pioneers make it easier for female medical students to follow in their paths. Although women and men now work side by side within every specialty, this does not necessarily mean that their lives and career paths are alike. Women may weigh different considerations when approaching their specialty choice. This may be in part because of a sociologic difference of perspective in what makes for a satisfying career between men and women. There are also practical concerns to consider, such as comfortably integrating the issue of pregnancy (and all of the decisions that come with it) and how its timing will affect their medical careers. Many women in medicine want a specialty that is family friendly—one that lends itself to having greater control over work hours and the possibility of working part-time when they have children. When deciding on her specialty of choice, every female medical student should spend some time honestly weighing these concerns and competing responsibilities. In doing so, you will likely choose the best specialty and have a rewarding professional career in medicine.

CAREER SATISFACTION AMONG FEMALE PHYSICIANS

There are a lot more women in medicine today, but are they all happy with their chosen profession? The majority of women (84%) are generally satisfied with their medical careers. But surprisingly, a solid number (38%) would choose a new specialty if they could do it all over again. Why such remorse? Many variables—work stress, degree of autonomy, work hours, income, and so on—affect how content a doctor is with his or her career. Choosing a medical specialty with the right balance, then, makes a big difference between a happy physician and a dissatisfied one. In fact, the same survey of female physicians revealed that work environment and stress (two factors directly related to their specialty) are the strongest predictors of career satisfaction.[7]

Certain types of female doctors have higher degrees of career satisfaction, according to this study. Dermatologists, psychiatrists, ophthalmologists, anesthesiologists, and surgeons were among the happiest of all female physicians. They were the least interested in changing their specialty. With the exception of surgery, these specific careers have the most controllable lifestyles in terms of work

hours and on-call demands. Internists and general practitioners, on the other hand, had the strongest desires to change their specialty. But a cushier way of life does not necessarily mean career satisfaction. Take radiology, for instance. With its 8-to-5 workdays and limited call responsibilities, this field should be full of happy doctors. Instead, the same survey found that female radiologists had among the lowest levels of career satisfaction. This was especially surprising in comparison to their colleagues in surgery, who cope with a rigorous lifestyle, long hours, heavy on-call demands, and a male-dominated work environment. Yet despite these perceived lifestyle drawbacks, female surgeons had some of the highest levels of career satisfaction, and 76% even reported that they would definitely *not* want to enter a different specialty! Perhaps this extraordinary contentment reflects a sense of pride in being a pioneer in surgery, coupled with higher income and more control in their everyday patient care.

To ensure the best chance for happiness, female medical students should ask themselves the following questions when thinking about their future career.

1. How Do You Envision Your Practice Style?

Some medical students prefer short patient interactions with no continuity, whereas others want to have life-long relationships with all those under their care. In general, women like spending more clinical time than men do with their patients, particularly regarding issues of counseling, preventive medicine, and psychosocial development.[8] If you share this preference, then consider careers in primary care fields. If you are more action oriented and like working at a fast pace, then think about emergency medicine, anesthesiology, or surgery. If you seek the latest technical gadgets, then cardiology, radiology, and radiation oncology may be the best specialties for you.

2. Could You Handle Working in a Predominantly Male Environment?

Certain specialties, particularly the more technical ones, are known to be boys' clubs. The most conspicuous are surgery (and surgical subspecialties), emergency medicine, radiology, and ophthalmology. Keep in mind that high levels of testosterone in the workplace can often lead to inappropriate comments, gender bias, and even sexual harassment. In the operating room, for instance, the perpetual locker room mentality often means that female surgeons tend to feel pressure to

behave as one of the boys to fit in well with their male colleagues. Are you prepared for this type of working environment? No matter the specialty, it is essential to feel comfortable around the physicians with whom you will be working. Without a supportive atmosphere at work, patient care may suffer.

3. Will You Be Able to Take Maternity Leave, Have Children, and Raise a Family?

It is challenging, but certainly not impossible, for women to maintain a thriving professional career *and* have children. According to the aforementioned study, the happiest female physicians—no matter the specialty—were the ones who had children. Certain specialties more easily allow for maternity leave and time to raise children, particularly during the peak reproductive years surrounding residency training and initial employment. In a survey of women who entered pediatrics, for example, nearly half based the timing of pregnancy on their career stage, leading to a mean age of conception at 29 years (when most were just out of residency).[9]

So if you are planning to have kids (or already have a family), keep in mind whether or not your dream specialty will permit time for them. Take a closer look at whether physicians in your chosen specialty might penalize female physicians for maternity leaves or even actively discourage their pregnancies. For instance, hospital-based specialties such as radiology, anesthesiology, and emergency medicine offer more predictable schedules, ones in which you will rarely take work home with you. Unlike the trauma surgeon, gastroenterologist, or obstetrician, physicians in areas like psychiatry and dermatology seldom get paged for emergencies in the middle of the night. These are all areas of medicine that might be more amenable to flexibility when it comes to timing a pregnancy.

For most women, stability within their specialty is just one of many factors that play a part in their happiness in medicine. In the workplace, female physicians often have to cope with sexual harassment, higher expectations, and salary inequity. In general, women in medicine earn less money than men because more are either clustered within the lower-paying primary care specialties or work part time. Moreover, women have to tackle an inverted career pyramid, one in which they will devote more time to their careers only after bearing and raising children at a younger age. Outside the workplace, busy physicians have additional stressors. They have to juggle multiple responsibilities—practicing medicine, managing their office, and running their household. Most women still do pro-

portionally more cleaning, cooking, and so on than their husbands, in some cases even after a long day of practicing medicine. Whether a radiologist, surgeon, or pediatrician, every female physician faces similar at-home challenges, which cannot be excluded from one's overall professional satisfaction.

SEX AND SURGERY: BEING A FEMALE PHYSICIAN IN THE OR

To become a surgeon, you must love spending hours in the operating room more than anything else in the world. Most specialties are flexible enough to allow women physicians to have an outside family life and to raise children. The rigorous, sleep-deprived lifestyle of surgery, however, requires the greatest time commitment, particularly when it comes to the intensity and length of residency training. Partly because of this, surgery has traditionally been a rather male-dominated field. Excluding obstetrics-gynecology, only 18% of surgical residents are women.[10] Within this small group, each female surgeon undergoes considerable self-examination to prepare herself for the demands of a surgical career.

Initially, just like their male colleagues, many female medical students do find themselves attracted to a career in surgery. They are partial to the emphasis on technical procedures, the ability to save a patients' life, and the immediate gratification of performing a surgical operation. They love the thrill of delving into the internal anatomy of a fellow human being. They could actually see themselves becoming orthopedic surgeons, cardiothoracic surgeons, or surgical oncologists. Yet there is still a striking underrepresentation of women in the surgical specialties. Why do 76% of women who plan to pursue surgery lose their interest and commit to something else?[11] And why do only 6% of female students actually gain interest in surgery during medical school?

It is clear that certain barriers within the surgical profession end up discouraging women from entering. Many women are discouraged by the long hours, family sacrifices, and male-dominated operating room. Also, performing routine and emergency surgery on patients at all hours of the day and night does not lend itself well to being an available parent. Compared to other specialists, female surgeons are more likely to be single (but their divorce rate is equal to that of their male colleagues). And, because of strong professional aspirations and interests, they are also less likely than others to have children, or, if they do, more likely to have full-time childcare.[12] Moreover, the military nature of a surgical residency—degradation, humiliation, and rigid chain of command—is especially unappealing. On a lesser note, many medical students and residents have observed that female scrub nurses

may have problems taking orders in the operating room because of their deferential role to another woman. Clearly, there are many variables that every potential female surgeon should think about carefully when considering a surgical career.

Surgery is the one specialty where female doctors have the most difficulty integrating themselves with their male colleagues. "Surgery is kind of a high testosterone battlefield, so when it comes time to give orders, women surgeons are sometimes taken less seriously," says a university-based female neurosurgeon. "When male surgeons 'take charge,' their behavior is usually interpreted as assertive and appropriate, but we women are often labeled 'aggressive and inappropriate.' "[13]

And yet, despite the decline in the number of medical students entering careers in general surgery today, a surprisingly higher percentage of women are deciding to become surgeons. General surgery, orthopedics, and neurosurgery are competing for these female applicants, all of whom are no longer discouraged by the rigorous training of the competitive tiers of medicine. As a way of helping their fellow women, many female medical students now aspire to become breast surgeons. Even the gentler surgical subspecialties—like urology—are experiencing an influx of women. Despite the drastically skewed distribution of men to women, nearly all (94%) of female urologists would highly encourage other women to enter this boys' club specialty.[14] As pioneers in their specialty, today's female surgeons build on their self-confidence and end up with extremely high levels of career satisfaction.

CONSIDERING YOUR PRACTICE OPTIONS

In every specialty—whether it is psychiatry or surgery—all female physicians can arrange time to raise children, pursue outside interests, *and* have a productive medical career. These aspirations are not mutually exclusive. But to do so, you must carefully plan the type of practice you want. In the primary care specialties, like pediatrics and family practice, female doctors have successfully led the way for innovative practice options, like working part time or job sharing. Other specialties, however, have been slow to accept the following more accommodating career strategies.

1. Practicing Medicine Part Time

By definition, working fewer than 40 hours per week is considered part time. The primary care fields are among the most favorable to part-time work, especially be-

cause they are appointment based. Specialties with highly controllable hours are also as conducive, such as the shift work of emergency medicine, the case-by-case nature of anesthesiology, the scheduled hours of pathology and radiology, and the lack of off-hour emergencies in dermatology and ophthalmology. Even surgeons can work part time. Breast surgeons, for instance, perform mainly elective surgery and can therefore schedule fewer cases and less clinic time each week. Another way to work part time is to arrange for a shared-schedule position with another physician. In this format, each doctor works half time with alternating appointment schedules; together, they equal one practitioner. Some even arrange this system with their spouse if both are in the same specialty. In either situation, remember that working part time means sacrificing higher salaries for flexibility. Another disadvantage is that part-time academic physicians are ineligible for tenure, and those in private practice often are unable to become partners or stockholders in the practice. Women should also keep in mind that many unsympathetic colleagues may be hostile to physicians seeking to change their schedules to fulfill parental roles.

2. Join Group Practices or Managed Care Companies

Through this practice option, a physician generally works 40 hours a week with little overnight call responsibility (shared among either the group partners or health maintenance organization [HMO] members). However, you will give up quite a bit of autonomy. Especially in an HMO, physicians have to submit to its rules, regulations, paperwork, and bureaucracy, which often dictate or constrain how you conduct patient care.

3. Work Out of Your Home

Many female solo practitioners, particularly those in psychiatry, opt to set up their office in their home. This allows for greater interaction with their family. The major disadvantage, of course, is the intrusion of patients, secretaries, nurses, and other staff members on your home property.

4. Enter Academics Rather Than Becoming a Private Practitioner

In the university teaching hospital, academic physicians devote less clinical time. They primarily supervise residents, who provide the majority of patient manage-

ment. You will have greater job flexibility in this salaried position because of the additional time for teaching and research. Unlike private practice, there is much less emphasis in academic medicine on productivity and seeing as many patients as possible. In fact, female physicians practicing in medical schools and teaching hospitals reported the most happiness with their specialty choice.[15]

FIND A MENTOR—BE A MENTOR

To make the most informed decision, all medical students (both male and female) should try to find an advisor, role model, or mentor. Seeking advice from a respected faculty member is an essential part of choosing a specialty; form these relationships early in your medical training. Because women often have additional concerns when deciding on their specialty, a good female mentor can provide invaluable guidance. Remember, you do not have to establish an advisor-advisee relationship with lots of physicians, or even with ones who practice in the specialty under consideration. More importantly, female medical students should seek out other women who have already gone through the same decisions. These doctors usually have a wealth of information and personal experience about being female in a male-dominated profession. They should be more than happy to share their thoughts and answer questions from a younger version of themselves.

The best female mentor makes you feel comfortable enough to exchange ideas, personal thoughts, and concerns. She should always make herself available for discussing somewhat intimate issues, such as marriage, gender discrimination, career aspirations, and the best time to have children. In a study of role models within the specialty of internal medicine,[16] the most sought-after faculty mentors:

- spend more than 25% of their time teaching students and residents
- spend more than 25 hours per week teaching and conducting rounds when serving as an attending physician
- always call attention to the psychosocial aspects of medicine
- emphasize the value of the doctor–patient relationship
- served as chief resident

Finding the perfect mentor may seem like the ultimate challenge. Regardless, female students should make it one of their top priorities during medical school. In the clinical years, seek out women faculty members in all departments, espe-

cially male-dominated specialties like surgery, radiology, and emergency medicine. Identify good role models and encourage them to take you under their wings (or rather, their white coats).

Why is having a first-rate mentor so important for female medical students? When choosing a specialty, inadequate (or nonexistent) exposure to role models can lead to high levels of career dissatisfaction in the future. After all, good clinical mentors exert considerable influence over medical students regarding the merits of a particular specialty. Take a female student rotating through the surgery department, for example. More women ended up committing to surgery as a career in cases where a higher proportion of women on the surgical faculty served as mentors during the rotation.[17] Similar conclusions can likely be drawn for other specialties, but first you have to seek out advisors within that department. These honest relationships can clear up misconceptions about career satisfaction and may even change students' specialty decisions. There are three ways to go about finding a female mentor in your specialty of choice.

1. Talk With Your Fellow Classmates or Dean

Your colleagues in medical school are usually the best source of advice. They can tell you which faculty members have traditionally served as excellent role models for women. Throughout the year, try to set up frequent meetings with them, keeping in mind that there are often a limited number of senior faculty physicians available. Not every female student finds a good mentor. In fact, at the typical academic medical center, 31% of men are full tenured professors of clinical medicine, whereas only 10.5% of women hold the same title.[18]

2. Become a Member of the American Medical Women's Association

Most medical schools have their own chapter of this excellent organization for female students. With members totaling more than 10,000 physicians, the American Women's Medical Association (AMWA) has been the voice of women in medicine since 1915. As the percentage of female physicians increased, AMWA expanded its scope accordingly. Having more women in medicine brought new issues to the forefront, like gender equality among faculty appointments and the role of women in male-dominated fields. To help students cope with the specialty decision-making process, local AMWA branches often sponsor brown bag lunches. Chapter members invite respected female physicians to give a talk over

the lunch hour about their careers and reasons for choosing their specialty. Speak to the president of your affiliated AMWA chapter for more information on how to get involved.

3. Contact Specialty Groups for Women Physicians

Nearly all specialties have affiliated women-only organizations, which are helpful sources of information. You can get in touch with them for names of doctors who may be willing to mentor female students and perhaps even allow for job shadowing. For a complete list of these organizations, visit the web site of the American Medical Association (http://www.ama-assn.org/ama/pub/category/2699.html).

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7 COMBINED RESIDENCY PROGRAMS

Choosing your dream specialty from 20 possibilities is hard enough. The dilemma becomes even more complicated for medical students trying to decide between two equally appealing fields of medicine. For instance, many doctors-in-training love taking care of the medical problems of both children and adults. After months of soul searching, they still cannot decide between a career in pediatrics or internal medicine. Both highly intellectual disciplines draw upon the same fundamental clinical skills, such as performing physical examinations and interpreting laboratory tests. So, why not do both?

TWO SPECIALTIES FOR THE PRICE OF ONE

The average medical student does not know that a unique *integrative* career option exists: becoming a physician trained in two specialties (Table 7–1). Any doctor can complete two separate residency programs and earn board certification in both disciplines. For example, a small subset of anesthesiologists, who have already completed 1 internship year of general medicine, also finish the 2 final years of internal medicine residency and become board certified in anesthesiology and internal medicine. Likewise, in other areas of medicine, different specialists take their own approaches to treating the same disease, such as the management of dementia by psychiatrists versus neurologists.

To train physicians in overlapping skills and knowledge, selected hospitals offer *combined residency programs.* Currently, there are 15 accredited types of these distinctive pathways. Upon completion of the accelerated training, a physician becomes board certified in both specialties and practices as a dual-trained specialist. These programs have transformed the physician workforce. Now, med-

TABLE 7–1

COMBINED RESIDENCY PROGRAMS

Type	Length (Years)	Number of Accredited Programs
Internal Medicine–Dermatology	5	2
Internal Medicine–Emergency Medicine	5	9
Internal Medicine–Family Practice	4	5
Internal Medicine–Neurology	5	12
Internal Medicine–Pediatrics	4	109
Internal Medicine–Physical Medicine & Rehabilitation	5	6
Internal Medicine–Preventive Medicine	4	6
Internal Medicine–Psychiatry	5	24
Neurology–Diagnostic Radiology–Neuroradiology	7	3
Pediatrics–Emergency Medicine	5	3
Pediatrics–Medical Genetics	5	8
Pediatrics–Physical Medicine & Rehabilitation	5	5
Pediatrics–Psychiatry–Child & Adolescent Psychiatry	5	9
Psychiatry–Family Practice	5	11
Psychiatry–Neurology	5	9

Source: Accreditation Council on Graduate Medical Education.

ical centers are producing internist–psychiatrists, pediatrician–emergency medicine doctors, and psychiatrist–neurologists, among others.

In the past, combined residency programs were few in number, so many medical students failed to consider them in their career planning; however, more and more hospitals are now offering these double residencies. Despite the rigor and length of training, their popularity among medical students has started to pick up remarkably. Because many students cannot make up their minds on a particular specialty, one program director recommends combined programs as "ideal for the chronically undecided."[1]

There is one caveat, however. While in training, attrition rates are generally the highest during the transitional period between departments. Rather than choosing this route out of sheer indecision, medical students should be equally

committed to both specialties from the very beginning. Otherwise, the odds of dropping out to a single specialty become much higher.

With a rigorous compressed structure, combined residency programs shave a year or two off the time it would take to complete two separate residencies. Despite the shortened training time, all combined residency programs adequately train residents to be competent in both specialties. In the end, their skills are *equivalent* to those of their counterparts in categorical programs. Board passage rates provide the best evidence for clinical competence following residency. For example, graduates of combined internal medicine–pediatrics programs achieved a slightly higher pass rate on the pediatric specialty boards (81.8%) compared to the scores of their colleagues who trained only in pediatrics (75.9%).[2] With this excellent dual training behind them, young physicians can now meet the challenge of being innovative, collaborative practitioners.

WHY TRAIN IN TWO SPECIALTIES?

You Will Become a Better Physician

The exponential growth of clinical information within medicine requires lifelong learning. Doctors with training in two specialties can better meet this challenge. In every patient interaction, dual-trained physicians integrate their knowledge base from two different fields, leading to better patient care. For example, a physician certified in both neurology and psychiatry commented, "I can think 'neurologically' and 'psychiatrically' about each patient."[3] Most important, learning one discipline well enhances one's mastery of advanced knowledge in another area. Internist–pediatricians, for instance, can easily manage difficult fluid and electrolyte problems in adults because of their understanding of weight-based pharmacologic and nutritional issues in children. Thus, combined training leads to the natural development of synergistic skills.

You Will Have Greater Career Flexibility

After completing a combined residency program, graduates may further diversify their experiences through fellowship training. Double-boarded doctors can subspecialize in one (or both!) of their primary fields. For instance, a graduate of a combined internal medicine–pediatrics program could elect to subspecialize in adult nephrology or pediatric endocrinology while also practicing general medicine and pediatrics. Some physicians add even more variety to

their careers by pursuing accelerated *dual fellowship* training, such as adult *and* pediatric cardiology, after completing a combined residency. As long as a program supports the idea of fellowship training in both disciplines, the possibilities are limitless.

Your Marketability Will Increase Job Opportunities

The comprehensive training of combined programs quickly propels new physicians' careers. Having two board certificates under your belt opens many more doors for young doctors than training in only one specialty. It is, after all, a good investment for employers to have doctors with so many great skills. For instance, graduates of internal medicine–psychiatry programs can choose from many options– general medicine–mental health clinics, academics, primary care medicine, or psychiatric consultations for private medical groups.

You Will Save Valuable Training Time

All combined programs eliminate 1 to 2 years of training compared to completing two separate residencies. You can use the additional time saved to enter practice right away, pursue fellowship or other advanced subspecialty training, or engage in research.

DISADVANTAGES OF A DUAL SPECIALTY RESIDENCY

Physicians who have completed a combined residency program believe that there is little difficulty in integrating both specialties into a rewarding career. They insist that the only negative aspects of double-specialty training are found during the actual years spent in residency. After all, getting two independent academic departments to work together toward a common goal can be a challenge.

A combined residency has the following drawbacks:

- Because of the limited number of double-boarded doctors, there are few role models and mentors in combined residency programs.
- Residents have less flexible elective time to complete subspecialty rotations due to the shortened training.
- By belonging to two departments instead of one, residents often feel like they have no true home base.

- Being a member of two departments often leads to scheduling conflicts, particularly those unrelated to direct clinical work, such as journal clubs, informal gatherings, parties, and so on. Your faculty members could perceive absence at these events as a way of showing a lack of commitment.

THE BIG THREE: A CLOSER LOOK AT SELECTED COMBINED RESIDENCY PROGRAMS

Internal Medicine–Pediatrics

Blending together the principles of internal medicine and pediatrics, med–peds (or IMP) is the largest and most popular combined program. Since its creation in 1967, an estimated 1800 physicians now practice both internal medicine and pediatrics.[4] In response to the generalist health care initiative of the last decade, the number of internal medicine–pediatrics programs increased dramatically. IMP offers an alternative choice for physicians-in-training who wish to treat patients of all ages but do not want to become family practitioners. Recent data attest to the popularity of IMP among today's medical students. Between 1990 and 1997, the number of US seniors choosing internal medicine–pediatrics increased by 165% (as compared to 65% for family practice).[5] In fact, among the primary care specialties, internal medicine–pediatrics currently ties with general pediatrics for the highest percentage of US graduates.[6]

Internal medicine and pediatrics provide intellectual stimulation, rewarding patient relationships, and a broad range of career possibilities. Across the entire spectrum of age and development, these doctors are superb diagnosticians and patient advocates. Becoming an internist–pediatrician makes you just like an old-fashioned general practitioner who takes care of everyone. IMP physicians fit in well with today's changing managed care system, in which there is a perceived need for well-trained primary care doctors. After completing the 4-year program, they are eligible to sit for board certification examinations in both internal medicine and pediatrics. Even better, they can further subspecialize if desired. Across both specialties, there are over 20 possible fellowship options, from infectious disease to rheumatology. IMP not only provides exceptional primary care training, it also leaves open the option of completing a fellowship in pediatrics, internal medicine, or both.

So what are the differences between internal medicine–pediatrics and family practice? Family practice has a wider scope; IMP has greater depth. Through comprehensive primary care, an internist or pediatrician cares for the entire per-

son. A family doctor, in addition, must also be competent in obstetrics, gynecology, and minor office-based surgery. However, according to the American Association of Family Practice, only 24% of family practitioners still offer obstetric or surgical services. Discouraged by high malpractice liability and rising insurance premiums, disenchanted medical students can now turn toward IMP programs. Here, they believe that they will obtain more practical and rigorous education in medicine and pediatrics. Instead of rotations in obstetrics, gynecology, and surgical subspecialties, IMP residency provides additional training in inpatient and critical care experiences involving both adults and children. Today, the majority of US seniors desiring a career in primary care for all age groups still choose family practice. However, IMP remains an increasingly popular option.

Internist–pediatricians provide the highest quality primary care to patients of all ages. It is possible for patients and families to meet all their health care needs in the same setting with the same doctor. You could potentially take care of the same patient from birth to middle age! Adolescent medicine illustrates this strength of specializing in both medicine and pediatrics. Normally, patients switch from a pediatrician to an internist around the age of 18. Knowledgeable in development concerns and health issues of young adults, the familiar IMP is rather inviting to a teenager as their adult physician. This continuity of care is particularly beneficial for children with chronic illnesses, such as cystic fibrosis, Down syndrome, or congenital heart defects, as they transition into adulthood.

With a broad understanding of medical issues in many age groups, internist–pediatricians can adapt well to the needs of their community, whether there is more of a need for a pediatrician, or patients require the skills of a good internist. This adaptability makes IMP physicians very appealing in a lot of primary care settings for many communities.

Many career opportunities exist for graduates of combined internal medicine–pediatrics programs. They can become urban or rural primary care doctors, hospitalists for adults and children, academic physicians, or subspecialists bridging both fields. In the largest survey of IMP graduates to date, nearly all practice both specialties and care for patients of all ages, from infants to the elderly.[7] Most were involved in direct patient care in small community practices, devoting only a small amount of time to research, teaching, or administration. A large majority (81.6%) are board certified in both internal medicine and pediatrics. Of the few dual-trained doctors who pursue fellowship, only about one third spend more than 20% of their practice on subspecialty care. In fact, a higher percentage of IMP residents go on to practice primary care than internal medicine or pediatrics residents. They truly live up to the generalist ideal of this combined residency program.

In the 2002 National Resident Matching Program, 85.2% of the 399 internal medicine–pediatrics positions were filled.

Internal Medicine–Psychiatry

In every primary care clinic in the country, a large number of patients seeking medical care also walk around with a significant amount of undiagnosed psychopathology. Many conditions, such as chronic fatigue syndrome and fibromyalgia, require treatment based on an understanding of psychology, social issues, and general medicine. There is a great need, therefore, for physicians who can manage people with both psychiatric illnesses and coexisting medical conditions. To meet this challenge, medical students can pursue a combined program in both internal medicine and psychiatry. Many of these doctors wanted to specialize in psychiatry, but were reluctant to give up the opportunity to practice clinical medicine. It is a career path growing in both popularity and professional recognition.

A rather academic field, internal medicine–psychiatry focuses on the mind–body interface. In the last decade, psychiatry has shifted to a more biological focus, with pharmacologic therapy as effective as traditional medical treatment for organic diseases. Moreover, underlying medical illness can precipitate or worsen psychiatric disorders. At some point, the two forms of disease become inseparable. There is no one better to understand and to sort out these diagnoses than a double-boarded internist–psychiatrist. In theory, each discipline complements the other. These doctors manage both primary medical conditions and psychiatric problems all in one setting. They even help teach nonpsychiatrist colleagues about the management of mental illness without having to refer their patients to a psychiatrist. Whether the problem involves an understanding of internal medicine or psychiatry, doctors double boarded in these specialties provide superior consultative services. They understand and articulate well the interaction between psychiatric and medical complaints.

The internal medicine–psychiatry combined program is rigorous, fun, and challenging. After training, graduates earn full board certification requirements in both disciplines. Because this residency is relatively new, little is currently known about the practice patterns of the graduates. Do they practice both internal medicine and psychiatry, only general psychiatry, or serve as consultants? Most patients with psychiatric illnesses present to their primary care physician rather than directly to a psychiatrist. Providing specialized care of psychiatric disorders in this primary care setting reduces health care costs by removing the need for outside consulta-

tion. As a result, job opportunities abound. Many rural areas of the country have a great need for both primary care doctors and mental health professionals.

Based on a recent survey of program directors, most internist–psychiatrists practice both specialties in an academic setting.[8] A smaller group works in the private sector, particularly outpatient clinics and integrated treatment programs. Those who work in state psychiatric facilities focus heavily on psychiatric diagnosis while also managing chronic medical diseases like diabetes and hypertension. Regardless of practice setting, combined training in internal medicine and psychiatry provides focused, in-depth, biopsychosocial training while expanding and sharpening primary care skills.

In the 2002 National Resident Matching Program, 68.7% of the 32 internal medicine–psychiatry positions were filled.

Internal Medicine–Emergency Medicine

Since 1991, these 5-year combined programs have prepared medical students for a career in both acute and chronic medicine. Training lasts for 30 months in each area and includes the minimum requirements for that specialty. Internal medicine–emergency medicine (IM–EM) specialists can treat a broad spectrum of disease and injury that range widely in presentation–acute, nonurgent, emergent, and chronic. They are experts in the diagnosis, treatment, and rehabilitation of all kinds of patients.

Is it possible for internist–emergency medicine physicians to practice both fields? After all, their work schedules are rather different. Internists typically spend their days in a clinic and on-call overnight, whereas emergency doctors work varying shifts—whether days, afternoons, or nights. A recent survey of graduates found that most (65%) are active in emergency medicine only, and 30% still practice both fields.[9] They are all highly satisfied with their careers. Those who do integrate both specialties well balance a part-time emergency department schedule with shifts on the wards as *hospitalists*. Instead of spending time in clinic, hospitalists are internists that work 12 to 24 hour shifts as inpatient physicians. In the same survey, most IM–EM specialists identified the academic teaching hospital as their primary clinical setting. Here, several are directors of observation units for patients under consideration for admission to the wards from the emergency room.

Although most graduates believe that their combined training provided excellent preparation for the clinical practice of emergency medicine, most (93%) felt it was only marginal training for the practice of internal medicine.[10] These

results perhaps indicate that most students entering this combined program are more motivated to become emergency medicine physicians than internists.

In the 2002 National Resident Matching Program, 81% of the 21 IM–EM positions were filled.

THE TRIPLE BOARD PROGRAMS: MASTERING THREE SPECIALTIES

Pediatrics–Psychiatry–Child and Adolescent Psychiatry

Would you like to devote your medical career to the physical and mental health of children and adolescents? This combined residency program may be for you! The goal of this pathway is not necessarily to train someone to become all three types of doctors. Instead, the program strives to create a unique type of child and adolescent psychiatrist. Many pediatricians and psychiatrists have difficulty collaborating when it comes to certain patients with multiple medical and mental problems. Since 1986, the triple specialty residency has helped to bridge the gap between two worlds by creating a group of child psychiatrists with solid medical training in clinical pediatrics.

Currently, there is a national shortage of physicians with specialized training in child and adolescent psychiatry. The curriculum of this program consists of 2 years of pediatrics, 18 months of general psychiatry, and 18 months of child and adolescent psychiatry fellowship. Upon completion, physicians are eligible to take board certification examinations in pediatrics, general psychiatry, and child and adolescent psychiatry. Graduates of this program tend to remain in academics and practice all three specialties. As *pediatric psychiatrists*, they believe that it is impossible to separate the medical and biological aspects of children from their behavioral and developmental issues. Triple-boarded pediatricians provide this needed well-balanced medical and mental care.

Neurology–Diagnostic Radiology–Neuroradiology

Interested in diagnosing and treating diseases of the brain and nervous system? This new combined residency program leads to triple board certification in neurology, radiology, and the subspecialty of neuroradiology. Graduates of these programs have the clinical and therapeutic skills of a neurologist, the diagnostic abilities of a general radiologist, and the specialized interventional techniques of a neuroradiologist. They are experts in cerebral angiography, myelography, positron

emission tomography (PET) scans, head computed tomography (CT), and brain magnetic resonance imaging (MRI). Unlike other radiologists, these physicians maintain a high level of patient contact through their neurology practice. The residency program consists of 6 months of general medicine, 2 years of neurology, 2½ years of radiology, and 2 years of neuroradiology (typically a fellowship). These triple-boarded specialists are academic leaders in treating diseases of the nervous system.

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8

OPTIONS FOR THE UNDECIDED MEDICAL STUDENT

Within the first few months of your senior year, a final decision about specialty selection must be made. What happens if an overwhelmed medical student simply cannot decide? Because of the myriad of options, the pressure can lead to hasty and uncertain decisions. And residents unhappy in their chosen specialty may have to switch fields, hunt for a new residency, or even repeat years of grueling postgraduate training!

Choosing a specialty is tougher than ever. Although most make the big decision near the end of the third year of medical school, in recent years more and more students are finding themselves undecided at residency application time. After 4 rigorous years and a formidable financial investment, these students generally refuse to commit to a particular specialty unless they are absolutely 100% certain. *Compromise* is certainly not part of their lexicon.

The undecided student believes that it is better to hold off on making a final decision than to select the wrong one and become an unhappy, dissatisfied doctor. They would rather do it right the first time or not do it at all (by delaying the decision). Putting off a final commitment is one of several options for an undecided medical student. You should keep in mind, however, that simple procrastination is not necessarily going to make the big decision any easier when the time comes around again to make a commitment.

If you are a fourth-year medical student and still undecided about what specialty to choose, you have several options. You can delay making your choice and seek refuge in a year of research or internship only. Or, you can tackle your indecision head on and apply to more than one specialty or apply to a combined residency program. Either way, the undecided student should not be over-

whelmed by the idea that choosing the wrong specialty is the end of the world. Most students would be happily satisfied in more than one specialty. And after all, no matter what field of medicine you end up in, you will still be a practicing physician.

This chapter addresses the needs of undecided students who, because of these fears, want additional time to reflect on the specialties before making the important choice. By pursuing these options, newly minted MDs will feel much more confident about their specialty decision.

Enter a 1-Year Internship Program Only

Let's say you are torn between several specialties that are quite distinct from each other, like radiology, pediatrics, and surgery. If you find it impossible to make up your mind, then consider only applying for general internship positions (with no further postgraduate commitment), rather than a complete residency. After all, this is what nearly every physician did back in the old days (before 1972) to decide upon their eventual specialty. By entering a 1-year internship, the undecided graduating medical student still earns credit for postgraduate training while at the same time continuing to explore other specialties. The intention, of course, is to reapply to residency programs to start hopefully as a PGY-2 resident in that specialty. Sounds like a perfect idea, right? Well, read on.

There are three types of internships, all of which are described in further detail in Chapter 9. In a *transitional year* internship, you receive broad exposure to many fields of medicine, like internal medicine, surgery, pediatrics, and obstetrics-gynecology, plus electives. It is similar to the third year of medical school, but you are now a full-fledged first-year resident, with all the responsibilities that go along with that status. If undecided students can at least make up their minds about where they stand on the medicine–surgery dichotomy, then the other internships will suit them well. A *preliminary medicine* internship is equivalent to the first year of a complete internal medicine residency, whereas a *preliminary surgery* internship is identical to the first year of a categorical general surgery residency.

There are many advantages to this option for the undecided student. During the internship year, you will have many new clinical experiences and the right specialty may present itself. At the same time, while earning PGY-1 credit, you stay immersed in clinical medicine, keep your knowledge and decision-making skills up to date, and gain more patient care responsibility.

Undecided students should be forewarned that seeking refuge from the big decision through a 1-year internship position has its many drawbacks as well. In reality, you are really only delaying your decision for 1 more year (from the beginning of senior year to the early months of internship) compared to the rest of your classmates. Remember, in early fall, the residency application process starts up again. In the end, you will only have about 3 months of internship experiences on which to make that important career decision (this excludes, of course, any clinical rotations from the fourth year of medical school). Not to mention the fact that internship is much more difficult and time-consuming than the senior year of medical school. How will you have the time and energy to spend on making the decision and the application process? Will a program director really give you time off from internship to fly around the country for interviews?

One of the main caveats about applying only for internship positions is the possibility of having to repeat this first postgraduate year. This really depends on the type of internship taken and the specific field of medicine sought. For instance, internal medicine, pediatrics, and surgery programs will not accept transitional year internships for PGY-1 credit. Categorical programs like psychiatry and obstetrics-gynecology may require you to repeat their own internship years, particularly if they were taken in internal medicine and surgery. Keep this important point in mind if you are considering this alternative path.

Pursue a Combined Training Program

Many confused and undecided senior medical students often waver between two different specialties, like internal medicine and pediatrics, or neurology and psychiatry. A good choice for them might be the combined residency programs, in which you receive extended training (leading to dual board certification) in both specialties. Instead of having to decide on just one area of medicine, an undecided student can end up with the best of both worlds and be able to pursue a medical career in both specialties. Chapter 7 gives a detailed explanation of the advantages and disadvantages of entering a combined training program, as well as a thorough description of the possible choices. Although a combined residency program is an excellent option for an undecided medical student, positions are limited. Moreover, most programs combine similar fields, like internal medicine and emergency medicine. If you are trying to decide between neurology and orthopedic surgery, no such combined program exists.

Apply to More Than One Specialty

Medical students who simply cannot decide between two fields (and for whom no combined residency program exists) also have the option of applying to both fields at once. This, in effect, delays the ultimate decision until late winter of senior year, when rank lists are due and the match process actually takes place. Aspiring physicians who are interested in both orthopedic surgery and radiology, for example, or doctors-to-be who could see themselves as either neurologists or neurosurgeons can use this option to delay making the final selection for another 6 months or so.

Be prepared, however, for twice the paperwork and effort (and financial expense!) in the application process. Both specialties will require their own set of recommendation letters, personal statements, and interviews. At rank list time, you will have to decide on the specific order of the programs. Thus, whatever specialty program is placed in the #1 position, in a way, clearly indicates the undecided student's final preference. Why take your chances with the match computer to make your final choice? Many undecided students apply and rank multiple specialties every year and let the computer break the tie for them. If you simply cannot decide on a specialty, and do not mind surprises on Match Day, then consider this alternative.

Enter a Specialty Training Program with the Intertion of Switching Fields Later

Some undecided medical students end up applying to a desired (although not perfect) specialty, with the intention of switching fields later. Although these students may not feel committed to that specialty, they are willing to give it a try while at the same time keeping open the option of changing.

Several studies have found that specialty switching is not such an uncommon phenomenon. In fact, 20% of medical school graduates switch fields before completing their first residency, 15% change after completing residency, and nearly 20% of practicing physicians report a high level of unhappiness and career dissatisfaction with their chosen specialty. Every day, month, and year of clinical experiences can bring about a whole new phase of self-discovery (and its accompanying self-doubt)– a period of contemplation that may even lead to the conclusion that your chosen specialty just is not the right one or the best fit. To change fields of medicine, the simpler application process occurs out of the match. Af-

ter deciding on a new specialty, physicians have to pick up the phone and start calling around to find out which residency programs have vacant positions.

Every physician should practice in a specialty for which they have passion and enthusiasm. However, there are several disadvantages to starting a residency program in one specialty with the intention of soon changing to another. Besides the recurring feelings of having wasted time, you (and possibly your family) will have to adjust again to a new hospital and a new life. The faculty at the first program may not appreciate your anticipated departure and may make the remainder of the year much more difficult. On a more practical note, you may also have difficulty securing funding for the entire length of the new residency. The federal government only reimburses teaching hospitals enough money for each resident to cover the number of years necessary to meet initial specialty board requirements (e.g., 3 years for internal medicine) plus 1 year. If the total training time is beyond these limits, funding may not be available and you will have to petition the hospital of your second residency to provide the money for your paycheck. In these tough financial times, this is not always that easy to accomplish.

Take Time Off to Engage in Research or Gain Experience

If you are struggling to figure out your true direction within the medical profession, then taking time off is certainly a helpful option. Junior medical students can postpone graduation for 1 year and spend that time conducting clinical research, doing hospital rotations, and continuing personal self-assessment before applying to residency next year. This kind of decision needs to be made late in the third year of medical school.

Because any nonmedical time off from education on a resume can be a warning sign to selection committees, most students choose to do a year of clinical research before applying to residency. Many apply for special 1-year medical student research grants to work at the prestigious National Institutes of Health. Other worthy options include experiences in public health, such as a fellowship with the US Department of Health and Human Services. You could also potentially use this time to pursue another degree, like a Masters in Public Health. Any of these types of experiences can provide time to help the undecided medical student figure out the perfect specialty and how to best plan a strategy for senior year electives and the residency application process.

AIMING FOR CONFIDENCE AND COMMITMENT

It should be obvious that these five options for an undecided student are all far from ideal. None of them allows for sufficient time to explore specialties further before having to make a final decision. This all stems from the compressed nature of American medical education and the very early start to the residency application process in the senior year.

Pursuing one of these options only defers the same crucial choice—commitment to a single specialty—which will still be there, no matter how hard you try to put it off. For this reason, all medical students should work hard during their 4 years to overcome any feelings of indecision or indifference. The best way to do so is by gathering as much information and experience as possible to make a definitive, informed, and confident decision. This commitment is an essential part of being a happy, satisfied physician for many long years to come.

9 APPLYING FOR RESIDENCY: AN OVERVIEW OF THE MATCH PROCESS

Once you have reached this point in the long journey through medical school, the deliberation is over. You have confidently chosen the field of medicine that for the next 10, 20, or 30 years will become the focus of each waking day. Now it is time to enjoy the learning opportunities of senior year, fulfill graduation requirements, and continue exploring other disciplines of medicine before dedicating yourself to the specialty you have chosen.

INTRODUCTION TO THE MATCH

But the rite of passage is far from over. Every fourth-year medical student must enter the dreaded *Match* to be paired with a residency program. The United States is fortunate to have many excellent hospitals and academic medical centers. Yet, the quality, desirability, and reputation of training programs vary greatly. Every year, competition for the top programs—those with greater resources and a higher emphasis on teaching—is quite keen. As a result, the fourth year of medical school has evolved into a long year of playing the high-stakes residency matching game.

Even for medical students, who are seasoned applicants, the residency application process seems unnecessarily complicated. There are lots of confusing acronyms to remember—NRMP, ERAS, LORs, and ROLs. There are many detailed tasks to accomplish—collecting recommendations, writing personal statements, preparing applications, and scheduling interviews. Most medical students agree that the entire time-consuming process interferes with the remaining education of senior year.

Four years of hard work pay off in a single defining moment: Match Day. Ever since choosing medicine as a career, medical students eagerly await that emotion-filled third Thursday in March. With friends, family, and the local news teams watching, 17,000 medical students rip open the envelopes at exactly 12:00 PM EST to find out where they will complete their residency. The excitement and anticipation from waiting an entire year is intense. This is a moment of high drama—people cheering, laughing, and crying. Whether a student receives his first choice or last choice, Match Day is a singular milestone in the professional education of a new physician.

Match Day, and the application process that precedes it, is a relatively recent phenomenon in American medical education. After World War II, when the rapid pace of scientific advances in medicine influenced many students to specialize, competition for internships and residency programs became intense. To secure

TYPES OF RESIDENCY PROGRAMS

The NRMP offers three types of postgraduate training positions in the Main Match. Medical students should become familiar with the proper terminology. Every residency program has an assigned ACGME identification number containing a single letter—C, P, or A.

1. *Categorical* (C): These programs begin training at the first postgraduate year (PGY-1), which starts in July immediately following medical school graduation. Depending on specialty, they consist of 3 or more years of graduate medical education. Residents are expected to complete the entire length of training required for board certification. Specialties such as internal medicine, pediatrics, obstetrics and gynecology, and general surgery are primarily categorical tracks.

2. *Preliminary* (P): These programs last 1 year, count for PGY-1 credit only, and are formally available through internal medicine, surgery, or transitional year. These positions exist to satisfy the 1-year prerequisite clinical training required by advanced specialty programs (see below).

3. *Advanced* (A): These positions begin only at the level of the second postgraduate year (PGY-2), after a year spent in a preliminary program. Specialized fields such as dermatology, ophthalmology, anesthesiology, and radiology are typically advanced tracks. Students apply to both advanced and preliminary programs at the same time, even though the advanced position does not commence for an entire year after the actual Match. (Your spot will be reserved).

the best medical students, less-competitive programs offered binding contracts early in the application season—sometimes even in the second or third year—which soon resulted in a cutthroat free-for-all of offers and counteroffers. Some students felt pressured to commit to less-favored programs before they could consider other options. Others reneged on their appointments once they received better offers from a more desirable choice. Clearly, the system needed to be reformed.

THE NRMP: LET THE COMPUTER DECIDE YOUR FATE

To bring an end to the chaotic free for all, a group of five organizations (including the American Medical Association and the Association of American Medical Colleges) joined forces in 1952 to cosponsor the formation of the *National Resident Matching Program (NRMP)*. It is a private, nonprofit corporation. Through the shared use of a *rank order list*, medical students and residency programs submit a list of preferences from among those interviewed. A master computer in Washington, DC, running a 6-minute algorithm, generates a single Match between applicants and hospitals. Both parties learn of a mutually acceptable appointment on a common date and time.

With this new system, the NRMP seemed to have achieved its purpose: uniformity and impartiality. For the first time, both applicants and residency programs could explore their options without intense pressure for early decision-making. Medical students now were given a great deal of choice in deciding which residency program they would prefer. However, because both parties were still anxious over the relative uncertainty of the final Match outcome, students and program directors began to exploit other avenues that compromised the integrity of the Match, such as outside-the-Match contracts, pre-Match promises, audition electives, and second visits.

Despite these ethical violations, the NRMP does not stringently enforce its own rules. The result is that today the participants in the residency appointment system no longer believe each other. Nearly one third of students felt that the residency program administrators had lied to them during the process, and 21% believed that program directors encouraged their unethical behavior in order to match.[1] Even the NRMP states that "the success of the match depends on a high level of trust among all participants." Apparently, a lot of people—medical students and program directors alike—seem to have missed reading the NRMP's *Statement on Professionalism*.

Take the out-of-Match contract, for example. During the application season, residency programs are not supposed to offer these binding commitments

to US seniors. They are intended only for any highly desirable independent applicants, a large group that consists of anyone who is not currently a US senior, like foreign-trained graduates, US graduates, osteopathic students, and Canadian students. If a medical student accepts a position outside the Match, the applicant commits himself to that program and is officially required to withdraw from the Match. Yet, some US seniors are even offered these under-the-table contracts. Certain specialties, particularly extremely competitive ones like radiation oncology and dermatology, are more likely to engage in this behavior. In either case, these agreements have a detrimental effect on the application process for the average medical student. Any residency program that signs applicants outside the Match is supposed to contact the NRMP and reduce the number of positions (its quota) published in its on-line directory. Most programs, however, do not. For the average candidate, it becomes much more difficult to plan an application strategy for positions that may not even exist!

Pre-Match promises and informal commitments, which will be discussed again later in this chapter, also add to the unethical gamesmanship of the residency appointment process. Program directors and applicants frequently send letters that imply, but do not guarantee, a commitment to each other. In addition, many institutions promise scarce residency spots to their own medical students, who then rank the program #1 and receive that desired Match. As positions become more competitive, this type of behavior undermines the integrity of the whole system. The two dermatology positions at a particular hospital, for example, may have already been promised to its own medical students and therefore be unavailable for the common applicant. The misleading numbers create uncertainty and insecurity and make it very difficult for advisors to counsel their students on how to obtain positions.

With this greater emphasis on networking and contacts, the residency Match game has become more and more unfair. Some students end up left on the sidelines. The NRMP has finally responded to the rampant unprofessional behavior and widespread policy violations. At some point in the near future, there will be new stricter rules. Residency programs participating in the NRMP will have to register and attempt to fill *all* their positions in the match. They cannot have some positions in the NRMP and at the same time fill other slots with independent applicants (outside the match). Programs will have to update their advertised quota of available positions. For now, however, the current NRMP system is here to stay.

ERAS: LET THE COMPUTER SIMPLIFY YOUR LIFE

The NRMP is the corporation that supervises the Match process, ensures its integrity, and runs the computer algorithm that pairs applicants with residency programs. To do so, the NRMP receives rank-order preference lists from both parties. However, the NRMP is *not* a centralized application processing service. This is where *ERAS*—the Electronic Residency Application Service—comes in.

Remember how you applied to college? For a long time, the residency application process worked the same way. Medical students had to contact each individual program for a paper application, address envelopes for their letter writers, and drag out the old typewriter from the closet. The process was time consuming and tedious, especially for medical students applying to 20 or more programs in very competitive specialties. In 1995, ERAS changed the way medical students submitted applications. At first only obstetrics and gynecology participated in the service, using a system based on diskettes sent in the mail. Over the next few years, more specialties caught on, particularly as ERAS became an Internet-based application. Today, nearly all specialties participate in ERAS (exceptions include neurology, neurosurgery, otolaryngology, and ophthalmology).

ERAS has streamlined the entire application process. Every year, ERAS electronically transmits tens of thousands of digitized documents: transcripts, recommendation letters, personal statements, application forms, and Dean's Letters. The web-based format is extremely user friendly, making it very easy to apply to multiple specialties, add or delete programs, or customize which supporting documents to send to each program. By reducing the amount of paperwork for both applicants and hospitals, ERAS has lowered application fees ($6 per program for the first 20 programs). Another feature is that medical students can track the transmission status of every single document on line, 24 hours a day, through the Applicant Document Tracking System (ADTS). Most medical students rate the ERAS system very highly.

What about the disadvantages of ERAS? There is a significant one. This service is so easy to use that candidates can easily flood the application pool with far too many unnecessary applications. Students should think carefully about limiting the number of programs to which they eventually apply. With the click of a mouse, you can check a box and, on a whim, add more programs, particularly those you are not seriously considering. The excess applications cause the same students to receive most of the limited interview offers available for a given specialty, leaving others out in the cold. ERAS attempts to prevent this shot-gunning

approach by increasing the fees for applying to more than 20 programs ($12 per program for 21–30 programs; $30 each for 31 or more programs). Realistically, very competitive specialties like orthopedic surgery and dermatology encourage students to apply to over 40 programs.

To set up a personalized MyERAS account, all medical students must obtain their preassigned ERAS token (a string of numbers and letters) from their Dean's Office. Enter this token to begin registration on the ERAS web site. Although the process is relatively straightforward, always refer to the detailed instruction booklet provided with your token. Apply as early as possible, so you will never have to worry about individual program deadlines (which can vary). A completed ERAS application consists of the following parts:

1. ***Profile:*** This 1-page form contains your name, identification numbers (social security, ERAS, NRMP, and USMLE), citizenship, medical school, and contact information. The entries can be changed at any time; an updated version is electronically sent to all programs.
2. ***Common Application Form (CAF):*** This 12-page form consists of all the basic background information typically found in a resume: degrees earned, research and work experience, extracurricular activities, hobbies, and publications. After completing the form and proofreading for typos, click on *certify*. The electronic certification process officially submits the CAF and locks out any further changes from being made. Until you cough up the money for your programs, ERAS will not allow supporting documents to be scanned and uploaded by your medical school.
3. ***Personal Statement:*** You should type, edit, and spell check the personal statement on a word processing program and then copy and paste it into ERAS. Simply create a blank new personal statement in the *MyDocuments* section. If you are applying to multiple specialties or preliminary programs, give it an easily recognizable title (e.g., *Derm*). Program directors will not see your titles. To create multiple personal statements, just click on the *New Personal Statement* button. Because the formatting of your document in ERAS will not look exactly like your original, print out a copy to view its appearance.
4. ***USMLE Transcript:*** The National Board of Medical Examiners (NBME) will send an unlimited number of USMLE transcripts to residency programs via ERAS (for a flat fee, of course). You must send all current USMLE scores and then choose whether or not to retransmit *automatically* updated transcripts when they become available. However, your decision is irrevocable

and binding. If in doubt, do not choose the automatic retransmission option. Most medical students prefer reviewing their USMLE Step 2 scores prior to submission (in case they are poor). Manual retransmission of these transcripts incurs no additional cost.

5. ***Dean's Letter:*** This document is scanned and uploaded by your medical school. It does not count as one of the four possible letters of recommendation. ERAS transmits the Dean's Letter to all selected programs on November 1st.
6. ***Medical School Transcript:*** The applicant's medical school also uploads this document.
7. ***Photograph:*** Students must provide their Dean's Office with a wallet-sized photograph for scanning and submission. However, residency programs are prohibited from accessing the photo until an interview has been granted.
8. ***Letters of Recommendation (LORs):*** ERAS allows applicants to assign up to *four* LORs to each individual residency program. However, an *unlimited* number of LORs can be solicited, scanned, and uploaded into the ERAS system. In the *MyDocuments* section, simply create a new LOR for each expected writer, clearly indicating the faculty person's name on the file. Print out the LOR cover sheet, check the appropriate box whether or not you waive your right to review the letter, and give the form to the writer. The faculty member returns the recommendation to your Dean's Office for scanning and submission. If you complete a stellar rotation in late summer or early fall, a LOR can easily be submitted after the others have been transmitted.

Selecting residency programs and assigning the appropriate documents is the final step in the application process. Your program selection list remains strictly confidential. For every program on the applicant's list, ERAS will automatically transmit the Profile, CAF, medical school transcript, photograph, and Dean's Letter. At this point, some personalization comes into play. For every program, ERAS will prompt the applicant to assign one personal statement and up to four letters of recommendation from the total submitted files. This feature allows medical students to customize the supporting documents each program receives.

THE "EARLY" MATCH: NON-NRMP SPECIALTIES

Of the 20 fields of medicine chosen by graduating medical students, all but 5 participate in the NRMP. These five specialties independently coordinate their own

match system on an earlier time frame. Applications are due in early August, interviews are conducted in the fall, and rank-order lists are due in early January. Match results are announced 1 week later. These lucky medical students will know their final destination about 2 months before the rest of their classmates.

Urology

In 1985, the American Urological Association (AUA) established its own matching program for all applicants seeking training for their first year of urology, regardless of their prior graduate medical education. The interview, ranking, and match process for urology applicants is similar to that of the NRMP. For a long time, all aspiring urologists had to contact each individual residency program to acquire an old-fashioned paper application. As of 2003, nearly all urology programs participate in ERAS. However, program directors and applicants still have to submit their rank lists directly to the AUA, instead of the NRMP. After announcing urology appointments in January, some programs require matched students to enter the NRMP. This step is simply a formality for matched students to acquire (via a single entry on the rank list) their guaranteed PGY-1 position in general surgery at the same institution at which they just matched for urology.

Neurosurgery, Ophthalmology, Otolaryngology, and Neurology

These four specialties participate collectively in an organization known as the *San Francisco (SF) Match*. Just like the advanced (A) specialties of the NRMP, training in these four areas of medicine begins at the second postgraduate year (PGY-2)—following an internship. Back in 1952, when the founders of the NRMP designed the new system for 1-year internships and for specialties that started at the PGY-1 level, budding neurologists and ophthalmologists still coped with the old system of early, pressured offers. At the time, the NRMP could not process both types of program appointments in its algorithm. In the 1970s, a separate match, supervised in San Francisco, was formed, which later evolved to incorporate the four specialties (neurosurgery, ophthalmology, otolaryngology, and neurology), as well as their respective fellowships.

The SF Match is similar to the NRMP except for the time frame. Be prepared for early applications, interviews, and matches. Fortunately, the SF Match has its own easy-to-use Internet application just like ERAS—the Central Appli-

cation Service (CAS). Interested students only have to provide one standardized application form and one set of supporting documents.

These four specialties begin training at PGY-2. What about the PGY-1 position? If you are applying to nonintegrated residency programs (which do not include a guaranteed internship year), you must apply and interview separately for PGY-1 positions through the NRMP. The early timing of the SF Match allows applicants to learn their PGY-2 appointment in January, before the mid-February deadline for submitting NRMP rank lists. This enables better coordination (particularly geographical) between the two matches. If a student matches with an integrated program, the PGY-1 slot is guaranteed. However, some programs still require these students to submit a single PGY-1 rank list to the NRMP as a formality. Most otolaryngology and neurosurgery programs offer integrated positions; the majority of ophthalmology and neurology programs require an outside search for PGY-1 positions (internal medicine, transitional, or surgery).

INTERNSHIPS FOR SALE: HOW TO SECURE A PGY-1 POSITION

Many of the specialized fields of medicine, such as ophthalmology and anesthesiology, begin residency training at PGY-2. According to NRMP classification, these are the *advanced specialties*. They require entering residents first to complete 1 year of broad clinical training, which is similar in scope to the old freestanding rotating internship required of all fresh graduates before its demise in 1970. Medical students who select a specialty with advanced positions have some extra work on their hands. Fortunately, the same application and matching system can be used to secure an internship position.

To meet PGY-1 requirements, there are three possible types of preliminary programs from which to choose. You have to decide for yourself what you want to get out of your PGY-1 year.

1. ***Preliminary Medicine:*** This track offers a 1-year rigorous experience in internal medicine. In most hospitals, the differences between preliminary and categorical (3-year track) interns on the medicine wards are minimal. They have similar clinical responsibilities, share the same call schedule, and admit the same number of patients. The only distinction is that preliminary interns sometimes are able to secure a few more elective months. Both community hospitals and academic medical centers offer preliminary medicine positions. You will learn a great deal of general medicine and how to take care of sick patients, both on the floors and in the intensive care unit. Stu-

TEN SURE-FIRE WAYS TO
GUARANTEE THAT YOU WON'T MATCH!

- Earn a USMLE Step I score of 180 (barely scoring above the 179 pass level).
- Choose a competitive specialty having earned mediocre grades in the corresponding rotation.
- Avoid doing an audition rotation or away elective because you are scared that they will think less highly of you.
- Apply only to the "top ten" programs in your specialty.
- Don't consult with a faculty member, advisor, or dean to help plan a realistic match between you and your possible list of programs.
- Never send a letter of intent to your top program stating that you plan on ranking them as your #1 choice.
- Don't have an advisor or chairperson make any calls on your behalf because you are afraid of inconveniencing the program director.
- Rank fewer than five programs on your rank-order list.
- Shorten your rank list because you received a flattering recruitment letter making you believe that the residency program was going to rank you at the top of their list.
- Don't select a preliminary year or other back-up option to place at the bottom of your primary rank-order list (for very competitive specialties).

dents entering advanced specialties that heavily emphasize internal medicine—like anesthesiology, dermatology, and neurology—often find it extremely helpful to complete their base year in preliminary medicine.

2. ***Preliminary Surgery***: Similar to its medicine counterpart, a position in preliminary surgery offers the exact same experience as that of an intern in general surgery. You will have the honor of rounding very early in the morning, managing postoperative patients on the surgical floors, taking call every third or fourth night, and rarely scrubbing in for cases in the operating room. What new medical school graduate would subject himself to such rigor? The answer is that most preliminary surgery positions are informally assigned outside the Match to applicants who have already matched into an early surgi-

cal specialty (urology, neurosurgery, and otolaryngology). This position serves as their general surgery internship. The remaining positions are sometimes chosen by students who believe that a pseudosurgical internship would best prepare them for residency, such as those in ophthalmology, emergency medicine, and anesthesiology. Realistically, most preliminary surgery positions are last-minute choices picked by scrambling students who failed to match into preliminary medicine or transitional year internships.

3. ***Transitional Year:*** Many medical students are confused by the role of transitional year programs. These highly competitive internships provide a diverse clinical experience that is fully accredited by the ACGME. Usually offered by community hospitals, transitional programs are cosponsored by two departments. The curriculum of a typical transitional year requires 4 months (minimum) of internal medicine, 1 month of emergency medicine, and 1 month of ambulatory medicine. Some programs also mandate months of surgery or obstetrics; others require critical care rotations. Regardless, all transitional year internships allow for 2 to 6 flexible months of electives. At some hospitals, the clinical duties of a transitional intern (especially during elective months) are so minimal that they consider themselves fifth-year medical students. Because of these many months without call or weekend rounds, competition for transitional year spots is quite intense. In the 2002 Match, only 8% of the 1062 available positions were unfilled. One word of caution: Unlike preliminary medicine or surgery, transitional years only count for PGY-1 credit in advanced specialties. If you switch later to a categorical specialty (such as internal medicine or pediatrics) during the transitional internship, you will have to repeat another PGY-1 year.

After deciding on one (or more) of the PGY-1 alternatives, it is time to apply. There is one more important item to clarify. Many specialty programs also offer, in addition to their advanced PGY-2 track, several categorical positions that *include* the PGY-1 internship year, typically at the same institution or affiliated hospital. For example, in 2002, the anesthesiology residency at the University of Chicago Hospitals offered six advanced positions and six categorical positions. All twelve residents started anesthesiology training as PGY-2s, but the advanced residents had to secure their own internships independently, whereas the categorical residents completed their PGY-1 year at the University of Chicago Hospitals. The bottom line: When making your final list of residency programs in these specialties, make sure to check carefully which ones offer both advanced and categorical slots.

The ERAS system makes applying for a PGY-1 internship quite simple. You simply transmit your application file to selected programs as if applying to multiple specialties (e.g., dermatology and internal medicine; ophthalmology and transitional). Here are some final tips for this important part of the application process:

1. When applying to preliminary medicine or surgery positions, look up the program under the categorical listings, but make sure to check the box labeled *preliminary track*.
2. Most medical students apply for PGY-1 positions either in the location of their medical school or in the anticipated city of their desired PGY-2 residency. Do you really want to move twice? This approach also keeps the interview process simple, sane, and easier on the checkbook.
3. You do not have to write a new personal statement for these positions. Most students either submit the same statement written for their primary specialty, or they modify it slightly to tailor it to preliminary programs.
4. The same letters of recommendation can also be assigned to PGY-1 programs. The directors all know that their interns will be leaving after 1 year. The more competitive preliminary medicine programs, especially those at academic medical centers, often prefer a Chairman's Letter from the Department of Medicine. Consult your advisor on how to obtain one.
5. Apply to a sufficient number of programs to ensure that you will match! Every year, qualified students who do not take this part of their application seriously find themselves unmatched for a PGY-1 position. If you do not want to scramble for a surgery spot, never gloss over the preliminary year as an afterthought. Hospitals are cutting back on the number of preliminary positions. The high numbers of competitive applicants in radiology, dermatology, and other highly desirable departments, are all vying for the same cushy transitional internships. Do not find yourself left out. If you put an equal amount of effort into both the primary specialty *and* the PGY-1 programs, there should be no surprises on Match Day.

APPLYING TO MORE THAN ONE SPECIALTY

Most advisors tell medical students who are interested in a very competitive specialty (such as orthopedic surgery or dermatology) to apply to a backup specialty

as a safeguard. The following advice also applies to medical students who remain undecided between two specialties and want to postpone the decision until they create the final rank list.

Thanks to ERAS, applying to more than one specialty is actually quite simple. You simply have twice the amount of work to accomplish: two personal statements, additional subinternships and audition rotations, more letters of recommendation, and more interviews. Once these are completed, the electronic paperwork is easy. ERAS sends the same CAF to both specialties and allows the applicant to customize personal statements and recommendation letters for each specialty program. The NRMP is equally flexible. The computer ranking system is designed to accept multiple specialties, program types, and locations—all on a single primary rank-order list.

AFTER THE INTERVIEW: COMMUNICATING WITH RESIDENCY PROGRAMS

The gamesmanship of the residency application process rears its ugly head particularly once the interview season ends. Just like for any job interview, most candidates send an appropriate thank you note to each of their interviewers. However, the NRMP explicitly prohibits applicants and program directors from asking the other party about their ranking commitment. Instead, they can only *voluntarily* reveal their ranking intentions. Both parties then start flooding each other with letters, e-mails, and phone calls in an attempt to convey interest and obtain assurance. Opinions on whether these attempts actually influence final ranking decisions in their favor vary greatly within the academic medical community. The NRMP stipulates that both parties "can express a high degree of interest in each other but must not make statements implying a commitment." Unfortunately, nonbinding statements like "We intend to rank you highly" or "We hope to work with you next year" are frequently misinterpreted as false promises. Both students and programs have experienced their share of disappointment. Now, neither group trusts the other.

After deciding on the dream program, many medical students send an official letter to that program informing the director of their intention to rank it as their first choice. They also compose letters to their next ranked programs to let them know they are "among their top choices." Do these letters actually make a difference when program directors sit down and rank students? Based on surveys

A STEP-BY-STEP GAME PLAN FOR THE MAIN MATCH

May–June (End of Third Year)

- □ Narrow specialty of choice.
- □ Plan senior year schedule.
- □ Arrange for audition rotations.
- □ Meet with Dean to review academic record and discuss competitiveness.
- □ Talk with graduating seniors about specific residency programs.
- □ Select an advisor in the department of your chosen specialty.

July–August (Fourth Year)

- □ Begin drafting the personal statement.
- □ Take application photos.
- □ Contact faculty members who will be writing your letters of recommendation.
- □ Register on-line for the NRMP Main Match—$40 fee.
- □ Gather information in residency programs through the Internet. Use general search engines or FREIDA.
- □ Pick up your ERAS token from the Dean's office to begin working on your on-line application.

September

- □ Complete final draft of personal statement.
- □ Finalize list of possible residency programs.
- □ Complete and submit the ERAS application on-line. The ERAS system does not allow electronic submission until September 1st; however, it is in your best interest to apply as early as possible.
- □ Your Dean's Office will upload your transcript, recommendation letters, Dean's Letter, and application photo.
- □ Use the Application Document Tracking System (ADTS), a feature of the ERAS website, to verify document transmission to each of your programs.
- □ Follow-up on any missing documents.

A STEP-BY-STEP GAME PLAN (*CONTINUED*)

November–January

- ☐ ERAS releases the Dean's Letter to all applied programs on November 1st.
- ☐ Respond to all interview offers promptly and arrange a schedule of dates.
- ☐ Complete all interviews.

February

- ☐ Discuss your highest program choices with your advisor or department chairperson and determine whether or not a phone call can be made on your behalf.
- ☐ Send letters to your highest-ranked programs.
- ☐ Complete Rank-Order List (ROL) on-line through the NRMP Main Match web site. Rank lists are due by midnight on the third Thursday in February.

March (3rd week)

- ☐ Monday: Un-Match Day—All applicants are notified of their match status (matched or unmatched).
- ☐ Tuesday: Scramble Day—Unmatched applicants contact programs with unfilled positions.
- ☐ Thursday, 12:00 PM, EST: Match Day—All applicants find out where they have matched.

evaluating the ethical behavior of both parties in this process, a recent study found surprising results.[2] Nearly 84% of program directors were skeptical of these informal commitments, because the majority had previously failed to match a top choice who sent in such a statement. In addition, most (91%) believed that applicants in some instances lied to them outright about their supposed interest.

The same study found, however, that residency programs are equally culpable. Nearly all (94%) program directors felt that the Match process encouraged dishonesty with applicants. Because directors like to brag about filling their program without going far down the list of their top choices, many coerce students into revealing where they intend to rank that program. Even though programs have the right to convey that they are strongly interested in a particular student's

candidacy, many send letters implying a high or guaranteed match. In spite of these words of encouragement, program directors, like students, often change their minds right before the Match and switch rankings. In the end, the medical students who ranked highly those programs that assured them of a high ranking (or match) are disappointed.

If you decide to submit a first choice letter of intent, *never* send the same letter to your second, third, or lower choices in an attempt to improve your chances. Be sincere about your intentions. Many program directors, especially those in smaller specialties, talk among themselves about candidates for whom they are all competing. Residency programs often give a higher ranking to applicants who state that the program is their first choice. Directors are furious when they rank that candidate within their quota but fail to acquire him or her because he or she has either lied or changed his or her mind. They must then resort to matching with a less-desirable candidate or filling the vacant spot with a student from the bottom of the unmatched applicant pool.

There are potentially serious consequences for dishonest students. The residency program can report the infraction to your medical school dean and blacklist future applicants from your school (by not offering interviews). The director can also give details about your dishonesty to the program at which you matched. The ensuing stigma could affect future fellowships and jobs, and follow you around for the rest of your professional career. The bottom line: If you choose to play the love letter game, *always* be honest!

CREATING YOUR RANK-ORDER LIST

Once the final interview is over in late January or early February, the next step is to assemble the official Rank-Order List (ROL). Of course, you can only rank those programs at which you interviewed. At the same time, program directors are ranking some (or all) of the candidates they have seen throughout the application season. The final preferences of both parties determine the Match outcome between applicants and programs.

In mid-January, the Main Match section of the official NRMP web site will open rank lists for creation. This is the same web site at which you registered sometime during the previous summer. The system closes exactly at 11:59 PM EST on the third Thursday of February. The NRMP recommends that all applicants enter their ROLs early to avoid on-line inaccessibility due to server overload. By inputting programs well before the deadline, students will have enough time to reflect on their choices in case any last minute changes need to be made. The system

allows applicants to modify the rank lists as many times as necessary before the deadline. The ROL is not officially submitted to the NRMP until the student electronically certifies the list and receives immediate confirmation via e-mail.

Types of Rank-Order Lists

Primary Rank-Order List This is the main list on which students place their desired specialty programs in order of preference. The programs can range from a simple list of psychiatry programs in New York to a complicated mix of different specialties and program types (categorical, advanced, or preliminary). It all depends on the applicant's preferences and needs. Students applying in very competitive specialties, such as dermatology, often rank preliminary medicine programs at the bottom of the primary rank list (after the dermatology programs) as a backup in case they find themselves unmatched in their desired specialty.

Supplemental Rank-Order List This list is used only by students who rank programs with advanced (A) positions on their primary rank lists. These applicants need to supplement the advanced programs with a PGY-1 position in preliminary medicine, surgery, or transitional. The NRMP allows for flexibility when creating supplemental lists. Students can use one supplemental rank list for all of their advanced programs or, at the other extreme, even create multiple supplemental lists—one customized for each advanced position. This convenience enables applicants to match the geographic location of their preferred PGY-2 positions with their corresponding PGY-1 rankings. Remember, it is still possible to secure an advanced program and fail to match to a PGY-1 position from the corresponding supplemental list. If that happens, you are committed to attending the PGY-2 program and must scramble for unfilled PGY-1 slots on Scramble Day.

List Guidelines

1. Rank the Programs in Order of Your True Preferences Always place your number one dream program, even if it is a long shot, in the #1 rank position. The student-favored computer algorithm will first scan the applicant's rank list in an attempt to match the highest choice. It is impossible to predict your position on a program director's rank list. And, where you rank a program on your list will in no way affect where you stand on that program's own list. Never place any program above the one that you really want simply because you think your chances for matching at your second choice are better. Because it is

impossible to game the system with such a strategy, always follow your heart and make a ROL based on the order that will make you happy. Medical students who speculate too much about program directors' rankings, or who place too much trust in their promises, often find themselves burned on Match Day.

2. Do Not Rank a Program on Your List That You Would Not Attend Under Any Circumstances All medical students are committed to entering the residency program at which they matched. Choose wisely. Do not place an undesirable program on your list simply for the sake of extending the length of the ROL. A long rank list does not affect the likelihood of matching to programs high on the list.

3. Do Not Shorten Your Rank List Because of Promises Made for Positions Every year there are disappointed medical students who failed to Match into programs despite having been verbally assured of their very high ranking. Be appreciative of positive feedback, but never take verbal commitments seriously. Students should always create a rank list without these promises in mind. After all, program directors, who have to interview about 10 applicants for each position, are anxious to make every applicant feel special.

4. No Matter What Specialty, Rank Enough Programs to Ensure That You Will Match All medical students should rank at least five programs (of any type) on the primary ROL. The NRMP allows applicants to rank up to 15 programs before incurring additional fees of $30 per program. In 2002, matched US seniors ranked an average of 7.96 programs; unmatched applicants had ranked 4.62 programs. The actual number really depends on the competitiveness of the intended specialty, the competitiveness of the desired programs, and the qualifications of the applicant. Even for noncompetitive specialties, like pathology or physical medicine and rehabilitation, there is fierce competition for the highly sought after top programs.

THE MATCH ALGORITHM: THE LONGEST 6 MINUTES OF YOUR LIFE

The NRMP uses a super-computer to process tens of thousands of rank-order lists, submitted by medical students and residency programs, in just 6 minutes. A newly revised algorithm creates the final matches. By starting at the top of the *applicant's* rank-order list, this student-optimal algorithm is on *your* side—not the pro-

grams'.[3] The following example illustrates how the applicant's primary ROL powers the action.

Medical Student XX is applying for internal medicine, and her top three choices are (1) University Hospital, (2) County Hospital, and (3) Suburban Hospital. The computer processes all the rank lists in a completely random order. When this student's ROL comes up for scanning, the computer looks first at her number one choice. The algorithm then scans the rank list from the internal medicine program at University Hospital. At this point, there are two possible pathways:

(a) If there are open spots in the program, a tentative match is made.
(b) If there are *no* available spots (meaning all positions have been tentatively matched already), then rankings are compared:
    1. If the student's rank on University Hospital's list is *higher* than that of the lowest-ranked applicant already in a tentative match with University Hospital, Student XX will replace that less-preferred applicant and obtain the tentative match.
    2. If the student's rank on University Hospital's list is *lower* than that of the lowest-ranked applicant already in a tentative match with University Hospital, the computer moves on to the student's second choice (County Hospital) and repeats the process until the applicant finally obtains a temporary match or until there are no more programs on her ROL.

The cycles continue over and over, running every applicant through the algorithm, making and breaking provisional matches. If a more highly ranked applicant replaces another student in a tentative match, the computer immediately attempts to create another temporary match for that bumped student, beginning at the first choice. The same process occurs with programs on supplemental rank lists (the algorithm only scans supplemental ROLs if an applicant is tentatively matched with an advanced program). Once the computer runs through all applicants, the temporary matches are finalized. Your destiny is printed out on a piece of paper, stuffed into an envelope, and then given to you exactly 1 month later.

BREAKING THE RULES: HOW TO PREVENT MATCH VIOLATIONS

When medical students or program directors officially register with the NRMP, both participants electronically sign an agreement to abide by the rules of the Match. In a recent interview, the director of the NRMP admits "it is impossible

to police something as big as this."[4] Match violations are common, but few are reported. This is why the NRMP believes that, despite making over 21,000 matches in 2002, "the vast majority of people are behaving with integrity."[5] Yet most would agree that this is not the case. Program directors desperately want to fill their programs with the best students, and medical students anxiously pine for their number one choice. Because medicine has traditionally been a competitive profession, we can assume that both groups have the potential to behave unprofessionally in an attempt to achieve their goals. A single breach of agreement negatively affects all applicants and programs.

Participants in the NRMP most commonly violate the following rules:

- Neither party may solicit or pressure the other to reveal their rank status or other form of commitment. But, the NRMP allows both groups to express interest in the other or to willingly share ranking information.
- Program directors cannot sign contracts with US seniors prior to Match Day.
- Program directors cannot pressure applicants to rank them #1 by guaranteeing these candidates a ranking within the program's quota.
- Unmatched applicants cannot begin contacting unfilled programs prior to 12:00 PM EST on Scramble Day.
- Both program directors and applicants must honor the binding commitment of the final Match result. The listing of a program or applicant on a rank-order list indicates a commitment to accept the appointment (provided that a match is made). Residency programs will release students from their Match agreements only in individual cases of serious hardship.

Because Match violations are rarely reported, most students are unaware of the consequences. For residents who are no shows at their matched programs, the NRMP stipulates that "failure to honor this commitment . . . will be a material breach of this agreement, and the NRMP is authorized to inform all interested parties, including the Dean of Student Affairs of the applicant's medical school, of such breach." To remedy the widespread problem of unreported violations, the NRMP is now considering stiff penalties. Residency programs could lose their accreditation for repeated offenses, and medical students may acquire a mark on their permanent licensure record. The Match system can only be fair and ethical when everyone—students and directors alike—abide by the rules like true professionals.

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10 LOVE AND MEDICINE: THE COUPLES MATCH

For those that subscribe to the belief that love conquers all, you will be happy to know that love can even triumph over the dreaded residency Match. During 4 years of education, medical students who are single often have more on their minds than memorizing drugs and bugs and reading good old *Harrison's* from cover to cover. After all, many physicians meet their life partners while in medical school. The sparks of love and lasting bonds could happen at any time, whether during first-year orientation or surgery clerkship. Today, nearly every graduating class has its share of student couples, and marriages in which both partners are practicing physicians are on the rise.

TWO DOCTORS, ONE MATCH

Just like their fellow classmates, medical student couples have to cope with the confusion, frustration, and uncertainty involved in choosing a specialty. But, for graduating seniors involved in a relationship, an additional hurdle awaits: the *Couples Match*. In this process, every couple has the same two goals: (1) to secure a residency position in the desired specialty of choice; and (2) to match at a program in the same hospital, city, or general geographic region.

The Couples Match is a special arrangement within the main residency matching system. In response to the increasing number of student couples as more women entered medical school, the National Resident Matching Program (NRMP) introduced the first Couples Match in 1984. It eliminated the chaotic behind-the-scenes negotiations couples used to secure residency appointments. The Match system now easily accommodates the additional flexibility medical student couples require to achieve their goals. According to NRMP data from the 2002 match, 543 couples (1086 applicants) participated in the Couples Match,

representing 4.6% of the total applicant pool of 23,459. However, there are also couples—such as those who participated in an early match—who coordinated a successful outcome *without* entering the Couples Match. Because NRMP data do not take into account these unofficial couples, the actual number of medical student couples is slightly higher.

In an official sense (meaning, for NRMP purposes), a *couple* is simply defined as two partners who are both graduating US seniors and who are entering the Match process at the same time. They can be from the same or different medical schools. Traditionally, most couples are engaged fiancés or married spouses. However, all types of couples can enter the Couples Match—boyfriends, girlfriends, newlyweds, gays, lesbians, or even close friends simply wishing to remain together during residency. Residency programs do not know which of their applicants are matching as couples, nor do they require couples to reveal the nature of their relationship. Technically, no romantic linkage is necessary. But before you and your best friend decide to Couples Match, remember that both partners in the relationship should be strongly committed to each other. After all, your futures (at least for the next 3 or more years) are intimately tied together. Based on recent Match statistics, the chances of matching together at the same hospital or in the same city are quite good (Table 10–1).

As described in Chapter 9, picking a specialty and then coping with the ap-

TABLE 10–1

STATISTICS FROM RECENT COUPLES MATCHES

Year	Number of Couples	Match Rate (%)
2002	543	95.1
2001	561	94.6
2000	508	95.3
1999	536	95.1
1998	525	94.2
1997	535	92.2
1996	504	90.5
1995	499	90.1
1994	446	91.6

Source: National Resident Matching Program.

plication and matching process as an individual applicant is hard enough. For couples, who have even more stressful challenges, the problems only multiply. In the residency application process, couples are usually limited to applying only to those programs with overlapping geography. If you are both applying in less competitive specialties, more flexibility exists due to the abundance of good residency programs within every major city. If one or both spouses are seeking extremely competitive specialties, the intense competition for a small number of positions will necessitate much more careful planning.

Because of the extraordinary amount of compromise and commitment involved, the Couples Match can cause much tension and anxiety throughout the fourth year of medical school. You should think long and hard and be sure that your relationship is ready for the stressful planning and possible outcomes. Read this chapter, talk with other successful resident couples, and consult with advisors and deans to discuss different strategies. By doing so, medical students who are planning lives together can prevent the unfortunate painful outcome of matching into programs that are thousands of miles apart (or even in a least preferred specialty!).

HOW THE COUPLES MATCH ACTUALLY WORKS

The residency application paperwork is the same for a couple as it is for an individual candidate. Both partners must separately fill out an on-line application through the Electronic Residency Application Service (ERAS), collect letters of recommendation, and arrange for the transmission of transcripts and Dean's Letters. The only point at which you are *officially* considered a couple occurs at the submission of the final rank-order list in February. When each partner registers for the Match on the NRMP web site, the system allows the applicant to indicate his or her intention to match as a couple. This process requires both students to enter each other's name and social security number into the system (and to pay an additional $15 per person for the privilege of using the Couples Match). Remember, the decision to match as a couple is not binding until the final submission of the rank list. You may *uncouple* yourselves at any point during the application and interview season.

Through the Couples Match, two applicants who are seeking residency positions actually *pair together* their individual rank-order lists. For every program on one partner's list, there is a linked residency program on the other partner's list. These entries must, of course, be placed in the exact same ranking position; meaning, the program placed in rank position #1 on partner A's list is considered

paired with an active program placed in the same rank position (#1) on partner B's list. Both lists, therefore, must contain an equal number of rankings.

After submitting the final lists (which may or may not be identical), the NRMP computer performs its magic. The matching algorithm of the Couples Match works the same way as it does for placing individual applicants into program slots. The couple will match to the most highly ranked *paired* set of programs on the list at which *both* partners have been offered a position. Because of the coupling involved, each partner receives the exact same choice on the ranking positions. If you fail to obtain matches as a couple, you will both be unmatched. The computer does not rerun the lists separately to generate individual matches.

Are you confused yet? Don't worry. Until you actually enter the programs into the on-line ranking system, the process may seem overly complicated. Take a look at the accompanying rank-order list of a fictional couple. It is a good illustration of the rules of the Couples Match and demonstrates a few of the possible outcomes.

Note that these lists are not identical. At first glance, you may wonder why the ranking preferences of this couple are different. On closer inspection, the geographical overlap of their choices becomes apparent. Both Brian and Rebecca clearly decided that UCLA was their first choice for their respective specialties. Their second, third, and fourth choices indicate that they both wanted to be in New York City if they were unable to match at their top ranking. Although this couple grouped their programs by city (Los Angeles, New York, Chicago, and Boston), an applicant can certainly mix and match different locations, as long as both partners' paired programs are in the same city. If a couple applies in the same specialty, each student does not have to rank the same programs.

On Match Day, both partners receive appointments only to those programs at the same ranking position. For instance, Brian and Rebecca could possibly each receive their first choice, fourth choice, ninth choice, or none at all. Because of the pairing, the computer does not perform individual matches. Consequently, several outcomes are never possible, such as Brian matching to his third choice and Rebecca matching to her first choice.

In addition, the computer system allows an applicant to rank a particular program multiple times to generate as many permutations as the couple pleases. This is the reason why Rebecca listed NYU twice in rankings #3 and #4, and why Brian listed Boston Children's three times in rankings #8, #9, and #10. With more options in a given location, this feature allows for greater flexibility to accommodate one of the partner's preferences. You should also note that this fictional couple submitted a rank list with 10 paired programs. The NRMP allows for a

BRIAN (*PEDIATRICS*)	REBECCA (*INTERNAL MEDICINE*)
1. UC-Los Angeles	UC-Los Angeles
2. Columbia Presbyterian	Cornell Medical Center
3. New York University	New York University
4. Cornell Medical Center	New York University
5. University of Chicago	University of Chicago
6. University of Chicago	Northwestern Memorial Hospital
7. Children's Memorial-Chicago	Northwestern Memorial Hospital
8. Boston Children's Hospital	Massachusetts General Hospital
9. Boston Children's Hospital	Brigham and Women's Hospital
10. Boston Children's Hospital	No Match

maximum of 15 rankings, above which each program incurs an additional $30 fee. This policy is identical for individual applicants as well.

Take a closer look at position #10 in this fictional couple's rank list. Their choices here illustrate another important feature of the Couples Match. To allow for additional flexibility in decision making, the NRMP provides the option of selecting *No Match* in any of the pairings. If one partner matches with the program in that ranking position, the other partner willingly chooses to go *un*-matched on Match Day. This selection ensures that the couple can remain together in the same city. The unmatched partner then has to scramble for an unfilled position or apply again the following year. In the 2002 Match, only 19 couples (3.5%) found themselves in this situation. If our made-up couple receives their tenth choice, Brian becomes a pediatrics resident at Boston Children's, and Rebecca scrambles for any open residency positions in the metropolitan Boston area (whether in internal medicine or any other specialty). This outcome is a small risk that some couples are willing to take to remain together.

OTHER ISSUES SURROUNDING THE COUPLES MATCH

One concern that medical student couples often raise is whether their couple status will place them at a disadvantage during the application process. In the 2002

match, 95.1% of couples (84% of whom were US seniors) obtained a successful match, and a remarkably similar percentage (94%) of individual US seniors also received a first-year residency position on Match Day. Based on these numbers, it seems that most couples perform the same in the Match as if they had applied and matched separately. This generalization, however, may not necessarily apply to couples in which one partner is a very strong candidate in a less-competitive specialty. For example, one successful couple, who applied in medicine-psychiatry and pediatrics, found the odds very much tilted in their favor. Program directors of medicine-psychiatry wanted the stellar candidate so badly that they called up the pediatrics residency director to improve the final ranking position of the partner. This situation only happens, of course, within the same institution. Medical student couples generally do not fit nicely into the formulas that program directors use for granting interviews and ranking candidates. Many times, departments often make exceptions for one another. On the other hand, if one or both partners are applying in extremely competitive fields, such as dermatology, there is less of an opportunity to use their couple status to increase their chances.

Regardless of specialty choice, applying as a couple should never decrease an applicant's chances of matching at his or her highest choices. Instead, the Couples Match usually has no effect on final candidate rankings, or, as illustrated above, yields an improved chance of matching. In general, residency programs look favorably on couples, no matter the level of commitment between the partners. Couples tend to be more stable applicants who are less likely to drop out of the program. In addition, couples who are residents in different departments, such as internal medicine and surgery, can foster better working relationships between two sets of housestaff. Thus, both departments gain something from accepting a couple into their institution.

If one or both members of the couple are applying to very competitive specialties, particularly outside the NRMP Match, they must be more strategic. In this complicated situation, one partner may be interested in an early Match specialty, such as otolaryngology, while the other plans to apply to orthopedic surgery. Non-NRMP matches, such as the San Francisco Match or the Urology Match, have no similar provisions for couples within their computer algorithms. Both organizations also do not coordinate matches with the NRMP. In these cases, your initial strategy should simply be to apply, interview, and rank as many programs as possible within the same cities or geographic regions. Candidates participating in the San Francisco Match will find out their results 1 month before rank lists are due for the NRMP. In this case, by knowing where one partner has already matched, coordination within couples becomes much easier.

If a couple consists of two stellar, highly desirable applicants both applying to extremely competitive specialties, another strategy is to negotiate with one of the programs for an out-of-Match contract. For example, one couple from the same medical school, John and Andrea, sought positions in urology and radiation oncology, respectively. John, an AOA applicant who was highly sought after by his top choice residency, informed the program director of their situation. The urologist then contacted the director of radiation oncology at the same institution and encouraged him to sign Andrea, also an outstanding candidate, through an out-of-Match contract. By working together, both departments ensured that the couple ended up together at their hospital.

By having so many different specialties and matching systems, there are scores of possible scenarios for the Couples Match. There is, however, one other important and common possibility to mention. What if one or both partners of a couple apply to advanced specialties, such as anesthesiology or radiology, which require a separate PGY-1 rank list? Unfortunately, the Supplemental Rank-Order List, which is used only for these internship positions, is not part of the Couples Match algorithm. As such, both partners must prepare this list separately. Because the goal is simply to remain in the same city during that year, you should only rank those PGY-1 programs on the supplemental list that are geographically acceptable. Otherwise, the hopeful medical student couple may find themselves in a long-distance relationship for this rather difficult year.

WORDS OF WISDOM: SIX TIPS FROM MATCHED-AND-MARRIED COUPLES

1. Good Communication Is the Key for Surviving the Couples Match Intact

After assessing your relative competitiveness in the application process, you should have an honest discussion with your partner about career goals and professional needs. Both partners should talk about what they are looking for in a residency program. The couple must decide together which desires are open to negotiation and which cannot be compromised. These needs may range from location to program size, or from the call schedule to research opportunities. Most likely, both partners will not fall in love with same programs or hospitals. As such, you should seize this opportunity in your relationship to be open and honest and to get to know your partner even better.

For new medical student couples, the decision about where to attend resi-

dency training may be the first significant compromise they have had to reach. Whether the issue is location, program, hospital, or even specialty, both partners must be flexible and open to negotiation. Without excellent communication throughout the entire process, the outcome on Match Day may elicit feelings of disappointment or resentment. But participating in the Couples Match can be a stress-free, even enjoyable, experience. Remember, the final decision on the ranked list of paired programs does not occur until February. Every couple can allay much anxiety by pushing the strategizing and compromising until the end. By doing so, medical student couples will prevent the Match process from creating any rifts in their relationship.

2. When Deciding Where to Apply, Geographic Location Is the First and Most Important Consideration

The purpose of the Couples Match is to ensure that both partners obtain residency positions in the same city, not thousands of miles apart. Thus, the first step in the application process is to decide together on the list of programs to which you are submitting applications. If a couple applies for the same specialty, they do not have to interview at all the same programs. Instead, simply apply to a large enough number of hospitals within the same city. Strong candidates in less-competitive specialties often have more freedom in interviewing at programs in smaller cities and towns. If one or both partners seek very competitive specialties, they usually focus their efforts on larger metropolitan regions, like New York City, Los Angeles, and Chicago. Because these areas have many hospitals with multiple programs in a given specialty, the odds of matching together are significantly higher.

3. Apply Early to as Many Programs as You Can

Because most medical student couples are typically constrained by geography, they submit more applications to increase their chances at matching in the same city. If one or both partners are seeking very competitive specialties, like dermatology, it is even more important to apply early to the longest possible list of programs.

4. Always Inform Your Interviewers and the Program Director That You Are Matching as a Couple

Although not all applicants mentioned their partners in their personal statements, nearly all agreed on identifying themselves as a couple during the interview and

postinterview stages. The NRMP does not reveal this information to residency program directors. At this point in the process, honesty serves you better than secrecy. Couples should be specific in mentioning the name of their partner and the specialty for which they are also interviewing. One successful couple, who sought positions in anesthesiology and radiology, felt that "we would not have matched if we had not told them we were couples matching."

5. Be Assertive and Aggressive as a Couple

The NRMP only knows that two applicants intend to match as a couple when the final paired rank-order list is submitted. As such, there may be times during the application and interview season when your status as a couple can help your chances at certain programs or hospitals. For couples applying in the same specialty, one partner may receive an interview at a desired program while the other does not. Instead of expressing jealously or resentment, be forceful and confident. Inform the residency program director of your intent to match as a couple.

For example, one couple from the same medical school, Julie and Ken, applied together to similar programs in internal medicine. At one competitive California program, Julie received an interview and Ken did not. When they explained their situation to the program director, Ken was promptly granted an interview. The moral of the story: couples should not allow their egos to prevent them from doing what it takes to make the Couples Match a successful reality.

6. The Perfect Couples Rank-Order List Involves Both Compromise and Strategy

Before entering the official rank list into the computer, both partners should first sit down and order their preferences alone. Ignore your partner or spouse, and disregard what you think the other would want. Instead, each of you must figure out your *own* rankings, and only then compare lists. At this point, couples should discuss, negotiate, and compromise on specific factors (such as location, size of program, call schedule, research opportunities, etc.). The only required common factor, of course, should be the same city. Otherwise, what was the point of entering the Couples Match?

In preparing the final rank list, refer to the guidelines in Chapter 9 on how to make a good rank-order list. In general, couples often rank two to three times more paired programs than an individual applicant does. As you assemble the preferences in order, remember that you do not necessarily have to match at the

same program (if applying in the same specialty) or at the same hospital (if applying in different specialties). The rank-order system allows all applicants, whether individual or couples, to enter many possible combinations, such as different program types, specialties, hospitals, and locations. The end result is a list of mutually acceptable programs in the same city where both partners are content to begin their training.

11

TOP SECRET! THE ULTIMATE GUIDE TO A SUCCESSFUL MATCH

For students currently in medical school, those tough premedical years may seem like a distant unpleasant memory. As a doctor-in-training, you have become accustomed to the competitive nature of medicine. Beginning in high school—and progressing all the way through college, medical school, residency, and fellowship—all aspiring physicians learned that they had to be the best. This is the only way to achieve one's career aspirations in medicine successfully.

To become a pediatrician, radiologist, or any other specialist, every medical student must earn a training position in a residency program. The competition for certain specialties and residency programs, however, can be rather intense. While trying to figure out which specialty is best for them, medical students still have to work very hard academically during these 4 years.

Unfortunately, many students rule out some specialty choices for fear of not being accepted. Everyone knows that some fields of medicine only have a limited number of coveted residency spots and an overwhelmingly large number of applicants. Other specialties are not as tough to match in. Instead, the fierce competition exists for the most highly regarded hospitals and institutions within that specialty.

RISING ABOVE THE COMPETITION

The residency application and matching process has become a discouraging series of obstacles. Regardless of specialty choice, planning for residency is a 4-year process. It takes a great deal of strategy (and luck) to make yourself the most mar-

ketable candidate. Why is all this advanced preparation necessary? For each field of medicine, there are many myths and rumors regarding the criteria necessary to obtain a particular residency. There are subtle and hidden requirements that students must meet to match into the specialty, such as board score cut-offs, personal statement topics, published clinical research, and more.

Due to the increasing competition for certain specialties, there is less latitude for mistakes. Whether you are a first-year student wondering what type of doctor you will become, or a fourth-year veteran starting the residency application process, careful planning is a must to enhance your credentials and ensure success. This chapter will prevent any career-related regrets by showing what it *really* takes to match into each specialty and into the residency program of your choice. For each specialty, I have summarized the advice provided by a number of medical school seniors, residents, faculty members, and residency program directors. For medical students interested in the extremely competitive specialties, this inside information will allow you to plan far in advance. There should be no excuse for not doing all the right things and being the strongest candidate possible. Pay close attention, and heed the advice of those who have come before you: successfully matched residents from all the major medical specialties.

Based on statistical information from the 2002 NRMP, San Francisco, and Urology Matches, I have ranked the 20 medical specialties into four tiers of competitiveness (see Table 11–1). The *unmatched rate* (percentage of US seniors who fail to match into their desired field of medicine) serves as an excellent indicator of the difficulty of obtaining residency in a given specialty. The numbers represent those US seniors who applied to that particular specialty *only*—without any back-up choices. The 20 major fields of medicine are categorized in order according to these data.

You should, however, interpret these rankings with a grain of salt. Many aspects of medicine are cyclical. The relative popularity (and therefore competitiveness) of any field of medicine can change over time. While assessing their level of academic achievement, medical students go through a great deal of self-selection before committing to a specialty. Ultimately, only the most highly competitive students apply to the ultra-competitive specialties, which can skew the final unmatched rates. Also, the difficulty of matching to a specific residency program may differ significantly from the overall competitiveness of the specialty. Remember, even in the less-competitive fields of medicine like family practice, the few positions in the top programs can be incredibly difficult to obtain. Competition, therefore, exists for *all* residency applicants, no matter the specialty of choice.

TABLE 11–1

SPECIALTY RANKINGS BASED ON 2002 UNMATCHED RATES FOR U.S. SENIORS

	Unmatched Rate (%)
Extremely competitive	
Plastic surgery	23.5
Ophthalmology	22.0
Urology	20.0
Radiation oncology	17.9
Dermatology	16.1
Very competitive	
Neurosurgery	15.0
Otolaryngology	15.0
Orthopedic surgery	14.9
Radiology	11.1
Emergency medicine	6.5
Competitive	
General surgery	5.4
Anesthesiology	5.2
Obstetrics and gynecology	4.3
Psychiatry	4.3
Neurology	3.0
Less competitive	
Physical medicine and rehabilitation	2.7
Pathology	2.1
Family practice	1.9
Internal medicine	1.6
Pediatrics	1.3

Source: National Resident Matching Program; San Francisco Matching Program; American Urological Association.

ADVICE FOR MEDICAL STUDENTS—BY SPECIALTY, A TO Z

Anesthesiology

Although the number of American medical graduates entering anesthesiology reached a low point in 1995, interest has steadily increased again. Program di-

rectors seek candidates who demonstrate excellence in one or two areas of interest—either an extracurricular activity, research, hobby, or academic achievement. Do something that makes you stand out from the rest. The pursuit of research is neither a requirement nor a prerequisite for matching at a top residency program.

During your preclinical years, strive to earn high grades in physiology and pharmacology. Several years ago, most residency programs did not consider board scores when evaluating applicants. Today, do your best to earn higher than 210 on the USMLE Step I to obtain an interview at the most competitive programs. During the clinical years, audition rotations at other hospitals are generally discouraged; they do little to improve your chances of matching at that program. Instead, spend your senior year learning medicine other than anesthesiology, like cardiology or critical care. Of course, you should take, at the minimum, one rotation in anesthesiology to confirm your interest and to collect letters of recommendation. Among your three to four letters, submit no more than two from an anesthesiologist; the rest should come from faculty in internal medicine or surgery. As always, a little name who knows you well is better than a big name who does not.

In your application, the personal statement should be a good read that clearly outlines your understanding of and interest in anesthesiology. Remember that poor grammar and spelling reflect on attention to detail, which is extremely important for this specialty.

Dermatology

In this extremely competitive specialty, most programs interview about 30 or so candidates (out of hundreds of applicants) for only two or three spots. Because of the stiff competition, future dermatologists must identify their interest very early in medical school. Because many students go into dermatology for the wrong reasons (lifestyle, money, etc.), interviewers screen for those who are passionate and truly committed to this challenging specialty. Get involved with the department as early as possible. Clinical research and publications in journals are extremely important for your candidacy, so find a research mentor during the preclinical years.

Board scores are also critical; earn the highest Step I score possible or else you may not make the cut. Nearly all programs heavily emphasize membership in AOA (the medical school honor society). In the clinical years, you will have to get lots of honors grades in your third-year clerkships to have the right numbers for interview selection. Take several electives in dermatology early in your

senior year. Scheduling audition rotations at programs of highest interest can improve your chances of matching. During these rotations, work hard to portray yourself in the best possible light to the faculty and, in particular, the program director. Remember, connections are important in this specialty. Often, who you know will provide the greatest chance of matching dermatology.

Most candidates submit applications to nearly every program in the country (upwards of 40 applications!). Three strong letters of recommendation from dermatologists are preferred, particularly with words like *outstanding, exceptional,* and *the best I've ever seen.* In the personal statement, explain how you arrived at the decision to enter dermatology and why your personality attributes are a good fit with this specialty. Be articulate and engaging, tell a compelling story, and use this opportunity to stand out from the crowd in a positive way. Above all, do your best to get into dermatology at the first shot. Candidates who are rejected and reapply the next year (*retreads*) are rarely successful.

Emergency Medicine

Selection committees like to see evidence that you are a healthy, well-adjusted person with interesting hobbies. During the preclinical years, it is highly advantageous to pursue research. Any specialty of clinical medicine is fine; program directors give bonus points for emergency medicine-related research. Immerse yourself in medical school and community activities, such as serving on committees, exploring emergency medicine interest groups, and volunteering Mother Theresa-style at local clinics. One successful candidate at a top program emphasized the importance of extracurriculars, especially "things that are outdoorsy, wild, crazy, or can kill you."

For this very competitive specialty, strive for USMLE Step I scores above 220. If your results are low, program directors recommend taking Step II early during senior year and earning higher scores. During the clinical years, earn high grades in medicine and surgery. Competitive candidates should then complete at least two rotations in emergency medicine—one at their home institution, the other at an audition hospital. The most desirable away rotations fill up quickly, so plan these fourth-year electives very early.

Because emergency medicine is a small community, obtain two letters of recommendation from EM faculty physicians. A strong letter from a community preceptor carries less weight than one from a program director or departmental chair. Most programs also prefer to see letters from every emergency medicine clerkship completed. Otherwise, their absence will raise concerns over your perfor-

mance in those rotations. Finally, program directors place less emphasis on the personal statement, but it still should be well-written. The essay should convey how you selected emergency medicine, why your personality and temperament are well-suited for this specialty, and what you plan to do with your training.

Family Practice

Although family practice is a relatively noncompetitive specialty—with plenty of residency positions nationally for everyone—the most desirable and highly ranked programs are intensely competitive and still get their share of stellar applicants. Program directors like students who are heavily involved in extracurricular activities, particularly clinically related pursuits in which they interact with members of their community (volunteering at local clinics, education in schools, etc.). Make sure to work hard and obtain leadership roles in these organizations.

Although research projects look nice on paper, it is not essential to publish an article or present an abstract to match into family practice. You should study hard for the USMLE Step I, but stellar scores are not necessary. Aiming for the mean is perfectly adequate for success in the match. In the clinical years, complete a community-based family practice elective, in addition to your medical school's core clerkship. Work hard to impress your attendings. If you are interested in a particularly competitive residency program, it is advantageous to complete an audition elective there. Because family practice is such a broad specialty, the remainder of the senior year should be spent in a variety of medical fields, from obstetrics to critical care.

After grades earned in third-year clerkships, program directors place the greatest emphasis on your three (or four) letters of recommendation. At least one should be from a family practitioner, but the remainder can be written by virtually any other specialist—internist, surgeon, or obstetrician. (Some programs may specify certain departments from which the letters should originate, so make sure to check carefully ahead of time). Above all, pick references from physician who know you very well, particularly when it comes to your clinical abilities.

Selection committees also highly value the personal statement, second only to letters of recommendation. The essay should be very well-written, personal, and engaging. Appropriate topics include a description of your involvement in significant extracurricular activities or other relevant personal experiences, the reasons for choosing a career in family practice, and the specific aspects of a training program you are most seeking. A good personal statement allows the program director to have a good sense of your character, values, and goals. Overall, there

is little specific preparation for a successful match in family practice, so enjoy your medical school years and make an effort to become a very well-rounded physician.

General Surgery

Over the past several years, there has been a steady decline in the number of applicants (particularly US seniors) to general surgery programs. Although you do not have to be the most elite medical student to enter this specialty, the competition still remains fierce for the most prestigious academic programs. Your academic credentials are most important. At some point during medical school, students should get involved with surgical research that could lead to a publication. If you want to be competitive for any program in the country, make it your personal goal to earn high clerkship grades (especially in the core surgery rotation—this is crucial!), election to AOA, and ranking in the top quarter of your class. Strive for Step I board scores well above the mean (>215). It is also very helpful to take the Step II examination early and score well—it reflects your application of clinical knowledge.

In your senior year, work hard during a month-long subinternship at your own institution. If you are interested in a particular program, sign up for a senior audition elective there (a maximum of two) and work hard to impress them on-site with a stellar performance. If you do, you will improve your credentials and look better than your fellow applicants, which could help you match. From all of your surgical experiences, choose three senior surgery attendings to ask for strong letters of recommendation. Ideally, they should be people who have worked directly with you and know you well, especially if they know your personal strengths in addition to your surgical skills. Letters from basic scientists or residents carry much less weight than those from the chairperson or program director at your medical school.

After applying, it can be helpful to use contacts to increase your chances of matching, so have your departmental chairperson make some phone calls on your behalf. Selection committees are looking for candidates with desire, work ethic, and the ability to get the job done. For this reason, some programs may be more open to review your complete record and overlook any academic deficiencies by valuing any other accomplishments, like volunteer and community work or other significant extracurricular activities.

Internal Medicine

Because there are hundreds of internal medicine programs, your chances of matching into this specialty are quite high. The stellar candidates all apply to the most prestigious hospitals; here, the competition is quite stiff. If aiming for these top-ranked academic programs, you need to strive for the strongest academic record possible. Earn high scores on the Step I boards and honors grades in your medicine rotations. Research is not essential, but can be helpful. Passion for nonmedical activities and interests is also important, so get involved in your community through leadership positions or other commitments.

In the senior year, audition rotations are unnecessary and sometimes risky. After all, simply getting stuck with a bad attending could ruin your chances of matching at that program. The selection committees read your letters of recommendation closely, so make sure to request references from physicians who know you well. For the most academic programs, it is imperative to obtain a recommendation letter from the departmental chairperson at your school. You should also submit two other letters from senior medical faculty (either third- or fourth-year rotation attendings).

Although the personal statement is less important, an excellent essay could clinch an interview for a borderline candidate, and a poorly written one could exclude a superior applicant. Successful residents in internal medicine recommend all candidates to be honest and enthusiastic throughout the entire process, complete their applications early, and notify their first choice program about their genuine interest.

Neurology

This specialty is becoming more popular among medical students. During medical school, research experience in neurology (either clinical or basic science) is very helpful, though not required. Your extracurricular activities are less influential factors, but you should try to score well on the USMLE Step I. In the clinical years, honors grades in neurology clerkships and subinternships are essential for matching at your top choice program. To prove your interest and commitment to neurology, get as much clinical experience as possible.

Away rotations are helpful in checking out any highly desired programs. When evaluating applicants, however, the three letters of recommendation carry the greatest weight among program directors. Two should be written by neurologists. The more renowned or senior the faculty member, the better. Addition-

ally, the letter writers may have personal contacts at hospitals where they completed their residency or fellowship, which could increase your chances of matching. But make sure that you have worked with them enough to elicit a good letter; a lukewarm one may actually hurt your application. Although the personal statement is less important, a poorly written essay—especially if filled with bad humor or philosophical diatribes—would undermine an otherwise stellar opinion of your candidacy.

Neurosurgery

Historically, this extremely competitive specialty has always attracted the very best and brightest medical students. Get involved with the department at your medical school early on. During the preclinical years, study hard so that you will be prepared for the USMLE Step I examination. Neurosurgery residency programs often have cut-offs for academic credentials. Although earning a top score of 270 does not necessarily guarantee a Match, it will certainly keep you in the pool of highly sought after candidates. You should aim for a score in the mid-240s.

Extracurricular activities only matter if they are significant. It is much more impressive to have a few outside interests to which you are truly dedicated or in which you had a leadership role. Life experience and achievement in research, however, are more valuable than extracurricular activities. The highly competitive programs basically require some form of research. After all, everyone loves students who have published a lot. At many places, you will interview not only with neurosurgeons, but also with neuroscientists associated with the department. In the clinical years, work hard to get stellar grades in your surgery and medicine clerkships, as well as the neurosurgery subinternship. AOA membership is helpful, but not necessarily a prerequisite for matching.

Audition rotations at other hospitals are generally not helpful. No matter how many physicians you may impress, it only takes one faculty member or resident whom you may have rubbed the wrong way to keep you out of the program. If you are a strong applicant, only complete rotations at your home institution. Program directors generally value letters of recommendation only from neurosurgeons. Obtain at least three of them, particularly from the chairperson of the department at your medical school. Because the personal statement is more likely to hurt you than to help, keep it neutral (unless you have something really amazing to say). At application time, apply to as many programs as possible. Your best chances of matching are often at your own institution—where people know you, like you (hopefully), and want you to remain there for residency. Because neu-

rosurgery is a very small community, the interview ends up being an extremely important factor for selling yourself to selection committees.

Obstetrics and Gynecology

Although fewer medical students are entering obstetrics and gynecology, it is still a moderately competitive specialty (especially for the most highly ranked programs). During the preclinical years, spend time getting familiar with the field. You should find a mentor within the department, go to grand rounds, and attend national meetings if possible. Extracurricular activities are important credentials, so make sure to do some volunteer work related to women's health in underserved settings (like STD clinics). Research is not necessary for matching, but it looks great—especially as an ongoing interest rather than an isolated project.

To be most competitive, students should earn a score of 215 or higher on the USMLE Step I. Work hard during the required OB/GYN clerkship for an honors grade. During your senior year, you should take additional electives in the specialty. For the most competitive programs, audition rotations can be very helpful (but only if you make a good first impression). Applicants must obtain at least two letters of recommendation from prominent and well-respected obstetricians-gynecologists. The ideal references are upper-level faculty members and the departmental chairperson. After all, connections are important. Additionally, your personal statement should concisely explain your interest in obstetrics-gynecology and how your community service experiences will lead to better patient care. Although the numbers are important, selection committees ultimately look at the bigger picture. They want residents who are personable team leaders, go the extra mile, and have positive attitudes.

Ophthalmology

Stellar grades, high Step I board scores (average was 225), and AOA membership are very important for matching into this second most competitive specialty. Although high academic achievement is a prerequisite, most program directors place the greatest emphasis on a candidate's letters of recommendation, clinical evaluations, and interview. Many are willing to consider the applicant as an individual with unique abilities and talents and look past any minor academic deficiencies—but only if compensated for by other outstanding qualities. Demonstrate your interest and commitment to ophthalmology by getting involved in

clinical research projects, spending time shadowing residents and faculty in clinic, and scrubbing in on lots of surgeries.

Depending on your school's policy, complete electives in ophthalmology as early as possible. To improve your chances of matching, it is advantageous to do a few away rotations at programs of highest interest. (Just make sure to work hard and impress them with your superior knowledge base). Obtain at least one glowing letter of recommendation from an ophthalmologist who knows you well, especially if he or she is the chairperson or program director. Mediocre references—ones that do not give any insight into your performance—from well-known names can actually be detrimental.

Inundated with top-notch candidates, selection committees often use the personal statement as a deciding factor for interview invitations. Your essay must be more than interesting, informative, and readable; it should differentiate you from other applicants by showing the intangibles that make you a good doctor. Because most programs grant interviews on a rolling basis, aspiring ophthalmologists should submit their applications as early as possible.

Orthopedic Surgery

This very competitive specialty requires a great deal of planning for success in the Match. Medical students need to work hard throughout all 4 years to achieve the best academic record possible. Earn stellar grades in all of your classes and rotations (especially the surgical ones!), because many competitive programs screen out candidates who have not been elected to AOA. Meaningful research projects, especially in orthopedics, can look very good on your application and will boost your credentials. Programs really put a lot of emphasis on having high board scores, so it is important to do well on the USMLE Step I. Although there is no magic number for making the cut for an interview, aim for a ballpark range around 230.

Orthopedic surgery is one specialty in which it is almost mandatory for students to complete as many well-planned audition rotations at other hospitals as possible. You must work your butt off and shine (without being annoying). Many applicants with less-than-stellar credentials can maximize their chances of matching by impressing the program director with hard work during a subinternship. Most students send out upward of 40 applications. Candidates should submit three to four letters of recommendation, which are typically the most important part of the application. At the minimum, two should be from orthopedic surgeons who know you well, especially if he or she happens to be the program director or

departmental chairperson at your medical school. Avoid sending letters from nonsurgical specialties like pediatrics, psychiatry, or internal medicine.

The personal statement should be brief, concise, and honest. Discuss what makes you unique and how you came to choose orthopedic surgery, but leave out any poetry or quotations and do not mention your parents if they are also orthopedic surgeons. Avoid listing personal inquiries as a reason for career choice. Around the time of assembling rank lists, have your advisor or chairperson make calls on your behalf if possible. After all, being proactive and using connections may sometimes make or break your chances at matching at a first-choice program.

Otolaryngology

Like other surgical subspecialties, otolaryngology (or *ENT*) is very competitive to match. You have to excel at many areas to stand above the rest of the competition. First, from the beginning of medical school, get to know the faculty at your institution so they can guide you and help you. Nearly all programs seek applicants with extensive research experience, particularly in ENT. Early in the preclinical years, make an effort to seek out an otolaryngologist and get involved in some small basic science projects or case reports. Although it is still possible to match into ENT without research, having your name on a published paper or presenting a poster at a national conference will only further enhance your credentials.

When it comes time to take the Step I board exam, you should aim for breaking at least 220. (If you score below 210, it might be wise to have a back-up plan, such as applying for general surgery as well). During the clinical years, an outstanding performance in surgery is the bare minimum. Future otolaryngologists should also earn honors grades in medicine and other clerkships. With top grades, membership in AOA gives an applicant an advantage. However, it is important to know that many students without AOA match at top academic institutions, and others with AOA status can find themselves unmatched. This is why letters of recommendation are very important in otolaryngology. You should obtain references from at least two otolaryngologists, particularly from someone well-known in the field. In the small ENT community, everyone knows each other, so connections can make a big difference. To obtain stellar letters, complete at least one audition subinternship at a large academic hospital with a well-known department. Work hard on these rotations and impress the faculty members. When it comes time to apply, students should submit as many applications as financially feasible. In the personal statement, make sure you clearly state your reasons for

entering a career in otolaryngology. At rank list time, applicants should have as many programs as possible in order to ensure a match.

Pathology

As more American medical graduates discover pathology, this unassuming specialty has become competitive again. In fact, the top-ranked programs like to see candidates with Step I board scores of about 220 or higher. In your preclinical years, learn all the basic sciences well. Research projects, publications, and presentations at national meetings are important credentials for matching at the most academic programs. A few of these institutions even do not consider granting interviews to anyone without a PhD in a basic science discipline. All students should demonstrate a committed interest in pathology, primarily by completing a month-long rotation. After the second year of medical school, some apply for competitive *post-sophomore fellowships*—1-year positions in which they function at the level of a pathology resident.

Although pathology is developing more interest among medical students, some applicants come to it later in their training. The absence of specialty clerkships, therefore, is not viewed as an absolute negative for matching in this specialty. During the senior year, audition rotations (which are generally unnecessary) could substitute for not having a PhD when applying to the most competitive programs. To impress the program director, you should always take the initiative, help out the residents, and conduct many literature searches during these rotations. At application time, letters of recommendation from any type of clinical faculty are acceptable; make sure at least one comes from a pathologist who knows you well. Most important, in the personal statement and interview, never say that you chose pathology because of "lifestyle reasons." Doing so will instantly drop you to the bottom of every director's rank lists.

Pediatrics

The fun-loving nature of pediatricians makes applying for this specialty a much more enjoyable process. There are excellent programs all over the country at both university and community hospitals. If you are seeking a position at top programs in pediatrics, the competition is stiff. You will need higher board scores and stronger clinical grades than your peers. During medical school, it is not necessary to pursue research to enhance your credentials. Instead, take the time to immerse yourself in outside interests and other extracurricular activities, particu-

larly those that involve kids. Become involved in substantial leadership, volunteer, or research projects. There are no unofficial board score cutoffs for pediatrics. Earn an honors grade in your required pediatrics clerkship, and follow this up with a stellar performance in a subinternship.

If you are interested in exploring a particular program, away rotations are helpful but not necessary. Most candidates submitted about 10 applications. Obtain letters of recommendation from one or two pediatricians who know you well. The rest can come from any specialty. If you are set on a particular program, do an outside rotation there, work hard to impress them, and obtain a letter of recommendation. The personal statement, an important part of the application, should be honest and straightforward and discuss how you decided on a career in pediatrics. Do not simply say "I love kids"—prove it with examples of what you've done. Pediatricians are easy-going folks in general. They are mainly interested in whether they will be able to work with you for 3 years, so relax!

Physical Medicine and Rehabilitation

This specialty has been largely undiscovered by most medical students. Positions in physical medicine and rehabilitation (PM&R) are available for nearly any interested student. Like most specialties, however, competition for the most highly ranked programs is intense. In the preclinical years, pursue outside interests that relate to the practice of physiatry, like working with disabled people, athletic events, or public health issues. Research experience will definitely provide a distinct advantage when attempting to attract the interest of the top academic-based training programs. But just because applicants to PM&R do not have publications or presentations listed on their resumes does not mean that they are locked out of this specialty. It is certainly by no means a requirement. This specialty is, after all, broad enough to attract physicians with a wide variety of talents, education, and personal backgrounds. So go ahead and pursue your own interests and extracurricular activities. Just make sure to study enough to earn an above average score on the Step I board examination. This will place you in a comfortable position to be competitive during the application process.

In the clinical years, solid performances in the internal medicine, neurology, pediatrics, and surgery core clerkships are important. Complete a PM&R subinternship or elective early in the fourth year to make sure that it is the right specialty for you. Depending on the specific institution, audition rotations may have some benefit. If you want to enhance your chances of matching at a certain hospital, make sure to work hard during an away elective because selection com-

mittees will keep a close eye on you. You will need three letters of recommendation, with at least two of them from PM&R physicians and the remainder from other core fields. Obviously, if you are interested in pediatric rehabilitation, a reference letter from a pediatrician with whom you have worked is logical. Likewise, if someone has an interest in sports medicine, a letter from an orthopedic surgeon who practices sports medicine would be suitable as well. Just be sure, however, that the accompanying personal statement is truly personal, honest, and well-written. Make sure to explain genuinely how you became interested in this field of medicine. Be creative, but avoid gimmicks.

Depending on their credentials, most candidates apply to around 10 programs to ensure a match. If possible, have a well-placed connection make a tactful phone call on your behalf to a program director. Most important, never say that you chose this field because of the lifestyle, or that PM&R is a backup specialty after orthopedic surgery. It will be doing yourself and that residency program a huge disfavor.

Plastic Surgery

It takes a lot of preparation and achievement to match into plastic surgery—the most competitive specialty among all areas of medicine. Hundreds of impressive candidates are seeking one of the few spots in the integrated, or categorical, plastic surgery programs (5 to 6 years long). During the preclinical years, students should link up with an academic plastic surgeon and find out more about what the specialty involves. Hang out in the clinic and operating room to gain more exposure. Immerse yourself in extracurricular activities and outside interests. Program directors look for students who are great at what they are expected to do, but the candidate with outstanding unexpected achievement is looked upon very highly (e.g., organizing a mission to an underserved area, training for the Olympics, writing a book).

Almost all selection committees look for achievement in clinical research (and most expect it), so make sure to plan some kind of plastic surgery project and get yourself a publication. If you are graduating from a mid-level school, work hard in your courses and rotations to earn membership in AOA. For everyone, it is imperative to score high on the Step I boards, because most programs look for scores around the 90th percentile. In the clinical years, get top grades in your core surgery and plastic surgery rotations. By exposing your limited knowledge of plastic surgery, audition rotations at other hospitals can be disadvantageous—particularly when other programs see that you have gone somewhere else for a subinternship.

Applicants must submit letters of recommendation from the surgery departmental chairperson, the plastic surgery divisional chairperson, and one other plastic surgery attending. (If you apply to general surgery as a backup, make sure you have two sets of letters that refer to the correct specialty). In the personal statement, discuss your motivations and experience in plastic surgery and highlight any outstanding achievements. Selection committees look closely at academic achievement and reference letters to determine if you are a dependable, honest, smart, and hard-working team player.

Psychiatry

A solid performance in medical school can land you a position in nearly any psychiatry program. The top programs, however, only accept the most stellar of candidates. If you are aiming for these hospitals, high board scores on Step I and II are helpful. Your clinical performance in the psychiatry clerkship is key to success in matching. In addition, above-average evaluations in other rotations and a thoughtful, complete application are sufficient to garner interviews at some of the best hospitals in the country. Audition subinternships can be helpful for specific programs, but are not completely necessary and may even work against you if your rotation performance goes awry.

Letters of recommendation should come from at least two psychiatrists who know you well in addition to one other clinical faculty member. The personal statement is an extremely important part of the application. It should address your reasons for entering a career in psychiatry and the type of residency program sought. The style must demonstrate maturity, empathy, and honesty.

Radiation Oncology

Over the last several years, this specialty has become ultra-competitive. Nearly all applicants are US seniors at the top of their medical school classes. Many even have a PhD in engineering, physics, or other basic sciences. Because radiation oncology is a very academic field, you should engage in as many scholarly endeavors as possible. Clinical or basic science research—particularly with publications—looks very impressive to selection committees. Find a mentor in radiation oncology and spend time with him or her on a research project or at least in the clinic. You should strive for the best possible scores on the USMLE Step I (at least 220 or above). Membership in AOA is helpful, but not essential. Regardless, try to earn high grades in third-year clerkships. Early in the senior year,

take a month-long elective in radiation oncology and work hard to impress your attendings.

Rotations at outside programs are particularly worthwhile for enthusiastic students with less strong academic records. Try to convey your excitement for delving into the scientific literature of the field. Because of the stiff competition, all candidates should submit as many applications as financially possible. You will need three letters of recommendation with at least one from a radiation oncologist who knows you well (even better if he or she is a big name, well-connected, or departmental chairperson). Although the personal statement varies in importance between programs, it should succinctly convince the reader of your passion for radiation oncology (not just for the decent hours and good pay). Program directors look for applicants with intellectual curiosity, competent clinical skills, and a friendly demeanor. If you meet this description, your chances of matching are quite good.

Radiology

As many stellar applicants discover the attractions of diagnostic radiology, this specialty has now become very competitive. Hundreds of well-qualified applicants find themselves without positions on Match Day. If you are interested in this specialty, you should immerse yourself in the radiology department at your medical school, particularly during the preclinical years. Clinical research in radiology will improve your chances in matching, particularly at the powerhouse programs with lots of grant money. By starting early, it may be possible to publish papers in radiology journals.

You should, of course, strive for high grades in gross anatomy. Program directors also widely use the USMLE Step I score to screen out applicants. The average score for matching in radiology is reportedly around 220 to 230, with scores higher than 240 necessary for the higher caliber programs. During the clinical years, you should try to earn stellar grades in all of your clinical rotations. Many programs eliminate candidates who have not achieved AOA status. In general, audition rotations do little to improve your chances at matching at that particular program. Unlike in other specialties, as a student, it is difficult to impress radiology attendings and residents with your knowledge and work ethic. At application time, apply to as many programs as you can possibly afford. Most candidates submit between 30 and 50 applications.

The personal statement is the appropriate place to convey that you are smart, hard working, and easy to get along with. Letters of recommendation are helpful

from physicians from any number of specialties, as long as they particularly emphasize your ability to work well in a team. In theory, radiology letters do not mean much unless coming from a big name. Due to the extremely competitive nature of this specialty, nearly all program directors recommend ranking preliminary medicine programs at the end of the primary rank list. This way the unsuccessful candidate can reapply while completing the required medicine internship year.

Urology

This specialty is at the top of the list when it comes to being one of the most competitive. Future urologists should immerse themselves in extracurricular activities to distinguish themselves in some way. Clinical research in urology is extremely valuable and can make you shine in the eyes of program directors, especially if it leads to publications or presentations. Many high-powered academic programs even go so far as to require research experience without divulging this to applicants. Basically, you need to excel at everything—particularly in academic achievement. AOA membership is helpful, but not a strict requirement. Study hard during the preclinical years and earn a high score on the USMLE Step I—at least around 220 to 230. (Because urology is an early Match, most programs do not require Step II scores). Honors grades in the surgery core clerkship and fourth-year urology electives are essential.

Away rotations at other programs are only necessary if there are no well-known urologists at your own institution from whom to request letters of recommendation. You should, however, consider doing a subinternship at one or two of your top-ranked programs. Urology is a very small medical community, so connections are important. Your letters of reference from well-known physicians could make or break your candidacy. Applicants should obtain three to four letters from faculty members who know them well, especially one from the chairperson of urology at their medical school. They are perhaps the most important part of your application. Submit as many applications as financially feasible. The personal statement is relatively important and should be unique and engaging. Make sure to outline clearly the reasons for your interest in urology and to convey that you are diligent, honest, and do not have a large ego. To avoid being unmatched, all candidates should list all acceptable programs that they would be willing to attend (preferable to not training at all in urology) in their desired order.

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YOUR MEDICAL CAREER BEYOND RESIDENCY

After selecting a specialty, medical students usually postpone thinking about practice options until the residency years. "Why bother worrying about how I will practice until the time gets closer?" most of them insist. Students should remember, however, that it is these two challenging decisions that define every doctor's medical career. The different choices and opportunities that lie ahead for every young physician-in-training range from being a professor of medicine at a university medical center to working on cruise ships all over the world.

Thinking about future practice options does not imply that now is the time to commit to one, especially because your energy should be focused on the more immediate problem at hand—choosing a medical specialty. But it is important to ponder exactly *how* you might use your specialty training throughout your career. Most medical students find it difficult to map out their long-term career goals and aspirations. To better organize your thinking, ask the following questions with your chosen specialty in mind:

- What do you want to get out of your medical career?
- For whom do you want to work?
- Do you want to be a leader in your specialty?
- How much time do you want to devote to research, teaching, or administrative work?

Planning the medical career you want is just as challenging as choosing the ideal specialty. For both, you must identify your personal and professional goals and find the right match with your personality and work ethic.

TO SUBSPECIALIZE OR NOT: THE FELLOWSHIP DECISION

Before considering their practice options, residents in every specialty have to decide whether or not to *sub*specialize. The additional time spent in fellowship training gives them advanced knowledge and skills—both of which are essential for practicing as an expert in a focused variety of specialty medicine. Depending on the subspecialty, fellowships can last anywhere from 1 year (e.g., interventional radiology, obstetric anesthesiology, clinical neurophysiology) to 3 years (e.g., gastroenterology, rheumatology, pediatric cardiology). Applying for these fellowship programs (which typically begin about 1 year before the anticipated completion of residency) is much less rigorous and complicated than applying for residency positions. Although some competitive fellowships use a computerized matching system, selection committees look primarily at letters of recommendation, the residency program's reputation, and personal contacts.

Every specialty has its own set of fellowships; however, not all are alike. Most training programs are officially approved by the Accreditation Council of Graduate Medical Education (ACGME). Successful completion makes you eligible to sit for the subspecialty examination and a passing score leads to full board certification status. Some accredited fellowships, like those in adolescent medicine and geriatric psychiatry, do not yet have board certification examinations and instead bestow a *certificate of special achievement* as the formal recognition. Another large group of subspecialties—like cardiac anesthesiology, neuroimmunology, and hyperbaric/undersea medicine—are neither ACGME-approved nor lead to board certification. In these cases, the lack of accreditation simply reflects a lack of uniformity across programs. But these fellowships still provide the same clinical experiences and advanced training as their ACGME-approved counterparts. So choose a subspecialty based on your sincere interest and enthusiasm for the subject matter. Your future employers will care about your clinical aptitude, your skills as an excellent subspecialist, and your ability to connect with patients—not about the accreditation of your fellowship program or board certification status.

By adding another layer of medical expertise, fellowship training changes the nature of how a future physician will practice medicine. In fact, many subspecialists have vastly different lifestyles, work schedules, incomes, and patient populations than those practicing in their parent specialty. Internal medicine is a perfect example. General internists spend long hours in clinic evaluating dozens of patients, practicing preventive medicine, and treating common problems like diabetes, hypertension, and osteoarthritis. They rely on drug therapy as their primary form of intervention. Their colleagues who completed fellowships in car-

diology, gastroenterology, and critical care have quite different practices. These subspecialists are usually at the hospital at all hours of the day and night, placing stents in coronary arteries, looking at colons and stomachs through scopes, and manipulating respiratory ventilators. They perform more procedures, earn more money, and practice solely in that one narrow area of medicine.

On the other hand, for some medical fields, subspecializing does not have as much impact on practice style. For example, perhaps because of smaller patient volume, neurologists specializing in headaches or radiologists specializing in abdominal CT have essentially the same professional lives that their colleagues do, with minimal differences in work hours, income, and lifestyle. In fact, these subspecialists usually still practice general neurology and radiology, for instance, more so than their subspecialty area.

Residents who become inspired by a particular organ system or a complex problem within their specialty should seriously consider pursuing a fellowship. The training provides sophisticated knowledge and skills, making you an expert to whom colleagues look for advice and teaching. Knowing one narrow area very well can enhance your career satisfaction and build your professional confidence. With an emphasis on research and scholarly endeavors, fellowships are also great preparation for careers in academic medicine.

Are there any disadvantages to pursuing a fellowship? Just one—the temporary financial sacrifice. You will have to wait several more years before paying off all those big educational debts hanging over your head.

CONVENTIONAL PRACTICE OPTIONS

Private Practice: Delivering the Best Patient Care

Most of you will enter private practice after completing residency or fellowship. In the private sector, physicians either work by themselves or with others, providing high-quality medical care to all types of patients. Because they are not tied strictly to the large academic medical centers, private practitioners have the flexibility to set up shop anywhere in the country—urban, suburban, or rural. Depending on the specialty, you may be working in the office-clinic (dermatology, rheumatology, allergy medicine), the hospital (anesthesiology, radiology, pathology), or both (internal medicine, surgery, pediatrics). Some private practitioners also make rounds at other places, like nursing homes (geriatricians, internists), state facilities (psychiatrists), and prisons (internists, family practitioners).

Although it is generally true that private practitioners earn a great deal of

money, they work hard for their salary. With income directly proportional to the number of patients seen or procedures performed, their focus is on patient volume, turnover, and productivity. In return for the higher salary, private practitioners generally sacrifice the opportunity to take care of interesting, complicated cases. Unlike their colleagues in academic medicine, private practice doctors take on a greater proportion of routine bread-and-butter cases. The rare, complex diseases (*zebras*) are typically referred to specialists at university medical centers.

If you are interested in private practice, the two most common options are going it alone with your own practice or joining a group.

1. ***Solo practice:*** With the increasing domination of managed care, fewer physicians undertake solo practice. Those who do can either start their own practice or purchase an existing one (with its fully equipped office and established patient base). Because solo practitioners have complete financial responsibility for their operating expenses, the economic risks are substantial. Many take additional loans to cover their initial start-up and overhead costs until the practice becomes profitable. Until word-of-mouth increases their case volume, solo physicians have to work long hours building a solid patient base. So why practice on your own? For doctors with an entrepreneurial or administrative side, solo practice provides freedom and autonomy. You can create your own schedule and run your practice any way that you see fit. Without the problem of less-productive partners who could hamper profits, solo practice has a greater potential for a higher income.
2. ***Group practice:*** Most residents sign on with group practices at some point during their final year of training. In this form of private practice, two options exist: single-specialty or multispecialty groups. By sharing patient care with colleagues, you have more flexibility for scheduling issues, like on-call coverage. Being a member of a group provides an established patient base without the overhead cost of starting your own practice. Once you become a full partner in the practice and start sharing in its profits, your salary increases greatly. There are shortcomings to group practice, however. Working in a team means having less autonomy and control over one's work schedule. In fact, because senior doctors prepare the schedules, junior physicians often perform a disproportionate share of the work.

No matter what type of practice you end up having, all private physicians have to deal with many hassles. You will spend hours on the phone with managed care and third-party insurance companies. You will learn more than you ever wanted

to know about securing proper reimbursement and coding diagnoses, office visits, and procedures. You will be frustrated by the high premiums for malpractice liability insurance. Additionally, private practitioners need to arrange privileges at local hospitals for either admitting or surgical purposes. Part of every day will be spent driving to different hospitals to round on patients, deliver babies, perform surgery, or administer anesthesia.

Academic Medicine: Shaping the Future of Your Specialty

Medical students who want to be leaders in their specialty should consider a career in academic medicine. A much smaller percentage of physicians work at university hospitals than in the private sector. Academicians serve as medical school faculty members in their specialty's department and also provide patient care at their affiliated teaching hospital. With less emphasis on patient volume and turnover, the pace of academic medicine is more relaxed than that of private practice. Although the job market for new faculty physicians is quite strong, the tertiary care medical centers are usually in major metropolitan areas. This limitation means that academic physicians—whether pediatricians or interventional radiologists—have less geographic flexibility than their counterparts in the private sector.

Whereas private practitioners deliver patient care to the masses, academic physicians in every specialty and subspecialty have a set of three universal—and equally important—responsibilities.

1. ***Teaching:*** Every doctor receives residency training in a teaching hospital. By staying there to practice, academic physicians instruct generation after generation of specialists. Much of this time is spent supervising and teaching fellows, residents, and medical students. Through hours of mentorship, academic physicians can make a meaningful difference in their charges' professional lives by shaping their formative years of clinical training. These inexperienced young doctors will pepper you with lots of probing questions, keeping you sharp in your specialty. Most faculty members recruited out of residency or fellowship start teaching at the level of Assistant Professor. Promotion and tenure—just like in nonmedical fields—are directly related to your ability to teach and conduct ground-breaking research.
2. ***Research:*** Through cutting-edge clinical and basic science research, academic physicians are responsible for advancing their specialty. They generate new knowledge, develop procedures and drugs, and evaluate the effi-

cacy of different types of treatment. For instance, a general surgeon might conduct a study looking at the best time to take out a chest tube, and an internist investigates the outcomes of treating diabetic and renal failure patients with ACE inhibitors. Academic physicians also have to teach their colleagues in private practice about the latest advances in their specialty. They do so by writing up their findings in medical journals and giving lectures at national conferences. To carry out any research project, academic physicians have to obtain the necessary funding—by submitting grants themselves or by receiving money from their department. In the world of academia, the number of papers published and amount of federal research grants received confers prestige on a university medical center. (In a certain weekly news magazine, the formula used to rank US hospitals and medical schools gives the greatest weight to research awards from the National Institutes of Health.)

3. ***Patient care:*** In every specialty, academic physicians provide the latest and most innovative medical care. Tertiary medical centers draw a diverse mix of patients, from the indigent (most teaching hospitals are historically located in underserved city neighborhoods) to the very wealthy (e.g., Saudi princes who fly in for the most advanced treatment). Most patients receive care directly from residents and fellows, who are supervised by their attending physicians, of course. Compared to private practitioners, full-time faculty members generally take less call, devote fewer hours to patient care, and earn less money. All revenue generated from clinical practice goes directly to the medical center instead of counting as personal income. In turn, the hospital pays each faculty physician a fixed salary that is directly proportional to the type and volume of medicine he or she practices. This is why academic pediatricians earn less than an academic cardiothoracic surgeon.

Academic medicine is perfect for doctors inspired by working with some of medicine's greatest minds—the authors of well-known textbooks, the renowned researchers who develop new drugs and vaccines, the innovators who figured out how to surgically separate two newborns sharing the same brain. Because teaching hospitals are part of major referral centers, academic physicians are the ones who manage most of the rare and complicated cases. You will take care of diseases and conditions on a level that few physicians ever surpass. This career path, therefore, gives you the autonomy to become a true leader in your specialty.

Locum Tenens: The Fill-in Physician

Do you love to travel? Want to avoid all the mundane administrative tasks involved in a typical medical practice? If the answer is *yes* to both, you might consider practicing medicine locum tenens-style for a couple of years. Like independent contractors, *locum tenens* (Latin for *place holder*) physicians only work short-term medical jobs. These nomadic doctors are hired to take the place of a physician who is temporarily absent. Hospitals turn to locum tenens to solve any type of staffing shortage: a need for more doctors because of increased patient demand, difficulty attracting newly graduated residents, or simply too many physicians on vacation. Although these options used to be limited to rural hospitals, now even cities and suburbs need their share of temporary doctors. All types of physicians are welcome, but today there is a greater demand for specialists and subspecialists.

Many new doctors fresh out of residency training are taking a closer look at locum tenens practice. They are joining the traditional locum tenens workforce: older doctors who have recently retired or who are just sick of the hassles of their full-time practice. It is quite easy to acquire a locum tenens position right away. You can go to web sites like <www.locumtenens.com> or sign on with national agencies that will find you that ideal short-term job. For a fee, these agencies take care of all the headache-inducing paperwork, like arranging for malpractice insurance, state licensure, and accommodations. Many hospital employers even pay your travel and living expenses.

What accounts for this newfound interest in locum tenens? This type of practice offers a great deal of flexibility. With most assignments being 2 to 6 weeks long, you can design a month-to-month schedule (including vacation), choosing only the jobs that have hours that suit you. Working a series of temporary jobs in different systems—hospitals, clinics, managed care, group practice—is invaluable experience. It gives a new physician time to figure out what to incorporate in a future practice. It adds a new layer of medical expertise by presenting diseases and clinical problems you might not encounter in other places. Locum tenens also gives you the opportunity to check out different parts of the country, which can help a new physician decide where to set up a practice. At the end of the assignment, it is not uncommon for the employer to offer a full-time position to the stellar locum tenens physician.

There are some less rosy aspects to life roaming the country as a locum tenens physician. They often get their assignments at the last minute, earn less income than a permanent doctor, and face a great deal of pressure to prove their medical skills to

their new colleagues. Moreover, life on the road can be hard on your personal life. Most physicians do not make a long-term career out of locum tenens practice. Instead, they pursue it for a couple of years at various points in their careers—beginning, middle, or end—to break the monotony of full-time private practice.

ALTERNATIVE MEDICAL CAREERS

If none of these practice options sounds appealing, there are always the alternative medical careers. Physicians can integrate their highly specialized training into careers outside of traditional medicine. And there is no reason to feel guilty about pursuing a medically related occupation that does not involve direct patient care. Everyone looks at their MD degree in a different light. For some, it could be the foundation for careers in business, law, industry, or even the entertainment world. Instead of worrying about being viewed as an outsider, you should spend your energy drawing on your creativity and resourcefulness to carve out an alternative niche within the medical profession.

Pharmaceutical Industry

Some doctors choose to work as physician-scientists for large pharmaceutical companies. Pharmaceuticals are a multibillion dollar business, so they only hire the best and brightest candidates. Physicians are unique, indispensable employees because they have lots of direct experience taking care of patients and they have an in-depth understanding of human pathophysiology. In these companies, physicians from all different specialties come together and apply their collective medical knowledge for a common goal: the development of new drug therapies. Specialists currently in high demand include neurologists, geriatricians, pain specialists, pulmonologists, oncologists, cardiologists, and infectious disease specialists.

Physicians working in the pharmaceutical industry help get new medications approved by the US Food and Drug Administration. They participate in this highly regulated process in many ways, such as administering large-scale double-blind randomized clinical trials or conducting bench laboratory work in pharmacology. By working on a drug that can be delivered to everyone, pharmaceutical physicians can leave a much greater mark on health care than those in traditional practice. They have special insight into what it is like for patients to take the kinds of medications that are being developed. Knowing how drugs can affect a patient's life is essential for figuring out the best way to test a new compound in human clinical trials.

Like their colleagues in academia, doctors working in the pharmaceutical

industry have careers in applied medical research involving experimental medications. They spend much of their time designing large-scale clinical trials, interpreting the data through statistical analysis, and presenting reports to the approving authorities. They also travel around the country attending scientific and clinical meetings. As members of multidisciplinary teams, they sacrifice autonomy for the chance to work with other professionals, like those in statistics, product development, and marketing. But industry doctors do not have to worry about securing grant funds, administrative hassles, or promotions—issues that academic physicians face every day. They also have regular hours, good lifestyles, and high incomes with lucrative stock options and bonuses. Clinical activities, however, are kept to a bare minimum (usually only one day per week at most).

Federal Government

Millions of Americans live in rural communities without primary health care. If you are committed to a primary care specialty (general internal medicine, family practice, obstetrics and gynecology, general pediatrics, or psychiatry), consider joining the National Health Service Corps (NHSC). This government agency recruits primary care physicians to serve in medically underserved areas—rural and inner city—where adults and children have the greatest need for primary health services. The NHSC offers competitive scholarships for medical students who are committed to this endeavor. They will pay for all 4 years of medical school tuition, fees, and educational expenses (books, etc.), as well as provide a monthly stipend for personal use. After residency, the NHSC assigns physicians to practice sites in a federally designated area with a shortage of health professionals. You must serve 1 year for every year of financial support (for a 2-year minimum commitment). Breach of contract results in immediate payback of the entire scholarship. You can also sign on with the NHSC after medical school. They offer a range of loan repayment public-service programs (such as the Indian Health Service Loan Repayment Program) in exchange for a minimum 2-year commitment.

International Medicine

Many physicians volunteer abroad to practice international medicine at some point in their careers. Most are either retired doctors or those who just want to take a break from the grind of day-by-day private practice. Surgeons, anesthesiologists, and primary care physicians are especially needed in countries seeking medical relief. By donating their time and skills, they give themselves selflessly

to others who are in desperate need of medical care to ease their suffering. Few experiences can match this level of personal dedication and fulfillment.

There are millions of people in the world today who need this kind of self-sacrificing care. They are refugees, displaced people, or victims of war, epidemics, starvation, disaster, neglect, and widespread infection (particularly tuberculosis, malaria, and AIDS). In regions like Africa, India, and Central America, volunteer doctors have many responsibilities. They deliver emergency medical care, perform surgery, administer vaccines, and help to construct new hospitals and clinics. They also train the local doctors about the latest medical care and educate the community about basic public hygiene. If this sounds appealing, it is easy to get involved as a volunteer physician. Organizations like Health Volunteers International, Doctors Without Borders, World Medical Missions, and many religious groups all sponsor short-term medical missions to third-world countries. International medicine gives every physician the opportunity to develop cultural sensitivity and to learn how to deliver medical care in the most rudimentary conditions.

Cruise Ship Medicine

Every large cruise ship needs a doctor on board, holding regular office hours and being on call for emergencies. Like mini-ambulatory centers, these fully equipped medical offices have basic laboratory and x-ray capabilities. To handle the variety of clinical problems that may occur during a cruise, ships usually hire generalist physicians with broad-based skills, such as those in primary care. Specialists in emergency medicine are among the most experienced and sought-after doctors. (In fact, the American College of Emergency Physicians has its own Section of Cruise Ship and Maritime Medicine, which oversees academic fellowships in cruise ship medicine.)

Just like practicing in an emergency room or urgent care center, cruise ship medicine is full of the unexpected. You have to be ready to treat all types of minor or severe medical and surgical problems, from traveler's diarrhea and seasickness to passengers who fall overboard or have encounters with marine creatures. Younger patients come in with injuries related to sports or alcohol use. Most passengers, however, are older men and women with chronic medical conditions (like heart failure or emphysema) who can present with complications while traveling. Cruise ship doctors have to know how to handle emergencies like heart attacks, strokes, arrhythmias, respiratory failure, blood clots, and fractures. They need to be skilled in cardiopulmonary resuscitation, intubation, and rapid evacuation. It can be an exciting clinical practice on the high seas!

Special Fortes

There are dozens of other ways for a physician to diversify his or her career opportunities. After all, a medical degree is a unique and invaluable asset to other professions as well. If you have an interest in broadcasting and media, you could sign on as a correspondent for local news channels, helping them with their nightly health segments. Doctors who like a university setting often work at student health centers. Many orthopedic surgeons become personal physicians for major athletic teams. If you have a penchant for business, consider going for an MBA and then entering a career in health care or even investment banking. Physicians who hold a JD can sign on with law firms and defend (or prosecute) other doctors, hospitals, or managed care organizations. Those with an interest in medical education are often hired by commercial test preparation companies to prepare test questions and teach courses. Doctors with a burning desire to initiate legislative change in the US health care system can enter political careers.

Is there any relationship between a physician's specialty and his or her choice of an alternative medical career? One study sought to answer this question by asking senior medical students what alternate career they would have pursued had they not entered the medical profession.[1] Students who were entering anesthesiology, radiology, surgery, and internal medicine were more likely to choose substitute careers in more highly technical fields—science, research, engineering, business, architecture, or law. Future pediatricians, family practitioners, psychiatrists, pathologists, obstetricians and gynecologists, and emergency medicine specialists were more likely to consider alternate careers in a helping/humanities category—teaching, journalism, writing, the arts, other health professions (like dentistry), and nonprofessional careers (like airplane pilot). These findings suggest that all physicians enter medical school with certain personality traits that not only influence their specialty choice, but also their desired career path (whether alternative or traditional).

The options for careers outside the traditional realm of clinical medicine are basically unlimited. If you are imaginative, resourceful, determined, and assertive, you can find your own niche within the professional world and have a long, satisfying career—in any specialty.

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2 SPECIALTY PROFILES

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13 ANESTHESIOLOGY

Brian Freeman

Ether. Chloroform. Nitrous oxide. Because they are widely popularized in popular culture, you are probably well aware of the first universally accepted general anesthetics. The anesthesiologist's domain, however, extends far beyond these drugs. It is unfortunate that many medical schools do not require a rotation in anesthesiology, sedation analgesia, and pain management. Most students do not come to medical school intending to become anesthesiologists. Instead, they share the common misperception that anesthesiologists are scientific technicians who just put patients to sleep. Nothing could be farther from the truth. They are doctors whose lives are dedicated toward a noble goal: the relief of pain. They thrive on the fast pace of acute medical care. They are the unsung heroes of the operating room.

THE SPECIALTY OF PERIOPERATIVE MEDICINE

Anesthesiology is dedicated to the complete medical and anesthetic care of the surgical patient. It is a precise, technical, and intellectual specialty that requires high standards. Anesthesiologists care for the whole patient—before, during, and after the operation. They administer powerful anesthetics, render patients insensible to pain and stress, provide respiratory support, and manage every medical need of the patient throughout the surgical experience. To do so, anesthesiologists closely monitor and treat the acute pathophysiology of multiple organ systems: cardiac, pulmonary, renal, and neurologic. It is a specialty that ties together the cerebral nature of internal medicine with applied procedural skills and critical care.

But anesthesiologists are more than just operating room internists. During surgery, they often end up saving lives. When patients crash on the table, the anesthesiologist comes to their rescue. Remember the ABCs (airway, breathing, circulation)? These concepts are essential to safe perioperative care. As such,

WHAT MAKES A GOOD ANESTHESIOLOGIST?

- ✓ Can pay attention to detail for long periods of time.
- ✓ Likes working with his or her hands.
- ✓ Can make fast decisions during stressful, rapidly changing situations.
- ✓ Is a congenial, confident, easy-going person.
- ✓ Likes to see immediate results of his or her efforts.

anesthesiologists have contributed immensely to advances in cardiopulmonary resuscitation and airway management.

The role of anesthesiologists as perioperative physicians has become increasingly diverse and complex. Although anesthesiologists are primarily involved in the action of the operating room, they also offer medical care and consultations in many other settings. You find them intubating trauma patients in the emergency room, managing critically ill patients in the intensive care unit, and administering epidurals in labor and delivery suites. They also provide anesthesia services for radiologic and diagnostic procedures (like sedation during cardiac catheterization, angiography, and MRI scans) and care for patients suffering from chronic pain.

It may surprise you that anesthesiology is both a highly focused specialty *and* a field of medicine that, in a way, involves primary care. Like their colleagues in family practice and emergency medicine, anesthesiologists care for patients of all ages, ranging from neonates to geriatrics. Within this spectrum, the surgical patient can also present with any number of complex diseases, from systemic lupus erythematosus to coronary artery disease. Thus, the practice of anesthesiology requires knowledge of *all* aspects of clinical medicine, whether from pediatrics, internal medicine, obstetrics, or surgery. Every patient requires a different strategy to match anesthetic needs with his or her underlying medical conditions and procedural requirements. Because of extensive progress in anesthesiology, critically ill patients can now undergo even more complicated operations and surgical procedures.

ESSENTIALS OF ANESTHESIA

Anesthesiology is a specialty in which the clinical application of many basic sciences becomes most palpable. Your fundamental knowledge base draws heavily on the key principles of physiology and pharmacology. You must become partic-

ularly well-versed in all aspects of cardiac and pulmonary pathophysiology. After all, during surgery, the support of a patient's life functions primarily concerns the heart and lungs. To maintain this physiologic homeostasis, anesthesiologists are experts on the latest advances in clinical pharmacology and drug delivery systems. Every day, they use an impressive arsenal of drugs: local and general anesthetics, analgesics, sedatives, cardioactive agents, neuromuscular paralytics, and many more!

Be forewarned—the responsibility is great. Anesthesiologists use powerful drugs that can kill people. They are the only physicians who bypass pharmacists and nurses to dose, prepare, and administer the drugs themselves. These intravenous agents cause immediate physiologic outcomes that, for an anesthesiologist, provide instant gratification. In a way, each surgical case offers the opportunity to test a physiologic hypothesis with a pharmacologic intervention. One physician in private practice chose to become an anesthesiologist because of the pace of acute care in the operating room. "You get to use powerful drugs to correct problems in physiology—and the solutions come to life right in front of your eyes," she commented. "Unlike the slow pace of other specialties, I never have to wait months to see if my manipulations work."

The seal of the American Society of Anesthesiologists (a lighthouse inscribed with the motto *vigilance*) symbolizes the importance of good patient monitoring. You will always focus on one patient at a time. If you want to become an anesthesiologist, you should feel comfortable manipulating monitors, pumps, ventilators, and other high-tech equipment. Although anesthesiologists are the guardians of patients' lives during surgery, they do not simply stare at monitors all day long. These doctors keep a close eye on the patient and the case itself, which is equally as important, and watch for potential problems like acute blood loss or compromised airway. As attentive observers of physiologic parameters, anesthesiologists become adept at multi-tasking. While listening to the beeping pulse oximeter and the sounds of suction, they monitor the patient's electrocardiographic rhythm, follow alterations in blood pressure, and integrate changes in urine output in their management.

To achieve such crucial goals on a minute-by-minute basis, anesthesiologists make use of a wide array of complex monitoring equipment. These include end-tidal CO_2 monitors, invasive and noninvasive blood pressure monitors, Swan-Ganz catheters, arterial blood gas analysis, twitch monitors, and electrocardiography—plus more sophisticated tools like real-time transesophageal echocardiography. Anesthesiology is a great specialty, therefore, for medical students who wish to incorporate the latest advances in biomedical engineering into their careers. Because of their skills in patient monitoring, anesthesiologists have greatly

improved patient safety and allowed for the development of more advanced and invasive procedures.

From beginning to end, the practice of anesthesiology for each patient is similar to flying an airplane. As captain, the anesthesiologist first conducts a complete preoperative history and physical examination. Induction of anesthesia, using powerful drugs like propofol, represents the "take-off" into the flight of the procedure. This part is more than just pushing medications—anesthesiologists have to set up the appropriate monitoring equipment and then intubate the patient. Once the patient is fully anesthetized, paralyzed, and breathing by a ventilator, maintenance has been achieved. Like a pilot, the anesthesiologist keeps careful watch over the patient, always adjusting physiologic parameters with pharmacologic agents as the case proceeds. Any operating room crises ("wind shear") require rapid interventions and quick thinking. The captain then lands the "anesthesia plane" by reversing neuromuscular paralysis, stopping anesthesia, and safely extubating the patient.

COPING WITH INTRA-OPERATIVE EMERGENCIES

Once the surgical patient becomes successfully anesthetized, paralyzed, and intubated, the operation is off and running. In a routine case, such as an appendectomy in a healthy young man, most of the anesthesiologist's time is spent monitoring the patient and his vital signs. The anesthesiologist, not the surgeon, is responsible for making sure that the unconscious patient wakes up at the end of the case alive, well, and breathing spontaneously.

Performing anesthesia can be much more dangerous than it looks, however. For all types of operations, anesthesiologists perform difficult tasks in a life-threatening environment. Always concerned that something may go wrong, anesthesiologists mentally prepare for any potential disasters during every case. Many describe their job as being "90% routine care, 10% sheer terror." When patients deteriorate during surgery, they can crash fast. Whether the problem involves massive acute hemorrhaging, intra-operative myocardial infarction, or dropping oxygen saturation, anesthesiologists must think fast, act quickly, and draw on their vast medical knowledge to make on-the-spot decisions.

Today, many surgical patients are quite sick with multiple medical problems, leading to rather complicated intra-operative courses. Under general anesthesia, even a patient with "only" a history of high blood pressure can create problems for the anesthesiologist. Maintaining the patient's blood pressure within normal limits is quite challenging in the face of faulty sympathetic responses and other homeostatic mechanisms. Moreover, bad things typically happen all at once.

While dealing with a plummeting blood pressure, the pulse oximeter will probably start beeping (indicating rapid oxygen desaturation) and the patient will likely start twitching and moving.

Rapid decision-making, therefore, is extremely important. Working with the surgeon, anesthesiologists guard the line between life and death for the unconscious surgical patient. Medical students interested in this field should be aware that anesthesiology requires one to react well to nerve-wracking situations. A patient can die very fast under your hands, making anesthesiology a more stressful field of medicine than most.

MASTERS OF THE AIRWAY

Anesthesiology is, without a doubt, a highly procedure-oriented, hands-on specialty. You will place intravenous and arterial lines, push rounds of powerful medications, perform direct laryngoscopy, and mask ventilate patients left and right. This is where the science of anesthesiology becomes an art form. After all, smooth anesthesia is equally as important as secure anesthesia. An anesthesiologist in academics believes that "anyone can inject someone with thiopental, but being able to smoothly do fiberoptic intubation and ventilating only one lung, now *that* is an art!"

Anesthesiologists' manual dexterity and expertise in the art of intubation make them masters of the airway. Both in and out of the operating room, they perform thousands of these procedures

RESIDENCY TRAINING

Residency in anesthesiology requires 4 years of postgraduate training. It requires an internship year (PGY-1), plus 3 years of clinical anesthesiology (CA-1 to CA-3). There are currently 132 accredited programs. The PGY-1 internship year can be internal medicine, surgery, or transitional. The first 2 months of residency include a *CA-1 tutorial*, in which new residents work alongside a single attending. Residents are also responsible for emergency intubations when cardiac arrests occur on the medical wards. Due to implications for patient safety, the American Board of Anesthesiology does not allow residents to work more than 24 consecutive hours in a shift. As a result, all programs permit residents to leave the hospital at 7:00 AM after their night on call. Most days are long but weekends, unless on call, are free. The typical monthly rotations include general OR, obstetrics, cardiothoracic, vascular, orthopedics, pain service and clinic, gynecology, urology, ambulatory/regional, critical care, and pediatrics.

throughout their career. Craving an adrenaline rush? Anesthesiologists are often called to the emergency room, intensive care unit, or patient floors to deal with the emergency management of a difficult airway.

Like all practical skills in medicine, the relative ease of endotracheal intubation reflects the technical dexterity of the anesthesiologist. During the preoperative clinic visits, the anesthesiologist conducts a thorough history and physical examination to identify potential airway problems in the patient, then prepares the proper instruments needed for intubation. The choices are many: different endotracheal tube sizes, multiple laryngoscopes, fiberoptic intubation, laryngeal mask airways, and an array of lightwands and stylets. It is kind of like having your own fancy toolset. During residency training, many hospitals offer simulated instruction on computerized mannequins to practice intubating patients with difficult airways. For medical students who enjoy a good mix of technical skill and intellectual challenge, anesthesiology may be the ideal specialty.

THE DOCTOR-PATIENT RELATIONSHIP

Most surgery patients feel reassured after spending time with the anesthesiologist, whose face is the last they see before losing consciousness. This specialty offers more than an intellectual challenge and a good lifestyle; it allows physicians to make a profound impact on their patients' lives. Anesthesiologists' contact with patients may be limited in duration, but extremely intense and rewarding in scope.

The preoperative consultation, a key interaction, involves more than taking medical histories and performing physical examinations. This quality time is spent answering questions about the planned anesthetic care and allaying patients' anxiety. Anesthesiologists need excellent interpersonal skills to comfort patients who are terrified of surrendering control of their lives under general anesthesia. They help patients emotionally who are undergoing one of the most stressful episodes in their lives. The best anesthesiologists are compassionate, sensitive, and supportive. Because of the specialty's emphasis on procedures, they must recognize that often one has to hurt somebody a little to help a lot. At all times, anesthesiologists are quick with a smile or a hand on the shoulder to foster comfort with their nervous patients. In most cases, empathy and compassion have a more lasting effect than premedication. Patient interactions, therefore, are always positive.

Although the relationships between anesthesiologists and their patients can be extremely rewarding, these physicians remain largely anonymous to health care consumers. Most anesthesiologists do not have their own group of patients,

nor do patients undergoing surgery choose their anesthesiologist. As a result, the general public has never completely understood the critical role of the anesthesiologist in surgical care. Many patients are unaware that these physicians have received the same length of training as most other doctors. Thus, medical students should know that this specialty, unlike more glamorous ones, rarely brings a lifestyle of fame, fortune, and glory.

"After surgery, most patients only remember the name of their surgeon, not their anesthesiologist. We never hand out business cards, and we never get interviewed on television for helping to save a trauma victim," said a university-based anesthesiologist. "A patient who never mentions their anesthesia experience is the one who is the satisfied customer. It means that the patient made it safely through surgery without pain. That is when I can go home feeling gratified I did a good job for the day."

If you want to become a world-renowned expert to whom patients come from all over the world, anesthesiology is probably not for you. Like other hospital-based specialists, such as those in radiology and emergency medicine, anesthesiologists do not depend on recognition from their patients for ego gratification. Instead, these behind-the-scenes doctors simply derive their personal satisfaction from within.

BELOW THE BLOOD-BRAIN BARRIER: RELATIONSHIPS WITH SURGEONS AND STAFF

One medical student who completed a rotation in this specialty commented that "anesthesiologists seem like mellow and easy-going people." Lacking huge egos, they are collegial physicians who communicate well with others. Although they are a diverse group not dominated by any particular personality type, all anesthesiologists have a high degree of intellectual curiosity.

Because of their relaxed disposition, anesthesiologists usually have excellent working relationships with operating room personnel, particularly surgeons. After all, many medical students interested in this specialty shudder at the thought of working with the stereotypical surgeon who curses, throws instruments, and yells at the entire OR staff, including the anesthesiologist. In most hospitals, however, the days when the surgeon was the captain of the ship are over. Instead, anesthesiologists now share leadership responsibility. As directors of the OR, anesthesiologists inform the surgeons when they should start, stop, and continue operating.

Unfortunately, relationships with OR staff in academic teaching hospitals

are sometimes more problematic. In this setting (where anesthesiology slowly developed as a rigorous academic discipline), many attending surgeons neither understand nor appreciate the important role of the anesthesiologist. They prefer, instead, to boost their egos by attempting to exert power in the operating room in front of their residents, students, and nurses. Here, OR nurses tend to jump for the surgeons first, anesthesiologists second. These ancillary staff members, who watch the anesthesiologist transporting patients and starting intravenous lines, sometimes continue to buy into the old captain of the ship mentality. A good academic anesthesiologist, therefore, knows both when and how to assert leadership and to take charge as the primary physician during times of crisis.

In community hospitals and private practice, the relationship is quite different. Here, one hand feeds the other. The surgeon relies on the anesthesiologist to keep the patient alive, safe, and pain free during the perioperative experience. By controlling turnover time between patients, anesthesiologists dictate the pace of the operating room and, consequently, its profits. Like the host at a busy restaurant, they coordinate the operating room schedule. In return, the anesthesiologist depends on the surgeon to provide case volume. In private practice, surgeons who upset their anesthesiologist with disrespectful comments may find them slowing down pre-ops and intubations, delaying or even canceling cases, and hampering profitability. You can see that this relationship is mutual. In most private practice settings, anesthesiologists and surgeons work together as a team, with respect and affability.

ANESTHESIOLOGISTS AND DRUG ADDICTION

The problem of chemical dependency is particularly prevalent in anesthesiology. Among physicians, anesthesiologists, who primarily abuse major opioids, reportedly have the highest incidence of drug addiction.[1] They comprise approximately 4% of all US physicians but make up about 12 to 15% of all doctors currently in addiction treatment programs.[2] However, the significance of the prevalence of drug addiction in anesthesiology, as compared to other specialties, is somewhat controversial. Anesthesia departments are better trained than others to detect early signs of addiction. Increased awareness of drug abuse, rather than greater frequency, may lead to an unusually high statistical representation of drug-abusing anesthesiologists. Moreover, another study found the highest levels of self-reported drug dependence not among anesthesiologists, but among psychiatrists (who abuse benzodiazepines) and emergency room doctors (who take illicit

drugs).[3] Regardless of drug or practice environment, physician substance abuse is a serious and universal problem.

There are several reasons why anesthesiologists are three times more likely than other physicians to start abusing drugs. They regularly administer highly addictive drugs (like fentanyl and sufentanil) that most physicians never prescribe. They are among the few specialists that actually prepare and dose intravenous narcotics themselves (usually done by a pharmacist). As a result, they have easy access to controlled substances, whether by blatant stealing, falsifying records, or switching syringes. They may become especially curious about the effects of the drugs they administer and want to experience what the patient feels. Finally, anesthesiologists are often under a great deal of stress. They have to cope with responsibility for a patient's life, pressure for rapid turnover time, anxiety that a minor error can cause a patient to die, and fatigue. The sheer strain of this specialty may cause an anesthesiologist to be susceptible to chemical dependency.

Because physician drug addiction is a concern in every specialty, this issue should not discourage medical students from considering anesthesiology. But medical students who have a personal history of substance abuse, whether of alcohol or illicit drugs, should be wary of the possible occupational hazard in anesthesiology. Because of the daily temptation, recovery and re-entry into the operating room environment can be exceptionally difficult. Most departments of anesthesiology have developed excellent mechanisms to identify individuals who may be susceptible to addiction. After all, the consequences are quite damaging. Depending on the point of their career, addicted anesthesiologists can lose their medical license, job, residency program position, or, at the worst, their life. A recent mortality study found that anesthesiologists are, compared to internists, at twice the risk of drug-related suicide and three times the risk of any drug-related death.[4] Although anesthesiologists are recognized as leaders in patient safety, their occupation can, at times, place their own lives at risk.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Although all anesthesiologists must become morning people due to the early start times of surgery, their lifestyle is rather enjoyable. The hours of patient care are predictable and scheduled. This means that your time spent out of the hospital is nicely protected. Unless you are on call, do not expect to be bothered by middle-of-the-night pages. The frequency of call depends on the size and type of practice and whether the hospital offers trauma and obstetric services. Recent surveys of lifestyle differences among various specialists show that anesthesiologists are the

VITAL SIGNS

ANESTHESIOLOGY EMPLOYMENT DATA

- Distribution among all physicians: 4.4%
- Practice type: 75% in private practice; 19% in academics
- Median patient care hours per week: 54.7
- 13.8% experienced difficulty in securing their preferred employment position
- 82.9% report that their salary is equal or higher than expected

Source: American Medical Association

biggest news and stock market junkies, tend to listen to rock music, are highly satisfied with their marriages and sex lives, spend a lot of time surfing the Internet, and avidly attend films and rent videos.[5,6]

As an anesthesiologist, your career can follow many different directions. The practice environments are as diverse as the patient population. Most choose the traditional role of administering anesthesia in the OR and taking care of patients perioperatively. Practice modes also vary from physician-delivered anesthesia in busy ambulatory surgicenters to leadership of an anesthesia care team (residents, CRNAs, and anesthesia assistants). Others draw on their business and administrative skills to become medical directors of operating rooms or intensive care units. Academic anesthesiologists spend their time teaching new residents and conducting innovative research on topics ranging from clinical pharmacology to improvements in patient safety. For those seeking longer patient interactions and continuity of care, the subspecialty of pain management has become very popular. Many anesthesiologists are joining free-standing pain clinics where they perform interventional pain management procedures. No matter the role, anesthesiologists remain the experts on determining perioperative risk and the safest way to care for critically ill patients.

A PRIMER ON THE ANESTHESIOLOGIST–CRNA DEBATE

Many medical students considering a career in anesthesiology often wonder about job security due to the presence of Certified Registered Nurse Anesthetists (CRNAs). Today, many groups of non-MD mid-level health care providers are seeking more autonomy to increase their scope of practice. Primary care doctors, for instance, work with both physician assistants and nurse practitioners. Yet, when medical students gossip about doctors being replaced by nurses, the CRNA issue seems to surface more than any other. The notion of anesthesiology as a threatened specialty destined for take over by nurse anesthetists is erroneous. By

helping to set up and monitor patients, CRNAs reduce the overall physical work in the operating room and allow the anesthesiologist to oversee multiple cases at once, thus increasing efficiency.

The differences between the two providers are significant. Whereas anesthesiologists are true perioperative physicians, CRNAs, like other nurses, have a knowledge base that is primarily experiential and practical. During their short training, they learn the basics of administering anesthesia, especially the necessary procedural skills. After all, most technical abilities in medicine—like taking history and physicals, delivering uncomplicated pregnancies, and suturing—can be taught to capable mid-level providers, whether nurse practitioners, midwives, or physician assistants. But when life-threatening emergencies arise, nurse anesthetists require the supervising anesthesiologist to come to their aid. This is why they are the principal providers of anesthesia care (under physician supervision) in rural hospitals, where routine bread-and-butter surgical cases abound. The tertiary medical centers of metropolitan regions, with its sophisticated care and disproportionately sickest patients, rarely rely on nurse anesthetists for their anesthesia services. A study of Medicare patients found a higher mortality rate during surgery and failure to rescue from complications when an anesthesiologist was not either directing or significantly involved in care.[7]

Anesthesiologists' depth of training and breadth of knowledge allow them to make rapid decisions and exercise clinical judgment. Their understanding of pathophysiology and pharmacology far surpasses that of nurse anesthetists. Critically ill patients undergoing complicated surgery, whether they have underlying scleroderma or develop a malignant arrhythmia, require anesthesiologists to make life-saving cognitive judgments in addition to technical interventions. They are the ones who can capably perform regional anesthesia, invasive monitoring techniques, and other procedures that require skill and judgment. They also oversee interventional pain management and are heavily engaged in research to advance the field as a whole. Anesthesiologists conducting basic science and clinical research have made many significant innovations, such as improved anesthetic agents, advanced patient monitoring, and new pharmacologic therapy.

Since 1966, the federal government has required that a physician oversee the delivery of anesthesia care in Medicare cases because of safety issues. The debate over whether to eliminate the physician supervision requirement was a key element of the Clinton administration's health care reform plans. In January 2001, 2 days before leaving office, President Clinton signed the bill that would have allowed CRNAs to give anesthetics to patients without being supervised by a doctor. But in

recent national polls, an overwhelming majority of Medicare beneficiaries and aging baby boomers opposed eliminating the physician supervision requirement.[8]

Upon arrival in office, therefore, the Bush administration suspended the bill for further review by the Center for Medicare and Medicaid Services. The final federal rule, published in November 2001, stipulates that every Medicare- and Medicaid-approved health care facility require physician supervision of nurse anesthetists. On the state level, governors can petition for an exemption after consulting with state boards of medicine and nursing and determining that this change is consistent with state law and in the best interest of its citizens. As expected, the only states considering an opt out from the physician supervision requirement are those with large rural and underserved areas that cannot attract anesthesiologists (or other specialists). Moreover, many patients undergoing surgery today have multiple and complex medical problems. If a hospital requires physician supervision of nurse anesthesia services, the surgeon would be held legally accountable for the nurses' actions.[9] Would any surgeon really want to take on this additional responsibility and liability? Regardless of resolutions made at state level, the final decision over these scope of practice issues lies with the hospitals and operating facilities themselves. They are the entities ultimately responsible for patient safety in the operating room.

Although the political lobbying continues today, this bureaucratic debate should in no way discourage medical students from considering a career in anesthesiology. As discussed in Chapter 2, the current and projected shortage of anesthesiologists has created a robust job market with lucrative offers and high salaries. Departments of anesthesiology at nearly every academic medical center are recruiting new faculty. It is also well known that the nursing profession has experienced a significant decline in recruitment for the past several years. Within this shrinking group of health providers, CRNAs make up a very small minority of nurses, especially compared to the much larger group of nurse practitioners. In one recent workforce study, CRNAs, the majority of whom are close to retirement age, are the only nonphysician providers among 10 groups that are projected to decline further in the next two decades.[10]

Because CRNAs will always have a role in dispensing health care, the practice of anesthesiology has morphed into the *anesthesia care team model*. Its members may include anesthesiology residents, nurse anesthetists, anesthesia assistants, respiratory therapists, and recovery room nurses. As the senior expert, the anesthesiologist medically directs and delegates responsibility to team members for the technical aspects of anesthesia care. The anesthesiologist is responsible for preoperative medical evaluations, the creation and implementation of anes-

thetic plans, and personal participation in the most challenging procedures (such as those involved in induction and emergence). The final responsibility and direction lies with the anesthesiologist. Therefore, future anesthesiologists will have multiple responsibilities: managing the operating rooms, taking care of sick patients undergoing complicated surgery, and supervising nurse anesthetists.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Pain Management

The multidisciplinary field of pain medicine applies the principles of anesthesiology outside of the operating room. Both acute and chronic pain is an extremely common complaint of patients. As such, there is a rapidly growing demand for specialists who can manage different pain syndromes. A typical patient is often an injured employee on workers' compensation. Anesthesiologists who specialize in pain management solely see patients in a clinic setting, such as a free-standing pain center. Here, the continuity of care lends itself to a more traditional doctor–patient relationship. They diagnose the etiology of pain syndromes and treat these problems with medication or procedural therapy (injections of local anesthetics, peripheral and central nerve blocks under fluoroscopy, implantation of spinal cord stimulators and intrathecal pumps, and transcutaneous nerve stimulation). In pain management, you can also earn certification in performing acupuncture.

Because of the emphasis on procedures, pain medicine has become a lucrative area of expertise with high reimbursements. However, you must be able to handle drug-seeking patients, chronic problems that sometimes fail to respond to treatment, and increasing competition from neurologists and physiatrists. In the academic setting, pain specialists often conduct research on the pathophysiologic mechanisms of pain. Regardless of the practice model, most patients consider you their personal hero for having relieved their pain and suffering. A fellowship in pain management typically lasts 1 to 2 years following residency. The American Board of Anesthesiology (ABA) offers a specialty examination for board certification.

Critical Care Medicine

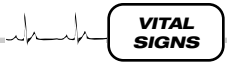
Anesthesiologists are natural and highly sought-after intensivists. By specializing in critical care medicine, they apply their ability to make rapid clinical assess-

ments, treat acute pathophysiologic problems, and perform a variety of procedures. Anesthesiologist–intensivists serve as medical directors of surgical and cardiac intensive care units, where they manage the complicated postoperative care of critically ill patients. Because anesthesiologists care for very sick patients during surgery, their domain logically extends into the sophisticated medical care of intensive care units. Critical care specialists with training in anesthesiology bring unsurpassed airway management skills, as well as expertise in monitoring, mechanical ventilation, fluid resuscitation, and other forms of high-tech life support.

Because pulmonary medicine physicians are the most prevalent specialists in intensive care, most medical students are unaware that anesthesiologists also practice as intensivists. The numbers, though, are small: anesthesiology-trained intensivists in the United States make up 4% of all anesthesiologists and provide 6% of critical care.[11] In contrast, their colleagues in Europe, who provide the majority of intensive care, have a much more dominant role. Despite the low interest, the aging US population will greatly increase the demand for critical care services, particularly access to a full-time intensivist. Critical care fellowships typically require 1 year of additional training, after which you are qualified to take the ABA specialty board examination for certification.

Subspecialties

Several subspecialty areas of anesthesiology have evolved to meet the needs of increasingly advanced operations. Currently, these areas include cardiac, pediatric, obstetric, regional, ambulatory, and neuro-anesthesia. By receiving special training in one of these subspecialties, an anesthesiologist can better manage the pathophysiology of intricate surgical cases, create more complicated anesthetic strategies, and, of course, optimize job opportunities. Cardiac anesthesia, one of the more popular options, allows an anesthesiologist to gain expertise in sophisticated intraoperative techniques, such as hemodynamic monitoring and cardiopulmonary bypass, and earn certification in transesophageal echocardiography. Most of these fellowships require 1 additional year of training. At this time, the ABA does not offer subspecialty ex-



MEDIAN COMPENSATION

Anesthesiology	$278,964
Pain Management	$280,130
Critical Care Medicine	$215,462

Source: American Medical Group Association

aminations for board certification in these areas.

WHY CONSIDER A CAREER IN ANESTHESIOLOGY?

The discovery of anesthesia and the ability to perform surgery without the sensation of pain remains one of the greatest accomplishments of medicine. October 16, 1846—the first public demonstration of anesthesia—was an important date for all anesthesiologists. In the now-famous Ether Dome of the Massachusetts General Hospital, Dr. William Morton administered the first anesthetic (ether) to a patient undergoing neck surgery. To the amazement of the skeptical surgeon and observers, the patient did not scream at the moment of first incision near his tumor. Since that time, more and more anesthetics followed: cyclopropane, halothane, sevoflurane, propofol, and many others. Today, the field of anesthesiology has made incredible progress in patient care, safety, and quality. Yet in spite of these achievements, the mechanism of *how* general anesthetics actually work continues to remain largely a mystery.

ANESTHESIOLOGY 2002 MATCH STATISTICS

- 1588 applicants competed for 1169 positions
- 992 US seniors and 596 independent applicants ranked at least one anesthesiology program
- Program directors ranked 9.1 candidates for each available position
- 95.2% of all positions were filled in the initial Match
- The successful applicants: 81.8% US seniors, 13.1% foreign-trained physicians, and 4% osteopathic graduates
- Unmatched rate for US seniors applying only to anesthesiology: 5.2%

Source: National Resident Matching Program

If you are considering a career in anesthesiology, the future looks very bright. The current data project a significant shortage of anesthesiologists for the next 10 years.[12] Anesthesiology was one of the most competitive specialties to match in the 1980s and early 1990s. It is poised for a remarkable comeback, as the specialty's popularity has skyrocketed today among top graduates from US medical schools. In 2002, while only 6% of all US seniors entered the field of anesthesiology, there was a 27% increase in applicants, which led to the lowest number of unfilled residency positions in the history of the anesthesia Match.[13]

Anesthesiology is a challenging, fast-paced field that combines many aspects

of medicine: on-the-spot differential diagnoses, the use of advanced pharmacology to correct problems in physiology, rewarding patient contact, and hands-on procedures. Every day, you are given the inspiring, yet humbling, responsibility of keeping patients alive during surgery. As their guardian and advocate, you protect their lives during a time when they cannot do so themselves. Some might consider anesthesiology the best kept secret in medicine.

ABOUT THE CONTRIBUTOR

Dr. Brian Freeman, the author of this book, is a resident in anesthesiology at the University of Chicago Hospitals. After growing up in the suburbs of Boston, Dr. Freeman graduated from Brown University and then went on to attend medical school at the University of Chicago. Dr. Freeman is considering fellowship training in cardiac anesthesiology. When not in the operating room, he enjoys relaxing with his fiancée Rebecca, playing ice hockey, and traveling. He can be reached by e-mail at nerveblock1@yahoo.com.

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14 DERMATOLOGY

Amy J. Farmer

As the largest of all organ systems, the integumentary system—comprised of skin and associated structures—can present with any number of diseases and conditions. Dermatology, therefore, is a much broader field than most people realize, ranging from the management of benign skin disorders and cosmetics to the treatment of skin cancers using intricate surgical procedures. It is a specialty that is intricately tied with the principles of internal medicine, because many diseases of the skin are manifestations of inner, systemic problems. One of the most competitive specialties to match into, dermatology provides a rewarding and intellectually satisfying medical career. You will become an expert diagnostician of complex skin problems, integrate both medical and surgical treatment options, and also provide patients with emotional and psychological support.

MELANOMAS, MOLES, AND MORE

Dermatology is the branch of medicine concerned with the skin and all of its related diseases and disorders. These specialists treat both kids and adults who present with any type of disease (either benign or malignant) of the skin, mouth, hair, nails, sweat and sebaceous glands, external genitalia, and mucous membranes. As the protective covering of the body separating us from the external environment, the skin has a broad range of physiologic functions, including temperature regulation and vitamin synthesis.

The spectrum of diseases treated by dermatologists is quite wide. Your patients could include a teenager with severe acne vulgaris, a middle-aged woman with dermatomyositis, a sun-burned farmer with malignant melanoma, a young woman suffering from psoriasis, or a baby with contact dermatitis from her diaper. Every year, millions of patients visit a dermatologist for skin-related complaints. Other common problems include impetigo, benign growths, cellulitis,

WHAT MAKES A GOOD DERMATOLOGIST?

- ✓ Likes working with a variety of patients
- ✓ Enjoys being an expert in a very specialized area of medicine.
- ✓ Is an intellectual, practical, and empathic physician.
- ✓ Likes seeing the results of treatment.
- ✓ Listens well to patients' concerns.

syphilis, rosacea, shingles, seborrheic dermatitis, scabies, vascular birthmarks, warts, and all kinds of rashes (usually either infectious or autoimmune in origin). Similar to the types of problems evaluated by internists, many dermatologic conditions are chronic and require long-term treatment.

Although dermatologists are specialists in skin disorders, they also have a solid understanding of disease processes typically found within the realm of internal medicine. This is because many skin conditions are simply external manifestations of some kind of pathologic process going on inside the body. For instance, the secondary stage of syphilis (a sexually transmitted disease) presents with a well-known diffuse rash. Cancers of visceral organs like the stomach or colon can promote the development of dark, thickened areas of the skin, commonly in the axillary region (acanthosis nigricans). Endocrine disorders like Cushing syndrome and hyper/hypothyroidism and rheumatologic disorders like dermatomyosits, rheumatoid arthritis, and lupus erythematosus all have cuteaneous presentations. Because these skin signs could identify the possible underlying systemic problem, it is important for all dermatologists to understand the pathophysiology and treatment of diseases that may cause certain skin abnormalities.

An essential part of being a good dermatologist is the ability to take a thorough patient history. This is especially important because skin lesions can change over time, and it is important to document these differences. You should feel comfortable asking probing, detailed questions. A complete dermatologic history consists of many details about the skin lesion, including location, duration, fluctuation or persistence, details of spread, and associated symptoms like itching, pain, burning, or oozing. Because dermatologists also think broadly beyond the skin to make proper diagnoses, they also ask questions about the patient's general health, medical history, family history (diseases like psoriasis often are hereditary), prior usage of medications, and a complete allergy history.

In addition to history taking, dermatology places great emphasis on excellent physical examination skills, with the descriptive abilities of the clinician being of

great importance. In the examination, dermatologists have to undress their patients and examine their skin under proper lighting, making sure not to neglect looking at the hair, nails, and mucous membranes. You have to look at a skin lesion and be able to describe all aspects of it in the most detailed manner possible. You have to know the right terminology—whether something is a papule, macule, bulla, or plaque. The physical examination is one aspect of dermatology that differs from many other areas of medicine. Dermatologists do not use any tools like stethoscopes or reflex hammers in their physical examinations. They simply observe the patient with their eyes without any aids, usually just palpating the lesion as well. Good dermatologists have developed their skills in knowing what to look for, understanding what they are seeing and feeling, and then—most important—communicating their findings to other clinicians clearly and precisely. The distribution of lesions in dermatology is extremely important because it may be of help in making the diagnosis.

DERMATOLOGY IS BOTH MEDICINE AND SURGERY

Medical students are usually attracted to dermatology because they like its mix of both medical and surgical therapy. You can use both the prescription pad and the scalpel all in one day of seeing patients. A generalized knowledge of medicine is critical, for instance, when administering medicines with systemic toxicity such as intravenous steroids. You will provide your patients with a number of topical ointments (especially steroids and antibiotics) in addition to treating them with your hands with surgery.

Not all of the procedures are necessarily therapeutic, however. Dermatologists use their hands diagnostically as well. At the bedside or in the office, they conduct simple tests to confirm suspected clinical diagnoses. This includes skin biopsies of suspicious lesions, potassium hydroxide ("if it scales, scrape it") stains of fungal infections, gram stains for identifying bacterial causes of skin infections like cellulitis or impetigo, Tzanck preparation smears for isolating herpes infections, and oil preparations to rule out scabies in patients presenting with itchy rashes.

In the therapeutic realm, dermatologists are the master surgeons of the skin. One of the most demanding forms of surgery is Mohs micrographic surgery. This advanced treatment for skin cancer involves the removal of cancer from certain areas, such as the face or ears, where skin-sparing excisions are important. It offers the highest potential for recovery. Historically, skin cancers were removed with a standard margin that would ensure the removal of the entire cancer. However, a certain portion of skin removed would be cancer free. Mohs surgeons re-

move serial slices of skin and evaluate them under the microscope, ensuring clear margin free of cancer all the way down to its roots. It allows the dermatologist to see beyond the disease and remove the entire tumor while leaving the healthy cells alone. After completing removing the skin lesion, the Mohs surgeon repairs the wound with complex closures.

More surgically oriented dermatologists can perform Mohs surgery with complicated flaps and grafts. Surgical dermatologists also perform procedures typically performed by plastic surgeons such as liposuction, blepharoplasties (eyelid surgery), and even rhytidectomy (face lifts). Surgical treatments also include procedures like excisions, electrodessication and cutterage, cryotherapy, sclerotherapy, laser surgery, hair transplants, and tissue augmentation therapies.

Certain dermatologists also perform medical and surgical skin rejuvenation procedures in the form of cosmetic dermatology. Medical rejuvenation involves the use of tretinoin, apha-hydroxy acids, and topical anti-oxidants for the treatment of age-related skin changes. Surgical rejuvenation procedures include *Botulinum* toxin injection, soft tissue augmentation, chemical peels, dermabrasion, sclerotherapy, and laser skin resurfacing. Many people, of course, have heard about *Botox*, a cosmetic treatment method that falls under the special expertise of dermatologists. This technique involves the injection of very tiny amounts of purified botulism toxin into a targeted facial muscle. The injection causes a nerve blockage and subsequent immobilization of the facial muscle; paralysis of the muscle prevents wrinkling of the skin when the patient smiles or frowns.

Many cosmetic dermatologists also perform laser skin resurfacing, which involves the use of a laser (*l*ight *a*mplification by the *s*imulated *e*mission of *r*adiation) to treat wrinkles, pigmented lesions (such as birthmarks), scars, tattoos, warts, and unwanted hair. A related advanced technique known as *electrosurgical resurfacing* uses micro-electrical radiofrequency to deliver a pulse of energy to the skin. Electosurgical resurfacing removes lesions without the loss of skin pigmentation, so it can be used on skin of all colors.

Compared to medical dermatology, the field of surgical dermatology seems to be growing rapidly. More and more dermatologists are specializing in surgical procedures. These private practitioners cite the perceived threat in the 1980s and 1990s that managed care would find ways to depress the earning potential of dermatologists practicing classical procedures. Furthermore, a recent study suggests that medical students who incur large educational debts in medical school believe that practicing surgical dermatology will be more lucrative than practicing classical dermatology.[1] Medical students should keep in mind, though, that dermatology is a major branch off the tree of internal medicine. This is why many

academic dermatologists believe that the core of dermatology comes from those diseases most often treated with medical, not surgical, therapy.

THE DOCTOR–PATIENT RELATIONSHIP

Although dermatologists have more of a consultative role, they maintain a high level of patient contact. They establish long-term relationships with their many patients whose chronic skin conditions require multiple follow-up appointments over the course of several years. Patients appreciate their dermatologists for their equal emphasis on preventive medicine and immediate treatment of acute skin diseases. While dealing with the current problem at hand, dermatologists also make sure to educate their patients on the importance of skin cancer prevention: staying out of the sun, using sunscreen, and watching their own suspicious moles. Many patients do not realize that mole self-checks are just as important as monthly breast self-examinations.

Most important, to have rewarding relationships with patients, a dermatologist must have excellent listening skills. In a way, dermatologists are part physicians, part counselors. As external manifestations of disease, skin disorders can affect the mental well-being of patients who are concerned that others are looking at their skin. You must take the time to discern how patients feel about their skin disease. This is important when it comes to evaluating the effects of treatment. You must be able to see and feel this disorder to properly empathize with your patients. Skin disease has much more of an effect on patient's psyches than high blood pressure or diabetes or anything else that may be internal. This is a unique aspect of dermatology.

MISPERCEPTIONS ABOUT DERMATOLOGY

Medical students interested in dermatology often feel that other physicians do not really understand or appreciate the role of dermatologists. Some doctors believe that the conditions dermatologists treat can be adequately managed by primary care physicians. In a recent study, 400 nonmedical respondents were asked a series of questions designed to establish a prestige hierarchy in the medical profession.[2] Specialties such as surgery and cardiology ranked among the highest; dermatology and psychiatry were ranked at the bottom. Perceived income was the most important predictive factor of a specialty's location on the list.

Even though dermatology is a very important part of medicine in our country, there are many who consider it an expensive and superfluous luxury. Many

primary care physicians and managed care administrators mistakenly feel that diseases of the skin are easy to diagnose and treat, and that there is therefore little need for dermatologists. If we allow their thinking to prevail, the number of dermatologists in this country will decrease significantly, and the quality of care for patients with skin diseases will rapidly deteriorate.

It also certainly does not help when dermatology gets lampooned in popular culture, such as the episode of *Seinfeld*, in which a dermatologist is mocked as an "aloe pusher" and "pimple popper, MD." Yet dermatologists are, indeed, true lifesavers when it comes to the treatment of deadly skin cancers. Although most skin diseases treated by dermatologists are benign, cancer of the skin is the most common of all cancers in this country. According to the American Cancer Society, one person dies of melanoma every hour, and among people between the ages of 25–29, melanoma is more common than any non-skin cancer. Dermatologists have the unique position to screen, diagnose, and treat their patients for these life-threatening diseases. If detected early, both basal cell and squamous cell carcinomas have an excellent cure rate.

The recent surge of media attention on dermatologists who provide Botox injections and lotions in their practices has left the general public with additional misconceptions. *Cosmetic dermatology* actually plays a small role in the field of dermatology, with the majority of dermatologists' time being spent on medical or noncosmetic surgical procedures.

In the medical profession, a common, and playful, dictum explains treatment options for a dermatologist: "If it is wet, dry it. If it is dry, wet it. Anything else, use steroids." This playful dictum does accurately reflect that few skin diseases end life, but the neglect of certain skin diseases can ruin a patient's quality of life (or end it). Many diseases in dermatology require prompt and proper diagnosis and treatment—particularly deadly skin cancers. Little known to the public, dermatologists specialize in the diagnosis and treatment of the more than 3000 diseases that plague the human skin.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

The regular hours, flexible employment opportunities, lack of overnight call, and handsome compensation give dermatology its reputation as a field associated with a good lifestyle. Unlike other fields, dermatology has few life-threatening emergencies, so overnight call in the hospital is rare. Most of the delivery of dermatologic services happens in the outpatient setting during regular business hours. In addition, almost all surgical interventions are in the outpatient settings. Ac-

cording to the American Academy of Dermatology, by 2005, 82% of all surgical dermatologic procedures will be performed in the outpatient setting.

When it comes time to set up shop, dermatologists practice in either academic or private settings. *Private dermatologists* build practices over time to ameliorate their clients' skin-related ailments. Some private dermatologists also offer their services to teach residents in academic centers. In *academic dermatology*, physicians typically choose between the following types of practices: serving as faculty in academic hospitals, seeing patients at Veteran's Administration centers, or conducting research, either funded by the government or by pharmaceutical companies. For academic dermatologists, government-sponsored funding is more difficult to obtain, because typical dermatology research is *translational* (applying basic science research on patients and their illnesses). Government sponsorship traditionally favors basic science research over translational research. Because of the scarcity of federal grants, academic dermatologists may have to explore private settings and/or funding. If a researcher's topic is not of interest to the pharmaceutical industry, it can be difficult to receive funding.

VITAL SIGNS

DERMATOLOGY EMPLOYMENT DATA

- Distribution among all physicians: 1.2%
- Practice type: 72.5% in private practice; 20% in academics
- Median patient care hours per week: 39.6
- 7.8% experienced difficulty in securing their preferred employment position
- 59% report that their salary is equal or higher than expected

Source: American Medical Association

Like other fields of medicine, the actual practice of dermatology can be tailored to accommodate your individual interests. Some dermatologists enjoy working with a microscope and focusing on diagnosing pathologic slides. These *dermatopathologists* rarely see patients in the clinic. Other dermatologists prefer the art of performing procedures such as Mohs surgery. Regardless of direction, nearly all dermatologists love the combination of outpatient medicine, procedures, pathology-

VITAL SIGNS

MEDIAN COMPENSATION

Dermatology	$220,766
Dermatology—Mohs surgery	$288,500

Source: American Medical Group Association

based clinical medicine, regular hours, patients of all ages, and the ability to improve a patient's quality of life. It is a perfect specialty for those who do not want to care for critical ill patients, conduct daily hospital rounds, be available for overnight emergency calls, or serve as a point person in a patient's general medical care.

DERMATOLOGY'S ORIGINS AND FUTURE DIRECTIONS

Over 200 years ago, in 1798, Robert Willan, a British physician, published his masterpiece, *On Cutaneous Diseases*, which organized and categorized skin lesions by small differences in morphology. Sorting out the definitions of the various lesions has been called "one of the great achievements of the dermatology of the nineteenth century."[3] In 1799, the first hospital devoted to dermatology opened in France. In the United States, the first dermatologic hospital ward opened in Massachusetts General Hospital in 1870. At this time, dermatology was actually an inpatient-based specialty with patients who were managed for prolonged periods of time in the hospital. Now, only 2% of patients admitted to the hospital for dermatologic diseases are managed by dermatologists.[4]

Much has occurred since Willan's time to expand professional knowledge about the morphology and distribution of skin lesions. Today's body of dermatologic knowledge is both wide and deep. In addition to the study of the morphology and distribution of skin lesions, the histopathology of skin lesions has become of paramount importance in understanding these diseases. The nature of dermatology has also changed dramatically over the past couple of decades. In what was once a male-dominated field, in which students often trained in internal medicine before dermatology, at least 50% of today's would-be dermatologists, if not more, are women.

Despite the growth of dermatologic specialization, primary care physicians are playing an increasing role in the treatment of dermatologic maladies. More than one quarter of Americans seen by their primary care physician have a skin-related complaint, and dermatologic disorders account for 6% of all chief complaints.[5] Primary care physicians are becoming more comfortable in treating basic and uncomplicated dermatologic diseases such as acne and fungal infections. (The use of isotretinoin, which can cause birth defects, for the treatment of acne remains within the control of the dermatologists.) Many patients prefer dermatologists for these problems because they can offer patients advice on general skin care as well as prescribe medicine. Some dermatologists welcome the involvement of primary care physicians for basic needs and have consequently shifted

their practices to focus on more special needs such as oncological, surgical, and cosmetic procedures.

The accuracy of nondermatologists diagnosing dermatologic diseases has been called into question. In a study designed to quiz physicians on dermatologic diagnoses using slides and high-quality transparencies, dermatologists performed better than nondermatologists (93% versus 52% correct).[6] However, family practice physicians did perform better than internal medicine specialists (70% versus 52%). This study suggests that when something goes wrong with the skin, a consultation with a dermatologist is in order.

In the twentieth century, the microscope revolutionized the practice of dermatology. For today's medical student, the digital camera may change the practice of dermatologists in the twenty-first century. *Teledermatology,* or the practice of dermatology using digital cameras, is a hot topic. This type of dermatology can be practiced in two ways: (1) the patient and the dermatologist have a real-time conversation via camera or (2) the patient's skin is photographed and viewed at a later time (store and forward method) in conjunction with a clinical history. Proponents of teledermatology argue that these services allow for equitable service to those patients in remote areas who may not have access to centers of excellence in dermatology. Also, studies have shown that teledermatology is an accurate and reliable way of diagnosing disease. Although teledermatolgy has been seen as a useful mode of communication for patients, the greatest concern has been the lack of relationship between physician and patient.[7]

While dermatologists must master the basics of medicine, they also must understand the interactions of various cells and the interplay between disease processes in the skin, for example, inflammation, immunology, oncology, and infection. The diagnostic process is fascinatingly rich—with an infinite arrangement of colors, patterns, and textures. It is this complexity that defines the field.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

There are many choices for specialized training within dermatology after the completion of basic residency training. Only two fellowships (dermatopathology and CLDI) lead to certificates of added qualifications. Practice in a dermatology subspecialty requires 1 or 2 additional years of training. The following are the four most common fellowships, but other nonaccredited fellowships exist in areas like contact dermatitis and cutaneous allergy, cosmetic dermatology, and dermatologic research.

RESIDENCY TRAINING

Residency in dermatology requires 4 years of postgraduate training. There are currently 106 accredited programs. A select number of integrated programs allow residents to earn combined certification in both dermatology and internal medicine. In either case, dermatology training does not begin until the second postgraduate year after completing a general internship (internal medicine, surgery, pediatrics, or transitional year). Because dermatology is an outpatient specialty, work hours during residency are generally benign but also include a significant amount of outside reading and self-study. During the advanced years of training, on-call requirements are limited to call from home. Residents spend time on different rotations including dermatopathology, pediatrics, Mohs surgery, VA clinic, inpatient consultation service, and general inpatient service. The majority of time during residency is spent in a hospital outpatient clinic with fewer weeks in a nonhospital ambulatory care setting.

Mohs Surgery

For dermatologists with a knack for surgical procedures, this fellowship provides additional experience in the rigorous technique of Mohs micrographic surgery. The focus of practice becomes the surgical treatment of skin cancer.

Dermatopathology

For those with a passion for the basic sciences, this fellowship creates experts in the pathologic diagnosis of skin diseases, including those of infectious, immunologic, degenerative, and neoplastic origin. You will spend much of your time in the pathology department poring over slides through microscopes.

Clinical and Laboratory Dermatological Immunology (CLDI)

This fellowship trains subspecialists in the use of specialized laboratory procedures to diagnose disorders characterized by defective responses of the body's immune system.

Pediatric Dermatology

This fellowship provides additional expertise in the treatment of skin disorders more commonly found in children. You will become adept at treating genetic skin disorders—like ichthyosis, epidermolysis bullosa, and pigmentary diseases—as well as a variety of vascular malformations, including birthmarks.

WHY CONSIDER A CAREER IN DERMATOLOGY?

Medical students interested in this specialty should not let the extremely competitive nature of the field dissuade them. It is a specialty that can lead to a very rewarding career in medicine. From the wide variety of skin problems to the different types of patients, dermatology is full of diversity. If you are seeking a high-pressured specialty with critically ill patients, then look elsewhere. In dermatology, the results of treatment are very visible and apparent to both the doctor and the patient. Unlike lowering blood pressure or treating diabetes, the effects of treating a skin disorder are obvious—it will either go away or stay. Many medical students like this clearly defined aspect of dermatology, which applies to each step in the diagnosis, treatment, and prevention of skin diseases.

VITAL SIGNS

DERMATOLOGY 2002 MATCH STATISTICS

- 545 applicants competed for 275 positions
- 347 US seniors and 164 independent applicants ranked at least one dermatology program
- Program directors ranked 10.4 candidates for each available position
- 100% of all positions were filled in the initial Match
- The successful applicants: 91.1% US seniors, 3% foreign-trained physicians, and 3% osteopathic graduates
- Unmatched rate for US seniors applying only to dermatology: 16.1%

Source: National Resident Matching Program

ABOUT THE CONTRIBUTOR

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15 EMERGENCY MEDICINE

Jeremy Graff

Nearly all medical students have watched emergency room physicians save lives and cure disease on *E.R.*, the popular television series. They witness the high drama, witty banter, cool procedures, diagnostic coups, and romance. Life (and medicine), though, is usually nothing like the TV show. Does the specialty of emergency medicine really live up to its glamorousas image?

Fast-paced and unpredictable, emergency medicine is one of the newest specialties in medicine. It has grown to meet the challenge of 100 million emergency room visits per year. As you know, the ER is always open and easily accessible. Emergency physicians must be prepared for any type of medical problem that arrives at the door, whether by foot, car, ambulance, or helicopter. It is never boring. They take care of a wide cross-section of Americans of all ages and races, rich and poor, insured and uninsured. These specialists like to work fast and think on their feet while serving on the front lines of medicine.

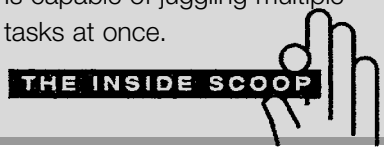
WHAT IS EMERGENCY MEDICINE?

Emergency medicine involves the immediate care of urgent and life-threatening conditions found in the critically ill and injured. These physicians are really specialists in breadth—their broad-based training encompasses acute problems that span several clinical disciplines. No other specialty can match the astounding variety of patients found within the emergency room. You will see, hear, and smell things that most doctors will not. In just one shift, an emergency physician may care for patients presenting with asthma attacks, atrial fibrillation, gunshot wounds, dislocated shoulders, and even cockroaches stuck in their ears. Every now and then, the EM doctor will discover a *zebra*, such as a pheochromocytoma (adrenal gland tumor) in a young woman with high blood pressure and headaches.

Emergency medicine became a specialty only about 25 years ago. Until then, most doctors who covered acute, emergent, and traumatic illnesses were actually

WHAT MAKES A GOOD EMERGENCY PHYSICIAN?

- ✓ Likes working with his or her hands.
- ✓ Is an adventurous, action oriented leader and team player.
- ✓ Can make logical decisions during rapidly changing situations.
- ✓ Likes variety and the unexpected.
- ✓ Is capable of juggling multiple tasks at once.



board certified in other fields, usually internal medicine or surgery. In smaller hospitals, just about anyone (including psychiatrists) could provide ER coverage for anything from a minor cut to an inflamed appendix. Some of these doctors left their original specialty to work full time in emergency rooms and grandfathered their way into becoming emergency medicine specialists.

During the 1960s, physicians began to realize that patients would have better clinical outcomes if they received prompt and appropriate care from the moment they entered the hospital. This small group of physicians recognized the need for formal study and training in emergency medicine and subsequently founded the American College of Emergency Physicians in 1968. Over the next 5 years, they worked to establish the first residency program at the University of Cincinnati and lobbied Congress to pass the Emergency Medical Services Act. As a result, emergency medicine began to expand rapidly, using federal funds to develop prehospital emergency systems and to expand emergency departments. In 1979, the American Board of Medical Specialties recognized emergency medicine as an official clinical specialty.

Today, only physicians who have completed an emergency medicine residency are hired in the nation's emergency rooms. All across the country, *ER docs* provide immediate recognition, evaluation, care, and disposition of a diverse adult and pediatric population. When dealing with acute problems, whether nonurgent or life threatening, their primary role is to stabilize the patient. They evaluate the ABCs (airway, breathing, circulation), take quick histories, perform focused physical examinations, order relevant laboratory and radiology tests, and contact consultants. In the contemporary ED, these specialists must be completely sure that all life-threatening causes of particular symptoms are completely worked up and ruled out. Despite being such a young arm of medical practice, emergency medicine has matured into a rigorous clinical specialty. You will receive formal training to handle just about anything that may walk through that door.

A typical shift in the ED is full of variety, drama, and excitement. As you greet the frequent fliers, who often come for both food and medical care, the chart boxes begin filling up with new patients to be seen. First might be a man clutching his stomach due to abdominal pain caused by pancreatitis. The next patient may be a pregnant woman who presents with vaginal bleeding and cramping abdominal pain—possible signs of an ectopic pregnancy. In this case, you take on the role of gynecologist, conducting a pelvic examination to see if the cervix is open or closed. You may even, depending on your training, take on the role of radiologist in such a case, using a hand-held ultrasound device to determine if the patient has a viable intrauterine pregnancy. Obviously, the emergency medicine physician has to love juggling dozens of different problems, situations, and treatments while teaching and interacting with patients at the same time. At any time, a code blue (cardiac arrest) or trauma could bring this somewhat orderly environment crashing down. You are generally the first doctor to arrive in the resuscitation room, a place where patients in respiratory distress—with dropping oxygen saturation and pink frothy liquid coming out of their mouths—need immediate endotracheal intubation.

The practice of modern emergency medicine does not formally include any continuity of patient care. Because EM doctors work in shifts and only focus on acute medical problems, there is no patient follow up. (Unless, of course, the patient returns to your emergency room a few days later.) After admitting or discharging a patient, the emergency physician moves on to the next one sitting in the waiting room or being flown in by helicopter. Thus, medical students interested in this specialty should carefully consider whether having their own group of long-term patients is important. Unlike world-renowned experts in other specialties, emergency physicians—and other hospital-based specialists like radiologists and anesthesiologists—are behind-the-scenes doctors who may remain largely anonymous to health care consumers.

Working in an ED does not necessarily mean that all patient interactions are curtailed by shift work and acute care. Although emergency physicians do not develop long-standing ties with their patients, they often establish a strong relationship with the community in which they practice. Plenty of patients, especially uninsured indigent persons looking for warmth, food, a place to sleep, and regular medical care, visit the emergency room regularly and form bonds with its staff. "Do I get to have a primary care-type relationship with all patients? Of course not, but I do get to know my community and many of the people in it," commented an emergency medicine specialist at an inner-city hospital. "This is 'their' hospital and for many of them I, or one of my colleagues, actually end up taking

the role of the family doc. It's hard to do in a busy ED, but building good rapport and relating with some of our most challenging patients is one of the more rewarding aspects of emergency medicine."

GENERALIST OR SPECIALIST?

Despite their specialized focus, emergency physicians are, in a way, true generalists. Although some may categorize these physicians as "jack of all trades, master of none," emergency physicians do have their own area of expertise: knowing the most important (i.e., acute or life-threatening) presentations of problems across the entire medical spectrum. They must be as comfortable with a gynecologic emergency as with a pediatric trauma patient. In a single work shift, an EM doctor can deliver a baby, stabilize an accident victim, evaluate a possible case of appendicitis, manage a traumatic airway, treat an asthma attack, and diagnose congestive heart failure. No other specialty of medicine, not even EM's closest cousin—family practice—matches the breadth of acute problems that these physicians must be prepared for. Because emergency medicine physicians really get to do it all, students who enter this specialty like the fact that they will be real doctors. You will know what to do if someone has a heart attack on an airplane or when a child gets hurt at the playground.

Although the spectrum of disease varies depending on practice location and community, EM docs are trained to handle anything, including patients, usually indigent or uninsured, who use the emergency room as their primary care clinic. This is why some describe the ED as "the world's largest family practice clinic." As an emergency physician, you will not necessarily see true emergencies all the time. In fact, about half of your patients will present with problems that are more appropriate for a primary care doctor—the common cold, musculoskeletal pains, rashes, and other nonurgent complaints. It is kind of like being a family doctor but without the long-term continuity, practice of preventive medicine, and clinic setting. Your goal, instead, is to treat the acute problem at hand and then direct patients to the next appropriate step for their medical follow up.

EMERGENCY MEDICINE REQUIRES MANY SKILLS

For most patients who seek urgent medical care, the EM physician is usually the first doctor on the case. This initial evaluation is both a privilege and a challenge. Patients do not arrive in the emergency room with their medical chart or old records. They may answer your questions poorly. As such, emergency physicians

often have to piece the clinical history together from fragments provided by unresponsive sick patients, family members, EMTs, police officers, and other sources. Being the first person to ask the appropriate questions in a limited amount of time can be frustrating. You must act like a sleuth. You must have the confidence to make fast medical decisions based on limited, incomplete information. For an emergency medicine doctor, nothing is more satisfying than taking a few bits and pieces of history (and abnormal physical findings), ordering some lab tests, and coming up with a working diagnosis and treatment plan.

While one case is being stabilized, many more are waiting patiently (and often impatiently) for evaluation, treatment, discharge, or admission. The emergency physician constantly juggles many tasks at once, whether acquiring data, making decisions, or performing procedures. Patients, lab results, nurses, chest x-rays, family members, and other physicians all vie simultaneously for your immediate attention. Because you are doing so many things at once, emergency care sometimes requires knee-jerk action, after which additional thinking is necessary. In a short amount of time, you coordinate a wide range of treatment plans, from readjusting an asthma patient's medications to suturing wounds of another patient who also just received a chest tube. With recent advances in medicine, more and more patients are coming to the emergency room with complex problems, such as unusual drug interactions, or complications from procedures that did not exist before, like organ transplants. Now, emergency medicine specialists find themselves with even more responsibilities to manage at once.

With many stressful events occurring at the same time, the ability of an emergency physician to triage patients becomes even more important. Based on the French word *trier*, meaning "to sort," *triage* involves allocating treatment to patients based on a priority system that assigns resources to where they are most needed. As patient advocates, these doctors must recognize the difference between the truly sick and those with less urgent problems. After all, "some patients are not as sick as they think, and others are not as well as they wish."[1] This is where triaging comes in. Without it, many people desperately in need of medical care might not receive it while their physician's attention is focused elsewhere. All emergency physicians learn to master this skill. After sorting patients correctly when many arrive at once, emergency doctors take care of them all the way through discharge or admission.

While triaging and examining patients, EM physicians apply lots of technical procedures in their diagnosis and treatment plans. Yes, these doctors really do get to perform much of that wild and crazy stuff seen on television. Remember, emergency medicine is a specialty in which urgently treating the very sick in-

volves manipulations and hands-on procedures. You will insert nasogastric tubes, reduce joints, defibrillate hearts, suture lacerations, incise and drain abscesses, intubate with endotracheal tubes, and deliver babies. Like playing with needles? Every day, there are always opportunities to place intravenous, central, and occasionally intraosseous lines. Even more complicated procedures like cricothyrotomies (inserting a needle through cartilage of the neck to create an airway) and thoracotomies (cracking the chest) are also possible. For medical students who like to work with their hands and think surgery is the only answer, take a closer look at this specialty. Emergency medicine is a quicker route to being a broad-based doctor who also gets to play with scalpels, needles, and thread.

TREATING TRAUMA PATIENTS

The dramatic, cool procedures that attract medical students to the field of emergency medicine are often performed on trauma patients—people with knife and gunshot wounds, or those who have been critically injured in motor vehicle accidents, drownings, construction accidents, natural disasters, and more. They are quickly transported to trauma centers and met by eager, capable emergency medicine physicians waiting to perform miracles. The idea of saving lives every day excites many medical students and is the strong appeal of this specialty.

A multidisciplinary problem, trauma always involves an entire team of doctors, namely emergency physicians, trauma surgeons, and anesthesiologists. As an EM doctor, do not expect to be the sole individual doing all the work. Typically, the trauma surgeon calls the shots during the resuscitation. After all, the appropriate management of internal injuries due to trauma falls within the realm of surgery. It is important for emergency physicians to recognize the boundaries of their special knowledge and skills. You must learn to appreciate the presence of and guidance by the surgery team with whom you share space.

In saving patients with traumatic injuries, the specific role of the EM doctor depends on the type of trauma and the hospital. First and foremost, all emergency physicians secure the patient's airway, which can often be surprisingly difficult. For those who thrive on adrenaline-inducing challenges, intubating trauma patients may involve suctioning blood, teeth, or even brain matter out of the way while keeping the patient immobile in a C-collar. Before the surgery team arrives, the emergency doctor continues the rest of the trauma assessment: breathing, circulation, disability, and exposure. While stabilizing the patient, their role can be quite fluid, depending on the patient's next outcome. To assess the need for surgery, they might use ultrasound imaging to locate free fluid in

the belly of a patient with blunt trauma. Emergency physicians often place central lines and chest tubes. Their most important role, however, is to stabilize the patient until definitive treatment (surgery) arrives. As such, future emergency physicians who want to go at it alone, or who become easily annoyed by orders from surgeons, may find their role in caring for trauma patients much more limited than they anticipated.

OCCUPATIONAL HAZARDS IN THE ED

For the next 20 to 30 years, your workplace will be a chaotic, messy, and tense environment. For some, the confines of the emergency room seem like a more dangerous work environment than the clinic, operating room, or ward. You will often be performing invasive procedures under time pressure, with blood splattering everywhere. Patients may not necessarily divulge any possible pathogens they may be carrying. And, all sorts of nasty bugs and critters make the ED their very special home. Here, brave emergency physicians are at an increased risk for exposure to everything from multidrug-resistant tuberculosis to hepatitis B and C, from HIV to potential biological warfare agents. The ED is, after all, one of the top locations where medical students have been exposed to accidental needlesticks.[2]

Although there is the potential of being exposed to an infectious agent, most modern emergency departments take all sorts of steps to minimize the risk. As a result of universal precautions, the rates of infection of the most concerning viruses (hepatitis B and C, HIV) are extremely low.[3] Regardless, emergency doctors realize that hazards exist every day on the job, including stray radiation from portable x-ray machines and the stress of shift work. They are willing to accept these challenges to practice in a challenging, dynamic, and fun environment.

The emergency room is also a place where everyone wants something from you immediately, and 9 out of 10 of them are angry with you. ER patients, who can be unruly, impatient, difficult, rude, or outright violent, are another of emergency medicine's occupational hazards. All hospital emergency departments are required to care for every patient who comes through the doors, regardless of their ability to pay and regardless of how hostile and belligerent they are. Furthermore, as our population ages, health care coverage decreases, and emergency department visits increase, future EM doctors are bound to encounter more patients, sicker patients, and, most certainly, angrier patients. Hospital emergency departments certainly feel the greatest crunch due to a health care system that is stretched very thin. Rising medical care costs and the lack of universal health care

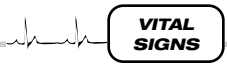
has left almost 40 million Americans uninsured. With the shortage of health care professionals, fewer hospital beds are available, which leaves upset patients in emergency rooms waiting sometimes for days until a bed opens up.

The end result? Many patients hate the emergency room and often greet their emergency physician with hostility and impatience. They are unhappy that it took 6 hours before their lacerated finger was sutured. They become agitated when you refuse to prescribe antibiotics for their viral-induced cough or narcotic painkillers for their sore backs. There will always be aggressive drunks and argumentative prisoners who will all want something from you, fast. Sometimes, the anger and hostility of unruly patients turns to violence. Emergency department physicians, nurses, and prehospital providers attempting to care for intoxicated or emotionally disturbed patients can often become victims of assault. During a 9-month period in one emergency department, members of the staff were kicked, grabbed, pushed, punched, or spat upon nearly 20 times.[4] Future EM physicians should be aware of the threat of violent and dangerous encounters.

In a busy ED, pleasing all of the patients waiting for medical care is usually impossible. Thus, you must be very thick skinned while juggling the needs of these patients with the more pressing needs of trauma victims and other critically ill persons. Using woefully inadequate resources, you will become adept at pushing the flow of patients through the ED into hospital beds, back home, back to prison, back on the streets, or wherever they most appropriately need to go.

LIFESTYLE CONSIDERATIONS: WORKING IN SHIFTS

Today, the trends in specialty selection among medical students have shifted toward lifestyle specialties—ones with controllable hours and the possibility of a better social and family life. Emergency medicine is at the top of this list. Emergency physicians typically show up at the hospital and work for 8 to 12 hours in a given shift. There is no such thing as being on call, because they never carry a beeper outside of the hospital. Once your shift is over, the noise, stress, and demands of the patients waiting in the ED are all left behind as you head out to the golf course. Because of the predictable hours, emergency medicine doctors have the flexibility to plan family and relaxation time without having to worry about get-



MEDIAN COMPENSATION

Emergency Medicine	$204,519

Source: American Medical Group Association

ting their patients covered. Unlike other physicians who are called at home, the illnesses and disasters that befall patients everywhere cannot tear you away from your picnic, night at the theater, or errands on a weekday morning.

However, the rotating shift schedule also has many drawbacks. The emergency department is open 24 hours a day, 365 days a year. Whether just out of residency or approaching retirement age, all emergency physicians find themselves working nights, weekends, and holidays. If you cannot imagine practicing medicine on Christmas Day, Saturday night, or other inconvenient times, especially with a family at home, then you should perhaps consider another specialty. You may dislike having a weekday off when friends and family are working or at school. Moreover, shifts sometimes last longer than anticipated. Emergency medicine doctors cannot simply walk away from a patient who presents with a possible heart attack 5 minutes before the scheduled end of the shift. They also must arrive a little early and stay a little later to help sign out patients, dictate charts, and tie up other loose ends from the previous shift.

Shift work quickly disrupts your circadian rhythms and normal sleeping and eating patterns, because the shifts typically alternate. In a given week, you may find yourself rotating through several blocks of tiring night shifts interspersed with day shifts or long weekend hours. Furthermore, your responsibilities do not always end after completing an overnight shift. Academic conferences, meetings, family duties, and errands often require your time during the day and prevent you from immediately going to sleep. As a result, EM doctors are always recuperating from their alternating shifts. This life of permanent jetlag can make a 40-hour workweek feel more like 80 hours' worth. Furthermore, constantly upsetting and resynching your body's internal clock can have adverse effects on your health. Studies have shown that rotating shift work contributes to higher rates of drug and alcohol abuse, hypertension, heart attacks, divorce rates, work-related accidents, and more.[5,6]

Basically, shift work is both a blessing and a curse. Most hospitals at least attempt to schedule shifts in a block format, rather than frequently alternating, for at least 1 week at time. Ostensibly, this format would allow your body and mind to readjust to a normal circadian rhythm again. By working the same type of shift for a large block of time, emergency doctors could better adapt their bodies and improve their cognitive performance. Despite the inevitable toll on body and mind, nearly all emergency physicians love being able to sign out patients and go home completely free of patient and medical responsibility. There is ample time to spend with your family, to spend weekends at the beach, and so on.

STRESS, BURNOUT, AND CAREER SATISFACTION

Emergency medicine has only existed as a specialty for 25 years. Yet, for some time, there have been discussions about the high attrition rates in this specialty. Many medical students contemplating a career in EM worry about the potential burnout factor and career dissatisfaction. Is this specialty really better for younger physicians rather than middle-aged doctors? Several studies refute this notion.

One study, which measured the degree of burnout among emergency doctors, found that although 60% registered in the moderate to high burnout ranges, the projected attrition rates were comparable to other medical specialties.[7] Another study, which measured the actual attrition instead of surveying EM doctors about their future career expectations, concurred with these conclusions.[8] These authors found that 15 years after graduating from residency, 86.8% of respondents were still practicing emergency medicine, which came to an annual attrition rate of less than 1% per year. They also found that the average percentage of time spent in clinical work decreases from 86% in the first year of practice to 60% by the 15th year of practice, while the amount of time spent in administration increases from 5% to 25% over the same time period. Physicians who left the specialty cited shift work as the most important reason, along with emotional stress, family considerations (especially working weekends and holidays), and physical stress.

Regardless of the actual attrition rate, emergency medicine does have inherent stressors, in addition to working shifts, that, over time, could lead to burnout: high patient volume, pressure, time constraints, and intensity. In a given shift, you might find yourself working for 8 or 12 hours straight without taking a break for food or rest. The lack of continuity of care, isolation from other physicians in the ED, abusive patients, and little positive feedback from either patients or consulting physicians, all can exacerbate stress. Emergency physicians also experience a great deal of doubt over the pressured decisions they make while managing unfamiliar situations with little information. There is always the potential for every visit to be a missed diagnosis (with associated liability). They worry, for instance, about getting sued for discharging patients who should have been admitted.

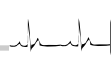
A lack of respect from other medical colleagues can also contribute to career dissatisfaction and burnout among emergency medicine doctors. Due to the fishbowl nature of an emergency room, these clinicians often feel the pressure of their decisions being observed and criticized by other doctors, especially in hindsight. Emergency physicians without thick skins and manageable egos will find

themselves burning out quickly. Many times you will not have the skills, specialized knowledge, time, or equipment to properly care for your patients, and you will have to call other extremely busy consultants and specialists (surgeons, private internists, etc.) for assistance evaluating an acute abdomen or clearance for admission to the medical wards. Because the ED is perceived as the source of more work for already overburdened doctors, many consultants may question the urgency of an EM physician's request and wrongfully dismiss them as triage nurses who simply decide whether the patient should be admitted or discharged.

As emergency medicine has matured into a full-blown specialty, however, issues of fundamental distrust or disrespect from other physicians, though still present, have subsided. Many of the older medicine and surgery attendings, who never really trusted the abilities or judgment of emergency room physicians, are no longer practicing. Today most physicians, whether pediatricians or thoracic surgeons, agree that their colleagues in emergency medicine are well-trained and appropriately call for help when the patient's condition warrants it.

PRACTICE OPTIONS: THE REAL WORLD

Emergency medicine doctors can work pretty much anywhere. Such a variety of jobs should satisfy just about anyone's needs. Because of the shift work and lack of fixed office practice, emergency physicians are somewhat nomadic—they frequently change jobs, move across the country, or work part time in multiple hospitals. Most are based in suburban community hospitals, academic medical centers, inner-city county hospitals, or rural acute care centers. Some work internationally or on cruise ships. Depending on the location, EM doctors can be salaried hospital employees, independent contractors, members of a practice group, or staff from a managed care organization. Regardless of the situation, part-time jobs abound in emergency medicine. Despite the obvious salary reduction, this possibility allows you to balance work, family, and other interests as you choose.



EMPLOYMENT DATA

- Distribution among all physicians: 2.8%
- Practice type: 68.2% in private practice; 24.9% in academics
- Median patient care hours per week: 38.7
- 6.5% experienced difficulty in securing their preferred employment position
- 75.5% report that their salary is equal or higher than expected

Source: American Medical Association

Urban emergency medicine offers constant excitement, high patient volume, trauma, and the always engaging multicultural milieu. Although not every city ED serves as a Level I trauma center, the urban EM doctor deals with a greater variety and abundance of sicker patients than their suburban or rural colleagues. Furthermore, a large city hospital usually means a greater availability of specialists for consultations. On the downside, as previously discussed, are the hazards that come with working in the emergency room of an overcrowded urban hospital (infectious disease, needlesticks, and hostile patients), as well as the possibility of violence.

How about rural practice? Because many people still live in the large rural areas of the country, being the small town EM physician is a truly rewarding experience. An isolated, rural setting allows the emergency physician to draw on all their skills without having to consult another specialist. As the only physician for miles around, you are responsible for managing many problems yourself. While knife and gunshot wounds are rare, trauma is still inevitable in these locations. Farming accidents occur at a rate of roughly 10 accidents or injuries a year for every 100 full-time farm workers.[9] Because of the lack of tertiary care facilities in these regions, rural emergency room doctors become experts at stabilizing very sick patients and then transporting them elsewhere. The increasing use of telemedicine technology adds an exciting new twist to the practice of rural emergency medicine.

A smaller number of emergency physicians choose careers in academic medicine. Teaching hospitals provide the greatest resources and access to a wide range of expert specialists. Clinically, academic emergency physicians work fewer shifts than those in private practice. Instead, they receive protected time for teaching new residents (at times even paramedics and firefighters), attending academic conferences, and conducting research. Emergency medicine physicians are immersed in a broad variety of basic science and clinical topics, from the molecular mechanisms of cardiopulmonary resuscitation to the clinical outcomes of novel treatments for asthma. In academics, you stay on the forefront of advances in this field.

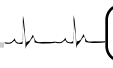
Emergency medicine allows you have a great deal of control over your practice and working life. You can be mobile, choose your own hours, and not be bound to the business of setting up your own practice. For new graduates of residency programs, the job market remains wide open. Despite the closure of hundreds of emergency departments over the last decade due to cutbacks by health care systems, there still remains a shortage of emergency physicians. Although the number of ED visits nationwide is increasing, the number of de-

partments is decreasing, thus placing great stress on those that remain open. Under most of the scenarios tested, a significant deficit of board-certified emergency medicine specialists will remain for at least several decades.[10] Of the 32,000 emergency physicians practicing in the United States, only little more than half (16,600) are certified by the American Board of Emergency Medicine (ABEM). As a result, emergency departments are now only hiring board-certified or board-eligible physicians who trained specifically in emergency medicine.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Medical Toxicology

A generation ago, a little green sticker called *Mr. Yuck* helped to prevent countless poisoning accidents. In 2000, over two million toxic ingestions or exposures, including 920 fatalities, were reported to poison control centers nationwide. Specialists in medical toxicology know all about the nasty substances that both kids and adults manage to get inside themselves, either accidentally or purposely. These poisons include medications, illicit drugs, chemicals, household toxins, industrial pollutants, hazardous materials, and environmental waste. In light of the growing awareness of biological and chemical terrorism, medical toxicologists provide an essential service. They apply their underlying knowledge of emergency medicine with sophisticated expertise in pharmacology. Many times, the treatment for one type of poison could exacerbate the situation if the wrong chemical exposure was diagnosed. The ABEM offers a board certification examination following this 1-year fellowship. If the idea of work-



2002 MATCH STATISTICS

- 1564 applicants competed for 1211 positions
- 992 US seniors and 596 independent applicants ranked at least one EM program
- Residency programs ranked 9.5 candidates for each available position
- 98% of all positions were filled in the initial Match
- The successful applicants: 87.5% US graduates, 4.5% foreign-trained physicians, and 7.5% osteopathic graduates
- Unmatched rate for US seniors applying only to EM: 6.5%

Source: National Resident Matching Program

ing in a city or regional poison control center sounds appealing, then you should consider this cool career choice!

Emergency Medical Services

Were you one of those kids who chased fire engines on your tricycle? Many medical students have worked as paramedics and emergency medical technicians before becoming physicians. Specialists with fellowship training in emergency medical services (EMS) study the logistical, organizational, and medical aspects of delivering quality care to sick individuals *outside* the hospital. These services include paramedic training, new prehospital treatments, disaster preparation, community organization, and more. Emergency physicians with fellowship training in EMS typically serve as medical directors of city- or county-wide emergency medical systems.

Pediatric Emergency Medicine

Do you like working with kids in an acute setting? All emergency department physicians receive training in the acute care of infants, children, and teenagers. It is rare, however, to find a doctor who feels completely at ease treating these younger charges. "Can I stabilize a sick kid? Absolutely. But, I am much more comfortable working with adults," commented a resident at a large urban hospital. "Kids can fool you—sometimes you'll see a bunch with minor complaints and then out of nowhere one will really surprise you." With further training in pediatric emergency medicine, EM doctors can easily take on any acute pediatric problem—croup, seizures, earaches, child abuse, fevers of unknown origin, asthma attacks, and trauma. Pediatric emergency medicine is an exciting and very rewarding branch of medicine. You will typically work in the ED of a major children's hospital. After completing this 2-year fellowship, the ABEM offers a subspecialty examination for board certification.

Undersea and Hyperbaric Medicine

For physicians who love scuba diving, this is the perfect fellowship. These specialists are experts at the use of hyperbaric oxygen therapy—the delivery of 100% oxygen at pressures greater than atmospheric pressure. With proper training and use, oxygen becomes a form of treatment that enhances the physiologic oxygenation of the blood and tissues. Physicians who complete this fellowship can

treat the harmful nitrogen bubbles of decompression sickness (*the bends*) and other diving accident cases. They also use this special therapy for patients suffering from carbon monoxide poisoning, gas gangrene of soft tissues, nonhealing wounds, bone infections, and tissue damage secondary to burns and radiation. If you have a special interest in diving, physiology, and gas mechanics, this interesting subspecialty provides an opportunity to apply novel approaches in emergency medicine to previously intractable treatment problems. Board certification is available.

Emergency Ultrasound

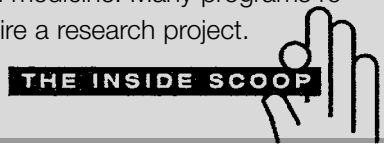
A single clinical specialty does not oversee the use of ultrasound. In the emergency room, physicians perform focused ultrasound examinations to seek a "yes/no" answer to a clinical question. At 3:00 AM, you will be responsible for evaluating the patient with excruciating abdominal pain. Is it pancreatitis, appendicitis, or cholecystitis? Emergency ultrasound is brief, interactive, and answers a limited number of discrete questions regarding one or two organ systems. For example, rapid ultrasound imaging can determine the presence of life-threatening ectopic pregnancies, diagnose pericardial tamponade (blood in the sac surrounding the heart), evaluate the abdomen for trauma, internal bleeding, or aneurysms, and even rule out lower-extremity blood clots without sending patients to the vascular lab. The modern emergency ultrasonographer is trained to perform at a comparable level to that of a radiologist. Because only a handful of 1-year fellowships exist, this new subspecialty has not achieved subspecialty board status.

Sports Medicine

Just like their colleagues in family practice, emergency medicine doctors are eligible for primary care-type fellowships in sports medicine. Of course, they do not perform orthopedic surgeries. Instead, these sports medicine specialists evaluate the overall health of athletes in a clinic setting. Through continuous care, they are responsible for enhancing their patients' general physical health and fitness and treating injury and illness through medical management. They draw on their knowledge of exercise physiology, nutrition, and rehabilitation to promote a healthy lifestyle for all active individuals. The ABEM offers certification examinations after completion of this 1- or 2-year fellowship.

RESIDENCY TRAINING

Residency in emergency medicine requires either 3 or 4 years of postgraduate training. Unlike other specialties, there are actually 3 types of EM residency programs. The majority (90) are 3-year programs that begin immediately after medical school. Some (14) are full 4-year programs. Another small group (20) require 3 years of EM residency after a separate internship year (transitional, medical surgical). During residency, the length and number of shifts worked per week varies per hospital. Regardless of type of program, EM residents also complete rotations in general medicine, critical care, anesthesiology, cardiology, and obstetrics and gynecology. The bulk of their training consists of monthly rotations in adult and pediatric emergency medicine, trauma, toxicology, emergency medical services, and aeronautical medicine. Many programs require a research project.



WHY CONSIDER A CAREER IN EMERGENCY MEDICINE?

Medical students who would thrive on a career in emergency medicine typically like the wide spectrum of clinical challenges and the multidisciplinary approach.[11] As the only specialty in which doctors are required by law to treat all patients seeking care, whether or not they have insurance, emergency medicine can be very challenging. These heroes juggle what seems like a thousand tasks at once, constantly readjusting moment-by-moment plans as events unfold. They also have the challenge of interacting with a dizzyingly varied group of people while caring for their patients, which sometimes involves fighting with the medical staff to make things happen. So, an EM doctor must meet the challenge of being a diplomat and team player. Emergency physicians also thrive on the intellectual challenges. They must be astute clinicians with a solid knowledge of nearly every single organ system and ailment. They really are the only contemporary practitioners who are skilled in the truly broadest range of medicine.

Emergency medicine specialists must have compassion, empathy, and an open ear, because every shift involves many social and emotional issues. In one day, you might have to tell a family that their loved one has died, counsel a battered woman afraid to go home to her violent husband, manage angry patients, perform a sexual assault examination, address homelessness, and communicate with police and other community services. For many patients who come to the ED for care, the emergency physician

is the only doctor looking out for their best interests, whether medical, emotional, or social. You will feel especially proud to serve as their advocate to make sure they get more advanced, specialized treatment when needed. Because of the variety of patients (some with emergent problems, others who are not really sick), your treatment plans will be as wide ranging as their complaints. The primary role, however, of the emergency physician is to stabilize patients, treat acute problems, and determine if they need to be admitted for further workup. Emergency physicians, in the end, are experts in rapid decision-making. Over time you will be amazed at how quickly and efficiently you can provide medical care to such a diverse group of patients.

ABOUT THE CONTRIBUTOR

Dr. Jeremy Graff is a resident in emergency medicine at the Alameda County Medical Center—Highland Hospital in Oakland, California. After attending college at the University of Chicago, where he majored in psychology, Dr. Graff spent 2 years as a PhD candidate in psychology at Stanford University. Medicine turned out to be his true calling, so he returned to the University of Chicago for medical school. Dr. Graff plans to practice as a community emergency medicine physician somewhere in California. He enjoys roaming the state's many redwood forests and cooking gourmet meals. He can be reached by e-mail at jfgraff@hghed.com.

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16 FAMILY PRACTICE

Michael Mendoza and Lisa Vargish

The specialty of family practice encompasses such a wide range of medicine that it is difficult to truly define a single scope of practice. Some physicians devote most of their time to high-risk obstetrics and operative deliveries, and others manage a harried clinic full of adults, children, and elderly in varying states of wellness and sickness. In the tradition of this community-based specialty, family physicians are well integrated into their communities and actively address issues in their patients' lives other than medical problems. This is why family medicine doctors serve as advocates—for patients, health care systems, and social change. No matter the role, these physicians emphasize health maintenance, disease prevention, and medical treatment, always aware of the psychosocial dimensions of their patients' lives.

DEFINING THE SCOPE OF PRACTICE

The American Academy of Family Physicians (AAFP) defines family practice as "the medical specialty [that] provides continuing and comprehensive health care for the individual and family . . . [and] integrates the biological, clinical, and behavioral sciences."[1] In essence, there are few limitations to what family physicians can do when it comes to practicing medicine.

It is no wonder that many medical students contemplating a calling in family practice have some trepidation about assuming such a breadth of practice in a single specialty. For others, this very breadth of practice motivates them to select family medicine as their career. No other specialty can possibly match family practice when it comes to its diverse practice environments, wide spectrum of patient demographics, and embrace of the entire breadth of clinical medicine. Being a family physician requires the ability to solve challenging problems of all

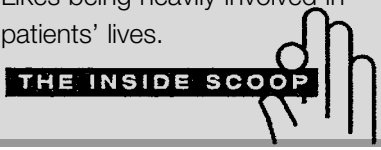
organ systems, to take comfort in your scope of knowledge and practice, and to accept universally all factors (biological, clinical, and behavioral) that can affect your patients' physical, emotional, and mental state of wellness.

Because of the extreme diversity within this specialty, family physicians are responsible for most of the health care delivered in the United States. In 2000, of the 822 million patient visits to physicians, 199 million were to family physicians, compared to general internists (126 million visits) and general pediatricians (104 million visits).[2] Family physicians, who care for newborn infants to the elderly, see more patients daily than any other specialist.[3]

As a family physician, you will draw your knowledge base from, among other areas, internal medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery. You may wonder how these other specialists can require 3 to 5 years to master any one of these fields, while family physicians spend only 3 years on all of the above. The answer: as all residents discover upon entering the world of private practice, completion of residency confers upon its graduates competency, not mastery. A physician who receives training in family medicine can competently manage patients presenting with diverse clinical and social complaints and also speak confidently about the nature of that complaint and how to diagnose and treat it. No properly trained graduate, however, will be able to say that he or she knows everything. (This can also be said of graduates of programs in internal medicine or surgery, except that the scope of practice in their fields is narrower.)

WHAT MAKES A GOOD FAMILY PHYSICIAN?

- ✓ Enjoys taking care of entire families.
- ✓ Relates well to all types of patients.
- ✓ Is an independent, creative, easy-going person.
- ✓ Prefers knowing a little about everything in medicine.
- ✓ Likes being heavily involved in patients' lives.



To be a good family physician, you must be content knowing something about everything, but not everything about anything. It comes as no surprise that family physicians must be adept at approaching the widest variety of clinical complaints. According to the US Department of Health and Human Services, the most common problems prompting a visit to the physician are related to coughing and the throat. Family physicians encounter these problems on a daily basis. But the scope of disease and their symptoms is much wider. They commonly treat medical conditions (hypertension, diabetes, headaches, rashes), surgical problems (diverticulosis, suspi-

cious moles), psychiatric disorders (depression, mania, schizophrenia), pediatric conditions (development, ear infections), and obstetrical gynecological issues (normal or high-risk pregnancies, sexually transmitted diseases, menopause).

The variety of diagnoses is rather extensive, so family physicians must adequately address these complaints to practice competently. Many times they have to take what may seem to be vague symptoms—weakness, dizziness, lower back pain, abdominal pain—and make the correct diagnosis to start treatment or make the appropriate consultation. If the problem at hand is beyond their experience or knowledge, they initiate a specialist referral. That said, only 6.3 % of all visits to family physicians result in referrals to other physicians.[4] Clearly, family physicians not only diagnose, but also are able to treat most clinical problems in the outpatient setting.

Family physicians commonly manage complicated acute and chronic diagnoses. In a recent survey, the majority (62%) of patients stated that they had a family physician as their individual source of care.[5] The same study found that family physicians treated many complex medical problems, including diabetes, heart disease, hypertension, anxiety, depression, and cancer. In addition, family physicians often see patients with a variety of symptoms but no pre-established diagnosis. In fact, 40% of patient visits to family physicians are for reasons classified outside the 25 most common complaints in primary care visits, reflecting the broad scope of family practice and the diversity of its diagnostic challenges.[6]

Family practice is a great specialty for students who want to have long-term patient relationships but still get to perform a variety of hands-on procedures. There are many office-based diagnostic tests that family physicians perform, such as electrocardiography, excision of suspicious moles, endometrial biopsy, spirometry, vasectomy, colposcopy, and obstetrical ultrasound. Of course, if you choose to include obstetrics as part of your practice, you will definitely have a lot of hands-on work delivering babies and even performing caesarean sections (depending on your training and experience).

SPECIALIZING IN PRIMARY CARE AND GENERALIST MEDICINE

A career in family medicine, however, goes far beyond understanding the breadth of clinical problems you will encounter. Over a span of months or years, the emphasis during office visits is on continuity, prevention, and health maintenance (unlike specialty clinics or inpatient settings where visits are sporadic or single problem-focused). For example, family medicine encourages you to think com-

prehensively about a patient's abdominal pain, not simply as a pathologic process that can be medical or surgical in etiology, but rather as a manifestation of an occurrence in a person's life. It may be acute or chronic, and may have resulted from any number of medical, surgical, or social factors that greatly impact that person's ability to function in his or her job, family, or spiritual life. So the practice of family medicine, with its many dimensions of medical care, is as much a philosophy as it is a body of medical knowledge or clinical skill.

As generalists, family physicians have a special focus on disease prevention. They derive great satisfaction from preventing disease—just as much as they do in treating disease. Routine physicals, well-child checkups, school and camp physicals, and cancer screenings are all important parts of this type of care. These physicians epitomize what primary care medicine is all about: preventing disease, maintaining health, and being the entry point into the health care system. They also practice cost-effective medical care, taking into account the scientific and clinical evidence, the patients' specific medical needs and preferences, and the values of the patients and their families. As generalists, the skills and knowledge they need differ according to the patient population of the particular community. For instance, family physicians working in the inner city have to address different types of problems than those working in rural geographic areas.

Inevitably, physicians responsible for family-centered primary care confront complex interpersonal social and behavioral issues. As such, all residency programs include family and individual therapy as part of training. For example, if a child presents with enuresis and encopresis (inability to control urination and defecation) at the age of 12, it would not be uncommon for other family members to feel some effect of their loved one's medical concerns. For instance, a parent may suffer from depression while attempting to cope with this situation. Other siblings may feel alienated if the focus of the family turns heavily toward one individual, perhaps further exacerbating the situation. Although pediatricians and internists are well trained to address the individual concerns of the children or adults, in this scenario the family physician is uniquely trained among primary care physicians to handle the behavioral and medical concerns of everyone involved.

Due to their large numbers and broad medical focus, family physicians contribute immensely to public health and primary medical care. For instance, in areas of the country with a large supply of primary care providers, colon and breast cancers are more likely to be detected at earlier stages, leading to higher cure rates.[7,8] Furthermore, countries with the best health care systems (as measured by longevity, infant mortality, and patient satisfaction) have the highest percent-

age of family physicians.[9] Socioeconomic status, however, is the only powerful factor that surpasses access to a family physician as a predictor of a person's health.[10] Although the relationship between physician workforce composition and the state of health care is complex, there is clearly a positive association between access to quality primary care and improved health outcomes.

The United States relies on family physicians more than any other physician to supply primary health care to underserved areas. The federal government designates health personal shortage areas (HPSAs) based on the shortage of primary care physicians per capita; namely, a ratio of people per primary care physician greater than 3500 to 1. In 1995, 25.4% of all US counties were designated as HPSAs. Of the remaining counties, 58% would actually qualify as HPSA without the contribution of family physicians, as opposed to 2.0% without general internists, 0.5% without general pediatricians, and 0.4% without obstetricians.[11] As you can see, family physicians provide the vast majority of primary care for these underserved populations.

THE DOCTOR–PATIENT RELATIONSHIP

The long-term relationship between family physicians and their patients is one of the most important aspects of this specialty. The level of bonding is intense. Family physicians typically spend every appointment discussing issues in their patients' lives that may not have anything to do with their current complaint. Family physicians guide patients through illnesses, problems, and other landmarks of life, from delivering babies to controlling high blood pressure, from treating cancer to coping with the loss of loved ones. In these relationships, patients develop great trust in their doctors. You learn about their hopes, dreams, and fears. You are with them through both good times and bad. This privilege is like none other in medicine. Many patients consider you part of their family, especially family physicians practicing in small, intimate communities where everyone knows each other.

Only in family medicine does continuity with patients span the entire life cycle and all the biological and social influences that bear upon it. It is not uncommon, for example, for a family physician to deliver and care for multiple generations of newborns in a single family. Even within the context of a single medical problem, the primary care physician is the one who integrates contributions from various specialists into a single treatment strategy. After establishing a plan and passing the acute phase of a disease, family physicians are able to manage most of these conditions. Specialists in different organ systems, although their

contributions are invaluable, typically do not provide ongoing comprehensive care for patients with medical conditions outside their specialty.

As you can see, family physicians have the unique opportunity to care for all the members of a family simultaneously. When emphasizing preventive measures, they always take the family unit into consideration. Take a family with a long history of diabetes and high blood pressure, for example. Family physicians can target all of the family's members and teach them proper nutrition and exercise as a means of primary prevention (for the children) and secondary prevention (for the adults). You cannot simply educate a teenager about avoiding an unhealthy diet without addressing the eating habits of members of the entire household.

Family physicians are also often called upon to initially manage complex medical problems in the context of "the family." If, for example, an adult family member is diagnosed with a condition thought to be hereditary, the family physician already has legitimate clinical relationships with other family members. They can easily encourage them to seek appropriate counseling and diagnostic testing. Although physicians in other specialties certainly participate in family-centered care, few other physicians share the same level of involvement with all family members.

Family physicians know that their relationships with patients are special because they take into account *everything* about the patient when making clinical diagnoses. Listening to their symptoms and examining for physical signs of diseases are just the beginning. Family doctors also listen to the patient's feelings, look at his or her behavior, and take into account the social and family history. If your patient presents with a chronic cough, you should still ask about his or her family, job, children, or anything else going on in his or her life. This is what good family medicine is all about.

Not all of your patients will require chronic medical care. Some just have problems that are bothering them and need someone to talk to and express their feelings. When it comes to caring for patients, a good family physician knows when to "wait and see" and is not overly aggressive with tests and treatment. In family practice, medicine is not always about ordering blood tests, prescribing medications, scheduling procedures, and giving referrals. Many times you are simply there for your patient as a compassionate human being.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

The practice of most family physicians usually centers on comprehensive ambulatory medicine. By seeing dozens of patients every day in the clinic, you will lead a

very busy life. Work schedules of course depend on the type of group and practice setting. Most are flexible for part-time work, maternity leave, and shared practice arrangements. In group practice, you do not have take call all the time after office hours. You will instead share call with the other members of your group and cover its entire patient base. But the inpatient side of the practice is also important. Family physicians have to round on their patients who require admission to the hospital. If a patient is ready to deliver a baby, and your practice includes obstetrics, you have to leave what you are doing—whether seeing a patient in clinic or having dinner with your family—to deliver the baby at the hospital. Thus, the lifestyle is very dependent on how much inpatient and obstetrical responsibility you choose to carry.

Some family physicians choose comprehensive practices involving obstetric care and surgical activities, whereas others define their scope more narrowly. Some may be the only physician for a large population, whether it is a rural community, an underserved urban community, a nursing home, or a Native American reservation. Those who practice a narrower scope of medicine may work within a multi-provider arrangement with specialists from other fields. In the last decade, there has been a gradual trend among family physicians toward practicing in larger groups: less than 15% of recent graduates practice in solo or two-person practices; over 53% now practice in a larger family practice or multispecialty group.[12] In a larger group setting, a family physician's practice may

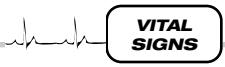
RESIDENCY TRAINING

Residency in family practice requires 3 years of postgraduate training. There are currently 497 accredited programs. Unlike other specialties, nearly all programs are sponsored by community teaching hospitals that carry some kind of affiliation with a medical school. The curriculum is the broadest of all specialties. Integrating both inpatient and outpatient experiences, residents spend several months rotating through multiple specialties: family practice, internal medicine, obstetrics, gynecology, surgery, emergency medicine, critical care, psychiatry, and numerous medical and surgical subspecialties. Call schedules and work hours depend upon the specific rotation. In the first 2 years of training, there is a greater emphasis on inpatient rotations; the final year consists of more ambulatory experiences. Throughout the entire program, residents carry their own set of patients and provide ongoing care to the same patients in the family practice center.

focus on pediatric, adolescent, or adult populations while still emphasizing family care, prevention, and education.

Because the role of the family physician in health care today is as complex as the specialty's scope itself, family physicians are often faced with the question of having sufficient knowledge. Although many family physicians supplement their residency with additional training in medical subspecialties, public health, or business, it is certainly not a requirement to practice good family medicine. Many physicians discover ongoing training comes from learning what is necessary to care for a particular population. Others simply choose to devote time to their families and extracurricular pursuits. Although the years of residency are rigorous, the life that follows for many is one of immense possibility, filled with the same complexity and life-long inquiry as in any other medical specialty. You can find family physicians heading local departments of public health, leading national movements for universal health care, or seeing a hundred outpatients a week in a local clinic. Most enjoy a good degree of free time, autonomy, and financial compensation that allows them to successfully integrate their personal and professional goals.

For many family physicians, the broad education and emphasis on systems-based (rather than individual-based) delivery of care provides the ideal foundation for a career in public health. Although formal graduate-level training is not a prerequisite to such a career, a Master's degree in public health affords one a certain level of legitimacy among public health professionals. Within this field, the possibilities for career development are endless. Family physicians often work as directors of public health in the same underserved areas where they developed their practice or trained as a resident. Others become more involved in community-oriented primary care, effecting local changes to strengthen a particular group's capacity to access care and prevent illness. Yet others may find their calling in a joint academic appointment in a medical and public health school, helping to shape future health professionals' thinking about communities and society.



MEDIAN COMPENSATION

Family Practice (without obstetrics)	$145,675
Family Practice (with obstetrics)	$159,095

Source: American Medical Group Association

FUTURE CHALLENGES FOR FAMILY MEDICINE

Although today's health care system challenges all physicians to be flexible when caring for their patients, some challenges are unique to family medicine. The

core-defining philosophies of family medicine—comprehensive, continuous, coordinated, and patient-focused care—are often inconsistent with the apparent goals of the current health care system. For instance, some patients and payers seem to value incidental medical interventions without continuity of provider over the relationship-based and more cost-effective care of family physicians.[13]

Responsible for the majority of outpatient visits, family physicians are equally susceptible to committing medical errors and carry the responsibility of reducing their overall burden. Unfortunately, because the scope of family medicine is so variable, it will be more difficult to develop universally applicable standards for family practice than for other more focused specialties. As the problem of medical errors becomes increasingly apparent, family medicine will play an increasingly critical role in developing measures to ensure quality improvement.

Medical students who might be interested in family medicine encounter multiple barriers. Several academic medical centers continue to resist the development of family medicine and primary care. Most medical schools still emphasize the subspecialties in their curricula and encourage students to choose them for future careers. In these environments, family medicine remains a true counterculture. As a result, students may continue to face discouragement as they show interest in pursuing family medicine as a career. In addition, the structure of undergraduate medical education cannot fully capture the richness of family medicine or other primary care specialties. Because medical students frequently rotate from one rotation to the next, they are unable to experience longitudinal outpatient primary care with the same patient more than once or twice. Clearly, participating in the intergenerational care that underlies family practice is not possible in the course of medical school or even medical school and residency. Compared to other medical specialties, it is difficult to experience the scope of family practice before deciding to enter it. The ongoing viability of family medicine, therefore, depends on the next generation of medical students and their decisions to become family physicians.

Because the scope of clinical research in family medicine is relatively undefined, it is understandably difficult to view family medicine as the academic specialty it has now become. Although recent initiatives demonstrate a broad range of interests, there is currently a lack of experience in and funding for academic family practice. As a result, academic inquiries that have fallen out of the traditional organ- or demographic-based scope have found their home in a broader scope: health systems, public health, and health policy research. As these areas of academic investigation develop, family practice will further define its contribution to the practice of medicine.

A final challenge for medical students entering family practice is the grow-

ing misperception that family physicians will become obsolete as physician assistants and nurse practitioners become more popular. To the contrary: although these professionals broaden access to primary care, family physicians are better suited and more cost-effective to provide care in these settings. Some studies comparing the two providers show that nurse practitioners and physician assistants are preferable within specific circumstances, but none have yet to demonstrate greater cost-effectiveness or a broader scope of practice compared to family physicians.[16]

FELLOWSHIPS AND SUBSPECIALTY TRAINING

VITAL SIGNS

FAMILY MEDICINE 2002 MATCH STATISTICS

- 3761 applicants competed for 2962 positions
- 1533 US seniors and 2228 independent applicants ranked at least one family practice program
- Program directors ranked 5.2 candidates for each available position
- 79.1% of all positions were filled in the initial match
- The successful applicants: 59.7% US seniors, 25.4% foreign-trained physicians, and 11.1% osteopathic graduates
- Unmatched rate for US seniors applying only to family practice: 1.9%

Source: National Resident Matching Program

The majority of family physicians do not choose to subspecialize formally. However, some doctors develop specific interests within family medicine and choose to pursue a special area of competence through fellowship or other post-graduate training. Graduates of family medicine residency can complete fellowship training in any number of subspecialties. However, geriatrics and sports medicine are the only accredited fellowships that lead to a certificate of added qualifications. Depending on the fellowship, further training may consist of 1 to 2 years beyond residency.

Obstetrics

A fellowship in obstetrics allows the family physician to acquire intensive training in performing cesarean sections, amniocentesis, tubal ligation, and other obstetrical procedures. Without this experience, most family physicians that include obstetrical care in their practice only perform normal vaginal deliveries and manage fewer high-risk pregnancies.

Faculty Development

This fellowship program prepares family physicians for a career in academic medicine. As a relatively new specialty, departments of family medicine are constantly forming and training new faculty members. If this sounds like a career for you, this fellowship provides experience in research, teaching, leadership, and management.

Sports Medicine

Similar to fellowships in sports medicine offered to emergency medicine and internal medicine residents, this program provides additional experience in the care of sports-related injuries. The approach, of course, is much more primary care and medical, rather than surgical.

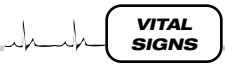
Geriatrics

This fellowship is similar to the one offered to internal medicine residents. You will gain additional experience in the special medical issues relevant to the elderly. As the population continues to age, there will be a greater need for physicians with specialized training in geriatric medicine.

Other areas that family physicians have chosen for specialty training (but not necessarily through formal accredited fellowships) include: preventive medicine, research, substance abuse, palliative care, primary care outcomes research, occupational/environment medicine, community medicine, health policy, informatics, family systems medicine, medical education, public health, minority health policy, osteopathic manipulative medicine, health psychology, family planning and reproductive health, emergency medicine, patient-doctor relationship, and family medicine hospitalist.

WHY CONSIDER A CAREER IN FAMILY PRACTICE?

Since its creation as an official specialty in 1969, family practice has fluctuated in popularity. Driven by technical and financial incentives, most medical students chose to enter medical or surgical specialties (and subspecialties) instead of careers in primary care. But medicine became far too fragmented with the increase in specialization, so in the late 1980's, a movement began that encouraged students to consider entering primary care fields again. It worked. The popularity of family practice jumped accordingly. More and more graduating physicians



FAMILY PRACTICE EMPLOYMENT DATA

- Distribution among all physicians: 10.7%
- Practice type: 85.3% in private practice; 7.2% in academics
- Median patient care hours per week: 45.5
- 11.7% experienced difficulty in securing their preferred employment position
- 65.7% report that their salary is equal or higher than expected

Source: American Medical Association

became family physicians. After all, family practice is the perfect specialty for those who love everything about medicine and want to become just like general practitioners—the very first physicians.

Family practice is an essential specialty that meets much of the nation's health care needs. As the only doctors who orient care toward the family and the community, family physicians treat nearly everyone, whether insured or uninsured. Knowing their patients' life and clinical history better than anyone else translates into higher quality, individualized patient care—treating the patient, not the disease. As the initial point of contact, family physicians guide patients through the complex health care system, directing them to appropriate tests and specialist referrals when necessary. At every step, family doctors treat all problems, unless they require additional testing or evaluation by a specialist. You are, essentially, a patient advocate, making an incredible difference in their lives. Because of the universal need for family doctors across the country, they are well represented in both urban and rural areas, which means you have a great deal of career flexibility.

If you have a desire to be a primary care physician, then definitely consider this specialty. You will provide comprehensive care for a huge diversity of patients, have long-term rewarding relationships, and focus on preventive medicine and health maintenance. You will diagnose all types of diseases in kids and adults, deliver babies, and perform minor surgery. You may even become formally involved in health policy or public health. But most important, as a family physician you will apply concepts of medicine and health care to *any* community you choose to serve.

ABOUT THE CONTRIBUTORS

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national officer of the American Medical Student Association. During this time, he also earned a Masters in Public Health at the University of Illinois at Chicago. A native of New York, Dr. Vargish earned her undergraduate and graduate degrees from the University of Rochester. After teaching elementary school, she decided to enter medical school and graduated from the University of Chicago. They can be reached by e-mail at mdmendoz@yahoo.com or lvargish@yahoo.com.

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GENERAL SURGERY

Danagra Georgia Ikossi and Jonathan Long Le

Surgeons save lives and heal the sick with their own hands. Surgery is the ultimate curative therapy for many patients and is an essential part of modern medicine. It is a career of constant excitement, high energy, quick decisions, and intellectual stimulation. No day is the same as the one before, and you learn to expect the unexpected. It is extremely gratifying to see the immediate results of your actions: the changes you make in your patients' anatomy and in the quality of their lives. Whether you are interested in performing open-heart surgery or repairing perforated peptic ulcers, you must first go through rigorous training in *general surgery*—the foundation and entry point for all areas of this branch of medicine. Some continue to practice as general surgeons; others move on to advanced training and become surgical subspecialists like cardiothoracic, pediatric, or vascular surgeons.

SURGICAL BASICS

Surgery, the treatment of disease by means of an operation, is often the definitive form of therapy—many times even curative—for a broad range of conditions affecting all organ systems. General surgery primarily encompasses diseases of the abdominal organs, breast, skin, and endocrine glands. The surgical subspecialties focus on specific organs, like the heart and lungs (cardiothoracic) or certain patient populations (pediatric, trauma, transplant). No matter the subspecialty, surgeons are also knowledgeable in many aspects of critical care, such as manipulating ventilator settings and adjusting powerful blood pressure medications. Many patients undergoing complicated operations are still sick and unstable after leaving the operating room, requiring extensive management in the surgical intensive care unit (SICU).

An esteemed surgeon in academic practice commented that "the general

surgeon is the only consummate physician left in the hospital." They treat diseases of the entire body that may or may not require surgical intervention. Some common examples include appendicitis, cholecystitis, pancreatitis, bowel obstruction, peri-anal abscesses, and a myriad of cancers. The diversity of general surgery extends past the strictly surgical into endocrine issues (thyroid, parathyroid, and adrenal disorders) as well as the complications of diabetes (leg ulcers, peripheral vascular disease). Obesity, an epidemic sweeping across the US population, has also become the realm of the surgeon, with stomach stapling and gastric bypass procedures receiving a remarkable amount of media attention. Although the basic principles of surgery have not changed in over a century, the field continues to develop, as highlighted by the introduction of innumerable elegant and ingenious laparoscopic procedures over the past decade. The most avant garde frontier is robotic surgery, which is now gaining momentum in both the pediatric and adult populations. These new and evolving aspects give aspiring surgeons the opportunity use their ingenuity to expand medical horizons.

The distinction between *physician* and *surgeon* lies in this specialty's emphasis on operating on patients—rather than treating disease with drugs. After trying to manage a pathologic condition conservatively through medical management (meaning, pharmacologic, nonoperative interventions), physicians may have to refer patients for a surgical evaluation to receive definitive treatment. Many patients operated on by surgeons have diseases with a primary underlying anatomic or structural abnormality that medications may not necessarily help. Examples include breast masses, hernias, abscesses, appendicitis, enlarging aortic aneurysms, blocked iliac arteries, and many more. For all surgical problems, however, surgeons draw on a fund of knowledge from many basic sciences; in particular, gross anatomy and physiology. Knowing the entire anatomy of the human body inside and out is absolutely essential, especially when many patients may have a normal anatomic variant. For instance, a routine gallbladder removal (cholecystectomy) can easily become quite complicated. When surgeons begin operating, they may find an aberrant cystic duct in an abnormal configuration, or an artery that originates from a different place than expected.

Although surgeons love performing operations and feel most at home in the operating room, their clinical skills are not limited to the strictly technical. They are accustomed to maintaining calm and commanding respect in the midst of chaos; surgeons are masters of managing emergent situations both in the operating room and on the wards. When things go awry and a patient becomes unstable, it is the surgeon who rallies the troops and organizes the resuscitation. In the hospital, many clinicians perform procedures, but it is the surgeon who is

consulted to treat the emergent complications of these procedures. For example, when internists do a *needle thoracostomy* (decompression of the pleural space) for patients with pleural effusions, the lung can collapse—a common complication known as a *pneumothorax*. If this becomes a *tension pneumothorax* and begins causing catastrophic hemodynamic and respiratory compromise, the surgeons are called to place a chest tube or perform emergent needle decompression.

The practice of surgery takes a team approach. Although the surgeon performs the procedure itself, they are never alone in the care of the patient. It is a misconception for medical students to think that internists make the clinical diagnosis and then refer the patient for surgery, informing the surgeon what procedure needs to be done. Rather, the physicians all work together in making decisions. Take, for example, a 60-year-old man with colon cancer who comes to his internist for his annual physical. A screening sigmoidoscopy shows several polyps, so the patient is referred to a gastroenterologist for a colonoscopy under sedation. The polyps are removed endoscopically and sent to pathology, where the pathologist finds evidence for the presence of adenocarcinoma with a positive margin in one of the polyps. At this point, the patient is evaluated by the general surgeon, who has already discussed the case with the internist and gastroenterologist, read the pathology report, and reviewed the radiographic studies with the radiologist. The surgeon discusses the implications of the findings and the appropriate surgical options. Together, the surgeon and patient decide to proceed with hemicolectomy to remove the diseased portion of colon. As you can see, the team consists of four physicians who have all participated in the care of this patient before the final treatment with surgery and who will assist in his care after surgery.

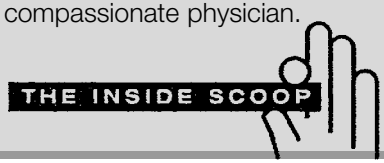
THE ART OF SURGERY

Surgery is as much art as it is science. Surgeons use their scalpels and electrocautery devices to make accurate incisions, and then skillfully bring tissues back together. They coordinate many tasks at once while maintaining the finest precision. There is no such thing as a routine or casual surgery, however. Complications can occur at any time, even in the simplest of all procedures. Surgeons have to treat every operation as unique. To perform surgery, you need patience, manual dexterity, and the ability to remain calm and composed under intense pressure.

Surgeons thrive on the immediate gratification of operating on patients.

WHAT MAKES A GOOD SURGEON?

- ✓ Has excellent hand-eye coordination and manual dexterity.
- ✓ Can think quickly and act decisively.
- ✓ Enjoys mastering new technology.
- ✓ Demands the highest level of perfection.
- ✓ Is an energetic, dedicated, and compassionate physician.



When choosing a specialty, medical students who dislike the idea of having to wait weeks to months to see if a pharmacologic treatment works gravitate toward the fast-paced surgical specialties, where you can see the results of your efforts right away. The general surgeon relieves a patient's unbearable abdominal pain by resecting an inflamed appendix or by cutting intra-abdominal adhesions to relieve a small bowel obstruction. The vascular surgeon restores blood flow to a patient's cold, nonfunctional limb and saves it from amputation by performing a femoral-popliteal artery bypass operation. Trauma surgeons repair spleens lacerated during a motor vehicle accident, surgical oncologists resect tumors, and transplant surgeons place new kidneys. The list goes on and on.

Few people are born with the innate technical skills to perform surgery well. For the majority of us, learning how to operate requires repetition, self-awareness, dedication, and intra-operative teaching—all of which takes place in the setting of an apprenticeship during residency. From the first day of internship, new surgeons are taught the proper technique for performing procedures appropriate to their level. Usually this begins with placing a central line—a catheter inserted into large veins and threaded to the heart to obtain central venous access for administering fluids and drugs. For all procedures, whether this simple one or more complicated ones, residents can learn certain aspects from textbooks: landmarks, patient positioning, indications, and risks. But the actual art of the procedure must be learned as an ap-

RESIDENCY TRAINING

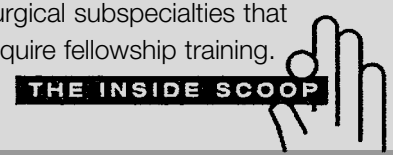
Residency in general surgery requires 5 years of postgraduate training. There are currently 254 accredited programs. Some programs offer (or require) an additional 1 to 3 years of research—basic science, clinical, or other creative options including biomechanics, robotics, and instrumental design. There is no argument that surgery is a tough residency. Residents arrive at the hospital

(*continued*)

prentice. To ensure the development of good technique with minimal risks to the patient, senior physicians directly teach residents how to hold needles properly, take a stitch, tie a variety of surgical knots, use the electrocautery device, and maintain adequate hemostasis (minimizing bleeding). Obviously there are some tricks of the trade that no textbook can illustrate. Over the 5 years of general surgery training, every resident cultivates his or her own style, within the limits of being a safe and skilled surgeon. Although learning how to perform surgery may seem daunting, in reality anyone in a solid residency program and with a modicum of dedication can learn the technical aspects of surgery.

In the operating room, surgeons learn the proper use of hundreds of instruments, from scalpels and scissors to retractors and needle drivers. To give residents even more experience with these tools, surgical skills laboratories have become part of most residency programs. They incorporate inanimate models, virtual reality, animal labs, and cadavers into surgical training. For example, first-year residents often complete sessions on tying knots or performing laparoscopic appendectomy in pigs, while the senior residents learn to how to perform more complicated resections—colectomies and splenectomies—on the same animals. These components of the long, rigorous surgical training are necessary because the craft of operating continues to change. Today there is increasing em-

very early to round on their patients before heading to the operating room. Because patient care and consultations continue after finishing the scheduled operations, the days are long and physically demanding. The rigorous call schedules require residents to stay overnight every third or fourth night. In the first year, surgical interns spend little time in the operating room. They see patients in the hospital requiring surgical consult and master the essentials of postoperative care of patients on the surgical wards and intensive care unit. Operating room time increases throughout the year. Residents spend the first 2 years primarily in general surgery but also rotating through surgical subspecialties like neurosurgery, urology, and orthopedics. The remaining 3 years are dedicated to improving operating skills through rotations in general, vascular, cardiothoracic, pediatric, and transplant surgery. Additional months of training include surgical intensive care and endoscopy. Residency in general surgery provides the gateway to a number of surgical subspecialties that require fellowship training.



phasis on *minimally invasive surgery*. This type of surgery seeks to provide alternatives to open surgery, including laparoscopic surgery and robotic surgery. *Laparoscopy* involves making small incisions and inserting ports to gain access to the abdomen or chest and to place cameras and instruments. By not opening up a patient, this approach shortens recuperation time and reduces potential postoperative complications. It also provides a different point of view from which to see the anatomy and attack the problem at hand. Learning the latest operative techniques, therefore, means a lifetime of constant reeducation and self-discipline.

BEYOND TECHNIQUE: THE INTELLECTUAL SIDE OF SURGERY

The medical community often makes a distinction between *physician* and *surgeon*. This does not imply, though, that surgeons are simply technicians who only make incisions and tie knots. Remember: many patients undergoing surgical evaluation may not end up needing an operation. A thorough understanding of countless aspects of clinical medicine, therefore, is necessary for surgeons to make these to-cut-or-not-to-cut decisions. An old cliché is that "you can teach a monkey to operate, the problem is teaching him when not to."

As a surgeon, you must think on your feet and maintain your composure in stressful situations. Surgeons cannot always predict problems during an operation, so they must be levelheaded and ready for anything. This requires a mastery of anatomy and common anatomic abnormalities, physiology and pathophysiology of disease, as well as of proper surgical technique and options for treatment. For example, to safely perform a laparoscopic cholecystectomy, surgeons must know the common anatomic variations of cystic artery, hepatic arteries, and the ductal system. They have to understand unusual disorders of the biliary tract like Mirizzi syndrome and parasitic diseases like *Clonorchis sinensis* infection to accurately interpret the clinical, radiographic, and intra-operative findings. Surgeons must know when it is appropriate to perform cholecystectomy rather than simply placing a cholecystostomy tube. This question often arises with the elderly and debilitated or those who refuse surgical intervention.

A common saying is that "the general surgeon is an internist who can operate." You must have a command of pulmonology, cardiology, radiology, pathology, anesthesiology, critical care, and concepts of nutrition and metabolism, wound healing, and resuscitation. You have to feel comfortable managing comorbid medical problems like diabetes as well as any medical complications of surgery. For instance, the administration of general anesthesia and the physiologic demands of major surgery increase the risk for myocardial infarction. A good

surgeon can recognize and treat an acute myocardial infarction while also knowing when to consult a cardiologist to perform angioplasty and take over the management. Surgeons also identify common and dire diseases of the lung, including pulmonary embolism and edema. Other common peri-operative issues include abscess formation, sepsis, systemic inflammatory response, and multi-organ system failure. This requires that surgeons have extensive training in critical care and feel at home in the SICU. More often than not, surgeons care for their own patients in the SICU without the assistance of critical care physicians. Likewise, they often perform their own bronchoscopies and upper and lower gastrointestinal endoscopies. In essence, the surgeon is the renaissance man of the medical field.

In the era of advanced radiographic modalities, it has become essential for surgeons to be proficient at reading plain x-rays, CT scans, ultrasound, and the occasional MRI. When a patient presents in the middle of the night with vague abdominal pain, elevated white blood cell count, and an unclear clinical history, surgeons use CT scan to clarify what kind of operation is indicated, if any. Does the patient have necrotic bowel and need emergent operation? Or perhaps an intra-abdominal abscess that could be safely drained percutaneously by colleagues in interventional radiology? Although radiologists are usually available to interpret the appropriate imaging studies, surgeons like to read their own films, too.

Like all other doctors, surgeons always begin with a focused history and physical before making the diagnosis and the decision to operate. In a typical day, surgeons may receive a page from the emergency department regarding an elderly patient with abdominal pain, emesis, and increased white blood cell count. The surgeon must ask focused questions to determine the acuity of the consult and prioritize the order in which patients will be seen. Proper clinical judgment determines what tests must be ordered, if further radiographic studies are appropriate, or if the patient should proceed directly to the operating room. What differentiates surgical disciplines from other fields is the limited time available to assimilate reams of information from the history, physical, laboratory results, and radiologic studies to come to the correct diagnosis and implement the proper course of action. This requires a sense of urgency and self-motivation on the part of the surgeon.

THE DOCTOR–PATIENT RELATIONSHIP

Surgeons do not step in, operate, and then leave, sending patients back to their primary care physicians. Rather, surgeons typically have close long-term relationships with their patients. Usually these relationships begin with an initial re-

ferral to evaluate a problem that did not respond well to medical therapy and may require surgical intervention. In other specialties of medicine, patients play an active role in their treatment simply by being compliant with their prescribed medication regimen. When it comes to surgery, however, patients have to bestow their undivided trust on their surgeon and give up all control over their care once the operation begins. This makes the surgeon–patient relationship an intimate, and very unique, bond within medicine.

By entering in this relationship, surgeons take on heavy responsibility. Patients are entrusting their welfare and their lives to your clinical judgment and technical skill. They are apprehensive about undergoing even simple operations like removing an obstructed gallbladder or an inflamed appendix. It is a daunting, frightening experience to allow another person to cut them open and manipulate their internal organs. At this point, patients are unable to answer questions, express their wants or beliefs, or provide any input regarding their care. A good surgeon takes time to reassure the patient before operating. As a surgeon, you have to convey that you will act in your patient's best interest and stand by your word. As a patient, you must trust that in an emergency your surgeon will have the knowledge, presence of mind, and skill to do what it takes to save your life.

A good surgeon–patient relationship requires sensitivity, compassion, and a gentle hand. The physical examination—which is of paramount importance in this specialty—provides the opportunity to show your tender, healing side. Despite all the technology involved in an operation, surgeons still have a great deal of interaction with their patients. A surgeon must know the patient's history well and understand at some level that person's belief system. Many procedures end up having a long-term emotional impact, such as a mastectomy, so you must be prepared to address these concerns as well. A surgeon's job does not simply end at the point of skin closure. You must always be there for your patient—pre-, intra-, and postoperatively.

THE "SURGICAL PERSONALITY"

Among medical students, general surgery is perhaps the most legendary and dreaded specialty. Before ever doing a surgical rotation, students hear tales of screaming chief residents and attending surgeons who throw instruments. There are many stereotypes about the typical *surgeon personality*, perhaps more than in any other specialty. Medical students probably enter their rotation with the disturbing preconception that most surgeons are male perfectionists who like to

crack sexist, juvenile jokes. Others have the misperception that surgeons are overbearing, overworked, and often cold physicians. Is there any truth underlying these perceptions? Or is the surgical personality simply an outdated caricature?

Most surgeons do not fit this stereotype. They are diligent, caring, lively, and driven hard workers. They are team players and take personal pride in their work. They are decisive, compulsive, and seek success in all their endeavors. These qualities reflect the level of dedication and personal responsibility the surgeon takes over the care of her or his patients. After all, surgeons need the confidence and ability to be assertive when necessary. They have to control their environment when carrying out plans. Remarkably, these characteristics have been extensively studied and well represented in the surgical literature. A recent study, for instance, examined the traits that are more common in surgeons than in the general population.[1] The authors found that surgeons are less neurotic, more extroverted, more open, and more conscientious. They also concluded that surgeons are more likely to be aggressive, prefer competition, and express their anger when necessary.

Given these observations about the so-called surgical personality, what does it actually take to be a surgeon? Anyone can go into surgery, but who will succeed? A professor of surgery once commented: "You don't have to be smart; you just have to care enough and work hard." A survey of faculty and residents concluded that the essential characteristics of a surgeon are decisiveness, fairness, willingness to participate in a team, flexibility, honesty about errors, discipline, ability to consider facts, motivation, and ability to listen.[2] To be a good surgeon, you must also understand the proper anatomic relationships between all types of internal structures and have skills of spatial orientation.

No matter the stereotype, surgeons are team players. It is ironic that the typical surgeon perceived by young doctors-in-training is a lone wolf, self-directed and independent, whereas the success of the individual surgeon depends on working well as a member of the team. The surgeon is called upon to consult on surgical issues and perform basic procedures for other services. (The placement of chest tubes and difficult central lines are two of the most common such procedures.) This highlights the constant interaction between surgeons and other physicians and the need for collegial relationships. The surgeon must communicate effectively with referring physicians, be they from internal medicine, gastroenterology, pulmonology, or other services. The efficient and accurate transfer of information is essential for the care of the surgical patient.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

The lifestyle of a surgeon—whether a resident, fellow, or attending—is infamous. Before heading off to a full day in the operating room, surgeons have to round on their pre- and postoperative patients quite early in the morning. There is no argument that surgical training is indeed quite rigorous, perhaps the most time consuming and physically draining of all specialties in medicine. To be a good surgeon and adapt well to the rigorous lifestyle, you need great flexibility. Remember—surgeons have to deal with the unexpected, which may not necessarily come at convenient times. Surgical problems happen at all hours, and many times you will be the physician on call to handle the situation. As a resident or attending, you will often end up canceling an evening out because a patient has been admitted requiring surgical evaluation for possible appendicitis or ischemic bowel who may then need to go to the OR. This is why the lifestyle issue is so important if you are considering becoming a surgeon. Surgery is not a 9-to-5 job, nor a specialty with controllable hours.

It is true that surgery requires intense dedication and that residency is a minimum of 5 years in length, but what happens after that? Is it possible to be a surgeon and be a complete person? Although there is little control over work hours during residency, after its completion, surgeons can choose any practice setting and decide how much or how little they want to work. Needless to say, if you enjoy what you do, the hours should be less of an issue. Although it is ideal to have control over your time and where you spend it, if you are tethered to something you love by choice, it is hardly a punishment. Most medical students are exposed only to the highly specialized practice of academic surgery, but the field of general surgery is practiced in a multitude of ways. As an academic surgeon, you can divide your time between research, clinical duties, and teaching. Academic surgeons are often experts in a certain field (e.g., parathyroid surgery, inflammatory bowel disease)

GENERAL SURGERY EMPLOYMENT DATA

- Distribution among all physicians: 4.9%
- Practice type: 85.2% in private practice; 14.5% in academics
- Median patient care hours per week: 60
- 22% experienced difficulty in securing their preferred employment position
- 53% report that their salary is equal or higher than expected

Source: American Medical Association

and give lectures at other institutions in their chosen subspecialty. You have residents to buffer you from the minutiae, but you ultimately are in control of the care of the patients. Moreover, teaching in the OR and through formal lectures is an enjoyable and fulfilling experience.

Alternatively, you could become one of many surgeons in a group practice. In this private arrangement, there is a set on-call schedule and a wealth of patients from established referral patterns. Although private practice surgeons may have less control over when they work, the hours are usually predictable and predetermined. Some of these surgeons also serve as clinical attendings and have resident coverage. Some go into solo private practice where there is maximal control over the work hours, but you are responsible for practice management, reimbursement and referral patterns, which administrators take care of in the academic and mega-medical-group settings. A rare few leave the clinical arena and dedicate their time to industry or research. Whatever practice you choose—and each option has its pros and cons—the bottom line is that the lifestyle of the surgical resident, which admittedly is quite busy, is not the same as that of the attending surgeon. Students should be warned to not ignore the forest for the trees.

VITAL SIGNS

MEDIAN COMPENSATION

Cardiothoracic Surgery	$401,440
Colon & Rectal Surgery	$277,441
General Surgery	$255,304
Pediatric Surgery	$270,593
Transplant Surgery (kidney)	$217,327
Transplant Surgery (liver)	$325,012
Trauma Surgery	$320,821
Vascular Surgery	$286,286

Source: American Medical Group Association

Regardless of work hours, being a surgeon will always require a tremendous amount of dedication. The training is long and the work is emotionally and physically strenuous. But for surgeons, medicine is not a job—it is a passion. During a busy night on call, an older surgeon said that he was delaying retirement because "there is nothing else I'd rather be doing at 3:00 AM."

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Completion of residency in general surgery and passing the American Board of Surgery's certifying examination allows physicians to practice as general surgeons only. There are many subspecialty areas, however, that build on this experience for advanced operations: cardiothoracic, vascular, transplant, and more. Inter-

GENERAL SURGERY
2002 MATCH STATISTICS

- 2250 applicants competed for 1039 categorical and 980 preliminary positions
- 1350 US seniors and 900 independent applicants ranked at least one surgery program
- Program directors ranked 9.2 candidates for each available position
- 94.4% of all positions were filled in the initial match
- The successful applicants: 79.7% US seniors, 12.6% foreign-trained physicians, and 3% osteopathic graduates
- Unmatched rate for US seniors applying only to surgery: 5.4%

Source: National Resident Matching Program

ested residents usually have solid research experience, have clinical experience in that subspecialty, and have published research papers or case reports. (Note: The surgical subspecialties described in other chapters, such as urology, have their own separate residency programs, which include a foundation in general surgery but do not require completion of the entire general surgery residency. They are also not considered fellowships).

Cardiothoracic Surgery

CT surgeons are experts on the heart, its complex physiology, and particularly the art of cardiopulmonary bypass. Within the domain of the heart, lungs, and mediastinum, they perform some of the most time consuming, regimented, and physically challenging of all operations. Their patients often leave the operating room in a critically ill state and head to the SICU for postoperative recovery. Surgery of the heart is delicate and fascinating. These surgeons treat conditions like blocked coronary arteries, thoracic aneurysms, and congenital abnormalities. On the thoracic side, they also perform pulmonary resections (e.g., on patients with lung cancer), mediastinoscopy, and bronchoscopy, just to name a few. They also perform esophageal surgery for cancer, achalasia, and other disorders of the esophagus. Fellowship training is typically 2 to 3 years in length. Subspecialty experience in pediatric cardiac surgery and heart–lung transplant is also available.

Colon and Rectal Surgery

This area of surgery, which helps bridge the gap between gastroenterology and general surgery, used to be known as *proctology*. After completing this 1- to 2-year fellowship, these surgeons diagnose and treat diseases of the entire gastrointesti-

nal tract: colon, rectum, anus, and peri-anal region. Patients present with a variety of diseases such as colorectal cancer, inflammatory bowel disease, motility disorders, diverticulitis, anal fissures and fistulas, fecal incontinence, and constipation. Colorectal surgeons can perform both endoscopy and major abdominal operations.

Pediatric Surgery

Do you enjoy working with kids? Although it is considered a subspecialty, pediatric surgery stays true to its general surgery roots because you perform operations on entire body regions: abdomen, chest, extremities, and more. Pediatric surgeons deal with the complex surgical problems, and their unique physiology, of kids of all ages, ranging from tiny premature newborns to maturing teenagers. Whether the problem involves a hypertrophic pyloric sphincter or a ruptured spleen, pediatric surgery is delicate, precise, and challenging. Some operations, such as the separation of conjoined twins, can be quite dramatic and life saving. Because accidents are the leading cause of death among children, pediatric surgeons deal with quite a bit of trauma in their work. Today, fetal surgery—surgically correcting congenital anomalies in a growing fetus—has become the hot area of this field. Pediatric surgeons naturally have to be quite adept at handling frightened children and their anxious parents. Fellowships require 2 years of training after residency.

Surgical Oncology

Surgery is often the last, potentially curative, option for patients suffering from cancer that does not respond to chemotherapy or radiation treatment. But taking out a tumor is not as simple as it may seem. Surgical oncologists undergo extensive training in a variety of complex operations: bowel resections, breast cancer resections, Whipple procedures (for pancreatic cancer), liver resections, and much more. Patients whose tumors are being removed feel an immense sense of relief, security, and appreciation when the cancer has finally been excised. Like their colleagues in medical and radiation oncology, surgical oncologists have to deal with a variety of emotions, particularly when their patients' cancer recurs or has metastasized too widely for surgery to have any added benefit. Many surgical oncologists work out of academic medical centers and conduct cancer research. Fellowships in this rewarding subspecialty require 1 to 2 years of additional training.

Transplantation Surgery

This surgical subspecialty encompasses kidney, liver, small bowel, and pancreas transplantation. It is a 2-year fellowship that provides training in a field ideal for those medical students who love both surgery and complex medical management. Because transplantation is used for treating end-stage organ failure, these surgeons are adept in the minute-to-minute management of the critically ill patient, both before and after the transplant. They are detailed, meticulous physicians. Another unique aspect of this discipline is that transplant surgeons initiate and manage the immunosuppressive drug regimens that patients require after receiving someone else's organs. The transplant surgeon typically works as a part of an integrated team of professionals, including transplant coordinators, nurses, psychiatrists, social workers, and medical subspecialists (nephrologists, endocrinologists, gastroenterologists, and hepatologists).

Trauma Surgery and Critical Care

Fast paced, intense, and unpredictable, trauma surgery gives you the chance to put your skills to work in the acute setting and save lives. This 1- to 2-year fellowship especially appeals to thrill-seeking surgeons. Traumatic injuries range from motor vehicle accidents, gunshot and stab wounds, crush injuries, electrical injuries, and much more. Trauma surgeons are true general surgeons who command a fund of knowledge about the entire human body. They serve as leaders of the trauma team to stabilize and resuscitate acutely ill patients before taking them off to the operating room. Working at Level I trauma centers, these surgeons have to be available 24 hours a day, 7 days a week when they are on duty. Many trauma victims are critically ill for long periods of time, so this dual specialization of trauma surgery with surgical critical care is an ideal combination. If you enjoy complex physiology and a great deal of direct patient management, this invigorating field is for you.

Vascular Surgery

Vascular surgery involves the arteries and veins of the entire body, from the neck to the distal extremities. Patients are often very sick and critically ill. To help an older man with severe peripheral vascular disease in his leg, which could lead to gangrene, vascular surgeons perform a bypass operation to go around the diseased artery segment. They also treat strokes, blood clots, and aneurysms, among oth-

ers. The procedures are delicate, difficult, and leave very little room for error. Vascular surgeons, therefore, maintain a high level of technical skill and finesse. It is a subspecialty full of great variety: elective procedures such as arteriovenous fistulas for dialysis access to emergencies like repairing a ruptured aortic aneurysm. Most patients undergoing vascular surgery have multiple comorbidities, in particular heart disease and diabetes. This highlights the need to know a great deal about the medical management of these disorders. If you enjoy medicine, surgery, and critical care, completing a 1-to 2-year fellowship in vascular surgery is the ideal combination for a gratifying career. Advances in endovascular surgery (stent-grafts for treatment of abdominal aortic aneurysm) are revolutionizing the field and expanding the scope of vascular surgery.

WHY CONSIDER A CAREER IN GENERAL SURGERY?

Surgery is the perfect field for those who want to see that their actions have an immediate and essential effect on their patient. It is an ideal career for those who want to heal, quite literally, with their hands. Consider the treatment of a teenager with appendicitis: a discussion with the patient, a dose of antibiotics, anesthesia, incision, resection of the appendix, and discharge the following day. This relatively simple operation is the now routine act of saving a life. Before the era of antibiotics and rapid surgical treatment, appendiceal perforation was much more common, often leading to death from overwhelming abdominal infection.

A survey of 59 surgeons currently in practice said that it brought them joy to "fix patients." They enjoy the patient interaction and diversity of cases; they love to use their hands and minds; and they enjoy operating.[3] Many studies in the surgical literature suggest that to encourage students to choose surgery as their specialty, all that is necessary is to increase their exposure to it. If they see what surgeons do and how they love it, they will be bitten by the bug that has bitten so many—generation after generation.

Students who love a fast pace and high energy will thrive in this field. Nothing is greater than the unbelievable surge of adrenaline that occurs while scrubbing in, stepping into the operating room, and gowning up. Surgeons combine the scientific nature of a technician with the passion of an artist and the empathy of a physician. They demand nothing but the best for the patients, and they give nothing but the best in all of their efforts. Although challenging and demanding, surgery amply rewards all the effort you put into it.

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INTERNAL MEDICINE

Jennifer Lamb and Ian Tong

If you are unsure what the discipline of internal medicine really includes, you are not alone! Many medical students, patients, public policy makers, and even physicians in other fields of medicine might find it difficult to define. Terms such as *internist* and *internal medicine* often elude patients. In fact, nearly half of all patients confuse these physicians with family practice doctors, general practitioners, or even interns (first-year residents).[1] The diverse patient population and spectrum of diseases treated by internists have created much confusion among health care consumers.

Internists take care of the general medical problems of adults. In a single day, they can act as a diagnostician, an educator, a director, an advocate, a motivator, a healer, and a comforter. In the clinic, they treat their patients' aches, pains, and sniffles. They also come to their bedsides in the hospital and manage their inpatient care. Some internists spend their time providing acute and chronic primary care; others become subspecialists in cardiology, gastroenterology, endocrinology, and more. Whether focusing on one organ system or taking care of the whole patient, internists approach everything with great intellectual curiosity. Sick patients with complex medical problems turn to internists for high quality care.

INTERNAL MEDICINE IS REALLY "ADULT MEDICINE"

In 1999, the American College of Physicians (ACP) initiated a public relations campaign called "Doctors for Adults" to help patients understand the true role of the internist within the medical community.[2] This new catchphrase captures the underlying common denominator within internal medicine—physicians who are experts in the nonsurgical health care needs of anyone over the age of 18. In many ways, internists are similar in practice style to pediatricians—but the kids have grown up. There is less asthma and more emphysema, the neonatal inten-

sive care unit has been replaced by the coronary care unit, and instead of worried parents there are concerned adult children.

Internists provide comprehensive medical care over a long period of time. Their primary responsibility is to diagnose and treat acute and chronic medical conditions. A number of illnesses invariably comprise the core of most internal medicine practices. These diseases can range from acute problems such as upper respiratory tract infections, influenza, viral gastroenteritis, and urinary tract infections to more chronic problems like diabetes mellitus, chronic obstructive pulmonary disease, hypercholesterolemia, and hypertension. In fact, a large proportion of medical patients are elderly with complex, chronic comorbidities. Common illnesses treated in the young-adult and middle-aged populations include gastroesophageal reflux disease, peptic ulcer disease, hyper- or hypothyroidism, depression, musculoskeletal injuries, sexually transmitted diseases, and the acute infections listed above. Despite the usual plethora of common complaints and illnesses, internists also have many opportunities to diagnose and treat rare diseases like babesiosis or Still's disease. This is why a general internist's daily practice spans a number of medical disciplines. You receive the challenges (as well as the rewards) of treating a broader range of illnesses than in almost any other specialty.

As you can tell, internists are more than just doctors for adults. This specialty is all about diversity: a varied group of patients spanning late adolescence to the end of life, a number of practice settings from the clinic to the hospital, a broad range of illnesses from acute to chronic, and over a dozen subspecialties. For example, a physician trained in general internal medicine will evaluate a 24-year-old woman presenting with weight loss and night sweats while a colleague who specialized in cardiology treats a 70-year-old heart attack victim in the cardiac catheterization lab. On a given day, a general internist with a special interest in sports medicine will treat a 40-year-old male with a torn rotator cuff, while another colleague gives preventive influenza vaccinations to the residents of a nursing home.

No matter the subspecialty, all internists have a similar set of clinical responsibilities. Most important, they provide long-term medical care while diagnosing and treating acute and chronic problems, whether in the office or hospital. Internists are generally responsible for taking care of their own patients if they are admitted to the hospital (for problems such as congestive heart failure, pancreatitis, asthma, bacteremia, unstable angina, and pneumonia). All internists practice preventive medicine, which involves health maintenance and disease screening. Although some internists may have a subset of patients who fall within

that physician's area of expertise, most rely on colleagues in other subspecialties for consultations on advanced problems. General internists must be aware of their own limitations and know when to seek specialized help on a given organ system disease. But do not think that these internists just spend their time consulting others. In fact, they are often asked by surgeons and obstetricians to see patients who have difficult general medical conditions.

Internists and family practitioners both take care of adult patients. So what makes a career in internal medicine unique? Internists have highly detailed knowledge about how to manage the most complicated of medical problems found in the adult population. Family practitioners, on the other hand, care for people of all ages throughout their entire lives. Because they have broader training across other disciplines (obstetrics-gynecology, surgery, psychiatry), family practice doctors have less depth of training in internal medicine. Internists, of course, do not treat young children or deliver babies. Another distinguishing feature of internal medicine is the option to subspecialize in a vast array of fields after residency. Although many internal medicine residents choose to enter a subspecialty fellowship, others remain in the broad field of general internal medicine and become known as *general internists.*

READY TO EXERCISE YOUR BRAIN?

Internal medicine is perhaps the most cerebral of all specialties. It requires a high level of critical thinking. Many students are drawn to internal medicine for the intellectual stimulation. There are always interesting cases that require a lot of problem solving and interpretation of signs, symptoms, and other pieces of data. Internists are very intellectually curious doctors. They always like to ask questions of themselves and others during the differential diagnosis process. Fascinated by the science of medicine, internists love exploring details—like the mechanisms of drug therapy or the pathophysiology of disease. To make the best diagnosis, internists tend to read quite a bit. Keeping abreast of the latest advances in general medicine requires a career-long commitment to reading journals such as *JAMA* or *The New England Journal of Medicine*.

Critical thinking is necessary because internists take a scientific approach to being master diagnosticians. They thrive on making a great diagnosis, analyzing a fascinating big case, and solving complex medical problems. Internists love to sit around and discuss disease. They get excited by putting together a patient's signs, symptoms, and laboratory findings and trying to come up with a long list of possible differential diagnoses. Unfortunately, sometimes the daily activity in

WHAT MAKES A GOOD INTERNIST?

- ✓ Likes physical diagnosis, pharmacology, and physiology.
- ✓ Is a thorough, cautious problem-solver.
- ✓ Can interact well with people and maintain long-term relationships.
- ✓ Likes working with his or her mind.
- ✓ Is a good, patient listener.

internal medicine is perceived as lots of thinking and talking but little action. In particular, academic inpatient rounds can perpetuate the stereotype of internal medicine as mental masturbation. This is because internists are thorough individuals who make sure not to leave out any possible diagnoses. Students who love to solve problems and mental puzzles find internal medicine a fascinating specialty.

Internists are experts at taking patient histories and performing physical examinations. It is with the information derived from the H&P that they make most diagnoses. After talking to the patient, the internist constructs a list of differential diagnoses for each of the patient's problems. This process allows them to clearly organize in their minds what is going on with the patient and how to address each issue; many patients have multiple medical problems or complaints. To finalize a diagnosis from a list of many, the internist relies on a great deal of critical thinking and deductive reasoning from the data at hand. They take pieces of evidence from the history, physical, laboratory data, and imaging studies to rule in or rule out various disease states. It is kind of like mental detective work. An internist in academics commented that "figuring out how all the pieces to a patients' clinical puzzle fit together is extremely rewarding."

With a confident diagnosis in hand, the internist then moves on to treating the patient. Across the subspecialties of internal medicine, therapeutic interventions take the form of either pharmacologic agents or procedures. General internists, for instance, keep up with the advances in treating high blood pressure with the newest medications and are experts at figuring out the proper antibiotic for a patient with bacterial meningitis. Although this specialty requires thorough, organized thought, internists are more than just thinkers; they are also proficient in many technical skills essential for the diagnosis and treatment of illness. These skills include a number of inpatient procedures, such as thoracentesis, paracentesis, lumbar puncture, and central line placement, and outpatient procedures like flexible sigmoidoscopy, endometrial biopsy, and intra-articular injections. Cardiologists open blocked arteries through percutaneous transluminal coronary

angioplasty, and gastroenterologists excise cancerous colon polyps through colonoscopy or stop upper gastrointestinal bleeding through esophagogastroduodenoscopy.

THE DOCTOR–PATIENT RELATIONSHIP

The ability to listen, understand, explain, advise, and educate are central to the role of an internist. Without strong interpersonal skills, it would be difficult to diagnose an underlying substance abuse problem, help a patient start an exercise program or quit smoking, encourage healthier eating habits, or guide a patient's decision to sign a do-not-resuscitate order and abandon aggressive treatment. Through comprehensive history and physicals, internists spend a great deal of time with their patients—talking with them and gaining insight into their lives, their values, and their concerns. Physicians with these qualities will establish lifelong, trusting relationships with their patients.

Having long-term, continuous relationships with patients and their families is one of the best things about a career in general internal medicine. Unlike the patient of an emergency medicine physician or anesthesiologist, your patient has the potential to stay with you until old age and death. Patients trust internists with their secrets, fears, and insecurities. Internists must respect the privilege of this trust and the enormous responsibility that comes with it. They are the ones, after all, guiding patients through their illness amidst their fears. As an internist, you also lead patients through the health care system and the myriad of subspecialty care and treatment options. At times, they even guide their patients through family stress and turmoil. Internists' ability to diagnose and treat illness depends on the foundation of a compassionate, insightful, and respectful relationship with their patients.

Although the action of internal medicine practice is not always as tangible as performing a liver transplant, delivering a baby, or intubating a patient before surgery, it is still complex and challenging. Within this specialty, the goal of intervention may not necessarily be to cure disease, but to help the patient understand the disease and cope with its psychosocial ramifications. Beyond thinking and communicating, internal medicine requires exploring patients' cultural beliefs, recognizing the impact of socioeconomic status, educating patients about diseases and treatments, motivating lifestyle changes, and organizing multidisciplinary care.

As an internist, you will pride yourself on your ability to solve difficult problems under intense pressure and sensitive circumstances. Take the following ex-

ample. An internist in private practice was evaluating a new patient in the hospital—a Taiwanese man visiting his family in the United States who became acutely and gravely ill but did not have health insurance. The patient's family members were divided on the decision of whether to continue hospital treatment versus caring for the patient at home due to financial concerns. Although the family was concerned about the patient's lack of insurance and the cost of continued care, they were also guided by cultural values to pursue every option to preserve the patient's life. As demonstrated by this case, the internist's role not only requires challenging medical management but also skills such as cultural competence, family mediation, health care economics, and a holistic view of care.

BEING ON THE FRONT LINE OF MEDICINE

An internist is often the first physician a patient turns to when an illness or symptom arises. By being on the first line of defense, the internist's initial interaction can influence the likelihood the patient will follow up after this visit. An internist with limited patience, poor communication skills, and skepticism toward the validity of the patient's complaint may discourage the patient from seeking further medical care. In contrast, the internist who expresses an appropriate level of concern validates the patient's complaint and offers an understandable follow-up plan may improve the likelihood that the patient will return for needed medical care. If you enjoy helping others solve problems while providing encouragement, patience, and guidance, then definitely consider a career in internal medicine.

Being on the front line of medicine also offers the intellectual stimulation and challenge of diagnosis. As the first physician to hear and understand the patient's complaint, your skill as a diagnostician directs the treatment plan. Being an effective diagnostician requires skill as an historian and examiner as well as the ability to synthesize history, physical examination findings, laboratory data, and study results. For example, internists are commonly presented with chief complaints of cough and heartburn. Although many of these cases can be attributed to upper respiratory infections or gastroesophageal reflux, the detail-oriented internist recognizes the necessity of a thorough history and physical to determine whether further workup is needed. But in today's health care environment of conservative resource utilization, only good clinical judgment can guide the appropriate decision to explore a patient's complaint further with laboratory tests and technological studies.

Preventive medicine is another extremely important part of being on the front line of medicine. Some patients may say "Stop smoking—are you joking?!"

or "Colonoscopy? You must be crazy!" But among the global goals of medical care, the prevention of disease has recently achieved a status equal to that of diagnosis and treatment. The difficulty of addressing chronic, multisystem illnesses in the limited time allotted for patient visits makes preventive health care one of the most challenging (and sometimes frustrating) areas of internal medicine. Suggesting a patient replace a weekly meal of fried chicken with grilled fish or convincing a patient it is worthwhile to have a two-foot scope inserted through the rectum can make you feel more like a salesperson than a physician! The lack of short-term, recognizable results also tends to make prevention a lower priority for patients as well as physicians. If you can envision yourself educating and motivating patients to change their lifestyle, internal medicine certainly provides abundant opportunities to do so. The future of this specialty undoubtedly involves an increase in the number and complexity of screening tests, as well as the opportunity for research on motivating and achieving changes in lifestyle.

THE INTERNIST AS "HEAD COACH"

Because many patients have multisystem diseases requiring specialized care, the team of physicians and other health care providers can easily become fragmented and disorganized, which in turn may seem confusing and frustrating for patients. An organized internist with leadership skills can prevent or at least minimize this frustration and confusion. By tracking medications prescribed by other physicians, monitoring potential drug interactions, following up on studies or procedures performed by subspecialists, and responding to their recommendations, the internist orchestrates multidisciplinary care and helps the patient navigate a complex system of care. In addition, the internist acts as the patient's advocate within the complex health care environment of resource utilization and restricted access to care.

Internists not only serve as leaders of a multidisciplinary team, but also determine which physicians are on the playing field. As an internist you must provide an appropriate level of specialized care, then recognize your limitations and refer the patient to a subspecialist for optimal care. This can become a fine line for any internist—requiring an impressive breadth of knowledge but a willingness to admit limitations as well. You can imagine a dermatologist being dismayed when an internist could not treat a patient with simple eczema or an infectious disease specialist frustrated by an internist's insistence on treating HIV even though the internist was not up to date on the standard of HIV care. To provide the best care, internists must learn to turn to subspecialty care when it is appropriate and establish professional, mutually respectful relationships with subspecialists.

THOUGHTS ON INTERNIST CAREER SATISFACTION

A recent commentary suggests that general internal medicine is truly at the "crossroads of prosperity and despair."[3] Prosperity is evidenced by the growth of academic general internal medicine, increasing research opportunities and funding, and the success of the "hospitalist" movement. Despair, however, might be an overly dramatic descriptor for the state of general internal medicine. In recent years, studies have found that career satisfaction among general internists has declined.[4] The reasons are variable, but the most common are reduced autonomy over treatment decisions, less time allotted for patient visits, and more time required for administrative paperwork. Because today's economic environment places less value on cognitive services than on procedural or diagnostic services, the decrease in the duration of individual clinic visits has compromised the management of psychological aspects of disease. At the same time, the growing elderly population presents more complex comorbidities, and the traditionally valued continuity of care has been disrupted as changes in patients' insurance now often require a change of physician as well.

There are indications, however, that advances within general internal medicine could improve job satisfaction. The option to divide inpatient and outpatient practice between hospitalists and primary care physicians has the potential to decrease both on-call responsibilities and total work hours. This separation of roles could also allow the outpatient-based internist more time to spend with each patient during clinic visits.[5] As training in psychosocial and preventive medicine becomes a central component of residency, internists will be better prepared to address these issues as aspects of multiple complex medical problems. Finally, the job satisfaction of all physicians depends on their ability to regain control over medical management decisions. This would allow an internist's time to be devoted to practicing medicine rather than constantly negotiating insurance coverage and financial reimbursement.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

RESIDENCY TRAINING

Residency in internal medicine requires 3 years of postgraduate training. There are currently 390

(*continued*)

The day-to-day life of a practicing internist is quite varied. It really depends on whether the physician is a cardiologist, rheumatologist, critical care specialist, general internist, and so on. Nearly all work long hours in an office-based prac-

tice. Cardiologists and gastroenterologists are frequently called into the hospital in the middle of the night to perform cardiac catheterizations for heart attack victims and endoscopies for gastrointestinal bleeders. The general internist in private practice is, in a way, on call all the time. When one of their patients is admitted to the hospital, they receive a phone call letting them know.

Because of the broad nature of internal medicine, residents often have a tough time responding to the question "Where do you intend to practice?" After all, the answer may change during your training and even over the course of your career. Your initial career plans may be your choice during residency to pursue a subspecialty fellowship or to remain in general internal medicine. For physicians who choose to remain in general medicine, other fellowship opportunities are available in fields such as end-of-life care, medical education, and medical informatics.

Once a general internist is prepared to enter the workforce, the decision between academic medicine and private medicine must be made. Both have many practice opportunities to explore. Some academicians are mainly educators, spending most of their time in the outpatient setting seeing their own patients and supervising residents in clinic and on the wards. Others are researchers with few inpatient or outpatient responsibilities who spend most of their time conducting research in areas that are not generally ad-

accredited programs in the United States (excluding combined programs with other specialties). Residency programs are offered by both academic medical centers and community hospitals. The training includes experience in both general internal medicine and subspecialty areas. It is a rigorous program, requiring in-house overnight call every fourth to fifth night while on an inpatient rotation. The first year is the most intense. Rotations in general patient medicine, subspecialties (consults and clinic), intensive care, geriatrics, and emergency medicine are required. Residents must demonstrate technical proficiency in a number of procedures, including abdominal paracentesis, thoracentesis, central venous line placement, and lumbar puncture. Because of the current emphasis on primary care, one-third of the residency must take place in an ambulatory setting. All categorical residents spend one-half day per week in a continuity clinic where they manage their own panel of patients over the course of 3 years. The decision to subspecialize and apply for fellowship typically occurs during the second postgraduate year.

INTERNAL MEDICINE EMPLOYMENT DATA

- Distribution among all physicians: 16.1%
- Practice type: 80.9% in private practice; 14.9% in academics
- Median patient care hours per week: 49.3
- 29.3% experienced difficulty in securing their preferred employment position
- 52% report that their salary is equal or higher than expected

Source: American Medical Association

dressed by subspecialty research but are broadly applicable to medicine: evidence-based medicine, psychosocial aspects of care, doctor–patient communication, medical ethics, management of medical errors, cost effectiveness, and the impact of socioeconomic status or race on medical care.

General internists who choose private practice also have several options. In the current health care economic environment, solo private practice is becoming much less common. Instead, most internists belong to a group practice such as multispecialty groups or health maintenance organizations. Some private internists have contracts with hospitalists to provide all inpatient care for their patients, and other private internists continue to see patients both in the clinic and in the hospital. Others hold a salaried position at a health maintenance organization.

In both private and academic practice, the generalist initiative of the last decade gave rise to the rapid growth of a new type of internist: the hospitalist. These internists practice only inpatient (hospital-based) medicine. Similar to consultants, they are called on to provide expert management for the care of sick patients admitted to the hospital wards. Typically, hospitalists do not have clinic, practice, or outpatient responsibilities. Instead of following a clinic schedule, hospitalists have a shift-work lifestyle similar to emergency medicine physicians. Patients highly benefit from having a hospitalist take care of them instead of their own private doctor coming in to round on them. With good communication between the two physicians, hospitalist care has been associated with lower costs, improved patient outcomes, and lower short-term mortality.[6]

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Internal medicine is comprised of many subspecialties. In 2000, roughly half of all graduates from internal medicine residency programs sought fellowship training.[7] Currently there are 10 possible areas of subspecialization. Before jumping

into one of these disciplines, take a moment for some honest self-evaluation. It is essential that you give some thought to your field of interest and the type of personality most suited to it.

For aspiring physicians who prefer direct primary patient care, general internal medicine is the place to be. Specialists tend to be much more scientifically oriented and enjoy more complex and difficult cases. They serve as consultants to the general internist, directing medical care for a specific organ system and often teaching the general internist about the patients' disease process. For certain specialties, like cardiology, gastroenterology, and critical care, more time is spent caring for patients in the hospital environment than in the office setting.

No matter whether you choose cardiology or rheumatology, all subspecialists are, at heart, excellent general internists. You will still be required to have high-quality history and physical examination skills, as well as the ability to interpret laboratory and radiographic findings, to produce a comprehensive differential diagnosis. In every subspecialty, all internists take care of very sick adult patients who have many medical problems.

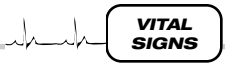
INTERNAL MEDICINE
2002 MATCH STATISTICS

- 9,551 applicants competed for 4,622 categorical and 1,675 preliminary positions
- 5,146 U.S. seniors and 4,405 independent applicants ranked at least one internal mediciene program.
- Residency programs ranked 8.1 candidates for each available position.
- 94.3% of all positions were filled in the initial Match
- The successful applicants: 62.3% US graduates, 29.4% foreign-trained physicians, and 5.6% osteopathic graduates
- Unmatched rate for US seniors applying only to internal medicine: 1.6%

Source: National Resident Matching Program

Allergy and Immunology

Millions of people suffer from allergies, which ultimately affects their workplace productivity and results in billions of dollars lost each year. These reactions include respiratory diseases (asthma, sinusitis, rhinitis), adverse drug effects, and unusual skin rashes. Because allergies have an underlying immunologic component, these specialists are also experts on antibodies, antigens, and other complex



MEDIAN COMPENSATION	
Allergy and Immunology	$192,000
Cardiology	$287,163
Endocrinolgy	$166,929
Gastroenterology	$246,663
General Internal Medicine	$150,534
Geriatrics	$152,260
Hematology/ Oncology	$210,000
Infectious Disease	$166,156
Nephrology	$205,000
Pulmonary Medicine/ Critical Care	$213,483
Rheumatology	$167,007

Source: American Medical Group Association

aspects of the immune system. They perform skin tests and drug desensitization protocols. They treat patients with autoimmune disease, immunodeficiencies (such as leukemias and lymphomas), as well as patients who have undergone bone marrow or organ transplants.

A career in allergy and immunology offers immense intellectual satisfaction, as well as good working hours. Here, there is a strong bond between basic laboratory research and its clinical application. When treating patients (both kids and adults), these specialists witness dramatic improvements in physical functioning. Results are usually fast, positive, and much appreciated. Today, more and more people suffer from asthma and other allergic disorders. As such, there is an extremely high demand for internists with formal training in this discipline. Career options are broad and include private practice, academics, and clinical or basic science research. Some allergist-immunologists also practice general internal medicine in addition to their subspecialty. A fellowship in allergy and immunology lasts 2 years.

Cardiology

Like fighter pilots, cardiologists take calculated risks while exercising skill and precision. As experts in the diagnosis and management of cardiovascular diseases, they take care of life-threatening medical conditions that affect a large majority of the population. These disorders include congenital heart defects, arrhythmias, valvular problems, hypertension, and coronary artery disease. Many of the treatment options, whether pharmacologic or interventional, have immediate life-saving benefits. A procedure-oriented specialty, cardiology requires a great deal of manual dexterity. It is a perfect field for those who love gadgets. You will perform cardiac catheterization, electrocardiograms, nuclear stress tests, and echocardiography. You will place stents within the coronary vasculature, open clogged ar-

teries with balloon angioplasty, and even electrically convert patients into normal sinus rhythms through defibrillation.

Life as a heroic cardiologist, however, can be physically draining. They work extremely long, arduous hours taking care of very sick patients. Due the large numbers of patients admitted to the hospital with heart attacks, cardiologists frequently come to the hospital in the middle of the night. In the intensive care unit, they help critically ill patients maintain their blood pressure through the administration of vasopressors and other powerful drugs. Despite the rigors of the profession, cardiologists maintain long, intimate relationships with their patients. They also practice preventive medicine by identifying risk factors for early diagnosis of heart disease. If you enjoy studying the anatomy and physiology of the heart and love mastering technical procedures, then cardiology is the subspecialty for you. Fellowships in cardiology last 3 years and are extremely competitive.

Endocrinology

This subspecialty involves the study of hormones, endocrine glands, and their effects on whole-body homeostasis. You will find an intimate connection between the latest basic science research and its application in bedside clinical practice. Endocrinologists are experts in treating disease states in which glands (pituitary, thyroid, adrenal, pancreas, gonadal) are either overproducing or undersecreting hormones. These problems include diabetes, thyroid dysfunction, gonadal disorders, pituitary tumors, adrenal gland dysfunction, and disorders of bone metabolism. Patients often live with chronic endocrine diseases that may not declare themselves for weeks or even years (other than a few subtle symptoms). Many of these diseases are treatable, often even curable.

Like great detectives, endocrinologists make use of an extensive array of diagnostic testing. They study ACTH stimulation tests, dexamethasone suppression tests, bone densitometry, and thyroid function panels. Aside from cases of diabetic ketoacidosis, adrenal crisis, and thyroid storm, there are few endocrine emergencies. This allows the clinician ample time to think about and prepare appropriate treatment regimens. Endocrinologists enjoy long-term relationships with their patients, who are typically on the younger side. As part of their patients' therapy, they often have to address the behavioral and psychosocial aspects of endocrine disease. For instance, patients with poorly controlled diabetes need to be taught (and encouraged) to modify their lifestyle, comply with their medication schedule, and use home glucose monitoring. Although much of their time is spent in the clinic setting, endocrinologists also serve as inpatient consultants for endocrine emergencies and diagnos-

tic or treatment challenges. If you are interested in this highly scientific subspecialty with many positive outcomes, there are 2-year fellowships in endocrinology.

Gastroenterology

Specialists in gastroenterology treat diseases of the entire digestive system—from the esophagus to the anus, as well as the liver, gallbladder, and pancreas. Depending on the disease process, their relationships with patients may range from a single consultation (e.g., a patient presenting with pancreatitis or upper gastrointestinal bleeding) to long-term close relationships (e.g., patients with ulcerative colitis, hemachromatosis, or chronic liver failure due to alcoholic cirrhosis). They often see patients on the surgical wards following liver transplants and in the intensive care unit with massive gastrointestinal bleeding or fulminant hepatic failure. Because of the delicate nature of the subject matter, gastroenterologists often have to pay close attention to psychosocial aspects, particularly when discussing the implications of bowel disease for the patient's lifestyle.

As in cardiology, exciting technical procedures are an integral part of the management of gastrointestinal disorders. You will become quite adept at inserting tubes into your patients' mouths and rectums and seeing their diseases right before your very eyes. Colonoscopy, flexible sigmoidoscopy, and esophagogastroduodenoscopy allow the clinician to directly visualize disease, take tissue biopsies for diagnosis, and even provide immediate treatment by excising polyps or cauterizing bleeding vessels. Patients rely on their gastroenterologist to screen for precancerous lesions and to remove them before they become malignant. Whether draining fluid from an abdomen filled with ascites or recording intraesophageal pressures, there are many other diagnostic procedures. With new technology on the horizon, gastroenterologists will soon be able to perform endoluminal surgery with lasers and use built-in ultrasound probes to provide new views of our digestive organs. Gastroenterology is a perfect specialty for students who love this combination of technical interventions and cerebral challenges. Fellowships in gastroenterology require 3 years of training. Special qualifications certificates are available in hepatology (liver disease) and advanced endoscopy.

Geriatrics

Rather then treating a particular disease or organ system, geriatricians care for a specific population—the elderly, the largest growing proportion of the US population. Patients within this age group typically have many complex medical

problems, ranging from degenerative neurologic disease such as dementia to systemic diseases like high blood pressure and diabetes. Because they take a fair number of medications, geriatricians must be experts on drug interactions, adverse effects, and how drugs are metabolized in an older person. At times, they must be selective about which diagnostic procedures and therapeutic undertakings their patients can tolerate. Using a multidisciplinary approach, they address the physical and psychosocial needs of their patients amidst an extensive constellation of medical issues. After all, the elderly have their own special set of problems, such as delirium, dementia, incontinence, and decline in functional status. Geriatricians are intimately familiar with nursing home settings and dealing with Medicare. The practice options for these highly sought after specialists include traditional outpatient care, consultations at nursing facilities, and academics. Fellowships in geriatric medicine require 1 additional year of training.

Hematology–Oncology

Most specialists practice both disciplines as a single field of medicine, usually with an emphasis on oncology more so than hematology. Patients with diseases of the blood, bone marrow, and lymphatic systems require the expertise of a hematologist. These disorders include anemias, clotting abnormalities, leukemias, lymphomas, and bleeding disorders like hemophilia. Medical oncology involves the evaluation and treatment of neoplasms, both benign and malignant, of every organ system, from the brain to the kidneys. Some oncologists develop specific expertise in a particular type of cancer, such as malignant mesthothelioma. They are experts on the latest forms of chemotherapy available, particularly those currently used in experimental clinical trials.

Regardless of the area of oncology, you will no doubt acquire both a philosophical and practical approach to life and death. Oncologists recognize that the therapy they prescribe is often harmful to the patient. They have to reconcile the benefit of every treatment option with the harm involved, which means exercising courage and faith in their patients' ability to cope with the burden of disease and its treatment. This specialty, therefore, requires the highest level of sensitivity, compassion, and empathy. While helping patients through a difficult time, oncologists must tell them the truth about their disease in an easily understandable and compassionate manner. They must guide patients and their families through the dying process, easing the process by providing good pain control and maintaining the patient's dignity. Hematology–oncology is especially rewarding for those who can handle the challenge that despite your best efforts and med-

ical care, many of your patients will not survive. Your efforts will never be in vain, for there are patients whom you will indeed cure or whose lives you will prolong. Fellowships in hematology–oncology are 3 years in length.

Infectious Disease

If you love studying bacteria, viruses, parasites, and fungi, then the subspecialty of infectious disease is for you. These physicians take the basic science of microbiology and apply it to clinical situations. In their diagnostic workup, they approach the patient's disease process by taking into consideration recent travel, geographic region, country of origin, and cultural practice. They are experts in the proper collection and analysis of culture specimens, plus a variety of laboratory tests, such as antibiotic sensitivity tests, CD4 counts, and infectious serologies. Their treatment regimens are largely pharmacologic and draw on the latest developments in antibiotic therapy. Through the use of vaccines, they practice a great deal of preventive medicine.

Most patients who require the expertise of these clinicians have diseases that are short-term in nature. Thus, infectious disease specialists typically serve as consultants for other physicians. In the summer of 2002, they were on the front lines of the West Nile virus outbreak in the United States. They consult on patients in the hospital for diagnostic challenges (e.g., fever of unknown origin) and for treatment regimens of specific infectious diseases (e.g., bacterial endocarditis, meningitis, cellulitis, sepsis). Many infectious disease physicians maintain longer relationships with patients suffering from chronic diseases, such as HIV/AIDS and tuberculosis, who require extensive follow up. Some practice travel medicine, serving as consultants to patients preparing for international travel and to those who acquired illnesses while overseas. Other areas of expertise include infection control within health care settings, international public health, and the prevention of antibiotic resistance through education and research. They also are involved in the tracking and epidemiology of certain communicable diseases. As the threat of biological attack becomes a growing concern, the prevention, recognition, and treatment of bioterrorism are now focal points of infectious disease. Fellowships require 2 years of training after residency.

Nephrology

Fascinated by urine, the kidney, and complex renal physiology? Nephrologists are masters of fluid, electrolytes, and acid–base homeostasis. After all, the kidneys are

responsible for filtering out impurities from the blood. As part of their diagnostic workup, they analyze acid–base studies, electrolyte panels, and urine collections. In this highly intellectual specialty, they treat all types of diseases of the renal system, such as infection, kidney stones, alkalosis/acidosis, autoimmune disorders, renal artery stenosis, and cancer. The nephrologist must understand how systemic diseases like hypertension and diabetes affect the kidneys, as well as be able to identify renal toxic effects of any medication. Long-term relationships are formed with patients who require chronic dialysis, and life-saving interventions such as acute hemodialysis are often provided within the intensive care setting. Nephrologists also treat postrenal transplant patients and manage the complications of chronic immune suppression secondary to posttransplant medical therapy.

There are several procedural skills to master, particularly the placement of hemodialysis and peritoneal catheters and the ability to biopsy tissue from the kidney. Some nephrologists gain additional interventional training and perform thrombectomies and even angioplasty of renal arteries. Although it requires technical skill, nephrology is also one of the most cognitive subspecialties within internal medicine. You can practice as a consultant, direct a dialysis center, work as an intensivist, or practice both nephrology and general medicine. Although dialysis patients can be demanding at times, solving their complex medical problems is highly gratifying. Nephrology fellowships require 2 years of training.

Rheumatology

Rheumatologists treat diseases of the musculoskeletal system such as osteoarthritis and gout in addition to complex systemic diseases like lupus and rheumatoid arthritis. They deal mainly with people with chronic diseases that are not curable. Diagnostic challenges are common in rheumatology, as evidenced by the treatment of rare diseases such as scleroderma, amyloidosis, vasculitides, and polymyositis. They interpret complicated rheumatologic blood tests and perform joint aspirations and steroid injections. What are complex presentations of disease for your colleagues, will, in your eyes, appear as routine manifestations of common rheumatologic disorders. Depending on your orientation to laboratory research, you may find yourself working within an overlapping world of rheumatology, immunology, and genetics. The treatment of rheumatologic disease most often consists of immunosuppression as well as adequate pain control. Future advances in gene therapy could potentially revolutionize therapeutic options within the field of rheumatology. Fellowships in rheumatology require 2 years of additional training.

Pulmonology and Critical Care

Despite taking care of the most critically ill patients, these technically superb specialists never lose their cool under pressure. Although considered two separate subspecialties, most clinicians undergo training in both fields. *Pulmonology* entails the diagnosis and treatment of diseases of the lungs and upper airways, whether infectious, inflammatory, or cancerous in origin. Every day, they interpret arterial blood gas studies and pulmonary function tests. These specialists often serve as consultants to patients requiring expert management of emergent problems like pulmonary hypertension, hemoptysis, and pulmonary embolism. Continuity of care is also important in pulmonary medicine, particularly for patients with chronic problems such as asthma, emphysema, and occupational lung damage. In the multidisciplinary world of critical care, these physicians deal with more than just disorders of the lung. They take care of very sick patients who have life-threatening multi-organ system problems, from septic shock to heart failure to metabolic abnormalities.

If using high-tech monitors and interventional skills to solve complex clinical problems sounds appealing, then consider a career in pulmonology and critical care. In both areas, you become quite adept at performing many procedures. These specialists are experts at bronchoscopy, thoracentesis, ventilator management, and the placement of central lines and Swan-Ganz catheters. You will witness life-saving interventions as well as prolonged and agonizing death, and you will learn to meet both outcomes with the same level of professionalism. You will also become seasoned in end-of-life decision-making. As they try to cope with the imminent death of their loved one, the families of your patients will be grateful for your care and guidance when addressing issues regarding goals of care and resuscitation limitations. Be warned, however, that working with critically ill patients—with its demanding pace and intense emotion—can lead to rapid burnout. Fellowships require an additional 3 years of training. You can also earn certification in only one of the two disciplines through 2 years of fellowship.

NEW "HORIZONTAL" SUBSPECIALTY AREAS

In recent years, new fellowship opportunities within internal medicine have multiplied. Unlike the organ-based orientation of traditional subspecialties (like cardiology or pulmonary medicine), the focus of these fellowships is specific patient populations and aspects of health care delivery that are applicable across many areas of general medicine. Training opportunities are becoming more abundant

and diverse each year. Because the American Board of Medical Specialties does not officially recognize these subspecialties, board certification examinations are not available. Instead, graduates of these fellowships earn a certificate of added qualifications. Programs typically last 1 to 2 years.

Addiction Medicine

Internists with specific expertise in addiction medicine provide treatment for those addicted to alcohol, tobacco, and illicit drugs on an inpatient and outpatient basis. Because medical professionals have a high rate of substance abuse, some addiction specialists focus on the prevention and treatment of addiction among health care providers.

Adolescent Medicine

In this growing subspecialty, prominent areas of prevention and treatment include substance abuse, eating disorders, acne, sexually transmitted diseases, pregnancy, and depression. In addition, adolescent medicine emphasizes the management of chronic diseases that begin in childhood and continue into adulthood, such as asthma, cystic fibrosis, congenital heart disease, and diabetes. Practice settings include high school- and university-based student care centers, mobile clinics, and outpatient clinics. Many adolescent medicine specialists work within large academic medical centers or in the public health sector.

Clinical Decision Making

Internists specializing in clinical decision making attempt to optimize health care delivery through analysis of cost effectiveness, health care policy, the development of clinical guidelines, and evaluation of clinical outcomes. Practice settings include academic departments, government policy-making agencies, health insurance companies, and managed care organizations.

Clinical Nutrition

Clinical nutrition focuses on the prevention and treatment of nutritional deficiencies, food allergies, eating disorders, and malnutrition of chronic disease. Some practitioners approach the subspecialty from a public health standpoint, whereas others develop expertise in nutritional aspects of specific diseases such as diabetes mellitus, inflammatory bowel disease, or chronic renal failure.

Medical Informatics

Internists with a specific expertise in medical informatics attempt to improve the storage and communication of medical data and imaging modalities. They integrate this data to yield biostatistical and epidemiologic outcomes. Most subspecialists in medical informatics have a background in computer science or biomedical engineering.

Palliative Care

A palliative care specialist provides pain control, emotional support, and dignity to dying patients while also addressing the needs of their family members. Practice settings most commonly include inpatient hospice facilities and home hospice care. Patients are not always comfortable discussing death and dying with physicians. As a skilled palliative care specialist, you can help the dying patient accept the passing of his or her life rather than fear and suffer it.

Primary Care Sports Medicine

Sports medicine is the practice of preventing and treating sports-related injuries, as well as promoting exercise as preventive medicine for the general population. Those internists practicing sports medicine often provide acute care of injuries during athletic events. Most work closely with orthopedic surgeons, although most athletic injuries, as many studies have shown, do not require surgery. The treatment of basic medical problems is considered to be sports medicine if the patient is an athlete or the problem is related to exercise.

WHY CONSIDER A CAREER IN INTERNAL MEDICINE?

There are many misconceptions about internal medicine, probably because it is such a broad field. A study by the American College of Physicians–American Society of Internal Medicine (ACP-ASIM) found that only 18% of patients surveyed thought that general internists could provide primary care, and 56% believed that general internists were subspecialists.[8] Some internists, in fact, have a patient base comprised of older children and adolescents, whereas others primarily see elderly patients in their practices. As a result, internists have the flexibility to work in many different settings: the ambulatory clinic, the inpatient ward, the intensive care unit, nursing homes, and hospices. Internal medicine, therefore, is much

more than a specialty devoted to chronic illness without possible cures. Instead, this very personally satisfying field of medicine allows a physician to help patients achieve the best quality of life possible.

Internists are knowledgeable in many aspects of medical care. They treat acute and chronic conditions, not to mention common and rare disease entities. Even if you choose another specialty, no physician can avoid the basics of internal medicine. For instance, orthopedic surgeons have to treat hypokalemia, obstetricians-gynecologists need to be well versed in the management of hypertension, and psychiatrists must be able to recognize the signs and symptoms of hypothyroidism. Internal medicine is, in a way, the foundation for all fields of medicine. If you are excited by the prospect of providing care for adults as a diagnostician, healer, motivator, and patient advocate, you would certainly find a career in internal medicine rewarding.

Medical students who are undecided on a specialty should take into account that training in general internal medicine provides the foundation for a long list of career options. Within one career, you could practice general medicine, provide primary preventive care, specialize in one organ system through formal fellowship, or even independently develop a specific expertise. By deciding to enter internal medicine, medical students ensure themselves a career filled with intellectual stimulation, diagnostically challenging patient interactions, and rewarding relationships. The focus on the patient makes practicing the art of internal medicine an extraordinary privilege.

ABOUT THE CONTRIBUTORS

Drs. Jennifer Lamb and Ian Tong are residents in internal medicine at Stanford University Hospitals. A native of southern Illinois, Dr. Lamb received her BS from the University of Illinois—Urbana-Champaign before entering medical school at the University of Chicago. She is considering a career in geriatrics with specific interests in hospice care and the integration of geriatrics into medical school curricula. After earning a BA in English from the University of California—Berkeley, Dr. Tong also received his medical education from the University of Chicago. He is planning on pursuing a career in primary care medicine, focusing mainly on the urban underserved patient population. They may be reached by e-mail at jrlambmed@hotmail.com.

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19 NEUROLOGY

Tomasz Zabiega

Neurology is the practice of medicine that concentrates on the human brain and nervous system. From higher cognitive disorders (such as Alzheimer dementia) to diseases of nerve and muscle (neuropathies and myopathies), neurologists serve as nervous system specialists at every level. With compassion and dedication, neurologists take care of patients presenting with a wide variety of complaints: headaches, numbness, weakness, tremors, seizures, speech difficulty, and changes in consciousness. Although they deal with some of the most distressing and debilitating diseases in medicine, neurologists tend to have an upbeat, calm, and casual attitude. They typically combine a sophisticated level of intellectual curiosity with down-to-earth friendliness and optimism.

Many medical students, after completing their rotation in neurology, are familiar with the stereotype of neurologists as excellent diagnosticians who cannot treat the underlying neurologic disorders. This observation may have been somewhat true 30 years ago. Today, therapeutics are equally as exciting as diagnostics. In the past several decades, new developments in neuropharmacology and noninvasive technology have revolutionized the modern practice of neurology. As our understanding of neurologic disease continues to expand, neurology stands as one of the most stimulating fields in medicine.

NOT JUST FOR "BRAINIACS"

The variety of diseases that fall under the expertise of neurologists is staggering. Because the nervous system controls other organ systems, this specialty overlaps with an entire range of other medical disciplines. For instance, neurologists must be comfortable with psychology when treating dementia and hysteria, with genetics when diagnosing muscular dystrophy and cerebral palsy, and with urology when evaluating a neurogenic bladder. They draw upon their knowledge of im-

munology to treat patients suffering from multiple sclerosis and myasthenia gravis. They use important concepts from otolaryngology to diagnose dizziness and dysphagia, from ophthalmology to evaluate visual problems, and from dermatology to manage neurofibromatosis. For patients with strokes, intracranial hemorrhage, or spinal cord transection, neurologists often serve as consultants to their surgical colleagues. They interact with oncologists to treat brain tumors. They also must be up on the latest methods of antibiotic therapy to treat patients with meningitis or the neurologic manifestations of AIDS. As you can see, this list goes on and on.

To deal with such a diversity of disorders, neurologists must become experts in an equally varied array of skills. They have to maintain a solid understanding of the basic sciences, particularly neuroanatomy, neuroscience, and physiology. These clinicians are superb history takers and examiners. After all, the neurologic physical examination is by far the most elaborate and important. In addition, the neurologist is called upon to interpret complex diagnostic studies, such as magnetic resonance imaging, computed tomography, electroencephalography, sleep studies, and blood tests. Manual dexterity is required when neurologists perform spinal taps and electromyography on their patients. On top of all these skills, the neurologist must treat these disorders with many types of medications and therapies, such as intravenous immunoglobulins, plasmapharesis, or infusion of powerful thrombolytic agents for acute stroke management.

The seemingly insurmountable amount of knowledge to master often discourages medical students from choosing a career in neurology. But they should be aware that neurology does not call for genius. Instead, it simply requires the physician to analyze intricate clinical findings in a systematic manner. A neurologist must integrate results from the history, physical examination, and diagnostics—all obtained from a single, logically structured organ system.

Mastering the intricacies of the nervous system is similar to learning the rules of a particular sport. Once you understand the set of laws within neurology, you find that diagnosing disorders and analyzing complications becomes a relatively simple and enjoyable task. Neurologists do not simply memorize terms, but are thinkers at heart.

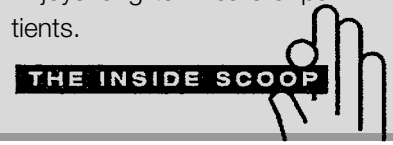
NUTS AND BOLTS: THINKING AS A NEUROLOGIST

To diagnose and treat neurologic disorders, neurologists draw upon their solid understanding of the basic neurosciences. This scientific discipline includes the anatomy, physiology, embryology, biochemistry, pathology, and pharmacology of

the human nervous system. Does this mean that you have to learn the name and position of every small structure found in the brain and spinal cord? Absolutely not. Neurologists who have failed to grasp the simplicity of their specialty often propagate this misconception. By understanding the different components of the nervous system, the most competent neurologists can easily manage complications that may result from disease processes occurring in those structures.

WHAT MAKES A GOOD NEUROLOGIST?

- ✓ Likes to figure out problems logically.
- ✓ Can deal with diseases that may have minimally effective treatment.
- ✓ Is intellectual and inquisitive.
- ✓ Likes serving as a consultant or seeing patients by referral.
- ✓ Enjoys long-term care of patients.



Neurology is a perfect specialty for aspiring physicians who like to delve into analysis and figure out rational solutions. The art of practicing clinical neurology is perhaps the most logical and structured of all fields of medicine. When a patient presents with a complaint related to the nervous system, the first step is to distinguish whether damage has occurred in the brain, spinal cord, peripheral nerves, neuromuscular junction, or muscles. Then, the differential diagnoses and thought process ascend cerebrally. Was the damage central (brain and spinal cord) or peripheral (nerve and muscle)? If the lesion is in the spinal cord, could it be localized within the cervical spine (upper extremity symptoms) or the lumbar region (lower extremity symptoms)? If suspected problems involve the brain, neurologists localize the lesion further to subsections of the brainstem or cortex. When a neurologist understands clearly the function of larger brain structures, he or she can more easily pinpoint defects within more intricate components.

This methodical approach to diagnosis is an integral part of the profession. It makes the job of the neurologist both relatively easy and extremely rewarding. A neurologist evaluates patients whose seemingly complex presentation often baffles other medical professionals. By systematically analyzing pieces of the clinical picture, these specialists often make rapid diagnoses (or at least greatly narrow the differential list) to the amazement of other doctors. They do so by showing how the pieces of the patient's puzzle correlate with each other through neuroanatomic relationships. But neurologists do not dabble in anatomy out of a masochistic thrill in learning every minute structure by heart. Instead, they en-

gage in a life-long study of nervous system structure to provide the best patient care and most accurate diagnoses.

THE COMPLETE NEUROLOGIC EXAMINATION

If you like using your hands to solve clinical puzzles, if you enjoy playing with reflex hammers and tuning forks, this specialty may be the perfect choice. In addition to the necessity of a thorough knowledge of neuroanatomy and accurate history taking, neurology is famous for its savvy methods of physical diagnosis. After conducting a complete physical examination, good neurologists pride themselves on knowing the exact localization of the problem prior to any laboratory or imaging studies.

Although modern medicine draws heavily on information derived from computers, advanced technology, and highly sophisticated diagnostic procedures, a neurologist armed with just a reflex hammer, safety pin, vibratory fork, and penlight often makes a more accurate diagnosis. Many neurologists have had the experience of findings from a physical examination revealing a specific lesion when every other test pointed to somewhere else. They integrate these findings with a precise patient history, which is usually as important and crucial as the examination. Neurologists who stick to their original diagnoses are often eventually proven right.

Combined with a careful history, the physical examination becomes truly meaningful. At this point, findings such as abnormal deep tendon reflexes and impaired cranial nerves begin to make sense. A thorough neurologic examination involves many complex parts, but a skilled neurologist can quickly conduct it without losing accuracy. The neurologic examination has remained relatively unchanged over the past 100 years, since the days of Charcot and Babinski, the fathers of neurology. This examination provides great insight into a patient's problems. It is an irreplaceable weapon in the diagnostic arsenal of an experienced neurologist.

NEUROLOGIC DIAGNOSIS: TECHNOLOGY AT ITS BEST

Neurology is a wonderful specialty for students interested in combining a slick physical examination with the latest advances in medical diagnostics. Neuroimaging and neurophysiologic studies are essential to the practice of contemporary neurology. A skilled neurologist can evaluate sophisticated radiological tests, such as magnetic resonance imaging (MRI), magnetic resonance angiography

(MRA), computed tomography (CT), and cerebral angiograms. The ability to do so rapidly and precisely is crucial for patient outcome. For instance, neurologists must distinguish intracranial bleeds from benign calcifications, strokes from cancers, and swelling caused by head trauma from infectious or autoimmune processes. These clinicians often consult with their colleagues in radiology to narrow their list of differential diagnoses further.

Unlike other fields of medicine, neurology has immense potential for amazing advances in diagnostic technology. Every day, there are new breakthroughs in neuroimaging modalities. Neurologists are now using tools that allow them to specify further the nature of a lesion. As a result, fewer invasive biopsies are performed. These advances include positron emission tomography (PET), single photon emission computed tomography (SPECT), and MRI spectroscopy. In the research labs, neuroscientists and neurologists are joining forces to perfect the use of functional MRI, which may be used in the future to determine which parts of the brain light up when stimulated by certain movements, thoughts, experiences, or substances.

For a neurologist, making use of the latest advances in medical technology involves more than just a trip to the radiology department. Their diagnostic repertoire also consists of many tools unique to the practice of neurology, all of which fall under the domain of electrophysiology. The most common is electroencephalography (EEG), a test that evaluates the electrical activity of the brain by placing electrodes on the head. The electrical discharges detected by these electrodes determine whether or not a patient has epilepsy and decipher the type and location of seizure activity. This test can also quantify cognitive function, determine brain death, and aid in the detection of difficult-to-diagnose disorders like Creutzfeldt-Jakob disease (mad cow disease). Neurologists specializing in epilepsy often send their patients for long-term video EEG monitoring in the hospital. Here, they record seizure activity to determine the patient's candidacy for neurosurgery or implantation of a vagal nerve stimulator (a pacemaker-like device designed to activate the vagal nerve and stop seizures from occurring).

Whereas the EEG evaluates neural discharges within the brain, electromyography (EMG) analyzes the electrical activity of the peripheral nerves and muscles. In the first part of this test, known as the *nerve conduction study*, neurologists apply small shocks via electrodes to determine the strength of stimulus conduction by sensory nerves. During the actual EMG, the physician inserts small needles into different muscles of the patient's neck, back, arms, and legs. By introducing electrical stimuli, it becomes possible to detect abnormalities in neuromuscular conduction. This test enables neurologists to evaluate a patient

for peripheral nerve and muscle disorders as well as radiculopathies (pinched nerves due to a slipped disk within the spine). Debilitating diseases such as myasthenia gravis are picked up by special EMG studies that make use of repetitive stimuli and single-fiber stimulation. By guiding the physician specifically to the affected muscle, the EMG allows for more effective treatment of patients with dystonia and severe muscle spasms.

SPECIAL PROCEDURES IN NEUROLOGY

Similar to most subspecialties of internal medicine, neurology is particularly rewarding for aspiring doctors who prefer using their minds more often than their hands. Regardless, there are several important procedures that all neurologists perform on a daily basis. The most common is the famous spinal tap (lumbar puncture). During this procedure, the physician carefully inserts a needle into the thecal sac below the termination of the spinal cord to withdraw cerebrospinal fluid. Unchanged for the past hundred years, this technique can diagnose patients with certain acute infections, particularly meningitis, as well as multiple sclerosis, intracranial bleeding, and neuropathies. Furthermore, the spinal tap can also serve as a therapeutic measure by removing fluid to relieve conditions such as hydrocephalus (water on the brain) or increased intracranial pressure. It also provides a means by which the physician directly injects chemotherapeutic agents or antibiotics to treat infections and cancers of the central nervous system directly (by bypassing the blood–brain barrier).

If sticking long needles into the backs of your patients is not enough, neurology also offers other types of procedures for medical students with great manual dexterity. In addition to EMG testing, neurologists perform injections of Botulinum toxin, a neuromuscular relaxant, to treat patients with severe dystonia, headaches, and even wrinkles. Within the emerging specialty of neurologic intensive care, these clinicians make use of even fancier procedures: placement of intracranial probes and shunts, evaluation of transcranial Doppler studies, and even performing cerebral angiograms.

THERAPEUTICS: "CAN YOU CURE ME, DOC?"

In the 1950s, physicians often jokingly defined a neurologist as "a specialist in the differential diagnosis of incurable disease."[1] When asked about their reasons for not choosing a career in neurology, many medical students still cite this perceived lack of treatment for patients afflicted with neurologic disease. Perhaps

they completed their rotations with attending physicians who concentrated too much on finding the exact anatomic position of the predicament rather than determining treatment choices. Contrary to this misinformed belief, neurologists *can* do much to treat their patients' wide variety of disorders. Over the past several years, the wealth of therapeutic options has risen dramatically.

Neurologists often consult with neurosurgeons and vascular surgeons to discuss treatment alternatives related to excision and repair of neurologic deficits. However, they also have an extensive array of neuropharmacologic choices in their therapeutic regimen. Whether the presenting disease is a complex pain syndrome, debilitating multiple sclerosis, or Parkinson disease, neurologists use powerful new medications to alleviate symptoms. In addition, they can also counter these diseases with more aggressive therapies, like high-dose steroids, strong acute blood thinners, intravenous immune therapies, plasmapharesis (for cleaning out the blood), vagal nerve stimulators, and many others.

Unfortunately, there still remains no effective treatment for many extremely debilitating, and usually fatal, neurologic diseases. These include amyotrophic lateral sclerosis (Lou Gehrig's disease), muscular dystrophy, certain brain tumors, Alzheimer dementia, and Creutzfeldt-Jakob disease. Yet this is part of the reason why neurology is an exciting field for future physician–scientists. Because clinical research in these areas is extremely active, therapies for these diseases may exist by the time current medical students begin their residency training in neurology.

THE DOCTOR–PATIENT RELATIONSHIP

In many fields of medicine, such as oncology, patients sometimes present with severe disease and die within months to years. In neurology, most of the disorders are not outright terminal. Instead, they generate significant disability over time. If they are mortal, death may take many excruciating years to occur. Sometimes, the neurologic disability presents with an acute, shocking nature; other times, it is slowly progressive. More than any other specialty, neurologists are confronted with a wide spectrum of progressive and disabling diseases. The paralyzed, wheelchair-bound young person is a neurologist's patient. The stiff, trembling elderly man with Parkinson disease is a neurologist's patient. The severely demented-grandmother is a neurologist's patient.

What does all of this mean for the clinician? Good neurologists always approach their patients with empathy, compassion, and patience, which are just as important in this profession as having a scientific, cerebral bent. When there is

little hope for significant improvement, they engage in honest discussions with patients and their families about the patient's medical care and future ability to function. After all, the most common reasons for a neurologic consultation are the sudden development of confusion, a gradual slip into a comatose state, or the determination of brain dead prognosis. Patients, therefore, seek neurologists who are good, patient listeners, especially when the afflicted person (or family member) expresses frustration.

In neurology, patience is the golden rule. Hasty decisions often have detrimental consequences. Many physicians in other specialties are often surprised when their neurologist consultant advises a wait-and-see approach to their patients. When treating certain disorders, such as an acute cerebrovascular infarction, neurologists often hold off on aggressive treatment while waiting for improvement. For example, if presented with a patient who has just suffered a stroke, an overanxious physician who intervenes by decreasing the blood pressure or giving powerful blood thinners may actually worsen the stroke or cause bleeding into the brain. Although there are many situations in which proactive measures are warranted, simply monitoring the patient may, in itself, provide great benefit. A university-based neurologist commented that "sometimes our patients get better *despite* us."

Neurologists practice by virtue of not giving up on their patients, no matter how little improvement has been achieved. Health professionals with little background in neurology often dash the hopes of patients and their families in cases of acute confusion, disability following a stroke, or progressive multiple sclerosis. Instead, the neurologist knows that even the most severely disabled patient may eventually recover substantially. But these physicians do not necessarily practice on the basis of common sense alone. Rather, all neurologists strive for a combination of calmness and initiative, compassion and objectivity, the ability to communicate clearly, and the skill to listen quietly.

The intimate physician–patient relationships make neurology an extremely rewarding profession. By treating disease and holding the best interests of your patients in mind, you become their ally. A neurologist in private practice believes that "all neurologists should provide a shoulder to cry on. We are here to serve our patients, to discuss their doubts openly, and to be someone whom they can rely upon and trust."

CURRENT CONTROVERSIES IN NEUROLOGY

Medical students interested in neurology should feel comfortable dealing with end-of-life care and the withdrawal of life support. Neurologists are frequently

consulted to evaluate the cognitive and brainstem status of comatose or vegetative patients. Most physicians agree that if a patient has no brainstem reflexes, no sign of brain function, and is unable to breath independently, then life has ceased. Neurologists are the ones who usually make this final conclusion, especially when the clinical picture is not clear.

Consider the following example. A woman lying in a coma state after suffering a severe brain injury may appear still and unable to communicate. In this case, families often wonder about the meaningfulness of any existing brain activity. What measures should be taken to maintain that patient's life? Do we give her medications for her assumed discomfort? Do we let her die peacefully? Is starvation and withholding medicine, in fact, a peaceful death or actually torture? Are we allowed to make any proactive decisions in this matter whatsoever, especially ones possibly bordering on euthanasia? Neurologists are the doctors who must cope with these difficult questions. But the answers are found on an individual basis. As a neurologist, you should apply your own ethical and religious standards, not any norms determined by medical or legal ruling bodies, to provide the most appropriate patient care.

The other current topic of heavy debate in contemporary neurology is the question of fetal tissue and stem cell transplants. By placing fetal brain extracts into the brains of patients with debilitating degenerative disorders, such as Parkinson disease, physicians hope to prevent (or reverse) disease progression. The goal is to increase the production of the disease-depleted brain chemical, such as dopamine. Is it ethically appropriate to use several fetal brains for every adult patient? Neurologists and neuroscientists are at the forefront of this research debate.

Because the results from current studies on fetal tissue transplants are inconclusive and disappointing, research has shifted its focus to another source of brain tissue: stem cells harvested from embryos. From these preprogrammed cells, nerve and other tissues could be grown to replace damaged organs. These stem cells, however, are currently harvested from embryos rather than from bone marrow or progenitor cells found in healthy adults. As a result, neurologists and other physicians are engaged in the controversial debate over the ethics of this research.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

What can a neurologist expect when entering the job market after residency? Among the possible options, academic neurology draws a significant percentage of specialists. After all, neurology is a field of medicine heavily intertwined with the basic sciences. Because much of the research in this specialty is still based in

VITAL SIGNS

NEUROLOGY
EMPLOYMENT DATA

- Distribution among all physicians: 1.5%
- Practice type: 65.7% in private practice; 28.6% in academics
- Median patient care hours per week: 48.4
- 19.7% experienced difficulty in securing their preferred employment position
- 66% report that their salary is equal or higher than expected

Source: American Medical Association

VITAL SIGNS

MEDIAN
COMPENSATION

Neurology	$181,689

Source: American Medical Association

the laboratory, as opposed to a clinical setting, many neurologists are MD–PhD trained scientists. In academic medicine, most neurologists concentrate on their clinical and basic science laboratory research responsibilities more than their clinical duties. To maintain their clinical competence, they typically hold outpatient clinics a few times a week and supervise residents and medical students as attending physicians on inpatient and consult neurology services.

The role of the neurologist in the private sector is quite different. In the community hospital setting, the neurologist is a consultant; they do not usually admit patients under their own name. Instead, neurologists consult on patients admitted to the hospital by primary care physicians. After rounding on these patients, they spend the bulk of their day in the clinic. They see new and returning patients, review relevant radiologic studies, and perform EEGs and EMGs. Although the workload may, in fact, border on staggering in some hospitals and clinic settings, neurologists are less likely to be woken in the middle of night for patients with neurologic emergencies. Thus, most neurologists maintain an enjoyable lifestyle with plenty of time to pursue outside interests.

Due to the aging population, new developments in brain science, and further subspecialization, the specialty of neurology is expanding rapidly. A recent study predicts that the demand for neurologists will greatly exceed the supply by nearly 20% in the next decade.[2] As a result, more neurologists are greatly needed in most regions of the country. Today, the average waiting period for a clinic appointment can range from a few weeks to several months. There are many job openings with excellent salaries and high earning potential in all types of markets, from urban to suburban to rural.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Since the founding of the National Institute of Neurologic Disease and Stroke in 1950, subspecialization within neurology has developed at an accelerating rate. According to the American Academy of Neurology (AAN), the most common areas of clinical focus among neurologists were headache, epilepsy, stroke, and neurophysiology. Most fellowships in neurology last 1 to 2 years following completion of residency training. For medical students interested in a career in academic neurology, a research-oriented fellowship in a subspecialty is almost imperative. Only two of the following fellowships (clinical neurophysiology and headache/pain) are ACGME-approved and lead to board certification.

NEUROLOGY
2002 MATCH STATISTICS

- 638 applicants competed for 541 positions
- 324 US seniors and 314 independent applicants ranked at least one neurology program.
- 90% of all positions were filled in the initial Match.
- The successful applicants: 64.3% US seniors, 28.7% foreign-trained physicians, and 6.5% osteopath graduates.
- Unmatched rate for US seniors applying only to neurology: 3%

Source: San Francisco Matching Program

Clinical Neurophysiology

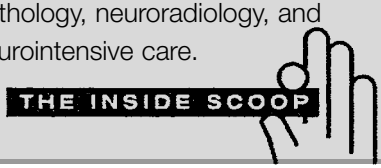
For the procedure-oriented clinician, this extremely popular subspecialty, involving both EEG and EMG, allows the neurologist to incorporate a greater number of procedures into his or her practice. By mastering how to perform and to interpret these tests, you will become a better diagnostician of epilepsy, sleep disorders, and neuromuscular disease. Clinical neurophysiologists often monitor EEG rhythms and interpret evoked potentials prior to and during surgical procedures. They also are sometimes trained in the evaluation of sleep studies. These neurologists become well-versed in the evaluation and treatment of patients with epilepsy, peripheral neuropathies, muscular dystrophy, myasthenia gravis, and amyotrophic lateral sclerosis. Clinical neurophysiology is a highly sought after fellowship, particularly by those interested in private practice.

Stroke/Neurointensive Care

According to the AAN, the prevalence of stroke in the general population is roughly 250 out of every 100,000 people. Thus, stroke and intracranial hemor-

RESIDENCY TRAINING

Residency in neurology requires 4 years postgraduate training. There are currently 117 accredited programs. It requires an internship year (PGY-1) plus 3 years of clinical neurology. The PGY-1 year (either internal medicine or transitional) must include a 6 to 8 months of internal medicine. Some medical centers offer categorical 4-year tracks that include a preliminary medicine year at the same institution; others have combined neurology programs with internal medicine, psychiatry, and radiology. During the last 2 years of training, overnight call may be taken from home. The typical monthly rotations include inpatient neurology, consults, outpatient clinic, pediatric neurology, EEG/EMG, neuropathology, neuroradiology, and neurointensive care.



rhage comprise the majority of neurologic admissions to the hospital. The advanced study of stroke and mastery of neurointensive care are often combined under a single fellowship. This is because many patients admitted to a neurologic intensive care unit typically have cerebrovascular disease. Neurointensivists serve as a bridge between neurology and neurosurgery. They are intense, hands-on specialists who direct patient care in the ICU by working closely with the neurosurgeons. These physicians can interpret transcranial Doppler studies and insert intracranial catheters and monitors. They are also very capable in the skills typical of any other critical care specialist, particularly those related to ventilator management, intubation, and other interventional procedures. Some academic centers also train their fellows in performing cerebral angiograms and interventional therapeutic procedures associated with this technique.

Movement Disorders

Nearly 1% of the population over age 65 has Parkinson disease. Neurologists interested in specializing in these types of diseases often complete a fellowship in movement disorders. They gain knowledge on the cutting-edge treatment for Parkinson disease, particularly the newest pharmacologic therapy. They also develop expertise in managing other disorders that cause abnormal movements or body distortions, such as progressive supranuclear palsy, dystonias, essential tremor, Huntington chorea, and Wilson disease. Because close observation of the patient is crucial to this subspecialty, movement disorder specialists are particularly fond of their video cameras. They are keen observers of abnormal tremors, jerks, muscle spasms, positions, and other unusual

motions. In addition, these physicians also gain skill in performing Botulinum toxin injections to treat such dystonias.

Neuroimmunology

Specialists in neuroimmunology concentrate on patients with autoimmune neurologic disease, particularly multiple sclerosis. According to the AAN, roughly 350,000 to 500,000 people suffer from multiple sclerosis in the United States. The neuroimmunologist also evaluates and treats patient with other autoimmune neurologic problems, such as myasthenia gravis, lupus, and Sjogren disease. Due to the complexity of these diseases, neuroimmunologists are also knowledgeable in their complications, including depression, psychosis, spasticity, incontinence, sexual dysfunction, and pain.

Behavioral Neurology

Specialists in this research-oriented academic specialty are mostly confronted with dementia, including Alzheimer disease, vascular dementia, dementias associated with prion disease (mad cow disease), and reversible metabolic dementias. The AAN reports that over four million people in the United States have Alzheimer dementia. The behavioral neurologist concentrates on evaluation of the patient's mental status, often using complex neuropsychological tests. Many of the skills these specialists have overlap with those of neuropsychologists and neuropsychiatrists.

Headache/Pain

In the general outpatient clinic, headaches are the main complaint evaluated by neurologists. Over 45 million people suffer from chronic headaches. This fellowship allows the clinician to gain further skill in treating chronic pain syndromes, including headaches. Some programs provide training in interventional pain techniques, similar to those learned by anesthesiologists. These procedures include epidural injections, trigger point injections, denervation procedures, and others. Many hospitals offer special headache clinics staffed by neurologists.

WHY CONSIDER A CAREER IN NEUROLOGY?

The future looks extremely bright for neurology, one of the fastest growing fields within medicine. Because of the rapid expansion of clinical information,

neurology will increasingly rely upon its many subspecialties to provide the best patient care. Most neurologists agree that with proper training, primary care physicians should manage certain uncomplicated neurologic problems.[3] However, more and more aging patients are presenting with complicated and chronic neurologic diseases. As a result, neurology may shift its focus from being a consultation specialty to one of long-term primary care by a subspecialist. For instance, many general neurologists, who consult on simple patients for primary care physicians, acknowledge that even their skills in treating severe intractable epilepsy and its complications are not enough. Instead, they refer their patients to specialized epilepsy centers, where research and clinical trials are usually held, for long-term continuity of care.[4] This cost-effective subspecialization is essential to both the progress of neurology and the improvement of patient care.

What entices physicians to become neurologists? For many, it is their fascination with the tremendous depth and complexity of the nervous system. Others enjoy using basic sciences to solve neurologic puzzles. Neurologists are physicians who are never bored. Every day, they encounter some of the most severely ill patients found in medicine. Despite the frequent interactions with pain, dysfunction, and disability, neurology is full of many wonderful rewards and intense satisfaction. Patients with neurologic disease challenge your scientific knowledge, diagnostic ability, and therapeutic skills. They express an immense sense of dependence and appreciation for your guidance that is unrivaled by any other patient population. You will learn to cherish and to admire your patients. They teach all neurologists about the importance of appreciating, loving, and enjoying the quality of one's life, even if it is compromised by disability.

If you are a medical student fascinated by the complexities of treating nervous system disorders, then neurology awaits you. By learning the language of neurology, you will join a group of specialists who are true medical detectives. They continue every day to be amazed by the depth and variety of patients and diseases they encounter. In the near future, neurologists will find themselves at the forefront of a revolution in therapeutics. This is an exciting and exhilarating time to be a neurologist!

ABOUT THE CONTRIBUTOR

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20 NEUROSURGERY

M. Jafer Ali

When something goes wrong with the nervous system, neurosurgeons are the specialists who intervene surgically to fix the problem. Contrary to popular belief, neurosurgery is not rocket science. It is, however, brain surgery—at least in part. A surprisingly broad and multifaceted surgical specialty, neurosurgery also encompasses components of surgical oncology, vascular surgery, and orthopedics. Neurosurgeons deal with disease processes that are unique to the central nervous system: Parkinson disease, epilepsy, developmental disorders, and even psychiatric disorders. The surgical approach to this gamut of pathologies, as you might imagine, is also remarkably diverse. In a given week, a neurosurgeon may delicately dissect out a brain tumor under the operating microscope, perform a spinal fusion with pedicle screw fixation, and use minimally invasive stereotactic techniques for surgery on a patient with Parkinson disease.

MORE THAN JUST BRAIN SURGERY

Neurologic surgery involves the diagnosis, treatment, and management of patients with diseases or injuries to the brain, spinal cord, or peripheral nerves. Neurosurgeons thrive upon the elegant complexity of the nervous system. They love being able to correct abnormalities of this organsystem by using their hands, surgical instruments, and the latest operative technology. This specialty deals with the entire nervous system—not simply the anatomic region of the body where its primary components (brain and spinal cord) are located. In a given week, a neurosurgeon might operate on a patient's brain, spine, face, arms, or legs. Their patients may range in age from newborns to adults.

Neurosurgical procedures are often awe inspiring. Imagine peeling back someone's scalp to find a graying white skull peeking up at you, then drilling

through it with a power drill to expose its exquisite contents. You look down and find yourself staring directly at a living human's brain, full of life, pulsating with every beat of the heart. Witnessing this phenomenon for the first time evokes extraordinary feelings: exhilaration, fear, and empowerment all at the same time. Operating on the brain is a skill that requires brilliant manual dexterity, often making the difference between life and death.

Expert diagnostic skills are also essential to the neurosurgeon. The neurologic examination is the backbone of the initial consultation. Of course, modern neurosurgeons are also trained to interpret a wide variety of neuroimaging studies, such as computed tomography (CT), magnetic resonance imaging (MRI), and cerebral angiograms. After making a diagnosis, close collaboration with neurologists and neuroradiologists is implemented to provide the best patient care.

For many reasons, neurosurgery can be a stressful profession. Neurosurgeons deal with a wide variety of potentially debilitating brain diseases: traumatic brain and spine injuries, strokes, intracranial hemorrhaging from aneurysms and other vascular malformations, brain tumors in eloquent cortex, chronic back pain, sciatica, and even movement disorders such as epilepsy. Managing these conditions means taking care of some very sick patients. Furthermore, bad outcomes in neurosurgery are often catastrophic, resulting in death or severe impairment of their patients' ability to think, move, see, or feel. The procedures are often long and intricate and require a high level of manual dexterity and stamina. The lifestyle is intense, which means emotional stability is necessary as well.

Do not take these challenges lightly. Neurosurgery is not a specialty to select simply by default. Residency in neurosurgery is arguably the most physically and emotionally rigorous training in medicine. Patients are often very sick and unstable. Those suffering from subarachnoid hemorrhages due to ruptured aneurysms may quickly deteriorate in the neurosurgical intensive care unit. This may happen, of course, at the same time the on-call resident has to evaluate the newest head trauma in the emergency department. In this field of medicine, true emergencies require immediate attention that cannot wait until the next morning. Rapidly expanding blood clots in the brain or spinal cord can leave patients dead or paralyzed if not attended to urgently.

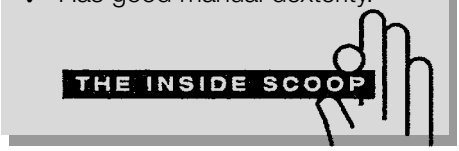
SO YOU WANT TO BE A NEUROSURGEON?

Who becomes a neurosurgeon? In 1999, the American Association of Neurological Surgeons conducted a survey of 1570 neurosurgeons and found that 94% of the respondents were men and 85% were Caucasian.[1] The preponderance of white males

in the field is not atypical of the surgical fields in general, of course. The personalities in this field, however, are as diverse as the disease processes with which they deal. Neurosurgeons do not, for the most part, have a typical background—such as the former college athlete often found in orthopedic surgery. Certainly there are some athletes—some of the premier neurosurgeons in the country had successful athletic careers before becoming neurosurgeons. However, neurosurgeons are just as likely to have been champion chess players or public health workers in the third world in their previous lives. Also, a large of contingent of neurosurgeons—many of whom are quite serious about academics and research—carry both MDs and PhDs.

WHAT MAKES A GOOD NEUROSURGEON?

- ✓ Likes the immediate gratification of surgical outcomes.
- ✓ Is confident, energetic, and detail oriented.
- ✓ Can remain calm under periods of high pressure.
- ✓ Likes highly technical procedures.
- ✓ Has good manual dexterity.



Admittedly, some people do have a relatively negative image of neurosurgeons. "What is the difference between God and a neurosurgeon?" the old joke goes. The answer: "God knows he's not a neurosurgeon." You will find that some people in this field do, in fact, deserve this egomaniacal reputation. Keep in mind, however, that this can be true for any specialty, especially within the surgical fields. The vast majority of neurosurgeons are kind, dedicated professionals who care about their patients (the sickest patients in the hospital more often than not). As a group, neurosurgeons are also very smart and technically savvy enough to adapt to the rapid advances in the surgical treatment of neurologic disease.

Cerebrovascular Neurosurgery: Operating on the Blood Vessels of the Brain

Cerebrovascular neurosurgery uses a surgical approach to treating vascular diseases of the brain and spinal cord. Intracranial aneurysms, arteriovenous malformations, arterial dissections, and occlusions of the extracranial carotid arteries are just a few of the many disease processes with which the cerebrovascular surgeon is confronted. As you might imagine, virtually all vascular diseases of the central nervous system are serious and potentially deadly. The vessels are of small diam-

eter and often located in very delicate tissue. Most neurosurgeons agree that vascular surgery of the central nervous system is among the most technically challenging and delicate surgery done in the field.

Cerebrovascular surgery enjoys a rich history. Not long after Egaz Moniz introduced cerebral angiography to the world, Normon Dott, a neurosurgeon, performed what may have been the first successful surgical attack on an intracranial aneurysm. Dott treated this aneurysm by wrapping the vessel with muscle, a technique still used for some large, unclippable aneurysms. Apparently, the patient survived and did quite well. This certainly was not the rule early in the early history of this subspecialty. A study done in 1965 suggested that the results of conservative therapy for intracranial aneurysms (no surgery) were actually better then if patients underwent surgical attack.[3] However, with the introduction of the operating microscope in that same decade, it became clear that results for patients undergoing surgical treatment for intracranial aneurysms was improving drastically. The further development of modern aneurysm clips and microsurgical techniques over the ensuing decades by such neurosurgical legends as Drake and Yasargil maximized the surgical treatment of intracranial vascular disease processes like aneurysms and arteriovenous malformation. In fact, some believe that the golden age of the cerebrovascular surgeon has passed, with the surgical treatment of these diseases reaching its climax in the 1980s.

In recent years, an entirely different approach to the treatment of neurovascular disorders has been growing rapidly. Interventional neuroradiology, or endovascular neurosurgery, is a relatively new field approaching these disease processes. These subspecialists make a small incision in the groin to access the femoral vessels, utilize a guide wire to travel into the intracranial circulation, and then perform cerebral angiography for visualization and navigation. *Guglielmi detachable coils*, which are used to treat intracranial aneurysms, perhaps best illustrate an endovascular technique. In this procedure, a catheter is introduced into the femoral vein and advanced into the intracranial circulation until it reaches the aneurysmal lumen. At this point, platinum coils are dropped into the aneurysm until it appears that the aneurysm itself is completely packed, with no residual aneurysm and a patent parent vessel. Early studies suggest that the use of this promising technique is rapidly increasing.[4] Some neurosurgeons, however, have questioned the durability of coiling aneurysms and point to the lack of long-term patient follow up in studies used to justify the indication of coiling over surgical clipping.[5]

The issue of whether to clip or to coil is actually a hot topic in academic neurosurgery today. Because the best way to manage certain cerebrovascular dis-

eases is still controversial, the camps are clearly divided. Some neurosurgeons become pretty emotional when they get started in this conversation. At the present time, coiling techniques are still reserved for patients with poor-grade subarachnoid hemorrhage and those with aneurysms located in especially delicate regions of the brain with increased surgical morbidity and mortality. These observations aside, the use of endovascular techniques in lieu of surgery is still institution dependent. No clear criteria have been agreed upon on which to base management decisions. Does the rise of endovascular neurosurgery mean that the era of the surgical clip is coming to an end? Some would say yes—especially the interventional radiologists who still perform most of these procedures. However, only long-term data will tell for sure. In the meantime, open surgical treatment of cerebrovascular disease is alive and well.

For those who love aneurysms, this does not necessarily mean that you should become a radiologist. In fact, many neurosurgeons are currently training in endovascular fellowships after residency. As you might imagine, there are certainly advantages to being a neurosurgeon who can clip and coil an aneurysm with equal proficiency. This neurosurgical adaptation to radiology techniques is an example of the technological aptitude of neurosurgeons—a common theme in this wonderful specialty.

Neurosurgical Oncology: Cancer and the Brain

In the United States, approximately 17,000 people per year are diagnosed with primary tumors of the brain. These tumors range from the relatively benign meningioma to the most aggressive of astrocytic tumors—glioblastoma multiforme. The neurosurgeon's role in the treatment of these lesions is primarily the surgical resection or, in some cases, debulking of otherwise unresectable tumors to alleviate mass effect.

From a surgical perspective, the approach to brain tumors can be quite challenging. Tumors can arise from any location in the brain, and elaborate surgical planning is required. Anyone who has studied the anatomy of the head, neck, and brain understands the difficulty in gaining access to places such as the skull base, the sella turcica, and the posterior fossa. Complex dissections have been developed over the years such as transphenoidal approaches for tumors of the pituitary axis and translabrynthine approaches for tumors of the eighth cranial nerve (the vestibulo-auditory nerve).

Unfortunately, limited success has been the rule in the surgical treatment of highly aggressive brain tumors. For glioblastoma multiforme, basically the most

deadly type of brain tumor, the average 2-year survival rate after surgical resection alone is only 7.5%. Sadly, systemic chemotherapy has been minimally effective in prolonging the lives of these patients. This is, at least in part, due to the challenge of drug delivery through the blood–brain barrier.[6] To remedy this problem, neurosurgeons have been involved in the development of novel therapeutic strategies to treat this type of disease. Many neurosurgeons who specialize in the treatment of brain tumors, especially at academic centers, are creating techniques to circumvent the blood–brain barrier, including blood–brain barrier disruption and direct intraparenchymal delivery of implantable polymers that release chemotherapeutic agents directly to the tumor and surrounding tissue.

It is likely that these kinds of "minimally invasive" therapies will become commonplace in the treatment of brain tumors in the future. Given the active role that academic neurosurgeons play in developing this technology, many therapies will likely become part of the neurosurgical therapeutic repertoire rather then the realm of neurologists or radiologists. Because of the hot research going on in this area and its direct application to clinical neurosurgery, neurosurgical oncology is a particularly appropriate field for individuals with a bent for academics.

Surgery of the Spine: The Other Half of the Central Nervous System

An interesting statistic—and one to take to heart if your intent is to be a brain surgeon—is that 60% of the procedures neurosurgeons perform are spine related.[7] In fact, according to a recent study by the American Association of Neurological Surgeons, brain tumor operations (which most people associate with neurosurgery) were fifth in line behind four spinal procedures in terms of frequency performed. This is an interesting statistic considering that, according to many older neurosurgeons, spine as a surgical field was almost lost to the orthopedic surgeons in the not-so-distant past. As the aforementioned numbers suggest, the spine is now a major component of neurosurgery.

Medical students interested in this specialty should be aware that a number of older surgeons make a distinction between *ortho spine* and *neuro spine*. The latter refers to patients with decompressions and other simple, more delicate spine procedures that are often done under the operating microscope. Ortho spine denotes spine surgery involving instrumentation, such as fusions and spinal deformity operations. As it turns out, these distinctions were made by physicians who were neither orthopedic nor neurologic surgeons. These days, the distinction be-

tween spine surgeons in these different fields has become difficult to identify. There are neurosurgeons who do the larger spine whacks, including some who do multilevel fusions with complex instrumentation for scoliosis. On the other hand, there are orthopedic surgeons who quite adeptly perform decompressions under the operating microscope.

No statistic exists that suggests whether orthopedic surgeons or neurosurgeons are more suited or better prepared to operate on the spine. There are, nonetheless, several issues to consider if you want to be a spine surgeon and are trying to choose between orthopedics and neurosurgery. In general, neurosurgery residents tend to operate on the spine with greater frequency and earlier in their training then their orthopedic colleagues. Lumbar discectomies tend to be beginner cases for neurosurgery residents because these procedures are considered less risky then craniotomies. At many teaching hospitals, a simple spine case involving the lumbar region is usually the turf of the first and second year neurosurgical resident. In contrast, orthopedic spine cases at the same institution are reserved for more senior residents. Furthermore, there are few orthopedic programs in the country where 60% of the cases done are spine related.

Another issue to consider is that, few would argue, orthopedic surgery training tends to be easier on residents' lives then neurosurgery training. The chairman of a neurosurgery program in Texas commented that "if I wanted to be purely a spine surgeon, I would have done orthopedics. It would have saved me a lot of sleep and years off of my life lost from the stress of neurosurgical training." To put things into perspective, the great spine surgeons today come from both neurosurgery and orthopedic backgrounds. Even if neurosurgery residents have an initial advantage in spine surgery because of their exposure and experience, it seems clear that orthopedic surgeons never fall that far behind. Fortunately, these two fields have enough differences overall that most physicians-in-training are able to figure out where they belong.

Pediatric Neurosurgery: Bringing Hope to Smaller Patients

Pediatric neurosurgery involves the surgical treatment of pediatric disorders of the nervous system. Obviously, there is some overlap between what adult and pediatric neurosurgeons do. Although brain tumors occur in both children and adults, the natural history of these disease processes is often remarkably different. However, pediatric neurosurgery also deals with developmental abnormalities of the nervous system—like neural tube defects and craniofacial development such as craniosynostosis. The vast array of congenital abnormalities with which pediatric

neurosurgeons have to be familiar justifies the additional postresidency training often required in this field.

Hydrocephalus—the enlargement of the brain's ventricular system secondary to decreased cerebrospinal fluid (CSF) outflow—is a particularly common problem that a pediatric neurosurgeon confronts. To solve this congenital abnormality, the surgeon typically diverts the flow of CSF from the brain's obstructed ventricular system by ventriculoperitoneal shunting. In this operation, a burr hole is made in either the frontal or occipital areas of the skull so that a catheter can pass into the ventricular system. Surgeons then attach the catheter to tubing tracked underneath the skin from the scalp to the abdomen. By inserting the distal portion of this tubing into the peritoneal cavity, excess CSF is drained away from the ventricular system, restoring normal CSF outflow pressures in the brain.

As in all neurosurgical subspecialties, new and exciting technological advances in pediatric neurosurgery are on the horizon. A particularly fascinating area is fetal neurosurgery, currently performed at only a few select institutions. In these cases, operative repair of congenital brain malformations in the early phase of human development may prevent progressive disability from secondary pathophysiology or from injury stemming from the intrauterine environment. Neural tube defects and fetal hydrocephalus are examples of the kinds of pathology that are currently the focus of this developing area.

Stereotactic and Functional Neurosurgery: Precise Mapping, Precise Treatment

Stereotactic and functional neurosurgery is a particularly exciting area in neurosurgery these days. This specialty is an especially good field for technology buffs and for those who loved the intricate pathways of the brain memorized (and often forgotten) in medical school.

Stereotaxy refers to the precise localization of targets in the brain using a localizing device affixed to the patient's head (while also imaging the patient with CT and MRI). The resulting images provide a virtual three-dimensional map for a variety of procedures to be performed. Based on this map, needles are precisely targeted to the desired location in the brain. Obviously, this is advantageous in the brain with all its delicate structures. Stereotaxy is used in a number of procedures in neurosurgery, including brain mass biopsies, catheter placement for radiation brachytherapy, and depth electrode placement in the treatment of epilepsy. Perhaps some of the most exciting work in neurosurgery is the use of stereotaxy in the treatment of movement disorders.

To illustrate how this works, consider a procedure known as *thalamotomy*, which is used in some patients with Parkinson disease. Between the pathway of the striatum and thalamus lie the ventro-oral nucleus—the target for hypertonia and rigidity—and the ventro-intermediate nucleus—the target for tremor. Using stereotactic imaging techniques and depth microrecording, these cell groups are precisely targeted and obliterated. With this innovative procedure, as many as 95% of patients with tremor and rigidity are cured on the operating table with minimal side effects.[8] Other procedures utilizing similar principles but different targets in the thalamus and basal ganglia include subthalamic nucleus stimulation and pallidotomy.

Functional neurosurgery is not limited to stereotactic techniques. The field is broad and growing at an exponential rate. However, *functional* is somewhat ambiguous, because it really encompasses many disease processes. This subspecialty has a special focus on the unique physiology of the nervous system. A tumor may occur in the liver, and an aneurysm may occur on the aorta, but disease processes such as Parkinson and epilepsy are limited to the physiology of the brain. This is the realm of functional neurosurgery. Some of the other disease processes that functional neurosurgeons deal with involve chronic pain and spasticity. Trigeminal neuralgia and hemifacial spasm, for example, are both syndromes of cranial nerve compression—often due to an aberrant blood vessel impinging on these structures. These syndromes are usually treated with microvascular decompression, where the offending vessel is dissected off the nerve and a special sponge is inserted to serve as a cushion between the two structures.

If you are interested in both neurosurgery and psychiatry, you may be especially interested in functional neurosurgery. This subspecialty is on the cutting edge (so to speak) of the treatment of mood disorders. For instance, anterior cingulotomy has been used in recent years as a treatment for intractable obsessive–compulsive disorder.[9] These operations have shown immense promise and will likely find a greater role in the treatment of psychiatric patients in the future.

PRACTICE OPTIONS AND EMPLOYMENT OPPORTUNITIES

One program director believes that "finding a place for the graduates of neurosurgical training programs is never a problem. The demand for new neurosurgeons seems to be high."[10] According to this report, approximately 140 residents finish their 7-year neurosurgical training programs every year. As of 1997, there were 3260 board-certified neurosurgeons in practice. Another 390 individuals

VITAL SIGNS

NEUROSURGERY EMPLOYMENT DATA

- Distribution among all physicians: 0.6%
- Practice type: 80.9% in private practice; 14.9% in academics
- Median number of patient care hours per week: 49.3
- 29.3% experienced difficulty in securing their preferred employment position
- 52.0% report that their salary is equal or higher than expected

Source: American Medical Association

who completed their residencies were awaiting their turn to take the oral part of the board examination and become certified. The 140 new neurosurgeons per year are nearly balanced by the number of neurosurgeons who have retired, died, or (in rare instances) had their board certification revoked. Overall, the number of practicing board-certified neurosurgeons had been slowly increasing over the previous 5 years.[11] What does this mean for anyone contemplating a neurosurgical career? Currently, it appears that the number of neurosurgeons in the country is about right where it should be. Nevertheless, the traditionally popular places to live—such as southern California—do appear to be overpopulated with neurosurgeons.

Fortunately, life does get better after completing the arduous neurosurgical residency. According to this same report, the average attending neurosurgeon works 60 hours per week in the United States. Neurosurgeons affiliated with Level I trauma centers find themselves, on occasion, coming in to the hospital to operate in the middle of the night. Overall, it appears that schedules vary among practicing physicians and can often be adapted to a certain extent on desired lifestyle.

Predicting the demand for neurosurgeons in the future is a difficult task. However, it is clear that the specialty is expanding and becoming increasingly specialized. Patients with Parkinson disease, epilepsy, and obsessive–compulsive disorder—who just a few years ago were considered manageable only by drug regimens—are quickly finding surgical alternatives with new and rapidly expanding neurosurgical technology. The workload, of course, depends on the range of disorders and operations necessary for the surgeon to undertake. At the present rate of expansion within neurosurgery, it does not seem likely that a neurosurgeon's

VITAL SIGNS

MEDIAN COMPENSATION

Neurosurgery	$391,250

Source: American Medical Group Association

workload will decrease any time in the near future. As a result, the demand for neurosurgeons will likely remain stable for years to come.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

The scope of neurologic surgery is continually expanding and redefining itself. For this reason, fellowship opportunities exist in virtually all of the neurosurgical subspecialties. They are becoming increasingly popular among graduates of neurosurgical training programs. However, the issue of accreditation in specific specialties is an ongoing controversy in this field. For the most part, fellowship training is not required for the majority of subspecialties. Currently, the two notable exceptions to this rule are pediatric neurosurgery and endovascular neurosurgery (interventional neuroradiology).

NEUROSURGERY
2002 MATCH STATISTICS

- 227 applicants competed for 143 positions
- 93.7% of all positions were filled in the initial Match
- Average USMLE Step I score of matched applicants: 230
- Applicants submitted an average 34 applications and received 10.7 interviews
- Unmatched rate for US seniors applying only to neurosurgery: 15.0%

Source: San Francisco Matching Program

A recent survey of neurosurgery residents found that 84.6% considered fellowship training as a possibility.[12] The majority of them were interested in the fields of peripheral nerve, endovascular, and skull base neurosurgery. The three top reasons cited for pursuing additional subspecialty training were personal interest for knowledge, job market demand, and academic prestige. Inadequate training during residency was cited by less then one third of those residents contemplating fellowship training.

Is it absolutely necessary for a neurosurgeon to subspecialize? Most neurosurgeons in the academic community agree that it depends on the medical center at which the resident completed his or her training. If a resident graduates from a program known to be extremely strong in a particular subspecialty, fellowship training in that specialty is not required. Many academic departments boast of the lack of need for fellowship training in areas in which their institution is particularly strong. The neurosurgery community is sufficiently small so that the relative strength of any given program for a subspecialty is actually accepted as common knowledge. Graduates of these programs often find jobs as

RESIDENCY TRAINING

Residency in neurologic surgery requires 6 or 7 years of postgraduate training. There are currently 94 accredited programs. The first year (internship) is spent strictly in rotations through general surgery and other surgical subspecialties. Most neurosurgical programs are small and spread the residents across several hospitals. This translates into a fairly rough call schedule. In most programs, a *q3* schedule (overnight call every third night) is very common, but it is not unusual to be on a *q2* call schedule for several months at a time. One resident described the arduous training as "the only residency in which the internship year is the easy year." In most programs, residents gain experience in the various subspecialties: pediatric, oncology, spine, cerebrovascular, and stereotactic neurosurgery. When not operating, they see patients in the outpatient clinic, neurologic intensive care unit, and hospital floors. There is also time devoted to laboratory research and clinical rotations in neurology, neurointensive care, neuropathology, and neuroradiology.

superspecialists even while foregoing additional subspecialty training in those fields.

WHY CONSIDER A CAREER IN NEUROSURGERY?

At this point, you have hopefully gotten a glimpse into what neurosurgery is all about. Unfortunately, medical students often have difficulty appreciating this specialty. Their exposure is limited because neurosurgery often is not a part of the core medical curriculum the way general surgery is. Even for students who do have the opportunity to rotate through neurosurgical services, it is difficult to assess what it is like to be a neurosurgeon. Because most intracranial operations are performed under the operating microscope, the medical student is often relegated to sitting in a chair in the corner of the operating room watching the procedure on a television screen. It is tough to get a good feel for an operation while watching it on a screen 20 feet away from the operative field.

How can you judge if would enjoy and flourish in this field? There really is no easy answer to this question. Neurosurgeons will tell you more often than not that their reasons for pursuing a neurosurgical career were based on gut feelings. You clearly have to love the nervous system—central, peripheral, and autonomic—and all of its anatomy. You will be making confident, aggressive surgical decisions. An interest in procedures is

also desirable, although many neurosurgeons reveal that they had little or no interest in general surgery during medical school. Another recurring theme among neurosurgeons is their love for technology and research (both clinical and basic science).

Finally, physicians in this specialty must help people at the bleakest moments of their lives. Not every day will be filled with success. A proper balance of compassion and emotional fortitude are necessary to deal with neurosurgical patients for whom severe disability or death is often the final outcome. Good results in neurosurgery are common and incredibly gratifying; on the other hand, bad endings are often tragic. Medical students interested in pursuing a neurosurgical career must have the ability to deal with either scenario with composure and humility.

ABOUT THE CONTRIBUTOR

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21 OBSTETRICS AND GYNECOLOGY

Kelly Oberia Elmore

Every woman needs a good obstetrician-gynecologist. These multidisciplinary specialists practice preventive medicine, deliver new lives into the world, and perform surgery. Most of their patients are healthy young women who come for prenatal care or annual physical examinations. More than just experts on the pelvic region and reproductive tract, OB/GYN physicians must handle problems that require highly technical medical and surgical skills, and, at the other end of the spectrum, be sensitive observers who can give psychological support. They are compassionate, highly focused listeners and clinicians who render the highest quality medical and surgical care. Whether in the clinic, operating room, or labor and delivery ward, their methods of diagnosis and treatment options are rapidly expanding.

ONE WOMAN—TWO SPECIALTIES

Prior to 1930, these two areas of medicine were separate and unequal. Obstetrics was considered a subspecialty of internal medicine and surgery departments claimed authority over gynecology. At that time, however, obstetricians were thriving on new developments in reproductive physiology and endocrinology, and many gynecology patients did not require surgery for their diagnoses (like sexually transmitted diseases). For this reason, the newly formed joint specialty of obstetrics and gynecology was born.

After completing their clerkship, medical students often comment how participating in the miracle of childbirth feels like an exhilarating adrenaline rush. The management of pregnancy, labor, and puerperium (the time period directly following childbirth) all fall within the realm of obstetrics. Obstetricians have the

privilege of taking care of not one, but two patients—mother and fetus. But the diagnosis of pregnancy is sometimes not as simple as a urine or blood test. Obstetricians must monitor the physiologic changes of the mother and her fetus during each stage of pregnancy. With an understanding of the symbiosis of pregnancy, they can better manage and determine its viability.

The mind of every obstetrician is organized into three time frames: prenatal, intrapartum, and postpartum. Although the outpatient component of this specialty may seem like excessive watching and waiting, the transition from monitoring to action can occur faster than you might imagine. If the pregnancy is not viable, the physician must provide immediate medical or surgical care. In times of urgent crises, such as a preterm patient with uncontrolled hypertension or multiple gestation, obstetricians must react quickly and decisively. Because there are many ways in which a pregnancy can go wrong, each patient could possibly present a new challenge.

Gynecology focuses on the overall health of the female and her reproductive organ systems, and in particular, the diagnosis and treatment of female-specific diseases. Ambulatory gynecology incorporates ultrasound and colposcopy; surgical gynecology involves vaginal, abdominal, endoscopic, and incontinence surgery. Gynecologists do more than just conduct pap smears, prescribe oral contraceptives, and perform hysterectomies dilatation and curettage (D&C). They also treat sexually transmitted diseases, manage pain disorders and menopausal symptoms, and discuss psychosocial issues, such as domestic violence and sexual dysfunction, with their patients. Remember—women look to their gynecologists for assurance, guidance, and understanding of how to care for their bodies. These physicians assume great responsibility in helping women of all ages find pride in themselves and their bodies.

Obstetrics and gynecology is a hands-on specialty full of many surprises. There is never a dull moment. You must be able to keep your cool while dealing with many varied situations simultaneously. To excel in this specialty, medical students have to tolerate touching many gravid abdomens, performing unlimited vaginal examinations, and getting their hands dirty (after all, any type of bodily fluid is game). During the third stage of labor, obstetricians may find themselves covered in blood, vomit, urine, and even fecal matter. Like their colleagues in emergency medicine, obstetrician-gynecologists are ready for anything when it comes to women's health. Whether the case involves an infant failing to deliver head first, a placental abruption, or a new patient with imminent delivery of twins, obstetrician-gynecologists have to think fast and react quickly and competently in life-threatening situations.

Many medical students enter obstetrics and gynecology because they are attracted by its integration of both surgery and medicine within the context of women's health. For example, a serious antepartum obstetric complication, such as gestational diabetes or preeclampsia, requires careful thought for its diagnosis and management. In other situations, such as nonreassuring fetal heart tones or complete placenta previa, surgical methods are necessary to bring both the patient and the fetus to a successful outcome. Although obstetrician-gynecologists perform many specialized procedures, such as hysterectomies, pelvic reconstructions, and exploratory laparotomies, the hands-on aspect of the specialty is not necessarily confined to the operating room. In the clinic or hospital ward, you also engage in many pelvic examinations, pap smears, colposcopies, and operative deliveries with forceps or vacuum.

WHAT MAKES A GOOD OBSTETRICIAN-GYNECOLOGIST?

- ✓ Likes working with his or her hands.
- ✓ Can deal with tense situations involving sensitive subject matter.
- ✓ Likes to see immediate results from his or her efforts.
- ✓ Has the ability to make fast, confident decisions.
- ✓ Enjoys taking care of women.

Several aspects of primary care and emergency medicine are also very important in this specialty. Despite subspecialty development, the vast majority of physicians who train in this field consider themselves generalists, meaning that they assume the role of obstetrician, gynecologist, primary care doctor for women, or all three. "In this specialty, you can really do a lot for your patients," remarked one gynecologist in private practice. In a single day, you may be delivering a baby, treating a sexually transmitted disease with an antibiotic, evaluating unusual vaginal bleeding in the emergency room, or counseling a woman on the psychological effects of menopause. In all cases, the obstetrician-gynecologist listens to the patient and empathizes with health issues that are unique to women.

IS IT PRIMARY OR SPECIALTY CARE?

Obstetrics-gynecology is unique in being highly specialized—in the medical and surgical treatment of female health problems—while still categorized as primary care. The majority of reproductive-age women in this country consider their obstetrician-gynecologist as their primary care provider. In a recent survey of

VITAL SIGNS

OBSTETRICS AND GYNECOLOGY EMPLOYMENT DATA

- Distribution among all physicians: 4.9%
- Practice type: 83.3% in private practice; 10.4% in academics
- Median number of patient care hours per week: 48.7
- 11.3% experienced difficulty in securing their preferred employment position
- 55.3% report that their salary is equal or higher than expected

Source: American Medical Association

OB/GYN residents, 87% believed that obstetrics and gynecology was primary care, while 85% intended to establish a balanced practice drawing on all of the skills they learned in residency,[1] with a special focus on health maintenance, screening, and disease prevention.

The first encounter with an obstetrician-gynecologist can mean the difference between a lifetime patient and an unsatisfied client. As a primary care physician, you use compassion, understanding, and patience to forge close interpersonal relationships. For example, during pregnancy, obstetricians promote a healthy lifestyle and continuously remind the mother of the best ways to care for both herself and her unborn child. They provide screening services related to blood pressure assessment, Papanicolaou smear, breast examination and review of the breast self-examination, and referral for mammography or other specialized services. They spend time discussing work-related health risks, smoking, seat belt use, safe sex and sexually transmitted disease prevention, and genetic screening for family planning.

Continuity of care is extremely important in obstetrics and gynecology. Following delivery, the obstetrician holds a responsibility to the mother for at least 6 weeks. The physician must continue to evaluate not only her anatomy, but also her psychological well-being. Most patients of gynecologists are either initially transferred from their obstetric clinic or referred from nurse practitioners or internists. They usually remain with their gynecologist throughout the course of their lives. Thus, patient relationships may be as short as one delivery or continue long after menopause.

OBSTETRICS AND GYNECOLOGY IN THE OPERATING ROOM

The art and science of surgery forms the core of this specialty. Without it, obstetrics and gynecology would probably remain under the jurisdiction of internal med-

icine. Because of the thrilling rush of the operating room experience, some obstetrician-gynecologists like the surgical aspect of their specialty the best. Caesarean delivery has become the most common hospital-based operative procedure in the United States and now accounts for about 23.5% of all live births.[2] Gynecologists also use their surgical skills to carry out many types of operations, such as an exploratory laparotomy, hysterectomy, polypectomy, and pelvic reconstructive surgery. One academic physician stated "in most cases, my surgical efforts cure problems, usually with good outcomes." She reiterates that many students are attracted to this specialty because of the immediate ability to fix problems using surgery.

The manual dexterity required for obstetric or gynecologic surgery may not approach that of, for example, neurosurgery or otolaryngology. However, the notion that gynecologists are not true surgeons is a myth. Despite the reduction in operating room time due to new primary care educational requirements, graduating residents in this specialty are still well-trained, competent surgeons of the abdomen and pelvis. In a way, obstetrician-gynecologists have much more in common with their colleagues in ophthalmology, a surgical specialty that also has significant medical and primary care components. Medical students should disregard condescending comments made by other surgical subspecialists. Some obstetrician-gynecologists take the initiative of completing a 1-year fellowship in pelvic surgery as a junior attending to gain additional surgical experience.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

A medical student who had completed his required clerkship in obstetrics and gynecology commented that the attending physicians "seem like very energetic and outgoing people." Self-confidence and a strong personality are necessary to deal with the stressful events and tense situations you face daily. There is little room for indecisiveness, meekness, or timidity within this specialty. Because gynecologic surgeries start quite early in the morning and deliveries or ruptured ectopic pregnancies can occur during the middle of the night, you must be able to function at all times of day or night. Even when tired or agitated, OB/GYN physicians have to be sensitive to the emotional and psychosocial needs of their patients. Your common sense and experience are calming and reassuring for an expectant mother about to deliver her first child, a preoperative gynecologic patient, and a woman struggling with the loss of a pregnancy.

The obstetrician-gynecologist's typical day often consists of a mix of surgery, hospital rounds, clinic, and administrative duties. Due to the erratic lifestyle, many medical students strike this specialty from their list of choices. Every practicing

MEDIAN COMPENSATION	
Gynecology	$207,000
Obstetrics	$230,044
Obstetrics & Gynecology	$230,804
Reproductive Endocrinology & Infertility	$221,850
Gynecologic Oncology	$300,340

Source: American Medical Group Association

obstetrician-gynecologist experiences long hours and irregular schedules. Whether at the office or while enjoying the evening at home, your plans may be altered by obstetrical patients in labor. However, there is some variability depending on your choice of practice. In private practice, the hours of patient care depend on the number of group members, location, and patient load. The number of interruptions by patients in labor correlates with the volume of obstetrics in one's practice. After finishing residency, some doctors choose to practice only gynecology. After all, the delivery of uncomplicated pregnancies also falls under the domain of family practitioners and nurse midwives. In the academic setting, obstetrician-gynecologists who are full-time faculty members spend less time in surgery and in clinic. More time is devoted to teaching and mentoring residents, conducting research, and administrative tasks.

Yet despite the infringements on family and personal time, most obstetricians and gynecologists are extremely fulfilled by their careers. Their high level of career satisfaction and desire to practice is comparable to that of other women physicians, particularly those in surgery.[3] If given the opportunity, the majority would not change their career decision. To honor maternity/paternity leave and family obligations, most hospitals and group practices create contracts with defined schedules including part-time hours, minimal on-call nights, and less operating time. Despite such flexibility, a recent study found that female obstetrician-gynecologists, compared to other women physicians, worked significantly more clinical hours and call nights; they slept even less when on call.[4] Consequently, domestic responsibilities, such as cooking and housework, and quality time with their children are greatly minimized.[5] According to a recent survey, nearly 67% of both male and female obstetrician-gynecologists were unhappy with their sex lives, making them the least satisfied among all specialists surveyed.[6]

GENDER ISSUES IN THE WORKPLACE

More and more female physicians are becoming obstetrician-gynecologists. According to the American Medical Association, the percentage of women in this

specialty increased from just 7.2% in 1970 to 26.9% in 1994.[7] In current training programs, nearly 70% of the residents are women.[8] By 2014, many predict that the number of female physicians will far exceed that of men practicing obstetrics and gynecology.[9] As they become dominant in this specialty, female physicians, who are perceived as more caring and sensitive, will greatly influence its scope of practice and research.

Gender discrimination in obstetrics and gynecology has undergone a significant role reversal. Not only do male obstetrician-gynecologists feel at times that they are losing ground, but some recruiters from private practice groups have begun discriminating against male physicians. Assuming that women prefer a female obstetrician-gynecologist, these practices aggressively seek female residents. They want to balance their male-dominated staff with female obstetrician-gynecologists, creating a dramatically changed workforce. As a result, many qualified male doctors struggle to secure their preferred career. In fact, one study found that 26% of graduating male residents reported difficulty in finding a job, compared to 17% of female residents.[10]

Should these facts discourage male medical students from considering a career in obstetrics and gynecology? Certainly not—men still have the ability to compete in this field. The idea that female patients feel more comfortable with a female obstetrician-gynecologist is completely erroneous. In a recent survey of obstetric patients during their postpartum hospital stay, the majority (58%) had no preference for the gender of their obstetrician; 34% preferred female physicians and 7% indicated a desire for a male doctor.[11] Rather than specifying gender, the attributes most satisfied patients said they wanted in an obstetrician-gynecologist were excellent interpersonal skills, an empathic communication style, the ability to make a connection, and a high level of technical expertise. Men who cultivate traditionally female skills, particularly empathy and good communication, can thrive as obstetrician-gynecologists.

DEALING WITH MALPRACTICE CONCERNS

When asked about any negative aspects of their specialty, most obstetrician-gynecologists were quick to cite the critical, and increasingly costly issue of medical malpractice. The current medicolegal climate of our society, with its get-rich quick incentives, makes obstetrics and gynecology a high-risk specialty. In fact, most medical students considering this specialty are especially concerned about the daily potential litigation. Many things can go wrong during the delivery of an infant. Because manifestations of these incidents, such as neonatal brain damage, may not appear until the child is much older, the threat of liability is always

present (until the patient reaches 18 years of age). In light of this ever-present malpractice menace, obstetrician-gynecologists must be passionate about their careers and provide outstanding patient care. In many instances, the threat of litigation encourages the development and training of better physicians.

If you look at all the statistics and numbers, obstetrician-gynecologists have the highest incidence of lawsuits throughout their careers. Since the 1950s, the number of malpractice claims filed against obstetrician-gynecologists has increased nearly 15% every year.[12] Approximately two thirds of these physicians have been sued for alleged medical malpractice; they now have one of the highest (and continuing to skyrocket) malpractice insurance premiums in the nation.[13] Some insurance companies are not only raising premiums, but are also refusing to provide liability coverage. In spite of all the negative statistics, there are still glimpses of hope. More than half of all claims were dismissed, settled without payment, or won by the physician.[14]

The rising malpractice claims are severely jeopardizing access to high-quality, affordable health care for women and their newborns. Due to unaffordable liability insurance premiums (or even the inability to obtain insurance) many physicians have curtailed their services. They are forced to reduce the number of deliveries they perform, cut back on high-risk patients, and even stop some surgical services. This loss of access to prenatal and delivery care particularly affects women in rural and inner-city communities, which are typically underserved. As a result, many obstetricians are banning together in various states to pass tort reform bills that cap the restitutions patients can gain. In California, physicians lobbied to enact a series of reforms that curbed soaring liability premiums, stopped physicians from leaving the state, and prevented the decrease in availability of care. The 50-year challenge of malpractice will continue to be an important issue for future obstetrician-gynecologists.

SHARING THE SPOTLIGHT: NURSE MIDWIVES

Due to rising insurance premiums and the overall threat of liability, fewer family physicians are including obstetrical care in their private practices. Many medical students wonder about the role of family practitioners and midwives, however, as providers of pregnancy-related care. A *midwife* (meaning *with a woman*) provides prenatal care, attends childbirth, manages her clinic patients during labor and delivery, and supervises the general care of women and children directly after birth. As advanced degree registered nurses, nurse midwives have completed an accredited midwifery program and passed the certification examination. Family practitioners are medical doctors who are trained in obstetrics. Although they

provide care to women during apparently normal pregnancies and deliveries, they must call on obstetricians if complications develop. All midwives are required by the American College of Obstetrics and Gynecology (ACOG) to have a physician with hospital privileges as part of the maternity team. Nurse midwives, however, attend only about 9% of vaginal births in the United States.[15]

Whether in private practice or affiliated with an independent birthing center, both obstetricians and midwives seek to fulfill the common goal of providing excellent health care for women. As such, their professional relationship should always remain collegial and cooperative. It is one in which the obstetrician—the expert consultant—steps in whenever his or her services are necessary.

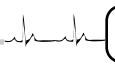
FELLOWSHIPS AND SUBSPECIALTY TRAINING

After completing residency in obstetrics and gynecology, one may decide to specialize. Each of the following approved fellowships requires an additional 3 years of training. To earn board certification, graduating fellows must pass the American Board of Obstetrics and Gynecology (ABOG) subspecialty examination.

Maternal–Fetal Medicine

Patients with high-risk pregnancies, who have serious co-existing medical or surgical disease that could prevent delivery of a viable term infant or affect the survival of the mother, fall under the expertise of specialists in maternal-fetal medicine (MFM). These specialists serve as consultants to general obstetricians for referrals involving pregnancies complicated by major disease or for diagnostic or therapeutic procedures.

Although MFM physicians may focus on consultations and sonography, they are specially trained in a variety of intricate



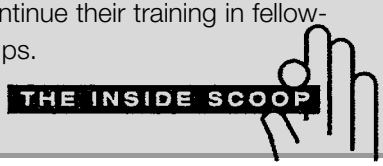
OBSTETRICS AND GYNECOLOGY 2002 MATCH STATISTICS

- 1389 applicants competed for 1138 positions
- 920 US seniors and 469 independent applicants ranked at least one OB/GYN program
- Residency programs ranked 8.1 candidates for every available position
- 93.8% of all positions were filled in the initial Match
- The successful applicants: 79.6% US seniors, 12.1% foreign-trained physicians, and 5.3% osteopathic graduates
- The unmatched rate for US seniors applying only to obstetrics/gynecology was 4.3%

Source: National Resident Matching Program

RESIDENCY TRAINING

Residency in obstetrics and gynecology requires 4 years of postgraduate training. There are currently 254 accredited programs. Unlike other surgical subspecialties, a PGY-1 internship in general surgery is not required. Instead, residents immediately begin surgical training in obstetrics and gynecology. They are required to prove competency in all surgical and obstetric procedures. The typical monthly rotations include labor and delivery, obstetric wards, general gynecology, reproductive endocrinology and infertility, gynecologic oncology, primary care, and neonatal intensive care unit. Due to the increasing emphasis on primary care within this specialty, most residency programs now require at least 6 months of outpatient rotations. About 10% of residents continue their training in fellowships.



procedures. Diagnostically, they perform genetic amniocentesis, fetal blood sampling, obstetrical ultrasound, chorionic villus sampling, and cordocentesis. Therapeutically, they are experts at high-risk deliveries, abortions, laparoscopy, fetal gene therapy, and fetal reduction.

Gynecologic Oncology

Roughly 15% of all cancers found in women involve tumors of the reproductive tract. This area of specialization focuses on the medical and surgical care of women with malignancies arising in the reproductive system: ovarian, uterine, cervical, vulvar, and vaginal cancer. These specialists receive extensive training in the biology and pathology of gynecologic cancer, particularly its diagnosis, treatment, and complications of oncologic care.

Gynecologic oncologists comprise an elite group of surgeons who bring hope to thousands of afflicted women. They are skilled pelvic surgeons who use the latest techniques in radical surgery, chemotherapy, and radiation treatment. They manage the urinary and bowel complications resulting from cancer treatment, as well as pain, palliative care, and psychosocial issues. Gynecologic oncologists are supported by a multidisciplinary team of medical oncologists, radiation oncologists, and gynecologic pathologists who collaborate to provide optimal care. Gynecologic oncologists practice in a variety of clinical settings—academic medical centers, regional hospitals, and specialized cancer centers.

Reproductive Endocrinology and Infertility

The endocrine system, which is responsible for releasing hormones that modulate the development of the ovum, is one of the most intricate and complex regulatory systems. For the specialist in reproductive endocrinology and infertility (REI), establishing a pregnancy for couples suffering from infertility is extremely rewarding. Their practice also extends to the treatment of hormonal and reproductive disorders affecting women, children, men, and mature women. Reproductive endocrinologists gain special competence in advanced microsurgical procedures, such as reversal of tubal ligation, treatment with fertility drugs, and methods of assisted reproduction (in vitro fertilization and insemination). With vast knowledge and expertise on the physiology of reproduction, REI specialists medically and surgically treat a variety of complex hormonal disorders, such as infertility, endometriosis, recurrent pregnancy loss, menopause, and ovulatory dysfunction.

Female Pelvic Medicine and Reconstructive Surgery

As women age, a history of multiple deliveries and other forms of strain may cause the musculature supporting the pelvic contents to slowly weaken. This can lead to disorders such as urinary incontinence or a prolapsed bladder, uterus, or vagina. To correct pelvic floor dysfunction, women should seek out specialists in female pelvic medicine and reconstructive surgery. Also known as *urogynecology*, this advanced surgical subspecialty remains on the cutting edge of medicine. It integrates the fields of urology and obstetrics-gynecology in the operating room. To diagnose pelvic prolapse and female voiding dysfunction, these physicians have special expertise in clinical evaluation, cystoscopy, and analysis of urodynamic testing. Because this is a surgical fellowship, specialists in pelvic medicine perform many reconstructive operations to correct pelvic floor dysfunction. They help to improve the quality of life for women with these disorders.

WHY CONSIDER A CAREER IN OBSTETRICS-GYNECOLOGY?

Despite its seemingly specialized nature, obstetrics and gynecology provide much diversity and variety. Medical students should disregard the narrow views of colleagues who may dismiss these specialists as "pap smear providers by day and baby delivery service by night." The breadth of issues includes acute and chronic medical conditions, health maintenance, genetics, operative gynecology, pregnancy

and delivery, adolescent and postmenopausal gynecology, infertility, endocrinology, urogynecology, and oncology.

Because of the diverse age of patients, your scope of practice can range from broad (primary ambulatory care) to very narrow (concentration in an area of specialization). With so many paths available within this one specialty, there is no limit to what you may be able to offer to obstetrics and gynecology. After all, a single obstetrician or gynecologist cannot provide for all of the needs of a woman. The positive interactions between generalists and subspecialists allow for the highest quality of care for women of all ages.

Although our society expects great things from modern medicine to improve quality of life, "nowhere are these expectations higher than in the practice of obstetrics and the desire and expectation of having a healthy child."[16] To achieve these lofty goals, obstetricians and gynecologists must demonstrate superior compassion, intelligence, and the ability to pay close attention to detail. Despite the rigorous lifestyle and the pressure of handling the high-risk responsibility, there are lots of rewards. Future obstetricians-gynecologists will be part of a group of caring, competent, and conscientious doctors who strive for the best patient care for women. Although not every day is filled with success stories, most obstetricians and gynecologists go home each day with the satisfaction of having changed someone's life.

ABOUT THE CONTRIBUTOR

Dr. Kelly Oberia Elmore is a resident in obstetrics and gynecology at the Naval Medical Center in San Diego. A lieutenant in the US Navy, she grew up in southern California and Chicago, graduated from Xavier University (Louisiana), and attended medical school at the University of Chicago. She plans to practice both obstetrics and gynecology in the military with a focus on women's sexual health. Dr. Elmore enjoys writing poetry and short stories. She acknowledges her mother as her main source of inspiration and support. She can be reached by e-mail at kellyelmore6867@msn.com.

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22 OPHTHALMOLOGY

Andrew Schwartz

Imagine the smallest, darkest, hottest room in which you have ever been. The room is so small that you cannot stand up straight and it is so dark that you cannot see your hand in front of your face. The floor has rotted and, with each step, you hope that your weight is not the final insult under which it will give way. You estimate there are hundreds of mosquitoes by the noises near your ear and the bites on your skin. In a way, you are glad for the darkness because it hides depressing details of the scene surrounding you. You turn on your flashlight to reveal a gaunt elderly woman in soiled clothes, lying on a homemade mattress with her knees pressed up to her chest. Her feet are dark, necrotic, and ravaged with ulcerations. Her legs will not fully extend within this confined room. Her blood sugar is markedly elevated and her eyes appear white due to cataracts. A young boy who brings her food explains that she developed "the sugar" 20 years ago and has not left her tiny home since she became blind. A fragile woman, she holds your arms tightly while being brought to the hospital. Without sight, only human touch could assure her that she was not alone.

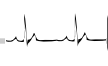
My encounter with this woman, on a service trip to Belize during medical school, gave me an unforgettable glimpse of the profound impact the loss of vision can have on human existence.

OPHTHALMOLOGY: SEEING THE LIGHT

Ophthalmology is the branch of medicine that provides the complete medical and surgical care of the eye and related structures of the visual system (extraocular muscles, eyelids, orbit, nerves, visual pathways, and more). Yes, they can (and often do) prescribe glasses and contact lenses. But their spectrum of care extends much further. It requires mastery of the anatomy, physiology, microbiology, and pathophysiology of the eye, as well as an understanding of optical physics. To treat ocular and visual disorders, ophthalmologists are really both internists *and* surgeons.

Most medical students' exposure to the field of ophthalmology is much less dramatic than my experience in Central America. In fact, many students are never introduced to this surgical subspecialty at all. It is unfortunate that every medical school does not actually require the completion of any sort of clerkship in ophthalmology. (And many seniors do not choose to pursue an elective in the specialty either.) Vision is usually only discussed in the context of a broader neuroscience course taught by neurologists and neuroscientists. As a result, most medical school graduates' only exposure to ophthalmologists is through lectures during surgery or outpatient medicine.

In addition, ophthalmology is largely an outpatient subspecialty. Because many hospitals do not have a big inpatient service, a medical center is usually not an ideal learning environment for a medical student who is untrained in eye examination techniques and can therefore have only limited responsibility in the outpatient clinic. Everyone knows how to use a stethoscope to listen to heart, lung, and bowel sounds; but not every physician or medical student can perform a proper eye examination. Despite the limited exposure, ophthalmology is one of the most highly sought after specialties. Why?



OPHTHALMOLOGY
2002 MATCH
STATISTICS

- 671 applicants competed for 440 positions
- 99.5% of all positions were filled in the initial Match
- Average USMLE score of matched applicants: 225
- The successful applicants: 87.7% US seniors, 7.9% foreign-trained physicians, and no osteopathic graduates
- Unmatched rate for US seniors applying only to ophthalmology: 22%

Source: San Francisco Matching Program

Ophthalmology remains highly competitive to match in despite the fact that it is a field that is not easy to get experience in and is not stressed by medical schools. First, it is one of the few specialties in which your practice includes the full spectrum of care, including preventative medicine, medical management, and surgical treatment of patients. For patients at high risk for developing glaucoma, for example, ophthalmologists follows their ocular pressure, visual fields, and cup-to-disk ratios. For patients with diabetes, they monitor for retinal neovascularization. This is what preventive medicine is all about. Once pathology is diagnosed, the physician who made the initial diagnosis now decides if a course of medical treatment is warranted and what that course should be. If medical management fails or is not applicable, the very same physi-

cian can now bring his or her patient to the operating room. The ability to provide every single aspect of a patient's care makes ophthalmology an extremely gratifying specialty.

Ophthalmologists' relationships with their patients vary in length, although they tend to be long term. Patients who have deteriorating vision due to diabetes require follow up with an ophthalmologist every year. The young child with severe bacterial conjunctivitis might only be seen once. Regardless of the particular patient or disease process, it is important to keep in mind that vision is a sensitive subject. When it comes to problems of the eye of any nature—whether serious or benign—most patients are very frightened of the possibility of going blind. Ophthalmologists must draw on their compassion and sensitivity to alleviate their patients' concerns. Knowing everything about the eye and its diseases is not enough. Patients who are worried or distressed about losing their vision require special attention that medical or surgical treatment alone does not provide.

WHAT MAKES A GOOD OPHTHALMOLOGIST?

- ✓ Prefers a highly specialized, detail-oriented discipline.
- ✓ Likes working with his or her hands.
- ✓ Enjoys both medical and surgical approaches.
- ✓ Is a relaxed, patient, and confident person.
- ✓ Has excellent manual dexterity.

It should be noted that there are many intangibles that make a specialty desirable to someone. Ophthalmologists are some of the nicest, most relaxed, and generally happiest physicians to be found in the hospital. It is rare to see an ophthalmology resident embarrassed at grand rounds or yelled at in front of his or her peers, in stark contrast to certain other surgical subspecialties. The eye clinic is usually a friendly and collegial environment in which to work and learn, so if you think you are someone who functions better in that kind of environment, ophthalmology is certainly a field you should consider.

SPECIALIZING IN TWO TINY ORGANS

The eye and its supporting cast make up perhaps the most highly specialized and complicated organ system in existence. Approximately 35% of all the sensory input into the brain is made up by the left and right optic nerve, and roughly 65% of all intracranial disease processes have ophthalmologic manifestations.[1] A

plethora of systemic disease processes, therefore, can affect the eye, each in several ways and by different mechanisms.

One of the most important things for medical students to determine when considering ophthalmology as a career is whether or not they would be happy specializing in only one region of the body. This is not to say that there are not vast arrays of disease processes that have ophthalmic manifestations; in fact quite the opposite is true. Rather, the examination skills, diagnostic tools and surgical procedures you learn and use as an ophthalmologist involve a small area of the body and one highly specialized organ system.

Unlike in surgical specialties, the ophthalmologists' surgical field is typically measured in millimeters. The lids and skin surrounding the eye and orbit, the eye itself from the cornea back to the optic nerve, orbits with their bone, vascular, sinus, lymphatic and neural components, and the central nervous system components of vision make up the world of the ophthalmologist. You will become an expert specialist in one particular system and know that structure inside and out. But do not think that it is easy to master the body of knowledge for these two small structures. There is an immense body of knowledge to be learned about the eye.

Ophthalmologists treat a wide range of disorders of the eye. Some of the more common conditions include cataracts (a disorder of lens clarity), glaucoma (a problem of increased intraocular pressure), conjunctivitis (inflammation of the conjunctiva, usually due to infection), and macular degeneration (progressive blindness). For such seemingly small structures, a large number of diseases can affect the eye. Any type of infection—from gonorrhea to herpes—is fair game. Ophthalmologists also deal with all kinds of trauma to the eye, whether it involves the orbit (in which the eye is located) or the eye itself. They operate on detached retinas. They resect intraocular tumors like retinoblastoma if found in time. They treat disorders of the extraocular muscles like strabismus. Even problems of the eyelid, eyelashes, and lacrimal (tear) glands fall under the domain of the ophthalmologist.

To be a good ophthalmologist, you need a solid foundation in general medicine. Many ocular disorders are manifestations of underlying systemic disease, congenital or chromosomal disorders, metabolic defects, connective tissue diseases, diabetes, and hypertension—the list goes on. You will not just find elderly patients with cataracts or glaucoma in an ophthalmologist's office. There will also be patients with inflammatory bowel disease, Grave disease (hyperthyroidism), AIDS, brain tumors, and Bell palsy—all of whom have problems involving the eye. Uveitis (inflammation of the iris, ciliary body, and choroid), for instance, is

a common ocular presentation of lupus, Crohn disease, and juvenile rheumatoid arthritis. Like dermatologists, who have to know the skin manifestations of underlying diseases, ophthalmologists require a good understanding of the pathophysiology of these primary disorders. Although the eye condition may at times be secondary, these specialists must maintain their general medical and surgical knowledge across a broad range of disorders. This is a recurrent theme within this specialty.

OPHTHALMOLOGY AS A HIGH-TECH FIELD

Ophthalmologists love gadgets and technical breakthroughs. Their offices are filled with a wide range of instruments ranging from simple ophthalmoscopes to complicated operating microscopes. In the last few decades, there has been an explosion of new technology in the visual sciences, which has resulted in several promising new techniques and advances. Diagnostic and surgical breakthroughs in this specialty include laser photocoagulation, micromanipulation, fluorescein angiography, and microsurgery. To be a good ophthalmologist and make the most of this technology, the specialty requires excellent visual and motor skills, depth perception, and color vision.

Pharmacologic treatments are important in ophthalmology. Primary open angle glaucoma, for instance, remains one of the largest causes of blindness in the world, affecting over 5 million people.[2] Traditionally, topical beta-blocking medicine provided the main form of therapy, but several side effects limited their usefulness in certain patient populations such as asthmatics. Several new medications, including topical carbonic anhydrase inhibitors, alpha-2 agonists, and prostaglandin agonists, have made the medical treatment of glaucoma far more effective. In addition, advances in surgical techniques and the use of antimetabolites, such as 5-fluorouracil and mitomycin C, have greatly improved filtration surgeries and dramatically improved postoperative wound healing. These advances have greatly improved the chances that patients with glaucoma will live into old age with their vision preserved.

The rapidly advancing technology has made surgical visual correction a safe reality for many people. LASIK, or laser-assisted in situ keratomileusis, is a procedure by which an excimer laser emitting ultraviolet beams removes precise amounts of corneal tissue based on a person's refractive error and corneal topography (essentially a road map of the cornea). It is estimated that 148 million people (52% of the population) wear some type of corrective eyewear and that approximately 1.8 million refractive surgery procedures were performed in 2002.[3]

For those who have near-perfect vision, imagine what it is like for someone to wake up every morning and be unable to see the alarm clock or to differentiate between the shampoo and conditioner bottles while taking a shower. The technology in the practice of ophthalmology—particularly LASIK—is having a dramatic effect on the quality of people's lives. Instead of always relying on glasses and being constantly reminded of their worsening vision, these patients' lives are transformed. They wake up with enormous smiles on their faces and perfect 20/20 vision for the first time in years.

PERFORMING SURGERY ON THE EYE

Like their colleagues in otolaryngology, ophthalmologists practice both medicine and surgery. To be a good surgeon of the eye and its related structures, you must have excellent hand-eye coordination and fine motor skills. Much of the precise, targeted surgery occurs behind the lenses of a microscope and with the use of a high-powered laser. It is a different kind of surgery than in other subspecialties: cleaner, shorter, more controlled, with less worry about bleeding and less of a need to suture fascia or cauterize blood vessels. Like most surgeons, ophthalmologists are action-oriented physicians who like to see fast results. In the operating room, they demand as much attention to detail as any other surgeon. In this specialty, all results of surgery are permanent and usually cannot be reversed. Thus, care, precision, and patience are key components to being a good ophthalmologic surgeon.

Most ophthalmologists perform refractive surgery such as LASIK, in which they reshape a patient's cornea to improve visual acuity. Because most of these procedures are elective, ophthalmologists must be aware of the extremely high (or even unrealistic) expectations patients have of refractive surgery. Ophthalmologists need to carefully evaluate their patients and make sure they have realistic expectations and understand the benefits, risk, and alternatives to surgery, because it is irreversible. Most patients, however, are very pleased with the results, especially as the newer techniques continue to improve.

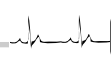
Perhaps the most common surgical procedure ophthalmologists perform is *phacoemulsification*,—the process of modern cataract extraction, in which the opacified lens is removed, usually from the capsule in which it sits. A cataract is considered present when the transparency of the lens of the eye has been reduced to the point that vision is impaired. Opacity of the lens is as much a part of aging as wrinkles in the skin. Reduced transparency is present in 95% of all persons over age 65.[4] Usually caused by natural aging, cataracts can also be con-

genital, secondary to trauma, or caused by systemic disease processes such as diabetes, galactosemia, Wilson disease, and myotonic dystrophy among many others. During phacoemulsification, the hardened lens is broken up using ultrasound and then the remnants are aspirated out of the capsule. Next, a lens implant correctly matched to the person's refractive power is implanted into the evacuated capsular bag. Consider that the entire intraocular procedure is performed through a 3- to 6-mm incision in the cornea in as little as 10 minutes, often using only topical anesthetic drops. Isn't ophthalmic surgery amazing?

Ophthalmologic surgery profoundly changes people's lives. The visual loss for someone with bilateral cataracts could be so profound that the patient may no longer see even the face of her granddaughter. Before phacoemulsification, her cataracts might be so dense that she could only see hand movement in front of her face but not count fingers. For these patients, ophthalmologists return to them the gift of vision. Through modern technology and the miracles of eye surgery, patients like this can now once again see the smile on her granddaughter's face. This is the type of impact ophthalmologists have on their patients on a daily basis.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

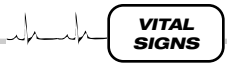
Although ophthalmology is a legitimate surgical specialty comparable to orthopedics, urology, otolaryngology, and the like, it offers a significantly better lifestyle than virtually any other subspecialty in medicine. It has the advantages of a surgical field, such as procedures, time in the operating room, medicine mixed with surgery, and good financial compensation, but is generally felt to do so while still allowing free time for endeavors outside of medicine. Equally important, it gives time to remain actively engaged in learning and to stay current on new advances in your field. Relatively few emergencies arise in ophthalmology, and as discussed above, only a small minority of patients is admitted to the hospital. A good lifestyle should never be your only consideration in choosing a particular specialty, but it certainly is a nice added benefit of ophthalmology



MEDIAN COMPENSATION	
Ophthalmology	$240,265
Retinal Surgery	$334,944
Refractive Surgery	$344,644

Source: American Medical Group Association

Although jobs abound in many different areas, most ophthalmologists work



OPHTHALMOLOGY EMPLOYMENT DATA

- Distribution among all physicians: 2.2%
- Practice type: 75% in private practice; 10.2% in academics
- Median patient care hours per week: 60.5
- 7.7% experienced difficulty in securing their preferred employment position
- 56.2% report that their salary is equal or higher than expected

Source: American Medical Association

in private practice. They typically divide their time between seeing patients during regularly scheduled appointments and performing procedures in the operating room. In the office, as internists of the visual system, ophthalmologists take patient histories, examine eyes with slit lamps and other advanced equipment, consider differential diagnoses, and prescribe new lenses and medication (both topical and oral). Many of these appointments are postoperative check-ups. In the operating room, ophthalmologists take on the role of surgeon as they perform fine, delicate procedures to improve patient's vision. Most ophthalmologists operate 1 or 2 days per week and spend the remaining 3 or 4 days in the clinic. Because a significant proportion of ocular disorders are the result of underlying systemic medical disease, ophthalmologists also play a role in managing these conditions in close consultation with the patient's internist, pediatrician, or other relevant specialist.

A relatively small field, ophthalmology continues to have excellent job opportunities for its graduating residents. As the American population ages, the demand for ophthalmologists to operate on the exponential number of cataracts and glaucoma continues to increase. Moreover, as new procedures, scientific breakthroughs, and techniques come into practice, more and more people are seeking elective refractive surgery and other procedures involving the eye, like plastic surgery. Historically, ophthalmology has done well to ensure that the number of residents trained every year corresponds to the health care needs of the population. The small number of available training positions is advantageous for graduating residents because it increases the likelihood of entering a good job market. It also helps to explain the highly competitive nature of matching in ophthalmology despite students' limited exposure to the specialty in medical school.

THE OPHTHALMOLOGY–OPTOMETRY DISTINCTION

Many medical students interested in a possible career in ophthalmology are confused by the role of optometrists, who are often mistakenly referred to as *eye doctors* by the general public. Where exactly do these health professionals fit into the spectrum of vision care? Optometrists, after all, are not licensed to practice medicine—only optometry. Although some states permit optometrists to prescribe limited topical medications, no optometrists are given privileges (or even training) for performing ophthalmologic surgery. Their expertise lies in understanding and treating problems with the optics of the eye. They prescribe the majority of corrective lenses in this country and also diagnose diseases of the eye that may or may not require referral to an ophthalmologist.

Instead of competing with each other, most ophthalmologists and optometrists have mutually beneficial relationships. As the medical doctor with extensive clinical and surgical training, ophthalmologists are specialists in every single aspect of the eye and all its diseases. The optometrist, who specializes in optics and the correction of refractive errors, is adequately trained as a generalist to provide primary eye care, leaving the sicker patients and complicated cases (which generally require surgical interventions) for the ophthalmologist. This is an excellent way to run a cost-effective private eye care practice. The ophthalmologist is present as a back-up for the optometrist, taking over diagnostic and treatment challenges that involve complex diseases. If they work closely together, they can form an effective health care team.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

It might be surprising that a field as seemingly specialized as ophthalmology could have several fellowship opportunities to specialize even further, but this is the reality. This extra training allows physicians to treat and operate on very different disease processes using equally diverse procedures. Ophthalmology fellowships are generally 1- to 2-year endeavors. Unlike many fields within medicine, completing fellowship training often does not mean limiting yourself only to that subspecialty area of practice. Many ophthalmologists who have completed fellowships choose to integrate that area of expertise into their practice of general ophthalmology.

Cornea and External Disease

This subspecialty involves the care of the cornea, sclera, conjunctiva, and eyelids. Various different types of pathologic problems, both congenital and acquired,

RESIDENCY TRAINING

Residency in ophthalmology requires 4 years of postgraduate training. There are currently 122 accredited programs, most of which are very small. It requires 1 internship year (internal medicine, surgery, or transitional) plus 3 years of ophthalmology training. The structure of individual programs varies greatly but must meet the basic requirements set by the American Academy of Ophthalmology. Some programs utilize full-time faculty for teaching while others provide instruction through community-based ophthalmologists as part-time or volunteer faculty. Usually the first year of residency is spent in the clinic evaluating a wide variety of patients, mastering examination skills, and seeing consults within the medical center. The resident may also perform minor surgical procedures during this year. The second and third years involve rotations through subspecialties like pediatrics and oculoplastics, as well as much more time spent in the operating room, assisting with surgery and then later functioning as primary surgeon.

can affect these structures of the eye. These include, but are not limited to, corneal dystrophies, corneal tumors, infections, inflammation, and manifestations of systemic disease processes as they affect the anterior segments of the eye. Cornea surgeons are experts in corneal transplant—one of the most precise and delicate procedures one will ever see in an operating room. In this procedure, roughly 30 stitches are placed around an area 10-mm in diameter to anchor a donor cornea into place. Indications for such a surgery include severe bacterial and fungal infections, scars secondary to trauma, corneal dystrophy, and corneal protrusion disorders. Cornea surgeons are also experts in refractive surgery, among many other procedures.

Glaucoma

Fellowships in this subspecialty provide additional training in the medical and surgical management of glaucoma, plus other disorders that may threaten the optic nerve with increased intraocular pressure. Glaucoma is an area of ophthalmology in which a great deal of research is underway. Like other subspecialties, glaucoma specialists have the unique opportunity to work with children and adults, as well as the privilege to care for their patients both medically and surgically.

Neuro-ophthalmology

For students who cannot make up their minds between neurology and ophthalmology, it is possible to have the best of both worlds. Neuro-ophthalmology involves both central nervous system disease and its effect on the visual pathways, as well as disease processes inherent to the nerves and pathways of the eye. Because about 65% of all intracranial processes have ophthalmic manifestations, the importance of this subspecialty is obvious. Although some neuro-ophthalmologists operate on a limited basis and are more involved with the recognition and diagnosis of disease, others perform complicated surgeries on the eye and orbit, such as orbital wall decompressions for Grave eye disease. This procedure involves the precise removal of areas of orbital bone to alleviate the exophthalmos (forward protrusion) of the eye that results from the swelling of orbital tissues—as can occur in thyroid disease.

Ophthalmic Plastic Surgery

Do you have an "eye" for beauty? Those trained in *oculoplastics* blend ophthalmology and plastic surgery in the treatment of the orbit, lid, nasolacrimal system, brow, and upper face. Oculoplastic surgeons remove the eye in cases of extensive trauma, intractable and severe eye pain, and destruction secondary to neoplastic or inflammatory processes. They reconstruct the orbit, lids, and upper face in cases of tumor, trauma, or other local processes, and perform cosmetic surgeries such as orbital wall decompression. They are also trained in the use of radiation and chemotherapy. *Optic nerve fenestration*, one of the more interesting procedures, helps young patients suffering from pseudotumor cerebri, a condition in which elevated intracranial pressure (for unclear reasons) causes vision loss. In this fascinating procedure, the oculoplastic surgeon dissects back to the optic nerve, rotates the eye laterally, and, rapidly enough so as to avoid damage due to the lack of blood flow caused by extreme rotation of the eye, cuts a window on the sheath of the optic nerve to alleviate pressure.

Ophthalmic Pathology

The existence of ophthalmic pathology as a specialty is a testament to the complexity of the eye and visual system. The anatomy and pathophysiology is so complicated that at most major medical centers, a trained ophthalmic pathologist (who has completed an ophthalmology residency followed by a pathology fellowship) examines tissue removed from the eye and surrounding structures.

Pediatric Ophthalmology

This specialty involves the eye care of the pediatric population, as well as the treatment of certain conditions such as strabismus (deviation of the eye from its normal visual axis) that can occur in both children and adults. Pediatric ophthalmologists perform surgery on congenital cataracts, repair ptosis (droopy lids), fix strabismus, diagnose childhood eye tumors like retinoblastoma, and treat amblyopia. One of the more common problems, amblyopia is defective vision uncorrectable by glasses in an eye that is otherwise normal; it is essentially the result of anything that causes vision in one eye to be better than the other while visual pathways are still developing in early childhood. Because several syndromes have a major impact on vision, this specialty also affords the opportunity to work with special needs children. Last, pediatric ophthalmologists work with premature infants: they monitor and treat the ocular sequelae of prematurity along with retinal surgeons.

Vitreoretinal Disease

Several disease processes affect these two important areas of the eye—the retina and the vitreous humor—including local, systemic, and genetic conditions. Trauma obviously has a profound impact on the retina, resulting in tears and detachments, and systemic diseases such as diabetes and HIV can also cause a variety of problems for this part of the eye. Diagnostic modalities are highly advanced and include fluorescein angiography and electrophysiology. Treatment modalities are equally impressive: cryotherapy, lasers, retinal detachment surgery, and vitrectomy, among many others.

WHY CONSIDER A CAREER IN OPHTHALMOLOGY?

There are many reasons why talented medical students should consider a career in ophthalmology. In a survey of residents,[5] they listed the following factors as the most influential in their decisions to pursue a career in ophthalmology, ordered from most to least influential: surgery, patient contact, lifestyle, junior/senior year electives, previous contact with ophthalmologists, potential income, and status among peers. Extrapolating from this study, the most important factors in choosing a career in ophthalmology are historically those inherent to the practice of ophthalmology and to patient care. Despite the fact that many medical students do not complete electives in this field, the desirability of ophthalmology remains high because of what it has to offer a future physician.

Ophthalmology is an exciting and challenging field that involves the complete care of the patient. It offers physicians the opportunity to practice preventive medicine, medical management, and surgical treatment of a wide variety of disease processes. It is a field in which physicians have a tremendous impact on their patients' health and quality of life and in which, as a result, their patients are some of the most satisfied in all of medicine. It also allows the physician to become an expert on one of the most complicated organ systems in existence—one in which miraculous new advances are constantly being achieved.

ABOUT THE CONTRIBUTOR

Dr. Andrew Schwartz is a resident in ophthalmology at The Mount Sinai Medical Center in New York City. After receiving his undergraduate degree from Tufts University, he attended medical school at Loyola University Chicago—Stritch School of Medicine. Dr. Schwartz is particularly interested in orbital trauma and other disease processes affecting the orbit. In his free time, he enjoys tennis and running, as well as playing and listening to music. Dr. Schwartz would like to thank his father and grandfather (both pediatricians) for inspiring him to pursue medicine and is very grateful for the continued support of his wife, Rebecca, and entire family. He can be reached by e-mail at andysmd@aol.com.

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23 ORTHOPEDIC SURGERY

John C. Langland

At some point in their lives, many people require the care of an orthopedic surgeon: little children who fall down on elementary school playgrounds, high school basketball players who twist their knees, and elderly men and women with chronic leg pain. Each patient seeks the expertise of a specialist in orthopedic surgery—highly trained physicians who treat the diseases and injuries of the entire musculoskeletal system, from the neck down to the toes. Although considered specialists, orthopedic surgeons actually have a rather broad knowledge base and take care of a wide spectrum of disease.

Although *orthopedic surgery* implies that most problems seen within this specialty are treated surgically, this notion is far from the truth. In fact, despite the long years of surgical training, most patient care is nonoperative. Cutting and curing is indeed an important part of orthopedic surgery, but medical students should keep in mind that it is not the sole focus of this wonderful specialty.

BONES, MUSCLES, AND JOINTS: THE HEART OF ORTHOPEDIC SURGERY

The specialty of orthopedics basically involves the care of the musculoskeletal system, which includes care of most disorders and injuries in the upper and lower extremities as well as the spine. As such, future orthopedic surgeons need a thorough knowledge of the anatomy, mechanics, and physiology of this body system. You master everything there is to know about each muscle, nerve, and blood vessel within all parts of the musculoskeletal system. In addition, proper diagnosis and management of orthopedic injuries requires a solid grasp of forensics and physics to understand the mechanisms of injury.

Orthopedics surgery involves more than just broken bones, dislocations, and sprains. It covers a wide array of problems, including conditions that may be congenital, acquired, or simply *idiopathic* (meaning of unknown origin). The list of

orthopedic pathology is quite long and diverse, but a sampling of the diagnoses includes musculoskeletal infections, bone dysplasias, arthritis, neuromuscular disorders, scoliosis, pediatric deformities, meniscus and tendon tears, ligament sprains, compartment syndrome, tendonitis, joint instability, osteonecrosis, bunions, hammertoes, gout, diabetic foot wounds, carpal tunnel syndrome, trigger fingers, rheumatoid arthritis, Dupuytren disease, nerve injuries, musculoskeletal neoplasms, spinal stenosis, herniated disks, spondylolysis, spondylolisthesis, gait disturbance, and osteoporosis.

Because orthopedics covers such a broad array of disorders and injuries, which requires an extensive knowledge base, it has been divided into many subspecialties. Many orthopedists practice general orthopedics and take care of a variety of common injuries and disorders. Other surgeons choose to subspecialize in areas like sports medicine, back and neck, shoulder and elbow, foot and ankle, upper extremity, adult reconstruction, musculoskeletal oncology, and pediatric orthopedics.

The joy of orthopedics is the ability to really help people with painful disorders and injuries, usually in a very short time period. Injuries cause mechanical problems in the body, and it is the job of the orthopedist to figure out the underlying problem and then correct the abnormality. Some problems can be fixed with simple medications or physical therapy, whereas others require a winning lottery ticket to the operating room. In general, orthopedic surgery includes the repair, reconstruction, and replacement of injured tendons, ligaments, bones, joints, and other anatomic parts.

Many health professionals make the analogy that orthopedic surgeons are like carpenters. If you have always loved working with your hands and building things, then perhaps this specialty is the perfect choice. The orthopedic surgeon is essentially the repairman and construction worker for the limbs and spine. They even have similar tools at their disposal in the operating room—saws, drills, tamps, hammers, chisels, screwdrivers, pliers, vice grips, and so on. With these tools, the orthopedic surgeon can do wonderful and amazing things to make people better. It is the ability to really make a significant change in a person's quality of life that makes orthopedics so enjoyable.

An easy example of the difference orthopedic surgery can make is looking at the result of a simple knee replacement. Knee arthritis can cause very disabling pain that limits a patient's ability to walk, climb stairs, and even get up from a chair. An orthopedic surgeon can perform a total knee replacement on that worn out joint and within 3 months that patient in most cases is pain free. With the alleviation of pain, their quality of life dramatically improves. There are countless other operations in orthopedics that help restore function and improve patient's lives.

EMERGENCY ORTHOPEDICS: BEING PART OF THE TRAUMA TEAM

Most orthopedic surgeons spend the majority of their time in the clinic seeing new and returning patients and, of course, in the operating room performing elective, nonemergent surgeries. However, most still have to live by the pager. After all, emergency care plays a role in the practice of many orthopedic surgeons. Many people—especially those involved in major motor vehicle accidents—come to the emergency room with severe traumatic injuries to their bones, such as fractures and dislocations.

To a medical student, it may seem like the orthopedic residents are always down in the emergency department evaluating patients for possible emergency surgery. Keep in mind, however, that this perspective is a little warped because most trauma centers are located in academic medical centers—a hospital with which a minority of practicing orthopedic surgeons is affiliated. In many teaching institutions, orthopedic residents handle even basic orthopedic problems such as finger dislocations for educational purposes. The residents and their attendings also work together as members of the trauma team to care for the severe injuries that show up at the medical center. Consequently, orthopedic surgeons who are on staff at a teaching hospital provide much more emergency care than those in private practice.

In the world of private practice and community hospitals, the amount of emergency orthopedic care is dictated by call schedule, hospital size and type, and practice focus. In fact, the emergency medicine physicians in the ED handle most minor orthopedic injuries. Many of those problems are simple sprains and lacerations and never need the care of an orthopedic surgeon. Follow-up care is instead arranged with the primary care physicians. Nonurgent problems requiring orthopedic attention are referred to outpatient clinic for follow up. Urgent or emergent problems are called immediately to the orthopedic surgeon on call. There are only a few orthopedic emergencies: infections, dislocations, open fractures, unstable fractures, compartment syndrome, and progressive nerve compression (spinal cord injuries, myelopathy, cauda equina) are the most common.

GOOD OPERATIVE SKILLS ARE ESSENTIAL

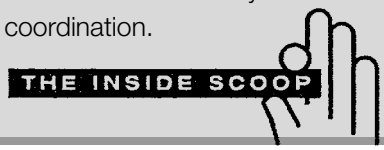
Orthopedic surgery obviously requires the ability to perform operative tasks. The surgical responsibilities can range from the very delicate (operating on the hand or spine) to the less intricate (using long rods and heavy hammers to stabilize a

fractured femur). The vast array of different operations keeps this specialty interesting and entertaining, and it is continually growing. Every year, new and less-invasive techniques are developed for older operations. Nonetheless, excellent hand-eye coordination is essential to being a good surgeon.

Currently, the increasing use of minimally invasive techniques has been the focus of many areas of orthopedics, especially in the areas of trauma and arthroscopy. This type of surgery requires the ability to use your hands and your brains. As more and more operations are performed using a scope and smaller incisions, even more precise hand-eye coordination is required. Although many of these motor skills can be acquired, the basic spatial coordination and perception are most often natural in those who seek out orthopedics. These skills—in combination with a thorough knowledge of anatomy—are essential to becoming a good orthopedic surgeon.

WHAT MAKES A GOOD ORTHOPEDIC SURGEON?

- ✓ Prefers action-based medicine.
- ✓ Likes working with his or her hands.
- ✓ Is a confident, decisive individual who can make fast decisions.
- ✓ Likes seeing the immediate results of treatment.
- ✓ Has excellent hand-eye coordination.



Orthopedic surgeons use their hands in other ways as well. The care of fractured bones makes up a significant proportion of a typical orthopedist's practice. Reducing broken bones and dislocations and holding them in place can sometimes be just as challenging as surgery. Placing casts and splints is definitely an art form. During residency training, many of these techniques are handed down from the senior resident to the more junior resident year after year. After all, there are many fine subtleties in casting that take dedication and practice. One simple mistake can mean the loss of the reduction or a painful cast sore. The feeling of warm wet plaster often brings a smile of satisfaction to the faces of most orthopedic surgeons. The cast is their creation and their work of art.

THE DOCTOR–PATIENT RELATIONSHIP

As an orthopedist, you have a variety of professional relationships with your patients. Some patients are treated only once, such as a man with a trigger finger who requires a simple injection. Others—like elderly patients with severe osteoarthritis—may be evaluated repeatedly. Other short-term appointments in-

clude preoperative evaluations and postoperative checks. Many patients are seen for painful disorders that are interfering with their life and work, such as an injury obtained on the job. The goal of the orthopedist is to help them get through these troubling times and return them to full function. It is a rewarding and immensely satisfying privilege to do so.

It is interesting that many patients pick their orthopedic surgeon by word of mouth from family members. For instance, a grandmother may come in to see an orthopedic surgeon for her hip replacement because he did such an excellent job taking care of her grandson's broken forearm. When his older brother tears his anterior cruciate ligament while playing football, the family will again see the same orthopedic surgeon. Patients also tend to return for other problems as well. These word of mouth referrals are important to help each orthopedic surgeon establish a successful practice. Without a good bedside manner and surgical skills, this would not be possible.

SPORTS MEDICINE: BEING A TEAM PHYSICIAN

The practice of sports medicine is a part of nearly every orthopedic subspecialty. In fact, many athletic medical students choose careers in orthopedic surgery because of their attraction to the glamour of sports medicine. Although internists, pediatricians, and emergency medicine physicians can also pursue fellowships in this subspecialty, only orthopedists manage all types of sports-related injuries from both a surgical and medical (nonoperative) approach.

Within the community, the orthopedic surgeon can assume the role of team physician. Providing care to a local high school team, for instance, is usually done on a voluntary basis and allows the orthopedist an opportunity to give back to the community. Divided up among different orthopedic practice groups, this service serves as an excellent public relations tool. Despite the lack of direct financial rewards, the time spent with the athletes, parents, and coaches can lead to significant referrals in the future.

Many orthopedic surgeons also take care of college teams and local semiprofessional teams. Depending on the situation, this service can involve a salary or remain strictly voluntary. Medical students should be aware that the amount of time required to be a team physician at this level is not for everyone. Usually, the time scheduled for seeing these athletes is outside of normal office hours and includes patient evaluations at night or early in the morning in the training room. If the medical care also includes sideline coverage, this can add up to extensive time spent with the team and away from family. Despite the commitment, most

surgeons find that getting the athletes back into their game at this level is extremely gratifying.

Many aspiring orthopedic surgeons are excited by the prospect of caring for professional athletes. To achieve this dream, you must successfully make it through orthopedic residency training, followed by a sports medicine fellowship that includes care of a professional team, such as one of the members of the National Football League (NFL). Although the job of a professional team physician looks fairly glamorous from the outside, it is usually hard and stressful work. Dealing with owners, agents, players, and the media and balancing the needs of everyone involved can be very difficult. In today's litigious environment, malpractice premiums have skyrocketed for professional team physicians. Because they deal with players making millions of dollars, the potential monetary reward for a malpractice claim often exceeds the maximum limits of an orthopedic surgeon's insurance policy. There is also a growing trend among professional athletes of traveling to outside sports medicine centers for their operative care. The local team physician, who takes care of the player on the field and in the training room, makes the diagnosis, but if the player requires surgery, it is often the agent who chooses a surgical specialist, undermining the physician–player relationship. Because of these difficulties, more and more long-term team physicians are leaving the professional sports setting.

Although not every orthopedic surgeon serves as a team physician, most take care of sports injuries in some capacity. Sports injuries span all age groups from young kids playing football, to middle-aged joggers, to elderly tennis players. By treating these problems, you derive immense satisfaction from returning your patients to their sport and livelihood as soon as medically possible. So whether or not you enjoy sports, sports medicine care will make up some part of the everyday practice of orthopedics.

A SPECIALTY JUST FOR DUMB JOCKS?

Despite the very intense competition for residency positions in this specialty, orthopedic surgery has long been labeled as the field for dumb jocks. Why is this misleading image perpetuated among medical students? Perhaps it is because orthopedic surgery—with its emphasis on sports medicine—also always attracts athletic students. For some, the classic stereotype of an orthopedic surgeon is a large athletic man who is in the bottom of his medical class.

Yet today this perception is very far from the truth. Orthopedics has become one of the most selective and competitive residency programs. Mostly top medical students from across the nation find themselves with a position in this specialty. If

you are considering a career in orthopedic surgery, you should worry more about your grades and board scores and less about your physical size or athletic capabilities. More important, not everyone in this field of medicine is a white man. In fact, according to the most recent demographic data, all residency programs were composed of women (9.0%), Asians (12.0%), African Americans (4.5%), and Hispanics (3.6%).[1] Yet there are still not enough orthopedic surgeons from underrepresented minority groups, and it continues to remain a challenging problem.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Some medical students are scared away from surgical subspecialties due to their tough residency and busy lifestyles. Many do not realize that the long hours, heavy work, and rigorous call schedule do lighten up after the completion of residency training. Out in practice, the lifestyle of an orthopedic surgeon is quite variable and hard to pin down exactly. It is basically whatever you make of it. It depends on a number of factors, such as subspecialty training, group size, referral area size, reimbursement, competition, and call schedule. According to the American Academy of Orthopedic Surgeons (AAOS), most physicians practice general orthopedics as part of a group and spend about half of their clinical time in the operating room. They generally work much longer hours in regions of the country where reimbursement is lower and competition is higher.

ORTHOPEDIC SURGERY EMPLOYMENT DATA

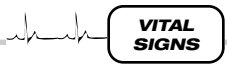
- Distribution among all physicians: 2.7%
- Practice type: 76.6% in private practice; 9.9% in academics
- Median patient care hours per week: 60.5
- 11.8% experienced difficulty in securing their preferred employment position
- 81.2% report that their salary is equal or higher than expected

Source: American Medical Association

If you truly love orthopedic surgery, do not be frightened of its rigorous lifestyle, which is typical of most surgical specialties. After long days in the office and in the OR, taking overnight call is an obligation of nearly every orthopedic surgeon in the country. However, the type and quantity of call can be quite different. In a large group practice, you may only take call once or twice a month. If the group covers a busy hospital, however, you may be up all night operating on patients.

Joining a more intimate group practice at a smaller hospital may entail a more frequent call schedule but less of a chance of actually being called in to evaluate a patient. Because there are other combinations within this spectrum, the lifestyle of an orthopedic surgeon depends on the specific practice setting. First determine your life priorities and acceptable work schedule and then seek out the practice of your dreams through careful job selection. It will be out there somewhere, but keep in mind it may not be the first practice you choose in your career.

As the specialist shortage continues to worsen, orthopedic surgeons are needed now more than ever. With the rising numbers of senior citizens in this country, there is plenty of work available for a newly trained orthopedic surgeon, scalpel and scope in hand. Among the aging population there are thousands of worn-out joints requiring replacement and just as many hip fractures needing repair. Also, with the nation becoming healthier and pursuing recreational sports later in life, orthopedic surgeons have a steady supply of injuries to treat. All across the country, rural towns and small cities are clamoring for more orthopedic surgeons. Some hospitals, in desperate need for orthopedic surgeons on staff, are now even willing to pay off student loans and guarantee large salaries.



MEDIAN COMPENSATION

Orthopedic Surgery (general)	$324,754
Orthopedic Surgery (pediatrics)	$321,432
Hand Surgery	$327,885
Joint Replacement	$400,017
Spine	$420,660

Source: American Medical Group Association

What about the stability of this specialty and its overlap with other areas of medicine? Aspiring surgeons should keep in mind that orthopedics is really primary care for the musculoskeletal system. As such, it will never get squeezed too hard from other specialties; no other physician has expertise in the entire musculoskeletal system. Over the last 20 years, there has been a limited degree of slow encroachment into orthopedics from other specialists and health professionals. Podiatrists, who have traditionally limited themselves to foot disorders, are now doing ankle work as well. Some neurosurgeons are pursuing advanced training in spine treatment to perform fracture care, diskectomies, and laminectomies from the neck down. Some will also perform carpal tunnel releases. In the area of hand care, there is some overlap between orthopedic surgeons and their colleagues in plastic surgery, who are also trained in the management of soft tissue and bony injuries of the hand. Yet there is still plenty of work to go around for everyone.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Because of its many areas of subspecialization, there are a variety of orthopedic fellowships. Most residents decide whether or not to pursue a fellowship by the end of their third year in residency training. According to the AAOS, the most popular fellowships are hand surgery, sports medicine, and spine surgery. Each accredited fellowship—no matter the subspecialty—generally lasts for 1 additional year. Some highly academic programs include an additional year of research. The orthopedic subspecialty areas do not have their own board certification examinations. Only a fellowship in hand surgery leads to any sort of recognition (a certificate of added qualifications). The others simply provide additional specialized training.

ORTHOPEDIC SURGERY 2002 MATCH STATISTICS

- 842 applicants competed for 570 positions
- 670 US seniors and 172 independent applicants ranked at least one orthopedic surgery program
- Program directors ranked 11.6 candidates for each available position
- 99.3% of all positions were filled in the initial Match
- The successful applicants: 93.6% US seniors, 1.4% foreign-trained physicians, and 0.2% osteopathic graduates
- Unmatched rate for US seniors applying only to orthopedic surgery: 14.9%

Source: National Resident Matching Program

Adult Reconstruction

If you seek additional experience in joint reconstruction of adults, this fellowship is for you. There is a strong focus on complex total joint replacements and revision arthroplasty for failed joint replacements. You will become on expert on the operative treatment of arthritis and deformity. Some programs focus only on knee and hip; others include other joints such as ankle, shoulder, and elbow.

Foot and Ankle

This fellowship provides advanced training in the care of foot and ankle disorders from simple bunions and fractures to complex deformities and wounds. Subspecialists in foot and ankle surgery are among the most needed orthopedic surgeons across the country.

RESIDENCY TRAINING

Residency in orthopedic surgery requires 5 years of postgraduate training. Some programs mandate an extra year of clinical research. There are currently 152 accredited programs. Although it varies per program, the internship year (PGY-1) usually consists of 3 months of orthopedics mixed with rotations in general surgery, other surgical subspecialties, internal medicine, and radiology. As with most surgical training, residents work long weeks in excess of 60 hours and take in-house call routinely during residency. In the last year or two, senior residents can take most night calls from home. Divided among the different subspecialties of orthopedics, the monthly rotations consist of trauma, adult reconstruction, pediatric orthopedics, musculoskeletal oncology, foot and ankle, hand surgery, sports medicine, and spine surgery. Programs that cannot provide adequate training in each subspecialty may send residents to other hospitals for subspecialty experience to meet accreditation requirements.

Hand and Upper Extremity

If you have delicate fine motor skills and like to work with microscopes or loupes, then hand surgery may be for you. This subspecialty concentrates on hand and wrist surgery for trauma (fractures, tendon injuries, nerve injuries, replants, flaps), deformity, arthritis, cancer, infection, congenital disease, and occupational injury. Some fellowships are strictly related to hand and wrist; others include other upper extremity work involving the shoulder and elbow. These subspecialists do some fine microsurgical work, such as replantation of fingers—which requires delicate nerve and vessel repair or reconstruction.

Pediatric Orthopedics

Pediatric orthopedic surgery provides training in the care of all musculoskeletal disorders and injuries found in kids. This includes the care of children with scoliosis, cerebral palsy, meningomyelocele, osteogenesis imperfecta, and other advanced disorders that can require multiple surgeries. A large portion of the training is focused on pediatric fracture care and treating other disorders such as in-toeing, clubfoot, scoliosis, and developmental dysplasia of the hip.

Musculoskeletal Oncology

This fellowship provides training in the nonoperative and operative treatment of bone and soft tissue neoplasms such as

sarcomas, rhabdomyosarcomas, and tumors that have metastasized to the bone. Many who seek out this fellowship have an interest in cancer research and treatment and enjoy being part of a multidisciplinary cancer treatment team. Your patients will range in all ages from children to the elderly.

Spine Surgery

Subspecialists in surgery of the spine have received advanced training in treating disorders of the spine—from the cervical portion down to the lumbosacral area. They repair and reconstruct spinal deformities that have resulted from trauma, infection, cancer, and degenerative disease. There is currently a shortage of specialists in this area of orthopedics.

Sports Medicine and Arthroscopy

Orthopedic surgeons with additional training in sports medicine and arthroscopy focus their practice on the care of athletes of all ages and how to take care of sports-related injuries. The vast majority of their operative experience is related to knee and shoulder injuries, with less work on the ankle, elbow, and hip. Most sports medicine fellowships provide extensive training in arthroscopy and advanced arthroscopic techniques. Many fellowships include time caring for a team, which may be a local high school, college, or even a professional team.

Trauma

This fellowship provides additional training in the management of complex traumatic injuries to the extremities and pelvis. This includes blunt and penetrating trauma as well as industrial accidents. Typical problems seen in the trauma bay are long bone fractures and complex articular fractures, including those of the pelvis and acetabulum. There is extensive training in long bone and articular fracture care as well as pelvic ring fractures. Those who seek out this fellowship should have good hand-eye coordination and excellent spatial orientation. As a member of the trauma team, you will learn how to prioritize multiple orthopedic and other surgical problems.

WHY CONSIDER A CAREER IN ORTHOPEDIC SURGERY?

If you want to get involved in a medical field that is leading the way when it comes to innovations in technology, orthopedic surgery is it. These specialists are now delv-

ing into the world of robotic surgery, gene manipulation, and medical therapeutics. The ability to alter the rate of bone healing or to correct a chromosomal error that causes a collagen disorder is fascinating. New techniques are evolving with which to grow new tissues such as menisci, cartilage, and bone. Because of the tremendous growth in research, many of the basic surgeries learned 10 years ago are being replaced by new techniques. This requires the orthopedic surgeon to constantly learn and participate in continuing medical education, particularly on topics related to biomechanics and the pathophysiology of the musculoskeletal system.

If you are considering a residency in orthopedic surgery, it is extremely important to know that this is one of the most competitive residencies to obtain. It ranks up there with most other surgical subspecialties. A decision to pursue orthopedics is best made very early in medical school. By making a decision early, you can provide yourself with the tools to match successfully in most cases. Although orthopedic surgery residency is arduous, long, and busy, the lifestyle and satisfaction you obtain is worth the effort. Most important, the ability to restore normal musculoskeletal function in your patients and to improve their lives is definitely worth it all.

ABOUT THE CONTRIBUTOR

Dr. John Langland is an orthopedic surgeon and specialist in sports medicine and arthroscopy at the Steindler Orthopedic Clinic in Iowa City, Iowa. Born and raised in Ottumwa, Iowa, Dr. Langland earned his undergraduate and medical degrees at the University of Iowa—Iowa City. He completed his residency in orthopedic surgery at the University of Wisconsin—Madison. During his sports medicine/arthroscopy fellowship at the University of Cincinnati/Christ Hospital, Dr. Langland took care of athletes from the University of Cincinnati Bearcats, the Cincinnati Bengals (NFL), and the Cincinnati Mighty Ducks (AHL). He assists medical students interested in orthopedics by managing the Orthopedic Surgery Residency Ring (http://osrr.orthosurg.net), which provides a gateway to information on orthopedic training. Dr. Langland is motivated daily by his wonderful wife, Traci, and his three children, Brittani, Christopher, and Brooke. In his free time, he enjoys water skiing, wakeboarding, and downhill skiing. He can be reached by e-mail at OSRR@orthosurg.net.

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OTOLARYNGOLOGY

Daniel J. Lee

Many medical students make the mistake of referring to otolaryngologists as *ENT* (ear, nose, and throat) *doctors*. Technically, the official name of this specialty—according to the American Academy of Otolaryngology—is *Otolaryngology—Head and Neck Surgery*. This description conveys the true scope of practice of these specialists: the medical and surgical management of any disorder in the entire head and neck region and its related structures (excluding, of course, the eyes and the brain—reserved for ophthalmologists, neurologists, and neurosurgeons).

These specialists are the ones to whom patients turn with particularly complex disorders of the ears, sinuses, oral cavity, larynx, throat, and other parts of the head and neck. The many structures in this region can all become diseased, creating a diverse group of surgical and medical problems. The patient population of infants, children, and adults is also diverse. Understanding the intricate anatomy of the head and neck is quite a challenge in itself. This is part of what makes otolaryngology such a wonderful specialty: it incorporates medical care with cutting-edge surgical technology.

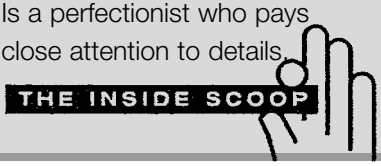
FROM ENT TO HNS: A BRIEF HISTORY OF OTOLARYNGOLOGY

Most medical students probably do not realize that otolaryngology is one of the oldest formally organized specialties within medicine. In 1896, a group of practicing ophthalmologists and otolaryngologists conducted a 2-day program of scientific presentations in Kansas City, which led to the formation of the Western Ophthalmological, Otological, Laryngological and Rhinological Association. This association was the genesis of the very first specialty board organization in the United States, the American Board of Ophthalmology, formed in 1917, and its successor, the American Board of Otolaryngology, formed in 1924.

In 1978 the specialty was renamed *Otolaryngology—Head and Neck Surgery*

WHAT MAKES A GOOD OTOLARYNGOLOGIST?

- ✓ Prefers working with his or her hands.
- ✓ Always brings new creative approaches to the same problem.
- ✓ Enjoys extensive patient contact.
- ✓ Likes seeing the immediate results of treatment.
- ✓ Is a perfectionist who pays close attention to details.



to reflect the increase in the breadth of this complex surgical field. Now, head and neck surgery, oncology, skull base surgery, and cosmetic, and reconstructive facial plastics officially became the otolaryngologist's realm of expertise.

BEING A MEDICAL AND SURGICAL SPECIALIST

Patients who suffer from hay fever, nose bleeds, loss of smell, or dizziness may benefit from an evaluation by an otolaryngologist. General otolaryngologists' domain includes diseases of the ear (hearing loss, chronic otitis media and externa, ear surgery for tympanic membrane perforations, balance disorders), the nose and sinuses (allergies, sinusitis, nasal obstruction, septal deformity), and the throat (diseases of the larynx and pharynx). These physicians are also experts in the management of head and neck tumors (salivary gland tumors, congenital cysts, thyroid tumors), chronic infections in children (tympanostomy tube placement, tonsillectomies, adenoidectomies), facial trauma and deformities, and basic voice and airway disorders (laryngoscopy, bronchoscopy, palate surgery for snoring and sleep apnea).

Otolaryngologists are unique among surgical specialists because they are trained in both surgery and medicine. After completing an accredited training program in otolaryngology, they acquire the skills to both medically and surgically diagnose and manage diseases of the ear, nose, throat, and head and neck. Otolaryngologists do not need to refer patients to other physicians when surgery is needed and, therefore, can offer the most appropriate care for each patient. Often, general practicing otolaryngologists refer specialized cases such as cochlear implants, facial cosmetics, revision sinus surgery, or advanced cancer of the head and neck to a subspecialty surgeon within otolaryngology—head and neck surgery.

Otolaryngology is an exciting medical field because of the diversity of disorders you encounter, including congenital, traumatic, inflammatory/infectious, neoplastic, degenerative, and cosmetic deformities. Accordingly, a broad base of knowledge

is required in facial, head, and neck anatomy; immunology and allergy; infectious diseases; neurology; and radiology of the temporal bone, sinuses, and neck.

As a surgical field, otolaryngology is exciting because of the varied instrumentation and surgical approaches required to treat the diversity of cases. An extremely broad skill set is required to complete these delicate operations. Surgical cases range in complexity from simple tonsillectomies and myringotomies to microsurgery of the ear and skull base, benign and malignant head and neck tumor surgery, reconstructive airway surgery, nasal and sinus surgery, microscopic voice surgery, and even cosmetic facial plastic and reconstructive procedures.

If you are interested in a specialty with cutting-edge technology (in addition to patient care), otolaryngology has both. For example, cochlear implants, the realm of a subspecialty of *otology and neurotology*, are the only bionic devices available for implantation in infants, children, and adults. Cochlear implants combine breakthroughs in acoustics and microcircuitry with microsurgical approaches to the temporal bone to provide an option for patients who no longer benefit from hearing aids. Three-dimensional CT-guided imaging techniques have enabled sinus surgeons and skull base surgeons to access complex regions of the head and neck with greater precision and safety.

THE DOCTOR–PATIENT RELATIONSHIP

Head and neck surgeons often have long-term relationships with their patients. General otolaryngologists or sinus surgeons may care for adults with chronic upper aerodigestive tract infections for months or years. Pediatric otolaryngologists may see children for years to manage recurrent infection or chronic airway problems. Otologists maintain long-term relationships to follow hearing loss, chronic mastoiditis, tumors of the skull base, and Meniere disease. Head and neck oncologists follow patients for the duration of their disease, and then to monitor recurrence following surgery, radiation, or chemotherapy. Laryngologists may have long-term relationships with patients who have vocal cord paralysis, spasmodic dysphonia, laryngeal carcinoma, or professional voice issues. Facial plastics surgeons' relationships with their patients are typically brief.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Compared with other surgical subspecialties, otolaryngologists enjoy a good lifestyle. Their colleagues often joke that ENT really stands for "easy nights and tennis." This may be an exaggeration, but the general acuity of most otolaryn-

VITAL SIGNS

OTOLARYNGOLOGY EMPLOYMENT DATA

- Distribution among all physicians: 1.1%
- Practice type: 84.3% in private practice; 10.2% in academics
- Median patient care hours per week: 52
- 15.7% experienced difficulty in securing their preferred employment position
- 66.3% report that their salary is equal or higher than expected

Source: American Medical Association

gology patients is not high; that is, there are few emergencies that cannot be managed the following day. With the exception of head and neck cancer patients, most patients who undergo surgery are relatively healthy and procedures are performed on an outpatient basis. This combination of factors makes call nights and clinical days less grueling—the patients are generally healthier and return home more quickly after surgery.

The surgical practice of most private otolaryngologists is primarily office-based procedures with a number of outpatient procedures and, occasionally, surgery that requires a 1- or 2-night hospital stay. Compensation and lifestyle are generally very good. Call may be shared with those in your group, or among a number of regional otolaryngologists. Common emergencies that require timely intervention are tonsillectomy bleeds, epistaxis (either spontaneous or following surgery), infections including peritonsillar and neck abscesses, and airway difficulty requiring tracheotomy or fiberoptic intubation. These emergencies at most require a quick awake procedure or a brief surgery under anesthesia. Facial trauma can be common; lacerations are simple to close, and more complex cases can be operated on the next day, after sufficient planning. Inpatient consultations, especially in a community hospital setting, are usually elective and rarely emergent.

Academic otolaryngologists enjoy the benefit of a teaching and research environment, and sacrifice some compensation and lifestyle benefits. The presence of residents to help cover first call for the hospital and emergency room frees up academic attendings to pursue administrative, teaching, and research responsibilities. However, the acuity and complexity of postoperative patients and inpatient consults in a larger medical center may place greater demands on the clin-

VITAL SIGNS

MEDIAN COMPENSATION

Otolaryngology	$253,971

Source: American Medical Group Association

ical practice of an academic otolaryngologist. Obviously, the nature of your inpatient service depends on your specific subspecialty. Head and neck oncologists perform incredibly complex and involved surgical cases. Accordingly, they have longer hours than their colleagues and operate on sicker patients. These patients stay in the hospital for more days than other otolaryngology cases and are generally associated with more serious complications. An otologist or sinus surgeon, for example, performs outpatient surgery much more often than a head and neck surgeon, resulting in few inpatients to round on.

The academic mission, however, can be quite fulfilling. First, the opportunity to teach medical students, residents, fellows, and colleagues allows for intellectual exchange and refinement of your skills. Second, as an academic otolaryngologist you can pursue clinical or basic science research to help advance the knowledge base in your subspecialty. Finally, your administrative responsibilities contribute to the improvement of your department, medical center, or medical school.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Advanced surgical training in the subspecialties of otolaryngology is available to graduating residents. It is important to emphasize that various aspects of all these subspecialties can be practiced by board-certified, nonfellowship–trained otolaryngologists, based on their residency training and comfort level.

Facial Plastics/Reconstructive Surgery

The surgical subspecialty of cosmetic and reconstructive facial plastic surgery has naturally evolved to become a major part of otolaryngology. This is simply because all of the surgical skills acquired during residency training involve operating safely and efficiently on the face and head and neck. Because the majority of facial plastics procedures are elective, avoiding complications and maintaining function while achieving optimal cosmetic outcomes are crucial. Aside from focused training in facial plastics during residency, cases in the other areas of otolaryngology provide additional, concentrated surgical experience in and around the anatomy of the face, especially with regard to preserving the facial nerve and its branches and assessing and restoring nasal function.

Although a significant proportion of training includes facial plastics, the vast majority of otolaryngologists and other surgeons who practice predominantly facial plastics complete fellowship training in either facial plastics or general plas-

VITAL SIGNS

OTOLARYNGOLOGY 2002 MATCH STATISTICS

- 390 applicants competed for 250 positions
- 98.8% of all positions were filled in the initial Match
- Average USMLE Step I score of matched applicants: 233
- Applicants submitted an average 39 applications and received 9.3 interviews
- Unmatched rate for US seniors applying only to otolaryngology: 15%

Source: San Francisco Matching Program

tic surgery (if interested in cosmetic and reconstructive surgery of the entire body). Facial plastics–reconstructive surgery is a very popular fellowship among graduating residents. It is typically 1 year in duration, and provides focused surgical training in cosmetic facial surgery (rhinoplasty, otoplasty, facelift, blepharoplasty, Botox injection, implants, facial peels and dermabrasion, hair transplants, etc.), reconstructive surgery (Mohs defects, auricular reconstruction, pedicled and free-tissue transfer and microvascular anastamoses for larger head and neck defects following oncologic resection), and rehabilitative surgery for facial nerve paralysis (free graft and nerve transfers, facial slings, upper lid gold weight placement), and many other procedures. Certification in this subspecialty requires successful completion of a clinical facial plastics fellowship followed by passage of the rigorous written and oral facial plastics–reconstructive surgical board examinations.

Otology, Neurotology, and Skull Base Surgery

This subspecialty encompasses the medical and surgical problems of the outer, middle, and inner ear, and the skull base. Balance, or vestibular disorders, also fall within this subspecialty. Perhaps one of the oldest subspecialties in otolaryngology, otology and neurotology is a fascinating field that has benefited tremendously from improvements in microsurgical techniques, nerve monitoring, enhanced cooperation with neurosurgery, and advancements in acoustics and microcircuitry for middle ear and cochlear implants.

Typical medical problems in otology and neurotology include pediatric and adult hearing loss and tinnitus, chronic otitis media, otitis externa and mastoiditis, cholesteatoma, tympanic membrane perforations, otosclerosis, disorders of imbalance (benign positional vertigo, Meniere disease, labyrinthitis), and tumors of the skull base (acoustic neuromas, meningiomas, facial nerve tumors, epidermoids, and pituitary tumors).

Otologic cases include tympanoplasty and mastoidectomy surgery, ossicular chain reconstruction, cochlear implants, middle ear implants, bone-anchored hearing aids, and stapes surgery. Both pediatric and adult otologic cases are seen. Skull base cases include temporal bone resection, facial and acoustic neuroma resection, meningioma surgery, pituitary surgery, cerebrospinal fluid leak repair, and superior canal dehiscence resurfacing. These cases often require a middle or posterior craniotomy approach, and are often performed jointly with a skull base neurosurgeon.

Otology is an exciting field—the anatomy is incredibly complex and challenging—and the surgery is generally restorative. Technological breakthroughs and greater acceptance by the deaf community have made cochlear implants very popular—they represent the most successful attempt to interface a bionic device with the human central nervous system. Tumors are usually benign in skull base surgery, and preserving function is usually the primary goal—especially with respect to the facial nerve. The microsurgical skill set required to perform otologic surgery is vastly different from the demands of soft tissue surgery, and this is why virtually all otolaryngology departments have separate temporal bone laboratories with drilling stations to provide additional time and training for residents, fellows, and staff.

In many ways, otology is a hybrid specialty between otolaryngology and neu-

RESIDENCY TRAINING

Residency in otolaryngology requires 5years of postgraduate training. There are currently 103 accredited residency programs. All residents complete 1 year of general surgery internship before training in otolaryngology. It is possible to tailor the internship year to include rotations that closely overlap with future training, such as plastic surgery and anesthesiology. Within the 5-year residency, up to 6 months may be used for research. Some programs allow residents at add up to 2 years of protected research time to their total training. Residents work long hours and take frequent overnight call, but the amount of in-house call decreases with each successive year. Call nights are more difficult in programs with significant facial and neck trauma exposure. The complexity of cases and patient responsibility—culminating in the fifth year (chief residency)—increases dramatically. Clinical exposure includes rotations in the four major areas of this specialty: facial plastics, head and neck surgery, otology and neurotology, and pediatric and general otolaryngology. Completion of basic

(*continued*)

residency training allows you to practice pediatric and adult general otolaryngology, head and neck surgery, facial plastics, and otology. For individuals who wish to pursue advanced training, opportunities exist for fellowships in subspecialty areas.

rosurgery. The majority of practicing otologists and skull base surgeons have completed additional fellowship training beyond residency. This fellowship period is now 2 years in duration and can include protected research time. As of 2003, a subspecialty certification examination in otology and neurotology is offered to fellowship-trained candidates.

Otology is an attractive subspecialty because most of the surgical cases are clinic-based or elective outpatient procedures on relatively healthy patients. For the academic otologist, this allows more time to conduct basic science or clinical research.

Head and Neck Surgery

Head and neck surgery encompasses the medical and surgical diseases of the upper aerodigestive tract, neck, and salivary glands. In the academic center, a typical head and neck surgeon is a surgical oncologist; reconstruction of head and neck defects following major tumor resection may be performed by the same surgeon, or by a plastics/reconstructive surgeon in a team approach.

Typical clinical problems seen in head and neck surgery include squamous cell carcinoma of the upper aerodigestive tract and neck, benign and malignant neoplasms of the salivary glands, congenital cysts and masses of the upper aerodigestive tract and neck, and benign and malignant thyroid and parathyroid disease. The classic head and neck surgeries include resection of primary cancers of the oral cavity, oropharynx, or larynx, and neck dissections for metastatic disease. These cases can be quite challenging and exciting and require meticulous surgical technique to preserve the functional anatomy and countless neurovascular structures that abound in the head and neck, while achieving adequate oncologic resection. Reconstruction of the defect can be done primarily (without grafts or flaps) or with the use of pedicled flaps or free flaps, which require harvesting tissue from a separate site and performing microvascular reanastamoses to provide blood flow to the new tissue.

These oncologic resection and reconstruction cases can be quite long (6 to 12 hours or more!) and involve several surgeons. Salivary gland surgery (parotidectomy, submandibular gland resection, etc.) and thyroid/parathyroid surgery also involve meticulous surgical techniques to preserve the facial nerve

or the laryngeal nerves, respectively. The variety of head and neck surgical cases, the challenge of resection and reconstruction to preserve speech and swallowing function, and the many opportunities for research (especially the tumor biology and genetics of squamous cell carcinoma) make this subspecialty attractive to many graduating residents.

Laryngology

The functional anatomy of the voice box, or larynx, is fascinating. Disease processes that affect this organ system are managed by laryngologists. Advances in fiber optics and imaging technology coupled with sophisticated rehabilitation techniques have revolutionized this field. Typical problems laryngologists encounter include hoarseness (dysphonia), problems with swallowing (dysphagia), vocal cord weakness and paralysis, management of the professional voice, vocal cord polyps and masses, neoplasms of the larynx, and upper airway stenosis and obstruction. Many procedures are office based and utilize state-of-the-art fiberoptic and stroboscopic digital imaging and analysis of the upper airway and larynx.

Often, a laryngologist sees patients with a speech and language pathologist, who assists in the initial fiberoptic evaluation of the upper aerodigestive tract and larynx. Temporary medialization of the paralyzed vocal cord and Botulinum toxin injections for spastic vocal cords are two common office-based laryngologic procedures. Common surgical cases include endoscopic and microsurgical evaluation and dissection of laryngeal polyps, nodules, and other lesions; laser surgery of laryngeal lesions and webs; permanent medialization procedures for vocal cord paralysis; and resection of laryngeal cancer, both endoscopically and via the neck in larger tumors.

Laryngeal fellowships are typically 1 year in duration and have become increasingly popular, especially for concentrated training in advanced microsurgical techniques of the larynx and management of the professional voice.

Sinus Surgery/Rhinology

Sinus surgery and rhinology deal with the medical and surgical aspects of nasal and sinus disease, as well as disorders involving the anterior skull base. Common problems include nasal obstruction and smell disturbances, chronic sinusitis and rhinitis, allergies, proptosis, and medical and surgical disease involving the anterior skull base. The advent of surgical endoscopes and modern video imaging, coupled with advancements in three-dimensional CT scan-guided surgical

scopes and instruments, has revolutionized this very popular surgical subspecialty, which formerly depended on more invasive open surgical approaches with less cosmetically appealing results.

Common surgical cases include endoscopic sinus surgery for chronic maxillary, ethmoid, or sphenoid sinusitis or chronic polyposis, endoscopic nasal septal reconstruction, endoscopic approaches to tumors of the sella turcica (like pituitary adenomas), orbital decompressions, frontal sinus surgery (both open and endoscopic), repairs of cerebrospinal fluid leaks in the anterior skull base, and oncologic surgery. The majority of sinus surgical cases are performed on an outpatient basis; anterior skull base surgery and pituitary surgery (occasionally performed with neurosurgery) and more extensive endoscopic sinus and orbital procedures are usually done on an inpatient basis.

Pediatric Otolaryngology

Common problems seen in infants, children and teenagers include chronic pharyngitis, sinusitis, and otitis media, hearing loss, congenital cysts and masses, aspiration and swallowing disorders, and upper airway obstruction/sleep apnea. Common surgical cases in pediatric otolaryngology include tonsillectomies and adenoidectomies, myringotomy and pressure-equalization tube placement, endoscopic sinus surgery, removal of foreign bodies of the upper aerodigestive tract and ear canals, upper airway endoscopy and surgery (including tracheotomies and tracheal reconstruction), resection of branchial cleft or other congenital cysts/masses, otologic surgery such as tympanoplasties and mastoidectomies, and occasionally, cochlear implants.

WHY CONSIDER A CAREER IN OTOLARYNGOLOGY?

Although highly specialized, otolaryngology demands a broad set of surgical skills and has a diverse patient population—infants, children, men, and women. Significant technological advances require a constant refinement of diagnostic, clinical, and surgical skills. With the exception of patients suffering from advanced head and neck cancer, most of your patients are generally healthy and require only outpatient operations. Otolaryngologic emergencies are few. Of course, the anatomy of the head and neck region is complex, challenging, and engaging in itself. It is a surgical region that is well-vascularized and "clean," meaning few wound infections occur.

One of otolaryngology's few shortcomings is that it is a highly competitive

specialty in which many US senior medical students find themselves without a position. The residency itself is rather strenuous. Although there is a general nationwide shortage of otolaryngologists, the major metropolitan areas have a surplus of surgical specialists. In addition, facial plastic surgeons compete with general plastic surgeons for patients while head and neck surgeons compete with general surgeons for thyroid and parathyroid cases. Given the small size of the specialty, few academic positions are available in otolaryngology for specific subspecialties in a given year.

Aspiring surgeons should not be discouraged, however. Otolaryngology's intricate procedures in small areas of the head and the neck demand excellent physical examination skills, hand-eye coordination, and manual dexterity. Otolaryngologists are fun, well-rounded professionals who enjoy surgery, teaching, clinical and basic science research, and still find time to enjoy their lives outside of the hospital. It is a specialty with many technical challenges, intellectual stimulation, and rewards.

ABOUT THE CONTRIBUTOR

Dr. Daniel Lee is the medical director of the Sounds of Life Center at the University of Massachusetts Medical Center. After earning his undergraduate degree from Columbia College, he attended The Johns Hopkins University School of Medicine, where he also stayed for otolaryngology residency as well as a research and clinical fellowship in otology, neurotology, and skull base surgery. His current research interests include the impact of deafness on mammalian brain development and the central auditory reflex pathways, which he studies at the Massachusetts Eye and Ear Infirmary—Harvard Medical School. Dr. Lee is actively involved in the education of patients and health care professionals through his websites: www.danieljlee.com, www.otomatch.com and www.cochlearnetwork.com. Dr. Lee may be reached by e-mail at otologist@danieljlee.com.

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PATHOLOGY

Lisa Yerian

Why would anyone want to become a pathologist? After all, their patients are already dead. For most people, pathology conjures up images of morgues, dead bodies, and jars of formaldehyde. Although forensics and autopsy examinations are important elements of pathology, this specialty encompasses a much wider array of investigative arenas. Pathologists use the oldest diagnostic techniques (gross examination) while at the same time developing the newest (real-time polymerase chain reaction). With these methods, they are at the forefront of medical discovery.

Pathology is exciting, multidimensional, and fundamental to medicine. Its limited patient interaction makes pathology an often-misunderstood field. Until recently, popular culture has not taken to glamorizing this medical specialty, which has led to pathology's rather low profile within society. No authors ever write novels about the heroic pathologist who spends hours poring over slides and discovers three cancer cells lurking under a lymph node capsule. Movies and television shows never portray the lives saved by a pathologist who detected mesothelioma in a hernia sac or a deadly sarcoma in a seemingly routine gangrenous toe specimen. This is, after all, what pathology is all about.

THE STUDY OF DISEASE AND ILLNESS

The practice of pathology involves the detection, analysis, and understanding of disease processes. As the only branch of medicine considered both a basic science *and* a clinical specialty, pathology is somewhat unique. By studying tissues, cells, and fluid samples, pathologists unravel the mystery of how a particular disease arises and develops. To do so, they draw on a variety of methods, ranging from microbiology to molecular biology. All diseased tissues in the body express themselves through symptoms, signs, and laboratory abnormalities. Without the

information provided by pathologists, most physicians would have difficulty interpreting their patients' clinical presentation and managing the progression of their illness.

Pathologists are divided into two types—anatomic and clinical. *Anatomic pathologists* examine organs, tissues, and cells to determine the precise cause of illness that prompted specimen removal. They make exact diagnoses on specimens from four sources—biopsy, fine-needle aspiration, autopsy, and surgery—and the information they provide is used for patient management. They love delving into gross and light microscopic examinations, immunohistochemistry, and electron microscopy. Anatomic pathologists always have to be vigilant in their work. Each day, there is the possibility of discovering unexpected disease processes.

Clinical pathologists analyze blood, body fluids, or other patient specimens. They are experts in the scientific principles and techniques of laboratory medicine. Most serve as laboratory directors at a hospital, where they are also involved in issues of management and quality assurance. These are the physicians who analyze quality control data to determine the sensitivity and specificity values of new diagnostic tests. In fact, many clinicians contact a clinical pathologist to discuss recommendations for the best test (to confirm or exclude a particular diagnosis) and how to interpret the results. To provide the answer, clinical pathologists need a good understanding of how the laboratory test works and the pathophysiologic processes that can result in abnormal findings.

Pathologists, however, are more than experts on the abnormal—they also are intimately familiar with the normal state of health. Consider this example: to detect cellular aberrations within a section of thyroid gland, pathologists mentally compare the specimen with their thorough understanding of normal thyroid morphology. Knowing healthy anatomic structure well is the most accurate way to recognize diseased states (and even yet-to-be-described pathologic conditions). Medical students interested in pathology, therefore, should work extra hard in first-year courses in biochemistry, cell biology, gross anatomy, and histology. These subjects provide the necessary framework on which pathologists ex-

WHAT MAKES A GOOD PATHOLOGIST?

- ✓ Likes precise scientific evidence.
- ✓ Has excellent management and organizational skills.
- ✓ Is an independent, studious, and inquisitive person.
- ✓ Likes serving as a consultant to other physicians.
- ✓ Enjoys the challenge of difficult cases.

pand their knowledge of human disease. Applying concepts from all the basic sciences is necessary for solving any complex patient problem.

It is not always easy to achieve the noble goals of diagnosis, description, and advanced understanding of disease. A pathologist requires an exhaustive command of the current medical literature. They have to stay on top of the latest advances and make every effort to assimilate new information. For this reason, pathology tends to attract individuals who never feel satisfied that they know (or will ever master) enough medicine. You must be committed to a lifetime of learning. Most good pathologists are copious readers because they need to know more than just the common disease entities. Their medical colleagues expect them to be ready to discern *zebras*—unexpected or unusual findings—and the associated clinical implications. "Pathologists have to know just about everything there is to know about disease," commented a senior resident. This requirement makes pathology intellectually demanding, yet extremely rewarding.

AUTOPSY AND MICROSCOPY: TO SEE FOR ONESELF

In pathology, understanding is power. If you are the type of person always wanting to know *why*, then you should definitely consider a career in pathology. Unlike other specialists, pathologists do not only rely on textbooks, journal articles, or dictated reports. Instead, they want to see for themselves exactly what is going on inside the body—deep in the tissues, within individual cells, and even in DNA, RNA, and proteins. This curiosity explains the emphasis on gross dissection (autopsy) and microscopic examination (histology). Using these skills, pathologists investigate a patient's unknown disease process or sudden mysterious death. They work tirelessly until the puzzle is solved and then move on to the next clinical enigma with great energy.

To appreciate disease for themselves, pathologists engage in a lot of hands-on analytical work. They handle diseased body parts, specimens, and pieces of tissue. They dissect bodies, slice up organs, and select the best sections to make into slides. In fact, you may be surprised to discover that pathologists function just like all other physicians. They obtain patient histories (by combing through medical records, police reports, and communications from other colleagues), perform internal and external physical examinations (on bodies and specimens), and order additional tests (including radiologic, toxicologic, and laboratory studies). In an inspiring moment of illumination, this investigation yields information that is integrated in a final diagnosis.

Pathologists like to solve problems by analyzing increasingly detailed levels

of information. After acquiring the clinical history, the post-mortem gross examination is the second step in this detective process. There are many reasons why pathologists study patients after their deaths. Many people die without ever knowing the reason; others have a primary diagnosis but the exact cause of death remains a mystery. In fact, a recent study of autopsy data found that 48.8% of deceased patients were clinically misdiagnosed.[1] Over half (58%) of these clinical errors were missed major diagnoses—if detected before death, a change in treatment may have lead to cure or prolonged survival. As the "ultimate measure of quality control in medical practice,"[2] the autopsy is essential for determining the extent of disease and the effectiveness of treatment. Autopsies enable physicians to evaluate diagnostic and therapeutic procedures so that they can prevent similar deaths and improve clinical outcomes. Of course, forensic autopsies also provide valuable information used to pursue justice. Medical examiners interpret the physical evidence to determine criminal causes of death (accidents versus homicides or suicides).

It is fascinating and humbling to see a human body inside and out for oneself. But this specialty has a greater scope than dissecting dead bodies in the morgue. Much of pathology, in fact, deals with tissues and specimens from people who are alive. Thanks to modern laboratory tests and imaging studies, most patients receive a clinical diagnosis for their problem, like sickle cell anemia or congestive heart failure. But many diseases—like ulcerative colitis—require a tissue diagnosis. This is why pathologists are also experts at *microscopic* analysis of specimens. For instance, they closely examine tissues sent directly from the operating room (frozen sections) to determine the presence of malignancy. When looking at cells under the microscope, one resident commented that "the best part about pathology is the minute in which you go from staring blankly at a field of pink and blue to knowing how to 'read' what is going on in the specimen and, therefore, in the patient's body." Combined with the autopsy, these techniques yield amazing insight into human anatomy, microscopic structure, biochemistry, and physiology.

MAKING CONFIDENT DECISIONS THAT CHANGE LIVES

Every day in hospitals across the country, pathologists make critical decisions that impact patient care. Their reports dictate the direction of a patient's treatment plan and, thereby, his or her life. The assessments are often difficult because pathologists grapple with a multitude of tough questions: Could the histologic pattern represent a follicular lymphoma or just a reactive lymph node? Does this

child's bone marrow show evidence of acute leukemia, or are the cells simply immature lymphocytes (hematogones) normally present in a young patient? Are those malignant tumor cells sitting in a lymphatic channel or within an artefactual space? How does one know if this unexpected lab value is correct?

Thoroughness, accuracy, and pain-staking attention to detail are all essential to the practice of pathology. Keep in mind that the final pathology reports have huge consequences for the patient. Their conclusions determine, for instance, whether a teenager undergoes a risky bone marrow transplant or whether a middle-aged man loses his prostate gland. After consulting with the pathologist, an oncologist may decide to initiate chemotherapy, a neurosurgeon may stop operating on a brain tumor, and a general surgeon may completely remove a patients' colon. Without good pathologists, misdiagnoses could lead to unnecessary disability, increased morbidity, and death.

Making these diagnostic decisions can be extremely difficult. Despite their poise and confidence, pathologists humbly recognize their clinical limitations. They have to balance their own level of uncertainty with their desire to provide as much useful information as possible. Many times they refrain from making a diagnosis (benign vs. malignant, positive vs. negative) if the specimen material is less than adequate. In these situations, under- or over-diagnosing a suspected lesion could yield catastrophic results for the patient. When additional information, such as new stains or antibody testing, becomes available, pathologists then adjust their diagnoses accordingly.

To provide the best patient care, pathologists constantly read, study, and know when to ask for help. When examining a specimen, they systematically think of every diagnosis a given abnormality could represent, from horses (common) to zebras (rare). They also have to determine whether a tissue sample is truly *negative* versus being *nondiagnostic*—two terms with opposite meanings and different consequences. Adding to this pressure, pathologists have to be certain that the patient's clinician understands all of the implications surrounding a diagnosis. For those interested in a career in pathology, expect some sleepless nights worrying "Did I make the right diagnosis?" and "Did I miss anything?"

The true answer to the clinical question accompanying a specimen is not always clear. Sometimes, surgeons and other clinicians identify an expected diagnosis and compel the pathologist to make an unwarranted conclusion. Often this type of pressure occurs even when there is no evidence supporting the preferred diagnosis. Self-confidence and recognition of one's limitations are attributes highly valued among pathologists. Just because a clinician believes that a patient has a given disease does not mean that the pathologist has evidence to support its

diagnosis. In the interest of patient care, pathologists stand firmly by their professional opinions, even in the face of disgruntled physicians and surgeons. They have to protect the patient from therapeutic interventions before firmly establishing a diagnosis (or lack thereof). In these cases, pathologists act as advocates for the patient.

On the flip side, a pathologist must be extremely careful if the preferred diagnosis fails to correlate with laboratory data or clinical differential diagnoses. For instance, mental alarms go off when histopathology appears inconsistent with radiologic or gross impressions, or when laboratory values do not correlate with clinical signs and symptoms. In these cases, pathologists proceed with caution. In the field of bone pathology, for example, this type of clinicopathologic correlation is essential. Bone lesions usually have characteristic appearances on radiographic films. Most textbooks, therefore, recommend that histologic diagnosis on bone lesions should never be rendered in isolation from the radiologic impression. Why is this so important? Think about it this way. During an intraoperative bone consultation, an accurate determination of benign versus malignancy could mean the difference between local resection and amputation!

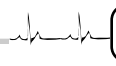
PATHOLOGISTS AS CONSULTANTS

Pathologists do not spend their entire days holed up in laboratories and morgues. As experts on disease processes, they are always communicating with their colleagues. Whether in person, on the telephone, through a written report, or at a conference, pathologists discuss patients with other physicians all the time. For instance, a pathologist receives telephone consultations from doctors wondering about the meaning of a lab value or pathologic finding. Keep in mind that every specimen arriving in the pathology department carries an accompanying clinical question. Whether the patient has an unusual neck mass or a surprising laboratory result, clinicians turn to pathologists for the answer. Sometimes the questions are not as clear, and pathologists have to sort out the relevant clinical inquiry. Is it cancer? What type, grade, and stage? Are there additional features that help assess the patient's prognosis and potential response to therapy?

The famous physician Sir William Osler once referred to the pathologist as "the doctor's doctor." Every aspect of their clinical care is essentially a consultative service. Because of this advice-giving role, good communication skills (both oral and written) are of utmost importance. While making the best diagnosis, pathologists often struggle to state their findings in a clear, concise manner. They

formulate comments that convey the relative significance of individual findings but never understate or overstate their degree of certainty. It is a challenging art form. "Communication skills are my currency with the clinicians," a senior faculty member in pathology remarked. "Other doctors cannot tell how good a pathologist is diagnostically. So, they only judge us on our ability to communicate the relevant information."

Because of this consultative role, pathology is a perfect specialty for medical students who appreciate precision in written and spoken language. Pathologists have to produce the most accurate and clearly written reports. They have to dictate each observation succinctly and in the proper format. For cases in which a diagnosis cannot be made, they must enumerate the relevant findings and the significance of each. If a possible diagnosis exists, the pathologist has to be careful about overstating their conviction. Like all fields of medicine, pathology is fraught with gray areas. Thus, in some cases, pathologists walk a fine line between under- and over-interpreting the findings. It is quite a challenge to submit final reports that are clinically useful yet do not over-imply diagnostic certainty. Word selection and order become critical factors. As such, pathologists tend to be good writers, striving to develop precise and accurate reports.



PATHOLOGY
EMPLOYMENT DATA

- Distribution among all physicians: 2.3%
- Practice type: 64.4% in private practice; 22.8% in academics
- Median number of patient care hours per week: 44.1
- 23.5% experienced difficulty in securing their preferred employment position
- 58.6% report that their salary is equal or higher than expected

Source: American Medical Association

THE DOCTOR–PATIENT RELATIONSHIP

Like other hospital-based physicians, such as those in radiology and anesthesiology, pathologists are anonymous, behind-the-scenes doctors. After all, most pathologists do not meet, talk with, or examine their patients. It is an unsuitable specialty for medical students wishing to perform thorough history and physicals and have intimate doctor–patient relationships. Although there are rare exceptions—bone marrow biopsy, fine needle aspiration, and plasmapharesis—in general, pathologists have no patient contact. Instead, pathology is perfect for those

immensely satisfied by providing other physicians with the best thing possible—the most carefully considered, sweat over, thoroughly analyzed diagnosis.

Despite this lack of patient contact, pathologists are real doctors who always care about people. Although seemingly invisible to their patients, their unique role allows them to make a big difference in patients' lives. One residency program director reiterated why pathologists are some of the most caring doctors around:

When I was in medical school, one of my patients died during a surgical procedure that I, pressured by my attendings and residents, advised the patient to have. After that point, I decided that never again would a person die because of something I said.

Although she wanted to avoid making life-or-death decisions in medicine, she ironically chose a specialty—breast pathology—where she has to make these kinds of decisions every day. She pores over cases late into the night and through weekends, searching for foci of tumor invasion and checking resection margins to verify if the surgeon completely removed the tumor. A diagnosis of invasive malignancy sentences a patient to a dangerous and traumatic course of surgery, chemotherapy, and radiation. In fact, this pathologist cares about patients so much that she turned to a defense mechanism—choosing a specialty in which she would not have to go through the emotional pain of directly interacting with patients, their fatal diseases, and their families.

QUESTING FOR KNOWLEDGE: PATHOLOGIC RESEARCH

In all fields of medicine (and especially pathology), the current textbooks and medical literature barely keep up with the growing amount of clinical and basic science information. There is always much more to discover and learn. And the pathologist holds the best position to ask and to answer probing questions about disease processes. Every day, they are the ones examining gross, histologic, cytologic, chemical, and molecular alterations. They have daily access to clinical material and are in constant direct communication with clinicians. Because of the integration of basic science and clinical consulting, pathologists have a distinct advantage in the area of translational research. As physician-researchers, pathologists maintain a special ability to identify the tissue, diagnosis, and cells in question. Today, with refined molecular techniques, researchers can detect subtle changes in human tissues and cells with increasing degrees of sensitivity and precision.

Pathologists advance our understanding of disease by studying tissues, cells, receptors, proteins, and genes, and their roles in disease. They analyze unusual findings, recognize patterns of disease, and make new connections between abnormal observations. They take new developments from laboratory bench research and test them for bedside utility. They develop new diagnostic tests and procedures, identify gene mutations and new disease entities, and study the pathogenesis of disease. In doing so, many pathologists either conduct their own research or collaborate with other researchers (not necessarily MDs). Through articles in scientific journals, together they bring the latest techniques to the forefront of clinical use. For these reasons and more, pathologists hold an optimal position to pursue descriptive and experimental research.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

A day in the life of a pathologist is difficult to describe, given the variation between different areas of specialty. For anatomic pathologists, a typical day includes reading slides, writing reports, and communicating with clinicians on a formal and informal basis. For clinical pathologists, a typical day includes tasks related to overseeing clinical laboratories in addition to speaking with colleagues. For both types of pathologists, an academic setting also includes some teaching and research. In general, though, the practice of pathology entails controllable working hours. Compared to other specialists, pathologists have more employment opportunities that provide a good lifestyle for family and outside interests. Pathologists are rarely called into the hospital at late hours. But, as consultants to other physicians, they still have to be available if such services are necessary. For most, this responsibility means carrying an institutional pager, typically on a rotational basis with other pathologists in that hospital or practice group.

Emergencies are rare, but can happen. In anatomic pathology, intraoperative consultations (frozen sections) require the presence of a surgical pathologist in the hospital to give an immediate tissue diagnosis. Most surgeries involving a potential cancer diagnosis are scheduled as elective cases during the day. Sometimes, however, a late-night, weekend, or emergency surgery requires a pathologist to come in from home to perform the frozen section. In clinical pathology, high-priority overnight calls come in the form of urgent laboratory values that must be reported to the clinician who ordered the test. At other times, pathologists may have to show up to confirm an abnormal finding that requires prompt therapeutic intervention, such as leukemic blasts in peripheral blood smear. Other late night calls may involve rush advice on the best test to rule out a par-

VITAL SIGNS

MEDIAN COMPENSATION

Pathology	$221,242

Source: American Medical Group Association

ticular diagnosis, the best way to obtain a particular specimen, or administrative and managerial issues.

Pathologists can pursue a variety of practice options. Most work in private practice, either at community hospitals or stand-alone laboratory centers. Clinical pathologists typically serve as laboratory directors, consulting to clinical services on challenging cases and making clinicopathologic diagnoses. Others work in regional or local independent laboratories. A significant number, particularly those dedicated to careers in research and teaching, become faculty at medical schools and university teaching hospitals. Forensic pathologists typically work in city or county medical offices. Government, military, pharmaceutical, and biotechnology organizations make up the remaining group of employers. There are many exciting opportunities for pathologists in all avenues of practice.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

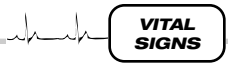
Blood Banking and Transfusion Medicine

Packed red blood cells, cryoprecipitate, single donor platelets—these are some of the products under the expertise of the transfusion specialist. These pathologists oversee blood donation, pretransfusion testing of compatibility and blood-related antigens and antibodies, and selection of blood for transplant. Therapeutically, they manage transfusion reactions, plasmapharesis, exchange transfusion, and peripheral stem cell harvest. From kids with leukemia to adults with anemia, these pathologists have opportunities for patient contact and work closely with clinicians. In most hospitals, they often act as immunohematologists, procuring and processing blood products and tracing the causes of transfusion reactions. Blood banking specialists make sure that patients in the hospital receive safe blood products.

Clinical Chemistry

Did you particularly enjoy biochemistry class? These pathologists draw on their expertise of biochemical processes to diagnose, confirm, and monitor a patient's disease status. They use sophisticated tests that quantify levels of many inorganic

substances in body fluids—electrolytes, gases, glucose, proteins such as tumor markers and cardiac enzymes, hormones, and antibodies (such as those that indicate the presence of HIV or hepatitis viruses). Clinical chemists apply this biochemical data to understand the cause and progress of disease in the human body. Toxicology is also an important part of chemical pathology. Here, the specialist performs therapeutic drug monitoring and detects illegal drugs or poisons. As supervisors of laboratory technicians, clinical chemists assure accurate measurements through a tight system of quality control.



PATHOLOGY 2002
MATCH STATISTICS

- 639 applicants competed for 398 positions
- 214 US seniors and 425 independent applicants ranked at least one pathology program
- Program directors ranked 5.6 candidates for each available position
- 83.7% of all positions were filled in the initial Match
- The successful applicants: 66.3% US seniors, 29.7% foreign-trained physicians, and 4% osteopathic graduates
- Unmatched rate for US seniors applying only to pathology: 2.1%

Source: National Resident Matching Program

Cytopathology

Rather than examining whole tissue sections, cytopathologists study individual cells obtained from fluid samplings, secretions, fine-needle aspirations, scrapings, and mucosal brushings. In the pursuit of a diagnosis, these specialists draw on techniques of cytochemistry and immunocytochemistry, in addition to standard light microscopy. They look closely at the nucleus, cytoplasm, and cellular adhesion features. The Papanicalou (Pap) smear—the shining star of cytopathology—still remains the best cancer screening tool ever invented. Cytopathologists examine thousands of cervical screening tests and save many women's lives.

Dermatopathology

Dermatopathologists are experts in diagnosing diseases of the skin. Certification in this subspecialty is under joint responsibility of the American Board of Pathology and the American Board of Dermatology. They become specially trained in various forms of microscopy (light, electron, and fluorescence). Dermatopathol-

RESIDENCY TRAINING

Residency programs in pathology vary in length, depending on whether one chooses to complete training in anatomic pathology (3 years), clinical pathology (3 years), or both (4 years). There are currently 155 accredited programs, mainly in combined anatomic and clinical pathology. Pathology does not require a medical or transitional internship year. During residency, physicians do not take in-house call, but rather go home every night and return to the hospital during the night if needed. Much of the training emphasizes reading and self-study. Typical anatomic pathology rotations include surgical pathology, cytopathology, autopsy, and forensic pathology. Typical clinical pathology rotations include clinical chemistry, microbiology, transfusion medicine, coagulation medicine, and immunology. Fellowships in pathology last 1 to 2 additional years and lead to a special qualifications certificate.

ogists work closely with their colleagues in dermatology to diagnose infectious, inflammatory, and malignant processes.

Forensic Pathology

Every day, in the hospital, at home, and out on the streets, people die unexpectedly. Some deaths are unexplained or have suspicious circumstances, while others are secondary to violent trauma, homicide, or suicide. In these instances, the bodies are transported to the county coroner's office, where forensic pathologists perform a partial or complete autopsy examination. They establish the cause of death through gross inspection, microscopy, toxicology tests, and crime laboratory methods. In addition to performing autopsies and writing the official report, they also occasionally testify in court. In some cases, the forensic pathologist even visits the crime scene to conduct an investigation. Many forensic pathologists serve as chief or deputy medical examiners of a city or county.

Hematopathology

Hematopathologists draw on an extensive array of techniques to examine a specimen. These specialists are experts in diseases of the lymph nodes and bone marrow, such as leukemias and lymphomas. They examine bone marrow samples from patients and review abnormal blood smears for malignancy, infection, and anemia. They integrate gross and microscopic examinations with information derived from clinical hematology, flow cytometry, immunohistochemistry, cytoge-

netics, and molecular laboratories. Hematopathologists work closely with their colleagues in medical hematology–oncology. Together, they integrate laboratory testing and clinical data in the evaluation of patients with leukemias, lymphomas, and bleeding disorders.

Medical Microbiology

Enjoy looking at bacteria, viruses, parasites, and fungi? Medical microbiologists strive for efficient isolation and accurate laboratory diagnosis of infectious diseases. They are trained not only in the principles used to establish diagnosis, but also in the correlation of culture results with the clinical setting. In addition to culturing and classifying organisms, microbiologists also utilize in vitro antimicrobial susceptibility testing when indicated. They also participate in epidemiologic studies and hospital infection control procedures.

Molecular Genetic Pathology/Cytogenetics

If you like the latest, coolest techniques in molecular biology as they apply to human disease, this is the subspecialty for you. These pathologists utilize molecular methods, such as polymerase chain reaction and gene sequencing, to analyze abnormal cells at the level of DNA, RNA, or protein. Tests offered by the molecular diagnostics laboratory include virus detection and identification, mutational analysis for genetic counseling, and evaluation for clonality and translocations. Cytogeneticists study the chromosomes to look for abnormal number and structure for diagnosis and to monitor disease status. Prenatal, constitutional, and cancer cytogenetic analysis provide information that is widely used in many fields of medicine.

Neuropathology

Neuropathologists specialize in the study of diseases of the central and peripheral nervous systems and their related tissues. They also often review muscle biopsies in the workup and diagnosis of myopathies, neuropathies, and neuromuscular disorders. Much of their work centers on gross and histologic examination of specimen material. Yet, in the complete workup of a case, neuropathologists also review MRI and CT scans as well as electron microscopy.

Pediatric Pathology

Pediatric pathologists specialize in the diagnosis and study of diseases of the developing human embryo, fetus, and child. This broad area of pathology encom-

passes disorders of early development (including embryology, placentology, and teratology), gestational and perinatal diseases, and diseases of childhood. They usually practice both surgical and autopsy pathology, reviewing surgical biopsy, prenatal, and autopsy specimens.

Surgical Pathology

Surgical pathologists make histologic diagnoses based on tissue sections from biopsy and surgical resection specimens. Their most acute role—being a consultant—occurs during the urgent, intraoperative frozen section. Freezing permits the tissue to be sectioned thinly so that microscopic analysis can be performed within 20 minutes while the patient is on the operating table. Surgeons need these pathologists to answer several crucial questions: Is it cancer? Should we perform a more extensive excision? Are lymph nodes involved? Is the malignancy totally excised? In addition to tissue diagnostics, surgical pathologists develop new classification systems, describe new clinical entities, and test prognostic markers. Surgical pathology offers a variety of fellowship opportunities in every organ system: gastrointestinal/liver, breast, lung, cardiac, head and neck, bone and soft tissue, renal, genitourinary, obstetric/gynecologic, and endocrine. Subspecialty training in an area of surgical pathology provides additional time to study, refine diagnostic skills, and pursue research.

WHY CONSIDER A CAREER IN PATHOLOGY?

Consider a career in pathology because you are prepared to have patients' diagnoses—and consequently treatment—rest in your hands. Choose pathology because you like to be precise in your words and exacting in your diagnoses. Choose pathology because you are careful and vigilant in your work and tireless in your commitment to arriving at the best diagnosis. Choose pathology because you want to help each patient by guiding his or her care with your knowledge, experience, and wisdom. Choose pathology because you feel inspired rather than intimidated by the vast amount of knowledge you must acquire and continue to have at your fingertips throughout your career. Choose pathology because you want an intellectually rigorous specialty. Choose pathology because you want to use your knowledge to make observations, to ask questions, and, in doing so, to contribute to medical knowledge.

Pathology is a fundamental discipline of medicine, requiring a broad mastery of basic and clinical sciences. The practice of pathology requires you to re-

tain your knowledge of pathophysiology from medical school education and build upon that knowledge to understand disease processes at ever-increasing levels of complexity. As physicians, consultants, and researchers all in one, pathologists contribute to patient care by making diagnoses and guiding therapeutic intervention. They are educators who impart their knowledge and understanding to their colleagues. Pathologists are real doctors who are simply fascinated by disease and its cellular processes.

One pathologist commented that "pathology is a versatile specialty that may not have been 'found' by many. Certainly those who have found it love it."[3] If you enjoy delving into scientific mystery and prefer the science of medicine over direct patient care, then consider becoming a part of the select group that have found their niche within this specialty.

ABOUT THE CONTRIBUTOR

Dr. Lisa Marie Yerian is a resident in anatomic pathology at the University of Chicago Hospitals. She earned her BS in biology at the University of Notre Dame and attended medical school at the University of Chicago. After completing fellowship training in gastrointestinal and liver pathology, she plans to practice at an academic medical center. In her free time, Dr. Yerian enjoys antique collecting and cooking (the kitchen is her second laboratory). She can be reached by e-mail at l-yerian-11@alumni.uchicago.edu.

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3. *Ibid.*

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26 PEDIATRICS

Aaron J. Miller

In nineteenth century England, before the advent of pasteurized milk, immunizations, intravenous hydration, or antibiotics, half of all children died before reaching their fifth birthday.[1] George Armstrong, a prominent physician of this time, described in his *Account of the Diseases Most Incident in Children* (1808) how the specialty of pediatrics was quite literally still in its infancy, with many doctors simply afraid to take care of infants and children:

I have heard an eminent physician say, that he never wished to be called in to a young child; because he was really at a loss to know what to order for it. Nay, I am told, that there is nothing to be done for children when they are ill.[2]

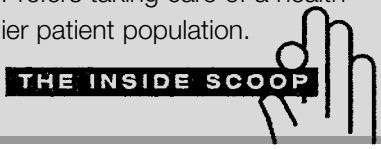
Clearly, the medical care of children has come a long way. In addition to the primary care and preventive medicine of general pediatrics, pediatricians can choose to focus on acute problems requiring immediate treatment (critical care, neonatology, emergency medicine) or a wide range of technical procedures (cardiology, pulmonology, gastroenterology). With such a wide variety of career options, considering a career in pediatrics starts with one not-so-simple question: Do you like kids?

CARING FOR CHILDREN AND YOUNG ADULTS

Pediatrics is the specialty of medicine that focuses on the comprehensive care of children—beginning from birth and continuing through the adolescent years. Yes, kids are cute, innocent, and fun and most will get better. But children also rarely explain their symptoms, know several ways to soil your clothing, have parents who can be frustrated and angry, and sometimes, sadly, do not get better. It is important to note that caring for kids is not just about treating their physical and medical problems. Every good pediatrician also addresses the mental and emotional

WHAT MAKES A GOOD PEDIATRICIAN?

- ✓ Has a particular interest in children.
- ✓ Enjoys extensive patient contact.
- ✓ Is a laid-back, sensitive, and good-natured person.
- ✓ Likes working with his or her mind.
- ✓ Prefers taking care of a healthier patient population.



health of their patients, which is equally as important as organic disease.

Most pediatricians practice general pediatrics, which particularly involves a lot of health maintenance and preventive medicine. It is your crucial job to make sure the child is developing appropriately, is reaching each milestone, and is otherwise healthy. Without you catching if there is anything wrong, the child could have serious health problems as an adult. In the outpatient setting, the emphasis is on growth, development, diagnosis of acute and chronic illness, parent education, and child advocacy. The inpatient setting also covers a wide range of medical and social issues, from respiratory distress in preemies to head trauma in adolescents.

General pediatricians enjoy the challenge of being proficient in a wide range of topics. Many diseases of adulthood first present in infancy and childhood with just a few vague symptoms, and the general pediatrician must know the initial workup and then when to consult subspecialists. For example, a patient who is not gaining weight has a wide differential diagnosis including gastroesophageal reflux, celiac disease, Hirschsprung disease, inflammatory bowel disease, congenital heart disease, hypothyroidism, cerebral palsy, neglect, cystic fibrosis, tuberculosis, HIV, urinary tract infection, renal disease, metabolic disease, eating disorders, collagen vascular disease, and malignancy. The pediatrician keeps the wide differential diagnosis in mind when taking the first steps, obtaining consults when necessary, and making sure that every last test and lab result is being followed up. During sick visits, your skills in diagnosis are critical as you decide which kids will improve on their own and which kids are truly sick and need further attention.

HOW TO BE A GOOD PEDIATRICIAN

The keys to caring for children and enjoying the field of pediatrics do not always come naturally. Medical students with any interest in kids should take full advantage of their core clerkship and learn as much as they can from the residents

and attending physicians. By getting an inside glimpse into the skills required to care for children, you will quickly figure out whether or not pediatrics is the right match.

For both office visits and admissions to the hospital, all pediatricians first have to establish a good rapport with the child and his or her parents. A rushed introduction keeps the child and parents on edge, making the examination difficult and trust harder to gain. From the moment you walk in to the room, set the tone by going straight to the child and introducing yourself with your first name. Kids are usually apprehensive about meeting doctors, and if you introduce yourself to the parents first, it reaffirms their fear that the physician is there to talk about "something bad" that is going on. You then look at the child and parents to gauge their level of anxiety and worry. Especially if the diagnosis or prognosis is unknown, pediatricians have to use more concrete reasoning—with a focus on the facts—with both parent and child.

After introductions, it is important to convey empathy for what the child and the parents are experiencing. Even a simple affirmation—"you guys must be exhausted"—goes a long way toward helping both parties feel like their concerns, anxiety, and needs are well understood. If the situation is not too tense, pediatricians look to break the ice by asking the child to "give a high-five" or asking the teenager about their career aspirations. When children perceive that their doctor is a fun, laid-back kind of person, they feel much more relaxed and at ease as well.

After obtaining a complete history, pediatricians begin the second important part of their evaluation: the physical examination. Often this starts by taking a minute to observe how the child looks in a parent's arms or in his bed. A child can convey a great deal of subtle clinical information to the physician in these moments of quiet and tranquility. For example, a toddler admitted for a cough might cry at a rate of 28 breaths per minute (which is normal) but may be loud enough to conceal abnormal findings like wheezes and rhonchi. Giving this child a few minutes to calm down, however, could reveal a breathing rate of 50, indicating respiratory distress. In this case, pediatricians often wait until the patient has relaxed (and does not have those large breaths or that surge of adrenaline helping her) before an examination.

Pediatricians are very careful to make sure that they obtain an accurate physical examination. To help keep a scared child at ease, they playfully hand children their stethoscope, or have their mother put it on their chest. Especially when examining infants and toddlers, pediatricians know to check their ears and throat last. All initial cooperation quickly dissolves as soon as the doctor

grabs that otoscope and tongue depressor. This is important because pediatricians, as excellent diagnosticians of abnormal heart sounds, must always listen carefully to the child's heart. After all, 1% of children are born with major congenital heart lesions, including atrial and ventricular septal defects, obstructive lesions, and cyanotic heart disease.[3] Because nearly half of all children will have a murmur at some point in their life, your cardiac examination skills play a crucial role in diagnosing sick children and, likewise, in preventing many needless referrals.[4]

When discussing the options for treatment, pediatricians have to assume the role of educator. They not only explain the potential therapy choices to the parents, but also have to draw on their creativity to explain it to the child in an understandable way. Children and their parents come to their pediatrician in their most vulnerable moments—physically and emotionally—and they need someone who places their issues into perspective and explains why a certain plan of action is best.

WORKING WITH CHILDREN AND THEIR PARENTS

Medical students often wonder about the special relationship between children's parents (the "second patient") and their pediatrician. At certain times, you will grow frustrated because you are dealing with parents who have become overly demanding. In the inpatient setting, there is little difference between pediatric patients and adult patients—both will have family members whose anger will test your patience. In the outpatient setting, where most kids are healthy, you will have fewer of these encounters, but each one will still require you to understand the bigger picture.

Although the parents of sick children can become frustrated or angry, pediatricians can still alleviate their concerns. The parents' anger is mostly based on a fear of the unknown, often made worse due to exhaustion from being up all night, and the fear that they are not being listened to or are not being informed of the current plan of diagnosis and treatment. All pediatricians know that a few minutes spent listening intently and acknowledging their experience will bring a strong sense of relief and trust.

Although the pediatrician–parent relationship can be challenging at times, there is nothing quite like the privilege of caring for their children. It takes more than just liking kids to be a good pediatrician. Because children are often hesitant to explain their symptoms, you must be able to approach them on their level to connect with them. Kids are fun. Their energy and enthusiasm are very re-

freshing. After settling the pressing medical issues at hand, at least for the moment, pediatricians look for any opportunity to make the child smile. Kidding around and being playful is just a part of your job. Have fun with it. And at the end of the day, when you are tired from having dealt with this battle and that, there is nothing quite as fulfilling as knowing that you have helped a young, innocent child.

Not everything, however, about pediatrics is easy, fun, and rosy. It is particularly tough to cope with the death of one of your young patients. Unlike adults, who sometimes can accept death if they have "lived a complete life," a child's death is always sad. Your heart goes out most to the family, because you know that the loss you are feeling is only a fraction of the loss that's hitting them. It is a time of quiet and reflection. Your empathy and patience will help be the foundation as they begin their process of grieving and healing. Although some kids do not get better from their illness, fortunately very few children die. In fact, the overall mortality rate of children in the United States, from birth to 19 years, is 0.07%.[5] The neonatal and pediatric intensive care units, where deaths most frequently occur, draw physicians who are strong enough to deal with the loss of a patient on a regular basis.

BEING AN ADVOCATE FOR CHILDREN

In every field of medicine, physicians act as advocates for their patients. This role is especially important in pediatrics, where your patients are only beginning to find their voice. With every new issue, pediatricians are always asking themselves, "What is it that brought this child here?" and more specifically, "What are the family dynamics at home and the living conditions that may have contributed to this issue?" Whether taking a careful history when a child suffers a burn, working with community leaders to make homes safer, or just asking about environmental exposures for a child with asthma, pediatricians are always looking for answers that will make a real difference in a child's life.

The American Academy of Pediatrics (AAP), which has always advocated on children's behalf, was originally founded in response to the government's policies on child health. Under the Sheppard-Towner Act of 1921, the federal government aimed to reduce infant and child mortality by creating matching grants for states to provide teaching to new mothers and frequent health visits for their newborns. As one of the first movements to provide health care for the poor, the program was seen as "an imported socialistic scheme" by certain members of the American Medical Association (AMA) and the government. In 1929, the law was

repealed, and tensions rose. Seeing that the needs of children were being neglected, a group of pediatricians split away from the AMA in 1930 and formed the AAP.

Pediatricians today have many avenues to focus their energy. Clinical research, community involvement, acute care settings, and the office all provide opportunities for pediatricians to find their own niche to do what they do best: care for children.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

In general, pediatricians lead busy but manageable lives. However, the hours worked and amount of call taken varies greatly among practice settings and pediatric subspecialists. General pediatricians in ambulatory settings work 4 or 5 days a week and are on call for parents' phone calls on a regular basis. Some of the middle-of-the-night phone calls can become tiring over time, but pediatricians who spend more time educating their anxious parents during office visits will end up sleeping much better.

VITAL SIGNS

PEDIATRICS EMPLOYMENT DATA

- Distribution among all physicians: 7.5%
- Practice type: 83% in private practice; 12.7% in academics
- Median patient care hours per week: 44
- 20.8% experienced difficulty in securing their preferred employment position
- 59.5% report that their salary is equal or higher than expected

Source: American Medical Association

Private practice is a great setting for those who like to make the big decisions about where, when, and how a practice will run. Going into solo practice is still possible, but many pediatricians choose to join a group practice. The group can hire you as a general employee, or you can be hired for a partnership track. This track usually consists of working for them for a year, then, if it goes well, buying into the practice. Being a partner adds another layer of challenges, but allows more freedom. You will have equal say in every issue, from leasing office space and hiring support staff, to deciding which insurance plans you will accept and which lab tests should be run in your office.

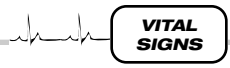
The majority of childhood illnesses can be handled during office hours set aside for sick visits. If the child needs more attention, however, your role in the

emergency department (ED) remains very important. Many EDs today are staffed by pediatricians, allowing you to take part in the patient's progress on the phone and arrange for prompt follow up. In some suburban and rural hospitals, however, the ED is staffed by adult physicians who do not feel comfortable performing procedures like lumbar punctures on newborns. Pediatricians sometimes have to come in during the middle of the night to perform these procedures. In addition, you also may be called in to attend cesarean section deliveries. Although most hospitals have nurse practitioners or residents to cover all deliveries, some rely on private pediatricians to take regular call.

In a group practice, all physician members take alternate turns going to the hospital to round on the group's inpatients. The morning starts in the nursery, meeting new babies and their families, and then moves to the general floor. Rounds usually finish before noon, in time for you to go back to the office and see afternoon appointments.

Hospital-based clinics and health maintenance organizations (HMOs) are good positions for pediatricians who do not want to deal with every last detail of the business side of a practice. These offices are just as fast-paced as private offices—and sometimes even busier. Many contracts with hospital-based clinics require the pediatrician to spend 1 month per year as the attending on the hospital's general floor. This month serves as a nice break from the day-to-day work of the office and offers an opportunity to work with a wider circle of colleagues and learn more about how to handle certain disease processes.

As the entire field of medicine has specialized, more hospitals have begun hiring pediatricians to be the full-time attending of service on the general pediatric floor. They are known as *hospitalists*. This position is especially good for those



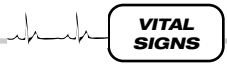
MEDIAN COMPENSATION

Allergy and Immunology	$140,689
Cardiology	$185,000
Endocrinology	$137,398
Gastroenterology	$165,094
General Pediatrics	$149,429
Genetics	$130,008
Hematology/ Oncology	$174,290
Infectious Disease	$147,394
Neonatology	$201,702
Nephrology	$176,815
Neurology	$150,480
Pulmonary Medicine/Critical Care	$176,678

Source: American Medical Group Association

who enjoy a more acute setting where kids are sicker and need more immediate workups to diagnose their illness. Many cases can be handled by you, the general pediatrician. In a tertiary care center, where patients have many more chronic and complex conditions, the general pediatricians then assumes the role of team leader, working with specialists on a daily basis and learning from their input the important information that will help make a diagnosis and treat the sick child.

FELLOWSHIPS AND SUBSPECIALTY TRAINING



PEDIATRICS 2002 MATCH STATISTICS

- 2821 applicants competed for 2209 positions
- 1769 US seniors and 1052 independent applicants ranked at least one pediatrics program
- Program directors ranked 7.1 candidates for each available position
- 90.2% of all positions were filled in the initial match
- The successful applicants: 78.4% US seniors, 14.4% foreign-trained physicians, and 4.5% osteopathic graduates
- Unmatched rate for US seniors applying only to pediatrics: 1.3%

Source: National Resident Matching Program

The many subspecialty areas within pediatrics are great for those physicians who want to know everything about a particular focused topic. In the past decade, there have been multitudes of advances in scientific research. In particular, doctors and scientists are studying the early childhood roots of many chronic adult illnesses, providing plenty of exciting new prospects for early diagnosis and treatment. Many pediatrics subspecialists eventually choose to stay in an academic setting, where their time is split between clinical work, teaching, and research. A growing number of subspecialists, however, are taking their skills into private practice.

Except where noted, each of the following fellowships requires 3 full years and leads to official board certification. In general, the first year is full of clinical work—with long hours spent on the wards—and the last 2 years are mostly research based with the occasional overnight call.

Adolescent Medicine

This subspecialty is a great field for those who want to become advocates and give

advice to an age group that really needs it the most. For most teenagers, these years are the healthiest ones in their lives. They have outgrown many childhood illnesses and their body is years away from starting to wear out—but they still struggle with many important issues, including school performance, sexuality, substance abuse, sexually transmitted diseases, pregnancy, depression and more. For many of your patients, you will be the only adult with whom they feel comfortable talking about their issues. Every encounter with them is an opportunity to validate their feelings and experiences, letting them know they are sane for feeling as they do, and that they should still aim high and chase after their dreams.

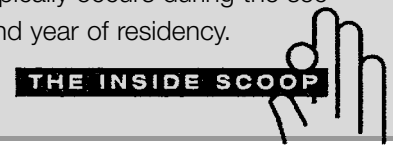
A fellowship in adolescent medicine can be entered from both pediatrics and internal medicine. The pediatrician is more familiar with how they got where they are, and the internist is more familiar with where they are headed. Either way, you will become an expert in helping young adults to achieve their full potential.

Allergy and Immunology

This subspecialty offers a relaxed practice setting in which you apply the concepts of immunology to real patient problems. You will be consulted to evaluate infants and children with disorders like eczema, unexplained episodes of anaphylaxis, fre-

RESIDENCY TRAINING

Residency in pediatrics requires 3 years of postgraduate training. There are currently 208 accredited programs (excluding combined programs with other specialties). Residency programs are offered by both academic medical centers and community hospitals. The training includes experience in both general pediatrics and subspecialty areas. It is a rigorous program, requiring in-house overnight call every third to fourth night while on an inpatient rotation. Rotations in general pediatrics, subspecialties (consults and clinic), intensive care (pediatric and neonatal), nursery, and emergency medicine are required. Because of the current emphasis on primary care, one third of the residency curriculum must take place in an ambulatory setting. All residents spend one-half day per week in a continuity clinic where they manage their own panel of patients over the course of 3 years. The decision to subspecialize and apply for fellowships typically occurs during the second year of residency.



quent sicknesses or rare diseases, failure to thrive, and vomiting or diarrhea that has not responded to initial treatment. This field also offers leading areas of research, where almost every day new forms of immunotherapy are coming forward to help treat immune-mediated disease. A fellowship in allergy and immunology lasts 2 years and qualifies the subspecialist to treat both adults and children.

Cardiology

Cardiology is a busy, exciting field in which you gain expertise in a wide range of technical skills. To diagnose complex congenital heart disease, these subspecialists perform many echocardiograms (an ultrasound of the heart) and cardiac catheterizations (threading catheters into the heart to define its anatomy through fluoroscopy). They also manage pacemakers and cardiac arrhythmias. Of all pediatric subspecialists who remain at an academic medical center, cardiologists often have the longest hours, working closely with cardiac surgeons and PICU staff to manage complex cardiac disease. For those who maintain more of an office setting, referrals come in for evaluation of new murmurs, chest pain, syncope, and palpitations. Although many times these symptoms end up not being related to the heart, there will be a significant number of children you will diagnose with arrhythmias like the Wolf-Parkinson-White syndrome and structural abnormalities like patent ductus arteriosus.

Child Protection

Child protection, sometimes referred to as *forensic pediatrics*, is an intense field in which the pediatrician becomes a medical expert on questions of abuse and issues of child advocacy. You learn the intricacies of interviewing a child who might reveal a story of molestation, while being careful not to ask leading questions. You act as a consultant to lawyers, and if there is no plea bargain, you are occasionally called to testify. The medical side of this subspecialty includes treating fractures, intracranial and retinal hemorrhages, sudden infant death syndrome, burns, ingestions, sexually transmitted disease, abnormal genitalia, rashes, and Munchausen syndrome by proxy. Accidental trauma is sometimes indiscernible from nonaccidental trauma, leading the state to undertake investigations of many parents. Many child protection specialists, therefore, have interests in researching the incidence and mechanism of accidental injuries in children, working with leaders in the community to find more effective ways to make homes safe and avoid harmful injuries. A fellowship in child protection lasts 2 years and is in the process of gaining board certification.

Critical Care Medicine

Critical care medicine is the perfect fit for pediatricians who prefer an acute fix-it-now-type setting. These subspecialists perform lots of procedures like placing chest tubes, central lines, and endotracheal tubes. They are the experts of physiology and medicine as managers of the ventilators, ventriculostomies, and invasive heart monitors. The ability to think quickly is of paramount importance as they assess and treat patients suffering from head trauma, postoperative cardiac surgery with complex physiology, sepsis, severe asthma, end-stage cancer, and more. Critical care pediatricians also must have a great deal of compassion, sympathy, and the ability to speak with families when their child is dying. The death of a child is especially sad, and parents cope with this tragedy with fear, anger, and frustration. Your empathy and patience help serve as the foundation for their process of grieving, healing, and coming to terms with the loss they are about to experience.

At academic centers, critical care specialists are on service about 2 weeks per month and sometimes need to stay long hours when there are very complicated cases. Other institutions are structured with shift work, allowing very predictable hours.

Development

Developmental specialists have a keen eye for subtleties in the pediatric examination. With infants, they first rule out any concurrent medical causes for a given delay and then perform a careful assessment so that appropriate referrals for speech, occupational, or physical therapy can be made. Infants who are at risk for delays should also be referred to developmentalists, including those born prematurely, those who had congenital heart disease or meningitis, or those who experienced any other event that may have temporarily impaired oxygen flow to the brain.

Older children with learning issues in school can also benefit from seeing a developmentalist. Although the general pediatrician should feel comfortable diagnosing and treating attention-deficit hyperactivity disorder, some children may have receptive or expressive deficits at the root of their problem that, if diagnosed, could lead to more effective strategies for therapy. Currently, a fellowship in developmental pediatrics lasts 3 years. In the near future, this fellowship will become part of a 6-year residency leading to triple board certification in pediatrics, neurology, and development.

Emergency Medicine

Emergency medicine attracts those who enjoy the challenge of a totally undiagnosed patient needing immediate attention. They must be comfortable knowing every type of disease presentation and form of trauma. After stabilizing the patient's airway, breathing, and circulation, the physician moves immediately to diagnosis and treatment. With patients who are more stable, the pediatrician must have strong clinical skills to assess how ill a patient truly is, and whether it is safe for them to go home. When a patient is nonverbal, this decision can be difficult. Similar to adult emergency medicine, this subspecialty carries a higher rate of malpractice lawsuits. These suits come more often from frustration, and occur less often with physicians who take a quick minute to sit down during the history taking, helping the parents feel that they are receiving the doctor's full attention.

One of the advantages of emergency medicine is the flexibility in work schedule. If you are a mother or father and only want to work part time, you can earn a very good salary working just two or three 12-hour shifts per week.

Endocrinology

Endocrinologists love hormones. On a daily basis, they focus on the biochemistry of the human body and how it relates to thyroid function, calcium deposition, menses, extreme obesity, genital ambiguity, secondary sex characteristics, insulin-dependent and insulin-resistant diabetes mellitus, short stature, and more. With so much groundbreaking research in medicine today happening at the biochemical level with cell receptors and manipulation of DNA, endocrinology has become a field rich with opportunity for research and development.

Gastroenterology

From infants who are failing to thrive to teenagers with possible signs of inflammatory bowel disease, the gastroenterologist plays an integral role in tough cases where a diagnosis is not known. Upper and lower endoscopy are your tools to visualize the disease process within the patient's gastrointestinal system and to biopsy the tissue for help in discerning between immune-mediated, infectious, and neoplastic etiologies. For instance, with infants, you use pH probes to help see whether chronic vomiting is gastroesophageal reflux alone or also due to a milk protein allergy. A significant number of children with chronic medical issues and problems gaining weight need a gastric feeding tube, and you will learn to insert this tube percutaneously aided by endoscopy. Emergencies needing a

consultation from a pediatrics gastroenterologist, such as upper GI bleeding, occur less often with kids than adults, which allows for regular working hours.

Hematology–Oncology

Because hematology and oncology encompass such a wide variety of diseases and treatments, many subspecialists eventually concentrate on one of these two fields. Both areas are extremely interesting because an initial abnormality in white blood cells, hemoglobin, or platelets can end up having a wide range of causes, including genetic, infectious, immune-mediated, ingestions, metabolic, and neoplastic. Diabetes, cancer, and several unknown factors put some children at higher risk for thrombotic events. They show up in the emergency room with an acute episode, which means that this subspecialist takes on the challenge of finding the cause and initiating anticoagulation. Many of the patients in your office will be children suffering from complications of sickle cell anemia or iron-deficiency anemia that did not respond to iron therapy.

Pediatric oncology attracts physicians who have a strong desire to always be there for their patients and family during tough and scary times when no one knows whether the child will be able to grow up and have a healthy life. Fortunately, with the latest therapies, we are approaching the point where 80% of all cancer in children and adolescents can be cured.[6] Research in genetics and tumor angiogenesis provides even more hope on the horizon.

A fellowship in pediatric hematology–oncology is very intense. As an attending, your months on inpatient services will be very busy. However, hematology and oncology patients receive most of their care as outpatients, which means months not spent on service will be very manageable.

Infectious Disease

Stubborn bugs and new-fangled drugs make up the world of infectious disease. Along with understanding the physiology and defenses of the human body, subspecialists in this field enjoy knowing all about bacteria, viruses, parasites, fungi, and the critters that host them and pass them on to children. In the inpatient setting, these pediatricians are consulted for advice on treating infections with resistant bacteria and patients with complex medical issues. Many specialists in pediatrics infectious diseases take care of children who are HIV positive. They provide regular medical care, follow their CD4 antibody count and viral load, and spend time talking with the child and helping ensure that he or she will be compliant with medications.

Neonatal/Perinatal Medicine

Neonatologists deal with a wide range of medical issues, from lung immaturity and intraventricular hemorrhage in preemies to infectious issues and congenital defects in full-term infants. *Perinatal* is often added because it emphasizes how neonatologists work in close conjunction with obstetricians in cases of preterm labor or when a fetal abnormality has been diagnosed by ultrasound or amniocentesis. Advancements in technology and medical understanding have lowered the minimum age of viability of newborns to 22 to 23 weeks gestation. Along with these advancements have come many ethical and philosophical questions about quality of life and how much should be done. Neonatologists, therefore, pay close attention to the desires and dynamics within the infant's family, spending time with them to help them cope and understand what lies ahead.

Depending on the hospital where these specialists choose to practice, most maintain predictable working schedules in the form of shifts. In academic medical centers, they are more likely to serve as the attending physician for month-long blocks at a time, available by phone every night to discuss cases with the fellow or nurse practitioner.

Nephrology

Pediatric nephrologists have a vast understanding of human physiology and the body's shifts in fluids, electrolytes, and acid–base disturbances. They diagnose and treat a wide range of diseases: renal artery stenosis, post-streptococcal glomerulonephritis, diabetes insipidus, and chronic renal failure. From the time they perform the renal biopsy, through the process of peritoneal dialysis, nephrologists build strong relationships with their patients who have chronic disease. During a morning clinic they might see referrals for hematuria or proteinuria that was not explained by the initial workup of the general pediatrician. In the afternoon, they make rounds on the inpatient ward to manage, for example, the high-output renal failure of a child who has just received a new kidney. Residents and attendings always seem to be picking their brains during interesting cases at morning report—their insight is always quite helpful.

Neurology

Pediatric neurologists are very patient, caring individuals who spend most of their time with children who suffer from diseases of the nervous system. These prob-

lems can range from benign headaches, seizures that disappear in late childhood, and attention deficit disorder to severe and progressively fatal diseases such as Duchenne muscular dystrophy, progressive seizure disorders such as infantile spasms and tuberous sclerosis, and various congenital brain malformations such as Dandy-Walker syndrome and pachygyria. Their careful examination skills help to find focal deficits, leading to quicker diagnosis and appropriate treatment. Many find this field frustrating because it seems like symptoms are only controlled and patients are rarely cured. But pediatric neurologists are drawn to their field because they know their interventions can improve their patient's quality of life. A fellowship in pediatric neurology is usually part of a combined residency (2 years of pediatrics, 1 year of general adult neurology, and 2 years as a fellow in pediatric neurology).

Pulmonology

Almost every disease process can affect a child's breathing and lung function, making pulmonology a very busy and exciting field. With infants, the pulmonologist helps to determine whether repeated wheezing episodes are from environmental triggers or due to aspiration from a swallowing dysfunction or gastroesophageal reflux. For toddlers, they get to use bronchoscopes to remove small Lego pieces that have been aspirated and polysomnograms to diagnose sleep apnea. Children of any age acquire complicated pneumonias that may form loculated pleural effusions needing a chest tube for drainage. When a child has asthma severe enough to cause more than one admission to a hospital, a pulmonologist is consulted and continues to see them as an outpatient, providing important education and treatment that will help save the patient's life.

Rheumatology

Pediatric rheumatologists have a gift for taking vague symptoms of aches and pains and rashes, and finding a diagnosis and treatment that can drastically improve a patient's quality of life. In the mysterious world of immune-mediated diseases, clinical and bench research are revealing that children and adolescents suffer from a set of diseases that is distinct from adult diseases. *Juvenile rheumatoid arthritis* (JRA), for instance, is falling out of vogue because it is not simply rheumatoid arthritis in a small person. Rather, the various juvenile inflammatory arthritides have distinct characteristics that need be taken into account when de-

ciding on a plan of action. Other diseases pediatric rheumatologists diagnose and treat include Lyme disease, the various forms of lupus, and dermatomyositis. Treatments for most rheumatologic diseases (anti-inflammatories and immunosuppressants) are not curative, but they are very effective in helping children live healthier, happier lives.

Sports Medicine

Sports medicine is a 1-year fellowship that provides great freedom for pediatricians. You can work as a general pediatrician and use the training to be the team physician for schools in your community, or you can join an orthopedics practice and work full-time helping children and adolescents with all types of injuries. With high-achieving athletes, watch closely for signs of eating disorders and irregular menses, and with certain fractures in children, carefully consider whether the mechanism of fracture merits further investigation. Fellowships in sports medicine are very competitive and can also be entered from family practice and internal medicine.

WHY CONSIDER A CAREER IN PEDIATRICS?

Pediatrics offers many different avenues in which a physician can find his or her personal niche: long-term health issues, acute critical care, and specialties that emphasize anything from physiology to psychosocial skills. A career in pediatrics also provides balance, because you continually educate both children and their parents. By building long-term relationships, pediatricians get to see kids when they are doing well, not just when they are sick. In the same day that you meet an infant who may not be growing properly, you will also give words of encouragement to a teenager, inspiring him to set goals for his future, and talking to him about sex, drugs, and rock 'n roll.

At the most fundamental level, of course, all pediatricians simply love working with kids. Forming special connections, they can understand and communicate with children when other doctors may not. While building a great deal of trust, pediatricians help kids reach their potential and be the best they can be. Medical students considering this specialty should make the most out of their clerkship and determine whether spending time with infants, children, and young adults is something that they enjoy. If you come away even a little more energized, with a feeling of gratification from having helped a child, then perhaps pediatrics is the career for you.

ABOUT THE CONTRIBUTOR

Dr. Aaron Miller is a pediatrician currently practicing in New York City. After growing up in Indianapolis, he did his undergraduate work at Goshen College and attended medical school at Indiana University School of Medicine. Dr. Miller completed his residency in pediatrics at New York Presbyterian Hospital—Cornell Medical Center and currently focuses his work on child advocacy and child protection. During his free time, he enjoys singing in the New York Choral Society. Dr. Miller can be reached by e-mail at am74@ureach.com.

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PHYSICAL MEDICINE AND REHABILITATION

Vicki Anderson

Surprisingly, many students have completed several years of medical school before they finally learn about "PM&R" and what this specialty entails– the restoration of function using physical modalities. Physical medicine and rehabilitation is based on the philosophy that addressing physical and cognitive impairments due to injury and disease will decrease disability. Physicians who specialize in PM&R are known *as physiatrists.*

Physical medicine and rehabilitation is a little-known specialty that even remains misunderstood by some in the medical community. If you tell someone you are interested in physiatry, you will undoubtedly get many questions: Did you say psychiatry? You are going to become a physical therapist? Are there really residency programs in physical medicine and rehabilitation? How long has this specialty been around? Although ignorance of this burgeoning field is still common, this should change in the near future as demand for the specialty continues to grow and as patients continue to make amazing achievements while under the care of a physiatrist.

AN OVERVIEW OF PM&R

Physical medicine and rehabilitation is the discipline concerned with preventing, diagnosing, and treating a variety of neurologic, musculoskeletal, and cardiopulmonary disorders through rehabilitation programs. A typical patient base can include those with conditions such as strokes, spinal cord injuries, traumatic brain injuries, burn injuries, postchemotherapy and cancer deconditioning, sports injuries, multiple sclerosis, amyotrophic lateral sclerosis, and, in children, cerebral palsy, spina bifida, muscular dystrophy, and postoperative orthopedic procedures. Because of the vast spectrum of disease, physiatrists can focus on one

(or more) of these medical problems. For instance, in many practices, there are physicians who subspecialize in pediatric rehabilitation and take care of only these younger patients.

Physiatrists coordinate the rehabilitative care of physical impairments and disabilities using a multidisciplinary approach. They prescribe pharmacologic agents to treat conditions such as spasticity, musculoskeletal pain, and neurologic pain. Along with prescribing medicines, physiatrists formulate specific physical and occupational therapy regimens—exercises that address each patient's individual needs. Every regimen is tailored to prepare the patient to meet a particular goal.

It is the physiatrist, with the help of the rehabilitation team, who sets goals for the patient. This interdisciplinary team includes physical therapists, occupational therapists, psychologists, nurses, dietitians, social workers, case managers, speech pathologists, and audiologists. With the PM&R specialist as team leader, they meet at appropriate intervals during a patient's hospital stay to discuss the patient's progress, goals, and any pertinent social or psychological issues. The team also includes, in an important sense, the patient and his or her family, with whom the physician also meets to ensure open lines of communication. Education of both patient and family is essential to increase the likelihood that the patient's physical and social needs are met. Ultimately, this means a successful integration into society.

Other essential responsibilities include prescribing assistive and adaptive devices to augment the patient's level of functioning: a wheelchair or walker to increase mobility, a communication device, or extensions to allow greater independence in performing daily tasks. To do so, physiatrists assess the difference between a person's functional level and the functional level required to perform a specific task. Physiatrists evaluate whether a wheelchair is the appropriate size and the seat is positioned at the right angle. They are experts at determining the energy expenditure required of patients with orthotic and prosthetic devices and prescribe these devices accordingly.

In rehabilitation care, the patient's basic neurologic and musculoskeletal function is essential, as well as the many psychosocial issues that affect the patient's participation in the community. PM&R is *holistic care* because it does more than prevent disease. This includes a program that attempts to solve the social and economic problems that may interfere with the patient's recovery.[1] As public policy and education advocates, physiatrists play a major role in public awareness of safety. In this specialty, therefore, you will find many opportunities to fight for patients' rights.

Physiatrists not only determine the rehabilitation goals, but also decide whether or not an individual is a proper candidate for rehabilitation. A physiatrist has the right and responsibility to withhold inpatient rehabilitation from ineligible patients, such as hospice patients who are not expected to regain much function before the end of their lives. As you can tell, an entire array of possible ethical situations can confront a physiatrist. But just like any other area of medicine, patients are free to obtain second opinions. Conceivably, one physiatrist may not accept a patient for rehabilitation while another deems her or him an appropriate candidate.

Other ethical issues physiatrists face include concerns of distribution and access to health care resources. Like other primary care physicians, they may find themselves spending increasing amounts of time convincing an insurer that physical rehabilitation will benefit the patient and ultimately save money and resources. Of course, in many of these instances, the bottom line is the incentive to cut costs, but perhaps the idea of spending resources on those with disability also plays a role. "As human rights and the dignity of the human being overcome archaic prejudices and economic priorities, new legislation will be passed to assist the disabled and the handicapped to take their rightful place in society."[2] Unfortunately, physicians can spend much time and effort fighting for human rights through paperwork, telephone conversations, and lobbying. For those involved in this struggle, this time-consuming advocacy work has been largely successful and quite rewarding. Equal rights acts such as the 1990 Americans with Disabilities Act came into fruition. Disabled people now have greater access to public places and transportation making possible greater functioning at home and work. Physiatrists, along with other advocates, lobbied to propel these issues to the forefront and influence the political system. Ultimately, they sought to better meet the needs of people by promoting health and quality of life.

Physiatrists do not just treat patients with severe disability, however. In recent years, the field of PM&R has also attracted many who are interested in sports medicine—working with trained athletes and dancers. Sports medicine doctors can become athletic team physicians. The goals of care for the professional athlete and the performer are obviously different than for a patient who has moderate to severe disability. In these cases, the physiatrist is focused on enhancing performance or is treating an injury due to repetitive movements. For both the athlete and performer, PM&R specialists are trained in dynamic interventional techniques that can enhance balance and proprioception and increase range of motion and strength.

PRIMARY CARE (SORT OF) WITH GREAT DIVERSITY

Do you like knowing what happens to patients after stabilizing an acute medical event? Are you interested in how people adapt in the aftermath of a major medical condition? Do you feel dissatisfied with the loss of contact with your patients when they are discharged from the hospital? If so, then physical medicine and rehabilitation may be a satisfying career for you. Ask yourself these questions before, during, and after your core clerkships in surgery, internal medicine, and pediatrics.

Dr. Howard Rusk, a pioneer in the field of rehabilitation medicine, identified three phases of medical care: preventive, curative, and rehabilitative. He insisted that the last phase should not be "passive convalescence," but active training to regain function and achieve greater independence and quality of life.[3] It is the attending physiatrist who prescribes physical and occupational therapies and coordinates goals among the multidisciplinary teams. The patient population consists of people with both chronic and acute medical conditions requiring rehabilitation: orthopedic patients after a hip or knee replacement, patients who have suffered strokes, or patients with major injuries leading to paraplegia and quadriplegia. The PM&R specialist can also be involved in managing heart transplant patients and other cardiopulmonary rehabilitation.

There are, unfortunately, many misconceptions about rehabilitation medicine. "Early in my career, I found it disconcerting that many other physicians didn't know very much about my specialty," commented a university-based physiatrist. "Over the years, I have found it rewarding to educate others about my career, especially because I enjoy my career so much." Patients are often transferred to "rehab" by internists and surgeons as part of discharge planning without fully understanding or appreciating the purpose of this care. Rehabilitation hospitals that provide inpatient programs are not simply dumping grounds after an acute hospitalization. At times, it can be rather frustrating to deal with this misunderstanding among colleagues. You are the one imbued with the power to decide if and when it is appropriate for a patient to begin a rehabilitation program. All physiatrists, therefore, value the virtue of patience when educating others about the importance of rehabilitation medicine. Their decisions are ultimately based on clinical expertise and their patients' best interests.

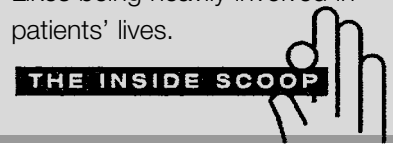
There is room for many different interests and practice types in physiatry—all of which focus on coordinating rehabilitative care and addressing each physical impairment or disability. For instance, if you like a lot of hands-on work, pain management is a subspecialty in which you can inject joints and soft tissue and

manage spinal cord stimulators, among other procedures. Physicians who choose this field often want to do physical work, such as performing simple procedures or acupuncture, without the intensity of major surgery. There is also time to evaluate and treat conditions under less pressure.

Physical medicine and rehabilitation is a specialty with great variety. Rather than focusing on one body system, the physiatrist collectively evaluates and treats deficits in function that may result from one or more anatomical or physiological abnormalities. One physiatrist commented that she liked the fact that PM&R "is not limited to any one organ system—it is not even limited to the body—but includes the psychosocial aspects of the patient's care." PM&R doctors can treat both the young and old, for this type of care is needed among all people, no matter their age. However, most physiatrists are able to tailor their practices based on their interests and training.

WHAT MAKES A GOOD PHYSIATRIST?

- ✓ Enjoys caring for chronic problems.
- ✓ Can be satisfied by small successes (possibly over long periods of time).
- ✓ Is a creative, hopeful, easy-going person.
- ✓ Can lead an interdisciplinary health care team.
- ✓ Likes being heavily involved in patients' lives.



THE DOCTOR–PATIENT RELATIONSHIP

Are you inspirational? Would you like to build long-lasting relationships with your patients? The doctor–patient relationship is a valuable and rewarding part of a career in PM&R. You meet patients at their baseline functional status and help them to overcome their initial limitations, thus building long-term connections. One of the many rewards in physiatry is the enormous sense of fulfillment and purpose in the day-to-day activities. Although clinical improvement may be slow in many instances, small gains over time in a patient's function and quality of life make it worth all the effort.

A patient under the care of a rehabilitation doctor has a higher chance for significant functional improvement from a recently acquired physical impairment. The earlier you establish this relationship, the better the outcome. The PM&R doctor is a constant source of stability and encouragement. Many patients prefer to see only their physiatrist for medical care. Their clinics are usually more accessible for the handicapped, and patients may feel greater acceptance by the

clinic staff. Most people naturally believe that their overall level of functioning has a great influence on their physical health. A physiatrist is more likely to delve deeper into these issues by inquiring about the specifics of their patients' daily functioning.

A career in physical medicine and rehabilitation also means that you must feel comfortable discussing many personal—often intimate—issues. For instance, patients with disabilities, especially spinal cord injuries, may be concerned about sexual functioning as well as reproductive problems. These concerns must be addressed with care and sensitivity, which is part of what being a good physician is all about.

Many physicians who choose this specialty have been influenced by personal experience with disability, either their own or that of someone they know. What is your own interest in working with people who have disabilities? Do you feel comfortable in their presence? If you ask PM&R specialists why they chose this specialty, the overwhelming response is that they "like taking care of people." Their responsibilities, therefore, are twofold: clinical work, in which they take care of patients with physical impairments, and advocacy work, in which they fight on behalf of people with disabilities.

HOW TO BE AN EXCELLENT PM&R PHYSICIAN

A superb understanding of neuroanatomy, neurophysiology, and the musculoskeletal system serves as the basis for your daily practice when evaluating patients and discussing rehabilitation plans with colleagues. All physiatrists can execute the neurologic examination as well as any neurologist and the musculoskeletal examination as skillfully as any orthopedic surgeon or rheumatologist. As directors of an interdisciplinary team, good physiatrists are also adept at coordinating people and tasks.

In an inpatient rehabilitation facility, the physician manages many chronic medical issues, such as controlling blood sugars in the diabetic patient, continuing anti-hypertensive medicines for the stroke patient, and administering cardioprotective agents for the post-heart attack patient. Other medical complications that may occur under a physiatrist's care include neurogenic bladder, autonomic dysreflexia, and spasticity. A PM&R doctor must be adept at managing acute situations, too. When preventive measures fail, the rehabilitation doctor must either handle an acute scenario or delegate the responsibility to the appropriate party. Moreover, a good PM&R specialist is astute at determining when a previously stable patient becomes acutely ill. Some are born with this intuitive skill; others develop it with experience.

THE TYPICAL DAY OF A PHYSIATRIST

In physical medicine and rehabilitation, the types of conditions you will treat encompass a variety of functional impairments. For example, an older patient population provides more opportunities to work with stroke rehabilitation and hip and knee replacements. A younger population, on the other hand, may present with more traumatic injuries, such as those suffered in sporting accidents or violent crimes.

In an inpatient rehabilitation setting, there are three areas crucial to a patient's health. A PM&R specialist is first responsible for managing any acute medical issues, such as hypertension, diabetes, and infectious disease. Second, you address medical concerns uniquely related to rehabilitation. These include pressure ulcers and problems related to proper bowel and bladder function. You may find yourself placing urinary catheters, measuring urinary bladder volume, disimpacting bowels, or debriding ulcers at the bedside. Third, there are functional rehabilitation issues to consider. In an acute rehabilitation setting, patients stay in rooms with beds much like other hospitals, but there are also physical therapy gyms and other therapy spaces where small miracles take place daily. A PM&R physician might also want to evaluate patients during their therapy sessions. For instance, a physical therapist might demonstrate a patient's limited flexibility for the physiatrist so that he could, in turn, prescribe or recommend other exercise or modalities to enhance the patient's range of motion.

Interdisciplinary team rounds are also an important part of physical medicine and rehabilitation. In this group, various allied health professionals share information about patient progress and, as needed, revise their goals for patient care. These comprehensive rounds enable PM&R specialists to get the whole story on the progress and treatment of their patients. Specialists in physical medicine and rehabilitation take part in three major clinical activities throughout their daily practice.

Prevention

Physiatrists encourage their patients to live safely, maintain safe homes, and wear helmets and proper equipment when participating in sports. In an effort to reduce the probability of injury, for example, a physiatrist who is the physician for a sports team makes judgments as to whether it is safe for a player to continue participating. Generally, education plays a key role in the effort to prevent both initial injury and disease and the complications that result from injury and disease.

Diagnostics

The history and physical examination are essential tools in this specialty. Often patients are referred to PM&R specialists after receiving an initial diagnosis (and in some cases after the initiation of treatment). The physiatrist must then reevaluate the situation and bring new, creative solutions to the table. The patient history allows the physiatrist to focus on the patient's premorbid functional level and set appropriate goals. They ask questions like, "How many stairs do you have at home?" and "What types of things can you do for exercise, before and now?" Physical examinations are often repeated during the care of a rehabilitation patient. The ability to remain objective, pay attention to details, and compare physical examinations to chart progress is invaluable to this specialty.

To help define disease and its progression, all physiatrists make use of laboratory and radiologic studies. They regularly perform electromyography (EMG), nerve conduction studies, and evoked potential studies—diagnostic modalities that residents in both PM&R and neurology are trained to use. Using these high-tech tools can help to differentiate between motor neuron disease, radiculopathies, peripheral neuropathies, and myopathies. These studies, therefore, complement each other and supplement the clinical history and physical examination in diagnosing a neuromuscular disorder.

Therapeutics

An inpatient rehabilitation program consists of standard management of patients' concurrent medical problems along with the rehabilitation medicine. Therapies used by PM&R physicians include, among many, paraffin baths, physical therapy, ultrasound deep heat, transcutaneous nerve stimulation, high-voltage galvanic stimulation, biofeedback, phonophoresis, and microwave diathermy. Physiatrists also perform intramuscular and intra-articular injections. Because of the wealth of treatment options, the specific ones you choose depend on your preferences. For instance, someone who trained at an institution heavily involved in biofeedback research and treatment is more likely to use this technique. PM&R specialists who trained at a school that emphasized interventional procedures may tend to turn to injections and other minimally invasive techniques.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Physiatry is a rewarding profession that allows the practicing physician to develop continuity of care with patients. This is especially true if you have a more gen-

eral practice or focus on pain management for patients who require life-long health care. Some physiatrists start solo practices, join medical groups with other physiatrists or a multispecialty practice, work in freestanding rehabilitation facilities, or remain in academics. For instance, a group of orthopedic surgeons may prefer having a PM&R specialist provide care for postoperative patients following hip and knee arthroplasty. Or a physiatrist in this group may care for patients who are not surgical candidates but have orthopedic-related medical problems. In this situation, physiatrists use their expertise to prescribe a program as part of the solution.

VITAL SIGNS

PHYSICAL MEDICINE AND REHABILITATION EMPLOYMENT DATA

- Distribution among all physicians: 0.8%
- Practice type: 79.1% in private practice; 16.5% in academics
- Median patient care hours per week: 47.9
- 23.1% experienced difficulty in securing their preferred employment position
- 55.8% report that their salary is equal or higher than expected

Source: American Medical Association

Taking a closer look at some of the statistics, you will see that there will always be a need for specialists in physical medicine and rehabilitation. Many elderly patients require rehabilitation to reclaim lost strength and function after being hospitalized for a short period of time or during their stay at a nursing home. Every year, thousands of people are born with cerebral palsy or sustain severe traumatic brain injuries, which more people are surviving than ever before. As the population ages and the rate of survival from previously fatal accidents and illnesses continues to increase, the number of disabled people continues to rise.[4] By 2020, it is estimated that 9 to 14 million people over the age of 65 will have moderate to severe disability.[5]

Because there are now only 6500 physiatrists in the United States, expanding this specialty and training more physicians are the only ways to treat all these patients with chronic disabilities. Although some analysts predict an oversupply of physicians in various medical specialties, the demand for PM&R specialists will only increase. One study projects that the

VITAL SIGNS

MEDIAN COMPENSATION

Physical Medicine & Rehabilitation	$171,549

Source: American Medical Group Association

demand will exceed the supply of physiatrists until 2015.[6] Because of advances in treating acute injuries and previously terminal diseases, there has been an increase in the number of people with physical impairments. Because physical medicine and rehabilitation is a referral-based specialty, the need for more physiatrists will only increase further as the medical community better understands and appreciates their skills and knowledge. Medical centers are now making a concerted effort to introduce PM&R to those students who may be interested in caring for people with acute and chronic disabilities.

Physiatrists' patient population overlaps with those of several other specialists: nonsurgical orthopedic practitioners (who treat sports medicine and work-related injuries), neurologists (who care for patients with traumatic brain injuries), and anesthesiologists (who provide chronic pain management services). Neurologists and physiatrists both perform thorough neurologic physical examinations, make use of EMG in diagnosis, and interpret neurologic imaging studies. But future PM&R physicians should not be overly concerned about competition within the health care marketplace. Although neurologists and physiatrists see many of the same medical conditions, they care for patients at different points in the medical timeline and vary when it comes to patient goals, treatment plans, and therapeutic modalities. In fact, some argue that they are actually part of a multidisciplinary team spanning practice boundaries. Ideally, neurologists and physiatrists should cooperate and share their knowledge and skills to help the patient achieve the best possible medical care.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Some prominent figures in the field are proponents of PM&R as more of a primary care practice. They believe that residency programs in physiatry should train graduates to become primary care physicians for patients with disabilities. Not surprisingly, there is some disagreement within the profession as to what this role would actually mean for the practice of PM&R. Advocates for a primary care model maintain that subspecialization detracts from a primary care focus, whereas others believe that the current movement toward subspecialization will strengthen, stabilize, and validate this discipline. For instance, there is a great need today for physiatrists who perform interventional techniques, such as injections for tenosynovitis, bursitis, arthritis, and myofascial pain syndrome. Not only are reimbursements for these procedures more lucrative, the delivery of health care has shifted to outpatient services to conserve expenses and control costs.

Should you consider completing a fellowship? In some instances, residency training more than adequately prepares you to practice in a subspecialty area of interest. After all, on-the-job experience as a practicing physiatrist can be enough to mold a physician into a subspecialist. A physiatrist at a rehabilitation center agreed: "If you are hired into a position—for instance your first attending job—where you are doing mainly spinal cord injury or traumatic brain injury, then you will become an expert in those areas." In fact, the first practice position you select after residency training could be more important to your career than obtaining a fellowship position. Pursuing formal subspecialty training, therefore, is an individual decision based on personal and professional objectives.

VITAL SIGNS

PHYSICAL MEDICINE AND REHABILITATION 2002 MATCH STATISTICS

- 467 applicants competed for 323 positions
- 201 US seniors and 266 independent applicants ranked at least one PM&R program
- Program directors ranked 6.8 candidates for each available position
- 89.5% of all positions were filled in the initial Match
- The successful applicants: 75% US seniors, 20.3% foreign-trained physicians, and 3.1% osteopathic graduates
- Unmatched rate for US seniors applying only to PM&R: 2.7%

Source: National Resident Matching Program

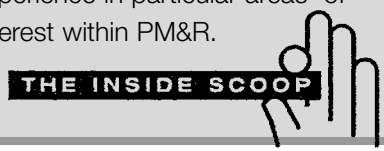
Clinical fellowships in physical medicine and rehabilitation typically last 1 year (although some include an optional year of research). Subspecialty training allows the resident to become an expert in one area of rehabilitation before actually having to treat patients as an attending physician. There are many types of fellowships available, but only three are ACGME-accredited: spinal cord injury medicine, pain management, and pediatric rehabilitation. You can become board-certified in these areas following successful completion of the subspecialty examination. At the current time, the American Board of Physical Medicine and Rehabilitation does not offer certificates of special or added qualifications for the remaining subspecialties.

Spinal Cord Injury Medicine

Patients who have suffered trauma to their spinal cord have special medical issues related to the level and severity of injury. Physiatrists trained in this subspe-

RESIDENCY TRAINING

Residency in physical medicine and rehabilitation requires 4 years of postgraduate training. There are currently 80 accredited programs. There are also several positions in combined PM&R programs with additional training in neurology, pediatrics, or internal medicine. All require a general internship year (PGY-1), which can be internal medicine, surgery, or transitional. In a typical program, residents gain experience in both inpatient and outpatient rehabilitation medicine. The amount of work hours varies per individual program. Overnight call—usually only a few times per month—is generally benign. Resident physicians have monthly rotations that provide training in gereral rehabilitation of neurological conditions, deconditioning, strokes and spinal cord and traumatic brain injuries as well as pediatric rehabilitation. Many programs have substantial elective time to gain experience in particular areas of interest within PM&R.



cialty learn how to manage acute problems such as autonomic dysreflexia or hyperreflexia, as well as chronic complications like urinary incontinence, infertility, and sexual dysfunction. They have to be able to respond to psychological factors, such as patients' fear of reinjury and its effect on their disability. Spinal cord injury fellows not only become experts in the clinical care of acute traumatic spinal cord injured individuals, but they also treat nontraumatic spinal cord injuries, such as those caused by multiple sclerosis, cancer, or amyotrophic lateral sclerosis. They even learn how to perform EMG as a diagnostic test for back pain.

Pain Management

Fellowships focusing on treating patients with chronic pain syndromes are primarily sponsored by the American Board of Anesthesiology, although there are a few PM&R-based programs. The daily activities include pain clinic, in which a fellow manages a patient base either medically or via interventional techniques. Some of the simpler procedures include epidurals, facet joint and target point injections, and fluoroscopically guided steroid injections. With its emphasis on procedures, pain medicine has become a lucrative area of expertise due to high reimbursements. Interventional pain management takes a different approach to the patient from traditional physical medicine and rehabilitation.

Sports and Musculoskeletal Medicine

Physiatrists can subspecialize in the diagnosis and treatment of sports-related injuries or musculoskeletal problems. They primarily manage musculoskeletal diseases but are still very knowledgeable in general primary care-type sports medicine. These subspecialists also receive training in electrodiagnostic studies, trigger point injections, fluoroscopically guided spinal injections, acupuncture, and the use of botulinum toxin therapy. Their patients are athletes, workers, or any individuals with chronic disability.

Pediatric Rehabilitation

Although physiatrists can work with patients in all age groups, many choose to subspecialize in caring only for children with chronic disabilities whose issues are profoundly different from those of adults. Pediatrics rehabilitation specialists treat kids with cerebral palsy, muscular dystrophy, spasticity, burns, spina bifida, and developmental issues related to prematurity at birth. This fellowship provides additional time for physiatrists to develop their skills in integrating a child into an environment that stimulates development and increases their physical, cognitive, and social functioning. Pediatric rehabilitation is both specialized and diverse, given that the patients vary from infants to young adults. Pediatric physiatry addresses those disorders potentially affecting children on a long-term basis, often involving multiple body systems. The emphasis is on helping patients achieve developmental skills and independence in self-care and mobility appropriate to their age. The fellowship also addresses the role of the physiatrist as coordinator of multiple services (medical, social, or educational), as well as the importance of acting as liaison and advocate for the child and family.

Stroke

Physiatrists with a special interest in caring for stroke patients can choose to subspecialize in this area of medicine. Stroke fellowships provide additional expertise in treating patients throughout the entire spectrum of recovery from a cerebrovascular accident. This includes management of acute stroke on a consult service, acute rehabilitation, and subacute rehabilitation. Stroke specialists receive additional training in neuroradiology and neuropharmacology and work closely with their colleagues in neurology.

WHY CONSIDER A CAREER IN PM&R?

Physical medicine and rehabilitation is one of the youngest specialties in the medical profession. It became a member of the American Board of Medical Specialties in 1947 after the veterans of World War II returned home with amputations and other combat-related injuries. The separate disciplines of physical medicine and rehabilitation became a single entity when two prominent physicians—Howard Rusk (rehabilitation) of New York University and Frank Krusen (physical medicine) of the Mayo Clinic—began collaborating. Through their efforts, with funding from the US Department of Health, Education, and Welfare, opportunities for training in this new field of PM&R began to blossom. Now, more US senior medical students than ever before are choosing careers in physiatry. In the 2002 Match, nearly 70% of positions were filled by American medical graduates, its highest percentage ever, nearly twice the number filled in 1998.[7]

This burgeoning field is full of rewards, both for the physician and for the disabled patient. The doctor–patient relationship is central to medical care, especially because physiatrists evaluate their patients in a holistic manner—involving both the body systems and the external ecosystem. The referral-based practice of PM&R also offers versatility: you can have a solo practice, be part of a multispecialty group practice, or work in academics. There is also a great deal of variety in terms of patient care, from bedside treatment to rehabilitation plans, from educational programs to patient advocacy. Within the small community of physiatrists, there are many opportunities for leadership, both in the public and private sector and in public policy. PM&R is a perfect specialty for all types of personalities—introverts, extroverts, cerebral individuals, and energetic folks.

Medical students wanting to make a difference in the lives of patients suffering from acute and chronic disabilities should seriously consider this specialty. As a specialist in physical medicine and rehabilitation, you will become a beacon of hope for physically impaired and chronically ill patients. These physicians pick up medical care at the point where the internists, surgeons, and pediatricians have left off. For those physicians who entered medicine to help people, there is no better choice than PM&R for a fulfilling medical career.

ABOUT THE CONTRIBUTOR

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PLASTIC SURGERY

Gregory H. Borschel

What is plastic surgery? Is it Hollywood? Is it nose jobs? Is it silicone?

Although many plastic surgeons perform cosmetic surgery on high-profile patients, this specialty involves much more than Hollywood movie stars and breast implants. The word plastic is derived from the Greek plastikos, meaning "to shape, change, or mould." As such, the goals of plastic surgery are threefold: (1) to alter surgically the form and function of anatomy—either normal or pathologic; (2) to improve the quality of life; and (3) to preserve life itself.

No other surgical specialist draws on a wider base of anatomic knowledge or operates in more regions of the body than does plastic surgeon. It has been said that plastic surgeons operate on "the skin and its contents," alluding to the fact that on any given day plastic surgeons might find themselves operating on the face, on the hand, inside the cranium, or inside the abdominal or thoracic cavities. The field has developed from the efforts and contributions of people from many different backgrounds, including general surgery, orthopedics, oral and maxillofacial surgery, and otolaryngology.

Plastic surgery receives all the media attention yet remains poorly understood by the general public—and often by physicians as well. In some ways, it may seem to be a paradoxical specialty. Plastic surgery encompasses all of aesthetic surgery, yet it also deals with clinical entities that are often considered grotesque, including chronic wounds, limb replantation, and head and neck reconstruction. It is considered a surgical subspecialty, yet the fund of knowledge needed for even a basic understanding of the discipline requires a five- to eight-volume text. And al-

though it is a relative newcomer as an organized specialty, some of the first recorded operations were performed by plastic surgeons.

THE EVOLUTION OF PLASTIC SURGERY

Although most contemporary plastic surgical techniques were developed only within the last 20 years, plastic surgery is actually one of the oldest surgical specialties. Historians believe that the Indian surgeon Sushruta, who took a flap of tissue from the forehead and covered a nasal tip defect, performed the first documented plastic surgery in 600 BC.[1] In the fifteenth century, Western plastic surgeons began using surgical techniques to alter the form and function of the human body.[2] Tagliacozzi, an Italian plastic surgeon, developed a technique to restore tissue to noses lost in traumatic amputations.

Much of the history of contemporary plastic surgery was shaped by war. Early twentieth century plastic surgeons such as Sir Harold Gillies[3] and Vilray Blair[4] served in World War I and helped develop many of the fundamental techniques and principles still used today. World War II, and the Korean and Vietnam wars later produced great numbers of complex wounds. Advances in critical care and trauma surgery meant that patients with increasingly devastating injuries could potentially be saved. In this setting, the plastic surgeon earned two relatively new responsibilities. First, it was recognized that acute wound coverage was necessary to prevent secondary infection of vital structures. Second, the functional and aesthetic demands of patients became a greater priority. Plastic surgeons realized that even if a soldier's life was saved, if he was so disfigured that he could not present himself in public, then he might consider his life not worth living. As such, they developed new procedures to maximize function, especially in the case of upper and lower extremity reconstructive surgery, and devised more aesthetic facial reconstructive techniques.

In the 1960s, Paul Tessier and others popularized new methods of manipulating the bones of the face and skull, leading to the development of craniofacial surgery. At this time, the microsurgical revolution began. Microvascular anastomotic techniques allowed reliable free tissue transfer (free flaps) for reconstructing defects of the head and neck, upper extremity, and distal lower extremity. In the 1960s and 1970s, tissue expansion led to innovative methods in breast reconstruction, aesthetic breast augmentation, and reconstruction of large cutaneous defects. Within the last 25 years, other significant advances have come into wide acceptance in plastic surgery, including the use of thin fasciocutaneous flaps

for lower extremity and head and neck reconstruction, osteocutaneous flaps for mandible reconstruction, lasers for vascular malformations, advanced means of bony fixation, distraction osteogenesis (bone stretching to produce new bone) for mandibular and long bone reconstruction, suction-assisted lipectomy (liposuction), and the use of engineered tissues.

The symbol adopted by the American Society of Plastic Surgeons is a pair of twin arcs that form a circle, representing the pursuit of perfection. The goals of the plastic surgeon include restoration of a feeling of wholeness to the patient. All plastic surgeons strive to achieve the best functional and aesthetic result for every patient in order to relieve suffering, both physical and mental. Tagliacozzi himself said, "as plastic surgeons we perform operations not to delight the eye, but also to heal the mind."

THE ALLURE OF PLASTIC SURGERY

There are always many more applicants to plastic surgery programs than positions available. What makes plastic surgery so compelling? Why would conscientious, idealistic new physicians want to go into a specialty that many associate with vanity?

No other surgical specialty—not even general surgery—deals with so many regions of the body. The breadth of anatomy seen within a typical week (or even within a single day) often includes the head, neck, chest, abdomen, lower and upper extremities, breast, and hand. Some may view this as a liability. Most plastic surgeons, however, welcome the variety and tend to become bored if repeatedly faced with the same types of clinical problems. They enjoy the beauty of anatomy, especially that of the more intricate regions, such as the hand and face.

Some plastic surgeons say they find their work particularly rewarding because the results are often so visible. For example, after a cleft lip repair, the surgeon's efforts are seen repeatedly for the next 70 years or more. Seeing a parent smile after their child's cleft lip has been repaired is one of the most fulfilling experiences in all of surgery and medicine. Likewise, when a patient awakes upon replantation of a severed limb (or scalp, ear, nose, or even penis) and sees the successfully reattached part, it reaffirms the plastic surgeon's choice of a career.

Physician–patient relationships in plastic surgery can be quite lengthy and involved. Most plastic surgeons find these relationships in particular to be quite rewarding. For example, in the case of congenital deformities, patients often re-

WHAT MAKES A GOOD PLASTIC SURGEON?

- ✓ Prefers working with his or her hands.
- ✓ Enjoys trying new approaches to the same problem.
- ✓ Is an independent and creative thinker.
- ✓ Likes seeing the immediate results of treatment.
- ✓ Is a perfectionist who pays close attention to details.

quire 10 or more operations prior to reaching adulthood. Families with inherited congenital anomalies, such as Apert or Crouzon syndrome, may have multiple generations followed by the same surgeon. Similarly, many problems in the upper extremity mandate a careful, staged approach to treatment. For example, if a man loses his thumb in a farming accident, he will need a procedure to achieve closure of his initial wound. He will require reconstruction to provide him with useful thumb function, which can sometimes take the form of a toe-to-thumb transfer. The surgery itself is quite involved and rehabilitation is certainly a long-term endeavor. Likewise, patients with facial paralysis (such as with Bell palsy) or brachial plexopathies may require multiple therapeutic procedures over several years.

Plastic surgery can be physically demanding. The training is intense, especially during the core surgery years, and the clinical component of most categorical plastic surgery programs lasts 6 years. Some operations are lengthy or technically challenging. Most plastic surgeons, including this author, have participated in operations that lasted more than 24 hours. Some have said that microsurgery, in particular, is a young surgeon's sport. Not only can these procedures be long, but the anastomosis of small vessels can sometimes be quite challenging. However, there are still a number of microsurgeons—many of them pioneers in the field—who continue to practice today.

BEING THE SURGEON'S SURGEON

It has been said that the plastic surgeon is "the surgeon's surgeon." Colleagues from other surgical disciplines will often refer patients to the plastic surgeon—either to help with a planned reconstructive need, or, occasionally, to help with a complication.

For example, neurosurgeons may require assistance in reconstructing defects

after removing certain brain and cranial tumors, or after repairing meningomyeloceles. General surgeons routinely consult plastic surgeons for reconstruction after mastectomy, burn reconstruction, and abdominal wall reconstruction. Orthopedic surgeons call upon plastic surgeons to help with complex soft tissue reconstruction following fracture fixation, especially in the distal lower extremity. Many orthopedists work in partnership with plastic surgeons during replantations, spine procedures, and reconstructions following sarcoma extirpation. In most centers, oral/maxillofacial surgeons and otolaryngologists often use plastic surgeons in head and neck reconstruction after cancer ablation. Vascular surgeons ask for assistance in covering exposed prosthetic vascular grafts with muscle flaps. Cardiothoracic surgeons may call upon their plastic surgery colleagues to close sternotomy wounds that have failed to heal, resulting in mediastinitis. Plastic surgeons also work with urologists in complex urogenital reconstructions. They may collaborate with multiple surgical teams during complex congenital cases, such as the separation of conjoined twins.

Collaboration also takes place outside the operating room. Plastic surgeons routinely team up with dermatologists in the treatment of melanoma and other skin cancers. They also pool resources with a number of primary care practitioners, intensivists, and medical subspecialists such as rheumatologists and physical medicine and rehabilitation specialists. Most plastic surgeons find these collaborations enjoyable and productive.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Plastic surgeons generally practice in one of two environments: academia or private practice. Some practices consist of a mixture of the two. Academic plastic surgeons are based in large tertiary care centers. Private practice plastic surgeons may have affiliations with larger hospitals, and they also may treat patients in a number of smaller venues as well. Academic plastic surgeons have usually completed a fellowship in a subspecialty, whereas private practice surgeons may or may not have pursued additional formal training within plastic surgery. Financial opportunities can be substantially greater in private practice. Regardless of type of practice, plastic surgeons are almost always among the highest-paid physicians (along with neurosurgeons and cardiothoracic surgeons).

Depending on the type of practice you desire, a plastic surgeon can decide to be on call for emergencies at local hospitals. Most find it important to take call for two main reasons: first, it allows them to develop relationships and refer-

VITAL SIGNS

PLASTIC AND RECONSTRUCTIVE SURGERY EMPLOYMENT DATA

- Distribution among all physicians: 0.7%
- Practice type: 80.5% in private practice; 7.9% in academics
- Median patient care hours per week: 55.6
- 35% experienced difficulty in securing their preferred employment position
- 41.4% report that their salary is equal or higher than expected

Source: American Medical Association

VITAL SIGNS

MEDIAN COMPENSATION

Plastic & Reconstructive Surgery	$282,825

Source: American Medical Group Association

ral patterns with other physicians, and second, it may bring in a large proportion of income early in a plastic surgeon's practice.

As with many specialties, certain regions of the United States are overserved. Nearly half of board-certified plastic surgeons are found in the greater New York or Los Angeles metropolitan regions. In these areas, it can be difficult to establish a new practice. Conversely, certain geographic locales—particularly rural ones—are markedly underserved. In these regions, hospitals and clinics are often more willing to pay more for the services of a plastic surgeon. Regardless of practice environment, plastic surgeons have historically described themselves as busy professionally and contented personally.[5]

A plastic surgeon's week is generally devoted to operating, seeing patients in clinic, and rounding on patients on the wards. Much of a plastic surgeon's time is spent in the operating room (usually from 2 to 4 days a week). Most plastic surgeons see patients in clinic 1 or 2 days a week. In addition to rounding on their inpatients, plastic surgeons see inpatients in consultation from other physicians. In an academic environment, 1 or more days a week are often devoted to academic activities, such as basic or applied science or clinical outcomes research.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Many plastic surgeons choose to pursue additional training upon completing a plastic surgical residency. Microsurgery fellowships are quite popular, as are hand

surgery fellowships. There are also programs in craniofacial surgery, aesthetic surgery, pediatric plastic surgery, and burn surgery. Most fellowships last 1 year, although they can be as short as 2 months or as long as 2 years or more.

VITAL SIGNS

PLASTIC AND RECONSTRUCTIVE SURGERY 2002 MATCH STATISTICS

- 157 applicants competed for 77 positions
- 134 US seniors and 23 independent applicants ranked at least one plastic surgery program
- Program directors ranked 11.1 candidates for each available position
- 100% of all positions were filled in the initial Match
- The successful applicants: 93.5% US seniors, 1.3% foreign-trained physicians, and 1.3% osteopathic graduates
- Unmatched rate for US seniors applying only to plastic surgery: 23.5%

Source: National Resident Matching Program

Aesthetic Surgery

Aesthetic, or cosmetic, surgery involves the manipulation of tissues to enhance appearance. Common aesthetic procedures performed by plastic surgeons include rhinoplasty (reshaping of the nose), facelift, aesthetic eyelid surgery, laser skin resurfacing, Botulinum toxin injection, breast augmentation, liposuction, and body lifts.

The field of cosmetic surgery is unique among surgical disciplines. First, aesthetic operations are performed on an elective basis for no truly functional purpose (although it has been argued that the function of the face, for example, is to look good). In other words, patients are subjected to the risks of anesthesia and surgery despite their being physiologically healthy. These patients can suffer all types of complications that are possible with other types of surgery, including nerve damage, hematomas, infections, skin loss, significant scarring, myocardial infarctions, cerebrovascular accidents, and even death. The aesthetic surgeon must be comfortable knowing that these adverse events will doubtless occur at some point despite even the most careful patient selection, perfect surgical technique, and smooth anesthesia.

Aesthetic surgeons must enjoy participating in detailed discussions with their patients about their aesthetic issues and the surgical plan, because rigorous presurgical patient screening is so important. Honest two-way communication is essential to be sure that patients' aesthetic expectations are realistic. They require

RESIDENCY TRAINING

Residency in plastic surgery requires 5 to 8 years of postgraduate training depending on the pathway chosen. There are currently 39 accredited "categorical" (integrated or combined) programs. Typical rotations in this pathway include plastic surgery, orthopedics, otolaryngology, maxillofacial surgery, pediatric general surgery, neurosurgery, trauma and burn surgery, general surgery, vascular surgery, emergency medicine, anesthesiology, and critical care. Rotations on plastic surgical services include pediatric plastic surgery, microsurgery and general reconstruction, hand surgery, aesthetic surgery, and burn reconstruction. Some programs may have satellite centers including private hospital affiliates or Veterans' Administration medical centers. Residents also devote significant time to patient care and preparation for case presentations and conferences. Most plastic surgery residents publish papers during residency. In light of recent ACGME work hour guidelines, most residents have time for raising families and participating in outside athletic, musical, and artistic interests. Most residents develop collegial, pro-

(*continued*)

much more question-and-answer time than reconstructive patients do. Usually, however, the expectations of the aesthetic patient are reasonable, and their response to cosmetic surgery is predictable.

Cosmetic surgery is unlike other fields within plastic surgery because of economic issues. There are no laws dictating the price of a facelift or blepharoplasty. Therefore, surgical fees are determined by supply and demand, and often these fees can be very high—on the order of $10,000 to $25,000 for a facelift alone, not including anesthetic expenses. Not surprisingly, other practitioners with varying degrees of training are performing cosmetic procedures. For example, dermatologists, dentists, oral surgeons, otolaryngologists, and even some ophthalmologists perform facial aesthetic surgery. Likewise, some obstetricians and general surgeons have performed breast augmentation and liposuction. Some states have passed laws preventing nonsurgeons from performing cosmetic surgery.

For those with artistic abilities, aesthetic surgery offers a means of sculpting the human body into living art. And the results can be truly impressive! Patients with facial aging can often be made to look literally decades younger and more energetic. Likewise, a woman who has had multiple pregnancies resulting in abdominal wall laxity and breast involutional ptosis can be made to look like she has the body of a 20 year old. A young, otherwise beautiful girl who happens to

have a large nose or prominent ears can be given more harmonious features. It can be quite gratifying indeed to provide joy to a patient who has been concerned with a cosmetic deformity for years by surgically correcting it.

ductive relationships with their attendings that continue beyond residency.

Most aesthetic fellowships last 6 months and tend to focus on a specific region—facial aesthetic surgery or body contouring surgery. There is currently no certificate of added qualification (CAQ) or universally accepted board examination for aesthetic surgery.

Burn Surgery

One-year fellowships are available to those seeking advanced training in burn critical care, acute surgery, and burn reconstruction. Plastic surgeons often head burn units in the United States and elsewhere, although general surgeons also play a major role in burn care. Burn surgeons treat patients with thermal injury, chemical injury, and cold-related injury. Plastic surgeons often focus on burn reconstruction rather than acute burn care. The care of these patients can be quite challenging and highly rewarding. Much of burn reconstruction requires bread and butter plastic surgery, such as local flaps, skin grafts, and tissue expansion. However, many cases require multiple stages, strategic planning, and advanced techniques.

Craniofacial Surgery

Craniofacial surgeons treat diseases of the bones and soft tissues of the face and skull. They often work with children, treating such conditions as craniosynostosis (premature fusion of the sutures of the skull), cleft palate, hemifacial microsomia (delayed growth of one side of the face), and conditions such as Apert, Crouzon, Treacher-Collins, and Pfeiffer syndromes. They can also work with adults, treating patients with untreated congenital anomalies, craniofacial trauma, and tumors of the skull base, as well as orthognathic deformities.

A team approach is used in the workup, management, and follow up of children with craniofacial anomalies. Craniofacial surgeons work closely with neurosurgeons, dentists, speech pathologists, social workers, and pediatricians to plan craniofacial and orthognathic (jaw correcting) procedures. Craniofacial surgeons usually practice within a large tertiary care medical center to generate the case

volume necessary for sustaining a standing craniofacial anomalies program. Many craniofacial surgeons find that the volume of craniofacial cases in their practice is less than desired, however. Some even say that the entire United States requires only six craniofacial surgeons!

Hand and Upper Extremity Surgery

Hand surgeons treat a variety of conditions of the hand and upper extremity, including fractures, tendon lacerations, traumatic amputations/devascularizations, rheumatoid arthritis, nerve entrapment syndromes, tumors, and congenital anomalies. In a single day, a hand surgeon may perform a replantation from an industrial accident, see a newborn with complete syndactyly, and perform implant arthroplasties to restore function in a patient with rheumatoid arthritis. Restoring pain-free function is the top priority in hand surgery. Cosmesis is also a secondary goal once pain and function have been addressed.

Worldwide, most hand surgeons are initially trained in plastic surgery. In the United States, however, plastic surgeons represent only one third of hand surgeons, with the balance coming mainly from orthopedics. Passing a qualifying examination earns the physician a certificate of added qualifications (CAQ). Hand fellowships are often combined with microsurgical fellowships ("hand–micro" fellowships). There is significant cross-over between hand surgery and microvascular surgery training; both usually involve advanced microvascular and microneural techniques specific to the upper extremity. Because hand surgeons often perform procedures involving small vessels and nerves of the upper extremity, a strong microsurgical background is critical. There is currently great demand for hand surgeons, especially those with a plastic surgery background, in both private and academic practice.

Microvascular Surgery

Microsurgeons are trained to manipulate tissues by creating microvascular anastomoses and microneural coaptations. They can, for example, replant a severed extremity by locating and repairing the vessels and nerves under the operating microscope. Microsurgical techniques are also used to perform free tissue transfers (free flaps). For example, if a woman has a mastectomy for cancer and desires an autologous (from her own tissue) reconstruction, then an excellent option is the transverse rectus abdominis musculocutaneous (TRAM) flap reconstruction, in which muscle, skin, and fat are removed from the abdomen

and placed on the chest wall to reconstruct the breast. Similarly, in cases of congenital facial paralysis, the gracilis muscle can be transferred to the face to make facial expression possible.

The microsurgical revolution occurred in the 1970s and 1980s. Demand for surgeons who have completed microvascular fellowships remains high, although not as high as during the past 20 years. Many plastic surgery programs provide extensive microvascular experience, and many plastic surgeons find that they are able to perform the more routine free tissue transfers, like TRAM flaps, without the need for further training. However, for complex reconstructive problems, especially those involving the head and neck and lower extremity, advanced microvascular training is valuable.

Pediatric Plastic Surgery

Pediatric plastic surgeons address the specialized plastic surgical needs of children, analogous to the way in which pediatric general surgeons address the general surgical needs of children. Conditions treated by pediatric plastic surgeons include craniofacial anomalies (if they have also pursued craniofacial training), cleft lip and palate, velopharyngeal insufficiency (nasal speech), separation of conjoined twins, congenital anomalies affecting the face, hands and upper extremities, trunk, and chest wall, and vascular anomalies including hemangiomas and vascular malformations. In addition, pediatric plastic surgery encompasses pediatric burn reconstruction, soft tissue tumors, and traumatic reconstruction, particularly of the face, hands and lower extremity. There are few fellowships available, most of which last 12 to 18 months.

SO YOU WANNA BE A PLASTIC SURGEON?

Unlike other surgical subspecialties, there are several paths a medical student can take to become a plastic surgeon. The best—and most highly desired—among them is the integrated model. In this route, the medical student is accepted into a 5- or 6-year categorical plastic surgery training program. Here, you are considered a plastic surgery resident from the very first day. Integrated residencies are specifically designed to give the resident graduated responsibility and experience in plastic surgery with a tailored foundation in related disciplines, including orthopedics, otolaryngology, maxillofacial surgery, neurosurgery, burn, trauma, and general surgery, and sometimes anesthesiology, oculoplastic surgery, and dermatology.

An alternative to the integrated model is the combined (or "3 and 3") training model, which is actually a variation of the traditional model, explained below. In a combined program, the resident functions as a general surgery resident during the first 3 years of residency. In fact, most combined programs require matching into a categorical general surgical residency with the implicit understanding that the resident is interested in plastic surgery. In the fourth year, the combined resident switches to plastic surgery training. The amount of time spent on general surgical rotations is generally greater in combined programs than integrated programs. Residents rarely obtain chief-level operative experience while on general surgery rotations in the combined model. In contrast, residents in integrated programs often function as general surgery chief residents during part of their fourth year. The Match for both integrated and combined programs is administered by the National Resident Matching Program (NRMP).

The third pathway is the traditional or independent model. In the traditional model, a resident is taken into a 2- or 3-year plastic surgery fellowship upon completing at least 3 years of a general surgery residency, or after completing a program in otolaryngology, orthopedics, urology, neurosurgery, or oral and maxillofacial surgery. Although the majority of plastic surgeons practicing today trained in traditional programs, the number of traditional training positions offered is declining as many programs are converting to categorical (integrated or combined) models. The match for the traditional model is administered by the Plastic Surgery Residency Matching Program (PSMP), a component of the San Francisco Matching Program.

WHY CONSIDER A CAREER IN PLASTIC SURGERY?

The future looks very bright for plastic surgery. On a practical level, this is a field in which it would be nearly impossible to replace physicians with physician assistants and specialty trained registered nurses (as has already happened in many specialties). Similarly, the physical defects that plastic surgeons repair are caused by problems that will continue to be major public health concerns for centuries, including cancer, trauma, burns, and congenital defects. And as long as people have mirrors, the obsession with youthfulness will ensure that there will always be a demand for aesthetic surgery.

On a more cerebral level, the field of plastic surgery offers a variety of clinical problems, many of which have excellent solutions. Others remain unsolved. Just as there is always something that can be done for plastic surgery patients, so too is there room for young plastic surgeons to make valuable contributions to

this rapidly advancing field with basic science, applied science, technical innovation, or outcomes research. Plastic surgeons make an immediate medical impact on the lives of their patients and can profoundly affect how they feel about themselves. It is a wonderful specialty for those who appreciate the beauty of the human body and have a creative imagination.

ABOUT THE CONTRIBUTOR

Dr. Gregory Borschel is a resident in plastic surgery at the University of Michigan Hospitals. After growing up in Indianapolis, he completed his undergraduate education at Emory University and attended medical school at The Johns Hopkins University School of Medicine. Upon completion of his residency, Dr. Borschel plans to pursue additional fellowship training. His research interests include tissue engineering of peripheral nerve, skeletal and cardiac muscle, and arterial conduits, as well as clinical research. Outside of the hospital, he enjoys marathon running, scuba diving, and traveling with his wife, Tina. He can be reached by e-mail at borschel@umich.edu.

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29 PSYCHIATRY

Kathleen Ang-Lee

As physicians who treat the mentally ill, psychiatrists have some of the most rewarding long-term relationships with their patients. This is an interdisciplinary specialty, well-suited for doctors who wish to use the broadest of all skills—psychosocial, scientific, and clinical. Historically, psychotherapy has always formed the core of psychiatry. But with remarkable advances in neuroscience and drug therapy, this field of medicine has shifted to a more biological-based approach. Now, psychiatrists draw on the latest research in brain imaging, genetics, and psychopharmacology to treat many debilitating disorders.

Most medical students begin their psychiatry clerkship with a preconceived notion of this specialty. You probably imagine that all psychiatrists tell their patients to lie down on their leather couches and talk about their childhood. Or, you may think that these physicians are simply drug dispensers. In reality, the practice of contemporary psychiatry falls somewhere between these two extremes.

THE MEDICINE OF MENTAL HEALTH

Psychiatry is the field of medicine dedicated to the prevention, diagnosis, and treatment of mental illness. The diseases they treat include depression, bipolar disorder, schizophrenia, addiction, delirium and dementia, anxiety, and personality disorders.

Psychiatrists meet an essential need within medicine. Psychiatric disorders, which are extremely common in society, often remain undiagnosed. In a given year, nearly 22% of all Americans over the age of 18 suffer from a diagnosable mental disorder.[1] Like physical diseases of the body, these conditions range in severity. They can cause mild social withdrawal, severe occupational impairment, or even be life threatening. Although many patients may not even appear ill, others present with withdrawal, psychosis, or confusion. This wide scope of disease provides intellectual stimulation and daily challenge.

There is no such thing as a typical psychiatric patient. In fact, many students discover that psychiatric patients are even more challenging than those with medical problems. You might be treating a depressed young woman with thoughts of suicide. Your next patient may be someone suffering from panic attacks, obsessive-compulsive disorder, or unusual phobias. Complex cases of schizophrenia, in which the patient presents with extremely distorted views of reality, are de rigueur for the typical psychiatrist. They also manage problems of sexual dysfunction, eating disorders like anorexia and bulimia, and all forms of substance abuse. If you are interested in working with children, the subspecialty of child psychiatry offers classic cases of attention-deficit/hyperactivity disorder, learning disorders, and other behavioral problems.

Many physicians are initially drawn to psychiatry because of the intriguing combination of medicine, psychology, and the social sciences. This specialty focuses on what makes people tick—how they feel, think, and behave. A psychiatrist in academics explained that "I really enjoyed studying philosophy and psychology in college, and psychiatry seemed to be a way to combine medical science with my background in the humanities and social science."

It is important not to overlook the fact that psychiatrists are, first and foremost, medical doctors. Many organic diseases, whether an electrolyte imbalance or hypothyroidism, can cause psychiatric disorders. Psychiatrists need to rule out any possible underlying medical diseases or drug reactions before treating a mental illness. In the hospital, they are called upon as consultants to distinguish between psychiatric causes and other medical causes of patients' symptoms. Every day, psychiatrists see first hand the intricate relationships between mental disorders, emotional illness, and medical diseases of the body. Because psychotropic medications affect other organ systems, psychiatrists must recognize adverse side effects and drug–drug interactions. A strong background in internal medicine and neurology, therefore, is essential for the practice of psychiatry.

If you are planning a career in this specialty, you will rely daily upon the "bible" of psychiatry—the Diagnostic and Statistical Manual of Mental Disorders, or simply, the DSM. This mammoth text has undergone several revisions throughout decades of advancements. Currently, the American Psychiatric Association (APA) has published the fourth edition (text revision) of the DSM. Based on symptoms rather than etiology, this hefty manual describes and categorizes the operational criteria of all recognized mental illnesses. It does not discuss treatment options. Instead, the DSM serves as a common classification system to which all psychiatrists adhere when assigning diagnoses.

THE PSYCHIATRIC EVALUATION: LISTENING TO PATIENTS' STORIES

When evaluating their patients, psychiatrists conduct a specialized psychiatric interview to gather information and initiate psychotherapy. This workup includes a thorough medical and psychiatric history along with a complete mental status examination. Aspiring psychiatrists find that a patient's interpersonal style, choice of subjects, and nonverbal communications—as well as your own emotional reactions to the patient—all constitute valuable data.

There are few mental illnesses for which a definitive laboratory test exists. In psychiatry, the patient interview is often the most important diagnostic instrument. With a complete history and interview, psychiatrists obtain indispensable information that goes beyond mere facts. To succeed well at these endeavors, medical students interested in psychiatry should have good communication and interpersonal skills. It also helps being flexible in your diagnostic thinking and tolerating some degree of uncertainty. Armed with this understanding, psychiatrists make accurate diagnoses and then recommend treatment options.

The doctor–patient relationship is absolutely essential to psychiatry. In this specialty, physicians take time to listen carefully to their patients' personal problems. "I have always been interested in understanding other people and hearing their stories," remarked a psychiatry resident. More than anything, psychiatrists are caring, nonjudgmental, and genuinely interested in what goes on in their patients' lives. Unlike other specialists, they get to spend more allotted time with their patients and maintain good working relationships under difficult circumstances. During these interactions, psychiatrists address the whole patient, including mental, physical, and psychosocial aspects.

WHAT MAKES A GOOD PSYCHIATRIST?

- ✓ Likes taking care of both mind and body.
- ✓ Can deal with very personal and sensitive topics.
- ✓ Is a nonjudgmental and independent thinker.
- ✓ Prefers to focus on larger meanings and ideas.
- ✓ Enjoys asking a lot of questions.

As you can tell, this specialty has two intriguing components: the challenging nature of diagnosis, and the diverse patients who will share their stories with you. "It's an incredible privilege to have patients let you into their lives. You see

and hear things that most people only see in movies or read about in books—this is not mundane medicine," declared a university-based psychiatrist. And, they are all extremely busy doctors. Mental disorders (particularly depression and alcohol abuse) rank among 7 out of the top 10 leading causes of disability in developed countries.[2]

This specialty is more than just sitting back and listening to patients' stories. Psychiatrists derive a great deal of personal fulfillment in actively helping patients who have debilitating mental disorders. "There is a sense that you can really change someone's life," one psychiatrist commented. "You don't necessarily have to be a surgeon and operate in order to dramatically alter a patient's life."

THE MIRACLES OF PSYCHOPHARMACOLOGY

Just as many diabetics require insulin and heart patients take nitroglycerin, people suffering from a severe mental illness may need a specific type of psychiatric medication. In recent years, the field of psychopharmacology has grown significantly. Treatment with drugs usually ends up being long term, and there are few actual cures. Unlike cases of physical disease, when there is successful treatment in psychiatry, the credit is usually given to the patient instead of to the drug or psychiatrist. Long ago, mentally ill patients were often placed in public institutions because they were thought to be harmful to themselves or to others. Thanks to the latest drugs on the market, most people today who suffer from a psychiatric illness—even debilitating ones like schizophrenia—can lead full lives after effective treatment.

What are some of these miracle drugs and happy pills? Fluoxetine (Prozac), which revolutionized the treatment of major depression in 1987, is probably the best-known example of the class of drugs called selective serotonin reuptake inhibitors (SSRIs), which are relatively safe and have a favorable side effect profile. These agents not only treat depression, but also help manage cases of panic disorder, obsessive-compulsive disorder, and social phobia. Antipsychotic medications also underwent a revolution with the introduction of atypicals (like Risperidone, olanzapine, and quetiapine), which have fewer adverse reactions. The latest pharmacologic advancement is the first atypical antipsychotic (ziprasidone) that can be given intramuscularly, just like the good old standby—Haldol ("Vitamin H").

Psychopharmacology involves more than just antidepressant, antipsychotic, and anticonvulsant medications. Now biotechnology and neuroscience are coming together in the new discipline of "pharmacogenomics." This area of drug ther-

apy promises to tailor treatment to each individual in order to improve efficacy and reduce adverse effects. The list of possible medications will now grow even longer.

PSYCHOTHERAPY IN THE TWENTY-FIRST CENTURY

With psychotropic medications increasing in efficacy, specificity, and popularity, many students wonder if there still is a role for psychotherapy in modern psychiatric treatment. In fact, the demise of psychotherapy has been greatly exaggerated. During residency, psychiatrists are trained in many different forms of psychotherapy. Because they may later specialize in certain therapies in their career, it still remains an integral part of this specialty.

What exactly is psychotherapy? It is a systematic method of treatment in which the psychiatrist and the patient discuss troubling feelings and problems during regularly scheduled meetings. Together, they find solutions to the underlying roots of these issues. There are many types of psychotherapy, such as those that help patients explore past relationships, discuss repressed feelings, or change thought patterns or behaviors. For most people, psychotherapy conjures up images of Sigmund Freud and classic psychoanalysis. This intensive form of individual psychotherapy involves four or five sessions per week over the course of several years. Psychoanalysts help patients recall and examine past events and memories to help them better understand their present behavior. Other commonly used forms of talk therapy include psychodynamic psychotherapy, behavioral therapy, cognitive therapy, and couples and family therapy.

Whether used alone or in combination with medications, psychotherapy works very well to treat a broad range of mental illnesses and psychiatric disturbances. Thanks to managed care, the stereotype of psychiatrists reclining in their armchairs while listening to patients talk has become outmoded. Today's psychiatrists are not purely therapists. Although they still practice psychotherapy, the modern psychiatrist uses a broader array of treatments—biological, psychological, and social—tailored to the specific needs of the patient. Most psychiatrists consider a combination of medication and therapy to be the most effective solution. A university-based psychiatrist commented that "every interaction I have with my patients is psychotherapy, even when I am only doing 'medication management.' "

As physicians working at the complex interface between mind and body, psychiatrists take advantage of this integrative approach. "You need to have a good understanding of your patients' psychological makeup so you don't attribute bi-

ological symptoms to psychological causes, and vice versa," stated one psychiatrist. "The physicians who run into trouble are the ones that only want to look at things as all biological or all psychological, without looking at the big picture." By listening to patients discuss their illness and how it affects their lives, psychiatrists form therapeutic alliances. With this style, psychotherapy becomes intrinsic to pharmacologic treatment.

ECT: TREATING THE MIND WITH ELECTRICITY

When patients struggling with their disease do not respond to mainstay treatment, clinicians sometimes turn to the single procedure available in their therapeutic arsenal: electroconvulsive therapy (ECT). Most people's perception of ECT as brutal and cruel comes from movies such as "One Flew over the Cuckoo's Nest" and "A Beautiful Mind," which depict the early use of shock therapy. During the 1940s and 1950s, psychiatrists in the United States usually performed ECT on the most severely disturbed patients, such as those who suffered from schizophrenia or multiple personality disorder. In the early days of the treatment, physicians often conducted ECT at high doses for long periods of time. This method proved harmful to patients, giving ECT its reputation as an abusive treatment, which was compounded by doctors' and nurses' use of it to gain control over unruly patients.

Today, psychiatrists turn to ECT as one of the most effective (and safest) treatments available for major depressive disorder. This therapy can also be extremely beneficial for patients suffering from mania, catatonia, schizophrenia, and other neuropsychiatric conditions. During the procedure, the psychiatrist activates the passage of controlled pulses of electrical current through the patient's brain. The stimulation produces a generalized seizure lasting 25 to 150 seconds. Contrary to popular belief, ECT is a brief, painless procedure. It is always administered under general anesthesia with muscle relaxation. Most patients requiring this course of therapy for depression will undergo roughly 6 to 12 treatments given three times per week.

In practice, psychiatrists either obtain a training certificate to perform electroconvulsive shock therapy themselves, or send their patients to an affiliated hospital to receive treatment. In either case, ECT is the only nonpharmacologic procedure currently available to treat severe or medication-refractory depression and other psychiatric disorders. It is also effective for patients who cannot take their psychotropic medications for reasons such as underlying cardiac disease. In the near future, medical students entering psychiatry may find themselves using another promising technique currently being studied: repetitive transcranial mag-

netic stimulation (rTMS). Thus, the therapeutic armamentarium of this specialty is poised to continue expanding in the near future.

REFLECTIONS ON MENTAL ILLNESS AND PSYCHIATRY

Mental illnesses are real diseases that affect a person's brain and change the way a person behaves, thinks, and interacts with others. In medicine, there exists an erroneous belief that diagnosis and treatment within psychiatry has no scientific foundation. The latest research, however, demonstrates strong physiologic and genetic components to most mental illnesses. For instance, neuroscientists have shown that patients diagnosed with major depression have lower levels of certain neurotransmitters, like serotonin and norepinephrine. "As psychiatry becomes more and more biologically based, and we continue to increase our understanding of the biological basis of behavior, psychiatry will eventually become more integrated with medicine," declared one psychiatrist in academia.

Despite this shift in focus to biological models, prejudice and discrimination against the mentally ill persist, no matter the type of disease. Some people mistakenly believe that mental illness is caused by personal weakness, poor upbringing, or a defect in character. They think that sufferers of psychiatric disorders should just "snap out of it." Yet the agitated homeless man talking to himself on the street and the chronic alcoholic who cannot quit drinking both suffer from pathophysiologic derangements. Just like mainstream conditions such as diabetes or high blood pressure, psychiatric disorders are biochemically based and require long-term treatment.

Many colleagues in medicine who do not look highly upon psychiatry consider its treatments less effective than those in other areas of medicine. The evidence seemingly refutes this misperception. With its wide array of powerful drugs, treatment in modern psychiatry surpasses conventional therapies found in other areas of medicine. In a study by the National Institutes of Mental Health, the success rates (defined as "substantial reduction or remission of symptoms") in treating mental illness were superior to certain medical procedures. It looks like psychiatrists have the edge over cardiologists: the success rates for treatment of depression (60% to 65%), schizophrenia (60%), and panic disorder (80%) were significantly higher compared to acute coronary syndromes treated with angioplasty (40%) and atherectomy (50%).[3] In a similar study, the success rates of therapy for addictive disorders, such as alcoholism (50%) and cocaine dependence (55%), were on the same level as chronic medical diseases like asthma, diabetes, and hypertension.[4]

Despite this evidence, psychiatrists and other professionals who care for the mentally ill traditionally have not received much respect from their peers. Psychiatry, with its earlier emphasis on psychodynamic and social models, has been seen as fluffy and nonscientific. Ignoring the biological basis of behavior, most physicians perceive psychiatry as less scientific and prestigious than other medical specialties. Nearly half of all psychiatrists agreed that other medical specialists view them as less than important.[5]

Unfortunately, this negative attitude carries over to medical students, who, just like their mentors, perceive psychiatry as a minimally important specialty. In a recent survey, entering first-year medical students believed that psychiatry had less prestige, satisfaction, and intellectual challenge than most other specialties.[6] They felt that the medical community, and the public in general, does not respect psychiatrists' skills and knowledge. Whether based on ignorance or misunderstanding, the persistently low ranking of psychiatry indicates that many continue to perceive it as outside the mainstream of medical practice.

Yet as new developments shift the focus of psychiatry to a biological approach, psychiatrists are beginning to garner more respect from the medical community. After all, they take care of extremely challenging patients most doctors would prefer to avoid. "You can't be thin-skinned to be in this field," a resident remarked. "But psychiatrists get their satisfaction from the knowledge that they have an incredibly important and interesting job—one that can really make a difference in patients' lives." If you are considering a career in psychiatry, do your best to disregard any mocking comments from those who fear treating patients with mental illness. These patients need your care and attention. Every day, they will provide intellectual satisfaction and personal fulfillment.

SCOPE-OF-PRACTICE ISSUES: PSYCHIATRISTS VERSUS PSYCHOLOGISTS

Today, physicians across all specialties are forced to share certain duties with competing non-MD mid-level health care providers. Managed care and its push for cost containment, however, have hit psychiatry unusually hard. Medical students considering a career in psychiatry often wonder about competition from other mental health professionals, such as clinical psychologists, social workers, and nurse practitioners. Many of these professionals can perform psychotherapy. In some states, particularly rural ones, nurse practitioners are often the first-line health providers evaluating and treating psychiatric patients.

In particular, the issue of psychologists being allowed to prescribe psychiatric

drugs is currently a matter of hot debate. Clinical psychologists do not have the education or experience to use powerful drugs in treating mental disease. Yet, in 2002, New Mexico made national headlines when legislators passed a law granting prescription-writing authority to psychologists. It became the first state to do so. In this case, psychologists argued that large rural areas of the state do not have enough psychiatrists for prescribing psychoactive medications. They have won a battle lost in other states. In the past decade, about 15 state legislatures rejected similar bills after considering the data and risks of placing potent drugs into the hands of people without medical education.

Nearly all psychiatrists (and many psychologists) agree that this ill-advised decision in New Mexico has significant potential to harm patients with mental illness. Because only those with the proper education should practice medicine, the medical community seriously questions whether psychologists can prescribe effectively and safely. Clinical psychologists, who hold masters or doctoral degrees, are trained only in psychotherapeutic principles to treat mental disorders. The New Mexico law grants prescription-writing privileges only to psychologists who take a crash course on psychopharmacology under physician supervision and pass a certification examination. But no quick workshop in drug prescribing, especially when reportedly designed and administered by psychologists, can substitute for the knowledge and skills earned from medical school, postgraduate training, and rigorous clinical experience.

Psychiatrists have extensive training in differential diagnosis, complex psychopharmacology, and the ability to evaluate whether symptoms are related to drugs or new medical problems. Whether or not they prescribe medication, psychiatrists, with their comprehensive understanding of both mind and body, always bring medical evaluation into their interactions with patients, even in psychotherapy sessions. As one academic psychiatrist observed,

As we increasingly understand how the rest of medicine can affect behavior, you must have a strong medical background in order to provide the best care. For instance, I had a patient who was seen by a psychologist who called him 'profoundly depressed with extremely latent speech.' When I saw him, I was able to immediately see that he was actually aphasic, and obtained a CT scan which showed a large brain mass. When you don't have a wide base of medical training, you miss things. This is not just about a power struggle between the psychiatrists and psychologists; it's just about good patient care.

The first psychologists to train under the new law in New Mexico will finish their academic and practical preparation by the end of 2003. Will this mark the beginning of a fundamental change in how mental illness is treated in the United

States? It is too soon to tell. Health insurance priorities have already shifted toward drug treatment over psychotherapy. If more states adopted such legislation, it might lead to more patients on psychiatric medications and less insurance reimbursement for psychiatrists' fees. Currently, no other similar bills in state legislatures have passed the introductory phase.

Regardless of the outcome, the current debate should not discourage medical students who are interested in psychiatry. Most psychiatrists worry about the quality of patient care under the new law—not their jobs. They are not threatened in any way by competition from mental health professionals. Remember, for the past several decades, primary care physicians and other nonpsychiatrists have written the majority of prescriptions for psychoactive medications. "We will still be the specialists in the field, seeing the most challenging—and interesting—psychiatric cases," stated a psychiatrist in private practice. The special education and medical experience of psychiatrists make them uniquely qualified to provide both psychotherapy and medication management.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

PSYCHIATRY EMPLOYMENT DATA

- Distribution among all physicians: 4.9%
- Practice type: 72.3% in private practice; 21.6% in academics
- Median patient care hours per week: 40.1
- 15.7% experienced difficulty in securing their preferred employment position
- 57.4% report that their salary is equal or higher than expected

Source: American Medical Association

As in specialties like family practice and general internal medicine, psychiatrists deal with mostly chronic illnesses that require long-term pharmacologic and therapeutic management. They work with adults, children, families, or a combination of all three. You can decide if you want to concentrate more on psychotherapy in your practice or on medication management. Psychiatric hospitalization is now shorter and more focused than in the past, with a greater emphasis on outpatient management and prevention. Although managed care guidelines may limit the number of patient visits to a psychiatrist, there is currently a push for improved mental health parity legislation.

You have a wide variety of practice options in this specialty. Psychiatrists typi-

cally see patients in outpatient, inpatient, or emergency room settings. In the hospital, they often work as part of a team that tailors a wide range of biological, psychotherapeutic, and psychosocial treatments to specific patient needs. Psychiatrists lead a group that may include clinical psychologists, social workers, psychiatric nurses, mental health counselors, and occupational and recreational therapists. Outpatient psychiatrists may have solo or group practices in clinics or community mental health centers. Here, they have the flexibility to set their own hours. They may also work in residential programs, VA hospitals, nursing homes, correctional facilities, and state hospitals.

VITAL SIGNS

MEDIAN COMPENSATION

Psychiatry	$158,275
Child Psychiatry	$172,107

Source: American Medical Group Association

"There is such a wide range of things you can do in psychiatry," affirmed a psychiatrist in private practice. "You can be flexible in this field and create a niche for yourself both in terms of your interests and management of your time." The many subspecialties within psychiatry offer additional career opportunities, and the end of the national generalist initiative has created many new jobs for graduating residents. Because of the variety of practice opportunities, psychiatrists generally lead a comfortable lifestyle. Call is minimal to nonexistent, emergencies are few and far between, and office hours are regular. Sound appealing?

FELLOWSHIPS AND SUBSPECIALTY TRAINING

At this time, four psychiatry fellowships are approved by the ACGME. But only one—child and adolescent psychiatry—has its own subspecialty examination leading to official board certification. The remaining fellowships only bestow a certificate of additional qualifications. Additionally, each fellowship lasts for 1 additional year of training, with the exception of child and adolescent psychiatry (2 years).

There are also several emerging subspecialties within this diverse field, such as consultation-liaison, emergency and disaster psychiatry, psychopharmacology, neuropsychiatry, and research. Formal fellowships are likely forthcoming. You can also choose to specialize in various psychotherapies by further training at a psychoanalytic or behavioral therapy institutes.

VITAL SIGNS

2002 MATCH STATISTICS

- 1588 applicants competed for 984 positions
- 652 US seniors and 919 independent applicants ranked at least one psychiatry program
- Residency programs ranked 7.1 applicants for each available position
- 94.5% of all positions were filled in the initial Match
- The successful applicants: 58.9% US seniors, 27.7% foreign-trained physicians, 5.3% osteopathic graduates
- Unmatched rate for US seniors applying only to psychiatry: 4.3%

Source: National Resident Matching Program

Addiction Psychiatry

According to a recent survey by the National Institute on Drug Abuse, approximately 3.5 million Americans are addicted to illicit drugs and 8.2 million fit the diagnosis of alcoholism. Based on these growing numbers, more specialists are needed to work in this critical area. Psychiatrists who specialize in addiction medicine are at the forefront of battling this epidemic. When managing disorders of addiction, they draw on their knowledge of pharmacology and physiology. Drugs such as cocaine, alcohol, heroin, nicotine, and ecstasy have profound, and usually devastating, effects on all organ systems. Addiction psychiatrists are also trained to recognize comorbid psychiatric and substance use disorders.

Child and Adolescent Psychiatry

The child psychiatrist serves as the advocate for the best interests of their young patients. According to the APA, an estimated 7 to 12 million youths in the United States suffer from a diagnosable psychiatric disorder. But only a very small proportion actually receives some form of mental health service. For the most comprehensive medical care, they need the expertise of a specialist in child and adolescent psychiatry.

The mental, behavioral, and developmental problems that affect children and teenagers include autism, attention-deficit hyperactivity disorder, learning disorders, bulimia and anorexia, behavioral disorders, and emotional disturbances. In their diagnostic examinations, child psychiatrists look at many components, from physical to cognitive, and from genetic to emotional. They take an integrative biopsychosocial approach, and consult with physicians and professionals from schools, social agencies, and juvenile courts. Working with kids

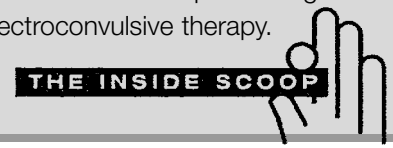
challenges your creativity and imagination. And they need you, too—there is currently a national shortage of qualified child psychiatrists. By 2020, the demand for these specialists is expected to increase by nearly 100%.[7] Although this fellowship requires 2 years of additional study, residents usually begin training after their third postgraduate year and complete both residency and fellowship within 5 years.

Forensic Psychiatry

This subspecialty is ideal for physicians who wish to apply their psychiatric training to legal matters. Forensic psychiatrists are not lawyers. Instead, they translate their medical knowledge of mental health into useful advice for the legal system. Forensic psychiatrists serve as clinical consultants to attorneys, victims, perpetrators, courts, or other parties involved in litigation. Through actual court testimony, they offer evaluations of criminal matters, patient competency, malpractice, mental disability, involuntary treatment, child custody, and the insanity defense. Although typically paid by attorneys to serve as expert witnesses, forensic psychiatrists try to avoid bias by focusing on the evidence within their area of expertise. Like other legal professionals, they draw heavily on their writing, research, and analytical skills. They review records, interview people, and consult with lawyers and other physicians. Most forensic psychiatrists continue to see patients in a clinical setting in addition to legal consultations.

RESIDENCY TRAINING

Residency in psychiatry requires 4 years of postgraduate training. There are currently 180 accredited programs. During the first year, residents typically rotate through 4 months of inpatient internal medicine and 2 months of inpatient adult neurology. Depending on the institution, some programs heavily emphasize pharmacology and biochemistry, whereas others focus on psychotherapy. Many residency programs have weekly training groups ("T groups") in which residents provide peer support, teach each other, and help run the residency. The typical monthly rotations include adult inpatient service, consultation-liaison psychiatry, geriatrics, child and adolescent psychiatry, outpatient clinics, addiction psychiatry, emergency psychiatry, and psychotherapy. Residents also can become trained in performing electroconvulsive therapy.



Geriatric Psychiatry

Elderly patients often present with a set of psychiatric disorders that are more prevalent among their age group, including dementia, delirium, and depression. Geriatric psychiatrists specialize in the biological and psychological components of the normal aging process. They manage the psychiatric effects of acute and chronic physical illness, such as cancer, heart attacks, renal failure, or osteoarthritis. Taking into account the physiologic changes unique to the elderly patient, geriatric psychiatrists use pharmacology to treat primary psychiatric disturbances of old age.

WHY CONSIDER A CAREER IN PSYCHIATRY?

Although this specialty is one of the oldest in medicine, World War II marked the beginning of modern psychiatry. At that time, hundreds of recruits were found psychiatrically unfit for induction, sparking a renewed interest in mental health. The federal government devoted massive resources toward the field, particularly with the establishment in 1949 of the National Institute of Mental Health. Medical students of the 1960s, who viewed psychiatry as a means of social change, flocked into the specialty. But while becoming more biologically oriented, psychiatry lost much of its resources due to the nation's desire to produce more generalist physicians. Combined with encroachment from managed care and competition from other mental health care providers, recruitment among graduating medical students began to decline.[8] In fact, the total number of US seniors entering psychiatry reached a low of 428 (52% of all applicants) in 1998.[9] The trend, however, is now rapidly reversing as the need for specialists increases. According to the latest report, "psychiatrists are in demand. In 2001, recruiters report difficulty in filling slots for psychiatrists in virtually every mental health care environment."[10]

In addition to the flourishing job market, psychiatry has a promising future as a frontier area that overlaps considerably with neurology. During the 1990s (the National Institutes of Health's "Decade of the Brain"), psychiatrists were major players in the remarkable advances in neuroscience, brain imaging, and psychopharmacology. These developments have led to exciting and effective new methods in diagnosis and treatment. Psychiatrists now have new drugs, new high-tech neuroimaging modalities, and the new DSM-IV-TR.

Most students who enter psychiatry have a strong background in humanities and seek the intellectual challenge of dealing with people's minds. This profes-

sion provides all of that and more. It blends biology, psychology, and sociocultural aspects together with clinical medicine. You get to know your patients well and strive to restore their mental and physical well-being. You use powerful medications to change lives. You find yourself engaged in challenging and rewarding work: bringing hope to patients suffering from troubling and disabling illness.

ABOUT THE CONTRIBUTOR

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30 RADIATION ONCOLOGY

Stephanie E. Weiss

Historically, radiation oncology has been one of the best kept secrets in medicine. Yet the specialty has of late become one of the most competitive fields for entering applicants. Radiation oncology is an intellectual discipline with physician–patient relationships at its heart. Its strength and appeal lies in the multidimensional approach to treating cancer patients.

Paradoxically, as popular as the field has become among medical students, radiation oncology remains poorly understood, even by other physicians. Radiation oncologists, who are embedded within the interdisciplinary practice of cancer treatment, play a role as both primary oncologist to cancer patients and as consultants to other physicians. It is a field that weds the physician's breadth of knowledge to the meticulous application of technical expertise. Every cancer patient, after all, offers an individual challenge.

RADIATION AS CANCER TREATMENT

Radiation oncology is the specialty of medicine that uses radiant energy for treating malignant disease (cancer). For most physicians, it is easy to think of prescribing a medicinal substance in terms of administering a certain number of milligrams of a drug, delivered perhaps orally or intravenously. Chemotherapy fits intuitively into this category. Yet it is not as obvious to think of radiation as a prescription, too. Radiation is invisible. It is not typically administered by vein or mouth, but rather by complicated equipment that may not even touch the patient's body.

Radiation, usually in the form of photons and electrons, works therapeutically on the molecular level by principles similar to other treatment modalities such as chemotherapy. The killing of cells by chemotherapy is induced by chemical substances, while radiotherapy inflicts similar damage through radiation. Specifically, radiation works by interfering with the cell's ability to reproduce suc-

cessfully. It takes advantage of the fact that normal cells can repair radiation-induced DNA damage in between daily small-dose treatments, whereas a cancer cell cannot.

It is the responsibility of the radiation oncologist to prescribe the proper dose of radiation. Measured in the unit of Gray, the amount of radiation administered is based on the tumor's radiosensitivity as well as the specific tolerance of nearby normal tissues to radiation. Treatment is adjusted accordingly to cause maximum damage to cancer cells while keeping normal tissue within its tolerance. These specialists have a good understanding of how changing the daily dosage or overall length of treatment optimizes these clinical benefits. The difference in susceptibility to radiation between normal cells and cancer cells is called the therapeutic index. A skilled radiation oncologist manipulates each plan to take full advantage of this therapeutic parameter.

THE TYPICAL DAY OF A RADIATION ONCOLOGIST

Those unacquainted with this specialty often make the mistake of equating the radiation oncologist's role to that of a technician. If you choose to practice radiation oncology, get ready for all manner of button-pushing witticisms. But your more earnest colleagues will often ask you to describe, in the most fundamental terms, what it is that you actually do as this type of doctor. Radiation oncologists do not press buttons any more often than medical oncologists (chemotherapy physicians) stand over a Bunsen burner preparing a concoction of some chemotherapeutic brew. Those who actually deliver the radiation treatment—the therapists—hold their own special position in the care of cancer patients, which is quite separate from that of the physician.

For a radiation oncologist, the care of a cancer patient begins with the referral for consultation. Radiation oncologists, therefore, take on the role of consultant, rather than primary, cancer care physician. You will receive patients from another member of the interdisciplinary cancer treatment team. For instance, an otolaryngologist who resects a malignant mass from a patient's neck may send that patient to you for additional treatment. Medical oncologists refer many of their patients with lung cancer or other malignancies to radiation oncologists for further management and specialized expertise. Radiation oncologists rarely receive patients directly from primary care physicians. This is mainly because a patient must first be diagnosed with cancer before they wind up with any oncologist. Sometimes the way to your clinic is even more serpentine, in part because radiation oncology simply remains a bit of a mystery even to other physicians.

Some patients tread a tortuous path before they find their way to the radiation oncologist, which illustrates the value to both you and the patient of having a learned referral base.

At the initial consultation, you will perform a history and physical examination that, in keeping with the academic nature of this specialty, is rather inclusive. Radiation oncologists are fluent in their diagnostic skills. Any patient under medical care needs observation for sequelae of disease and effects of medical intervention. Cancer patients are quite prone to a host of systemic problems from the outset. Because patients receive treatment in clinic every day, the radiation oncologist often diagnoses many medical problems while the patient undergoes treatment. A keen diagnostic eye and reasoned mind is a must.

During this consultative appointment, emphasis is placed not only on the particulars of the patient, but on prior or planned therapy and other diagnostic information. You must be well-versed in relevant surgical procedures, radiographic images, and pathologic variants of disease. At consult, radiation oncologists have a considerable amount of information to correlate to achieve a complete clinical picture and come up with a cogent treatment plan: Was there total gross resection? Were the margins microscopically positive or was tumor trailing along a nerve bundle? Was there an operative tumor spill? Compression or invasion of other organs will also be taken into account. All radiation oncologists must consider anatomic involvement as defined at surgery and then compare it with findings from diagnostic imaging.

WHAT MAKES A GOOD RADIATION ONCOLOGIST?

- ✓ Likes fast-evolving technology.
- ✓ Enjoys an intellectual environment with an emphasis on scientific literature.
- ✓ Can cope with treating patients who are terminally ill.
- ✓ Enjoys being part of an interdisciplinary team.
- ✓ Has an amiable personality.

Further testing and clinical investigations are an important part of practicing radiation oncology. Radiation oncologists direct the overall plan for their patient by ordering whatever additional diagnostic studies are needed. Comprehensive skill at diagnostic techniques, therefore, serves you well in this specialty. In particular, the ability to interpret radiographic and nuclear images is vital. After all, radiation oncologists have to scan for the presence of disease that may have been missed by the surgeon's eye but is still important to encompass in your ra-

diation port. For instance, when viewing a lung mass on CT scan, you will play an integral role in complex diagnostic considerations. Is that all tumor which needs to be treated, or perhaps there is associated consolidation, which could represent an area of lung that your treatment might spare? For the medical oncologist, this may be less of a consideration if it does not affect their treatment plan. But for the radiation oncologist, it may have significant impact. You may end up ordering, for example, a functional imaging scan such as positron emission topography (PET)—a new way to look at metabolically hot (and likely tumor-related) cells. Before initiating any radiation treatment, you may also suspect the presence of metastatic disease. Appropriate investigations, therefore, confirm or rule out your suspicion. Radiation oncologists need to understand the clinical behavior of the disease so that they can give the most appropriate treatment.

Radiation oncologists also require a solid understanding of the histology and pathology of cancer. Endometrial cancer, for example, is one of the common malignancies these physicians treat. For this disease, knowing the pathologic difference between high-grade and low-grade tumors could determine whether a patient should receive any radiation therapy. The expression of particular genetic markers and the depth of lymphatic or vascular invasion—two important diagnostic contributions from pathologists—may also guide the radiation oncologist's protocol. All of this diagnostic and treatment related information, plus any findings on physical examination, figure prominently in the decision whether to subject a patient to radiation treatment.

PLANNING RADIATION TREATMENT

For every radiation oncologist, the final treatment strategy is a personally designed plan of attack. Just as surgeons think about how they will approach an operation, radiation oncologists synthesize a great deal of information to come up with the best therapeutic regimen.

Radiation therapy begins with a simulation. During this phase, the oncologist uses techniques of fluoroscopy and CT scanning to localize the particular malignant area of interest. You analyze its relationship to normal and sensitive tissue structures so that they may be protected. Because tissues in the body all have a limit to the lifetime dose of radiation they can safely receive, treatment plans must always take into account this factor. This is where diagnostic imaging, pathology, and indeed the surgeon's narrative, come into play. Radiation oncologists incorporate all of these variables as they come up with a treatment plan.

Because radiation oncologists expose the body to radiation (a foreign sub-

stance), the goal of therapy is to optimize the beam arrangement so that the prescribed dose reaches the tumor while minimizing exposure to normal tissues. Radiation oncologists work side by side with professional dosimetrists, who apply filters and change the relative weights of the beams to meet their specifications. (One can think of dosimetrists' role as parallel to that of pharmacists in medical oncology.) They make sure the correct dose of therapy gets to where you prescribed it. In addition, physicists are also on hand to verify that the plan delivers its dose.

Days later (sooner in cases of oncologic-related emergencies like spinal cord compression or superior vena cava syndrome), the patient is on the treatment table, ready to be set up in the same position as at simulation. The therapist aims the collimator (the tube which shapes the beam of radiation as it exits) and takes an x-ray (port film). The port film images the patient's bony anatomy, ensuring that the field in the beam's actual pathway is the same as planned during simulation. If the radiation oncologist thinks there is any deviation, the therapist shifts the patient in the appropriate direction. Once optimized, treatment is given. As you can tell, medical students interested in radiation oncology must have a firm grasp of gross anatomy.

RADIATION THERAPY: A MERGING OF BIOLOGY AND PHYSICS

Radiation oncology requires a solid knowledge of two important basic sciences: radiobiology and physics. Radiobiology is the study of the biologic and molecular basis for radiation therapy, such as the cellular response to radiation exposure in differing conditions and time schemes. You will learn how to select different types of radiation, choose appropriate energies, and calculate dose delivered to a patient. You will become familiar with a variety of isotopes used in the oncology clinic.

It is important not to let a bad experience with physics as a premedical student discourage you from taking a closer look at this specialty. The body of knowledge in both physics and radiobiology required for the radiation oncologist is not overwhelming, nor does it require a particular knack for the physical sciences. The vexing part of radiation physics, however, is simply that it is usually unfamiliar and daunting to undertake for the first time. Familiarity with physics is not necessary for medical students prior to entry into this specialty, because residency programs teach the required medical physics during the course of training.

For medical students with a bent toward either medical physics or basic sci-

ence research, radiation oncology offers great opportunities. There are many laboratory experiments in radiation physics and dosimetry, as well as investigations in clinical oncology. Current trials include vaccines, cell sensitizers, and normal tissue protectors. These studies have already led to the use of medicines that protect the function of normal tissue from radiation preferentially over cancerous tissue. Even relatively recent research in radiobiology has now become the standard of care in treating specific cancers. For instance, today's radiation oncologist now has the option of applying radiation with novel therapies like hyperthermia and oxygen enhancers, in addition to combining radiotherapy with routine chemotherapy to increase its effectiveness.

Research and scholarly projects are an essential part of this specialty. First and foremost, radiation oncologists are oncologists, so all issues pertaining to the prevention, evaluation, and treatment of cancer are rich sources of investigational material. As a result, there is an abundance of clinical research—outcome studies, new forms of treatment, evaluation of developing technology—open to the radiation oncologist. For the serious academician, many multi-institutional groups have developed a host of randomized trials in which radiation oncologists partake in the development of treatment protocols. In 1999, the American Board of Radiation Oncology introduced the Holman Research Pathway, a residency-level initiative designed to foster interest in careers of basic science and clinical research. As you can tell, the laboratories within radiation oncology welcome all medical students interested in partaking in bench research and advancing the field of cancer treatment. No PhD is necessary to apply!

A HIGH-TECH SPECIALTY FOR HIGH-TECH PHYSICIANS

Today, more and more medical school graduates seek careers in radiation oncology. The specialty's surging popularity may have something to do with the fact that the first generation of doctors raised during the computer revolution is now graduating. Many technology-savvy medical students, who have grown up with both a compelling interest in and familiarity with technology, are drawn to the high-tech nature of radiation oncology.

There are many examples of radiation oncologists' use of the latest advances in medical technology. First and foremost, of course, is fractionation—the treatment method that takes advantage of the healthy cell's ability to repair a small amount of radiation damage (whereas a tumor cell is susceptible to destruction). In the 1930s, a group of French physicians observed that a single dose of radiation necessary to sterilize a ram caused prohibitive damage to the skin of the scro-

tum. By giving smaller doses of radiation for several weeks, they found that they could achieve their objective (sterilization) without producing any unacceptable skin damage. Based on these and later studies, scientists postulated that tumor cells were very similar to fast-growing germ cells and applied this model to cancer treatment in humans. Using fancy delivery systems, radiation oncologists today treat their patients with small daily doses of radiation for several weeks. Many fractionation schemes have been proposed with varying degrees of practical utility in the clinic.

New forms of technical experimentation are essential for improving the delivery of radiation. The major focus in research, of course, is improvement of the therapeutic ratio—killing only tumor cells while leaving healthy tissue intact. Back in the old days of radiation oncology, the technology consisted of easy-to-plan simple opposed beams of radiation, which are still common, useful, and practical today. However, with exciting developments in bioengineering, three-dimensional radiation therapy is fast becoming the standard of care. Using computed tomography (CT)-based simulation, radiation oncologists apply multiple beams of high-dose radiation from many different angles—all within a three-dimensional plane. In the 1990s, another wonderful technologic development came along: intensity-modulated radiation therapy (IMRT). In this technique, thin sliding metal blocks (leaves) enter and exit a field of radiation for varying lengths of time. Both of these amazing forms of technology allow physicians to provide superior conformational coverage to the target. The end result is better protection of normal organ tissue and higher doses of finely shaped radiation to cancerous tissue.

The development of exquisitely precise beams has given birth to radiosurgery, the ability to destroy diseased tissues using radiation with surgical precision—but without the invasiveness of the scalpel. In its most common form, radiosurgery is used to treat tumors of the brain; of course, neurosurgeons are around for assistance. Many have heard about the gamma knife, a device frequently used to treat tumors of the brain and the pituitary gland. Traditional linear accelerators (the standard treatment machines in radiation oncology) can also be programmed to perform radiosurgery. What else lies on the horizon for this field? More radiosurgical gadgets are the on the way, including a cyber knife (with which radiosurgery will be possible nearly anywhere in the body) and tomotherapy (which uses a modified CT scanner to check patient position and correct daily variation moments before treating with a fanned beam of radiation).

Radiation oncologists are also experts of brachytherapy, the temporary or permanent placement of radioactive seeds and ribbons (depending on the organ)

directly into the tumor itself. Because brachytherapy delivers radiation for a short distance before falling off to negligible amounts in surrounding tissue, oncologists find this method very appealing for primary or adjuvant radiation treatment. It can potentially wipe out the tumor without harming the neighboring tissue. Brachytherapy is often performed in the operating room and involves an interdisciplinary team—such as gynecologic oncologists, orthopedic surgeons, neurosurgeons, or urologists—who assist the radiation oncologist in performing the procedure.

THE DOCTOR–PATIENT RELATIONSHIP

Radiation oncologists do not spend all their time in the laboratory or conducting research trials. They typically see their patients for a short visit once a week during treatment. This appointment gives you the opportunity to address the patient's problems or acute side effects from radiation therapy. Once radiation treatment has ended, follow-up appointments continue, depending on the nature of the malignancy. These follow-up visits are extremely rewarding—particularly when a patient is cured. You are important to your patients, who are keen to recount the many happy events that have occurred in their lives since their last appointment.

Of course, not all of your patients will be cured. Radiation oncology has an important role in the palliation of patients with incurable disease. Although radiation treatment is used with the intent to cure, many malignant diseases have an extremely poor prognosis. If you enter this specialty, be prepared to cope with the emotional toll of caring for patients with cancer.

As an outpatient-based service, the practice of radiation oncology is calmer and less dramatic day to day than, for example, treating acutely ill patients on the general medicine wards. Nevertheless, a sizable percentage of your patients succumb to disease within a few years. Although emotionally draining at times, caring for these patients and their families is very rewarding. As you guide them through the rough seas of radiation therapy (not a pleasant treatment for anyone), patients want reassurance that they will not be abandoned. Remarkably, it is often this reassurance—more so than any promise of a miracle to cure—that provides patients and their families with solace, comfort, and peace of mind. One physician, for instance, makes an effort to convey to every patient that "I'll take you through hell and back to treat your cancer, but every single step of the way, I will always be there for you."

Like any physician, radiation oncologists are willing to accept the ambiguities of medicine and deal with issues that most people generally find frightening.

Your patients' will to survive and endure intensive treatment—both radiation and chemical therapy—will humble and inspire you every single day. Indeed, this specialty can offer much perspective on life for any busy physician.

RADIATION ONCOLOGY AS A PALLIATIVE MODALITY

Through long-term relationships with their patients, radiation oncologists assess for clinical stability or signs of recurrence and manage any long-term sequelae of treatment. This is particularly important as these late effects can become manifest weeks to years down the line, and may even include iatrogenic (radiation-induced!) secondary tumors. Your familiarity with radiation's true long-term effects on many organ systems will allow you to identify and medically intervene when necessary.

In light of the potential side effects from radiation treatment, if some patients cannot be cured, what role does this therapy have for them? You will find that radiation oncologists have an important role maintaining comfort for cancer patients by palliating local symptoms. Tumors of all types can be painful or even functionally obstructive. If surgery is no longer an option to resect the cancer, radiation becomes the preferred (or adjunctive) modality to shrink the tumor mass. In particular, radiation oncologists have much success in eliminating the severe pain caused by cancer (particularly lung, breast, or prostate) that has metastasized to bone. With just a couple of weeks of therapy, most patients report a partial or complete resolution of tumor-related bone pain.

The need for radiation therapy as a palliative measure to make patients feel better is often urgent. For instance, patients suffering from metastatic breast or prostate cancer may develop neurologic symptoms due to the tumor's extension from the vertebral body toward the spinal cord. In this case, radiation oncologists are called in for rapid treatment of spinal cord compression. They are the only specialists who can attempt to reverse quickly the neurologic deficit and prevent paralysis. They also help relieve the symptoms of superior vena cava syndrome, when tumors (usually lung cancer) grow and obstruct the main vessel draining blood from the head and neck into the heart.

BEING A PART OF MULTIDISCIPLINARY CANCER TREATMENT

Many medical students are under the misconception that chemotherapy will supplant radiation therapy. Although this is certainly not true, it is important to realize that radiation is just one of three major arms in the fight against cancer.

Long before radiation oncology, the only physicians who could treat cancer were the surgeons, who sought to prolong life by cutting out the tumor mass. Along came radiation therapy, a new modality that also helped to destroy cancerous tissue. Today, chemotherapy is often seen as the most promising therapy, especially because the general public has particularly high hopes that scientists and doctors will discover a magic pill to cure cancer completely.

Unfortunately, despite the technologic developments and other promises of twenty-first century medicine, a miracle cure is unlikely in the near future. Given our greater understanding of the mechanisms of cancer, no single modality—whether surgical, radiation, or chemical—will wipe out malignant disease. All future oncologists must accept the mantra that "different cancers in different stages respond to different schemes of therapy." This is why radiation oncologists are integral members of interdisciplinary cancer care teams whose members—across multiple specialties—work together to treat a patient afflicted with cancer.

Through conferences known as Tumor Board, the three major types of oncologists come together—along with pathologists and radiologists—to decide on the best course of treatment. Chemotherapy is particularly helpful for its systemic properties, dealing with small numbers of tumor cells that may spread throughout the body. Radiation, on the other hand, is especially valuable in treating the primary disease site, whether a gross tumor or microscopic disease. Frequently, radiation is superior to chemotherapy in treating bulky disease. Interestingly, chemotherapy can also act concomitantly with radiation as a sensitizer, thus enhancing the effects of radiation.

For the radiation oncologist then, an awareness of the multidisciplinary approach to cancer is essential. Although surgical oncologists can often resect all gross tumor seen with the naked eye, this approach may not be adequate to achieve a cure. Some cancers are particularly sensitive to radiation (like prostate cancer), whereas others respond quite well to chemotherapy (like the type of leukemia often found in kids). Radiation therapy might be used as the primary treatment (instead of surgery) or as a supplement to surgical or chemical therapy. This is especially important because often the appropriate dosage and the timing of radiation treatment depend upon whether or not the patient will go for surgery or certain types of toxic chemotherapy.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

The lifestyle of a radiation oncologist is relatively benign compared to that of other specialists (although this may vary depending on the type of practice posi-

tion). As hospital-based physicians practicing in an outpatient setting, they work predictable and humane hours, earn relatively generous salaries, and have low malpractice premiums. Although there are few oncologic-related emergencies that require immediate radiation treatment, most oncologists still carry a beeper, typically taking call from home for 1 week several times per year. As a result, there is ample time (including most weekends off) for radiation oncologists to spend with their families and pursue other interests.

VITAL SIGNS

MEDIAN COMPENSATION

Radiation Oncology	$303,750

Source: American Medical Group Association

Much of this "free time," however, is spent in research, scholarly pursuits, and keeping up with the latest medical literature. Radiation oncologists who are faculty members at an academic medical center have teaching and research responsibilities in addition to patient care. All doctors are life-long learners, and radiation oncologists, who have to learn about emerging technology all the time, perhaps best epitomize the importance of a significant amount of academic reading and studying.

After successfully passing the brutal board examinations (written and oral), newly certified radiation oncologists can decide among the three standard choices of practice: salaried academic jobs, community/private practice positions, or freestanding/private practice centers. As a primarily hospital-based specialty, the practice of radiation oncology requires an extensive amount of expensive equipment, supplies, and staff—all of which are usually covered by the hospital. In a recent career survey of new physicians, most board-eligible radiation oncologists (50%) favor private practice; 30% chose an academic setting. The remainder opted for fellowships, locum tenens, military work, or remained undecided.[1] Regardless of choice, the job market for young radiation oncologists coming out of residency is ex-

VITAL SIGNS

RADIATION ONCOLOGY EMPLOYMENT DATA

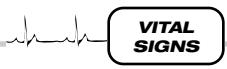
- Distribution among all physicians: 0.5%
- Practice type: 78% in private practice; 22% in academics
- Median patient care hours per week: 54.7
- 30% experienced difficulty in securing their preferred employment position
- 62% report that their salary is equal or higher than expected

Source: American Medical Association

tremely good. In studies evaluating the trends in the job market for radiation oncologists, program directors viewed the job market strongly.[2,3] Starting salaries are high and rising, and choice academic positions are available.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Perhaps unlike most other specialties, residents' training experience in radiation oncology can be quite variable. Although there are some uniform ACGME curricular requirements, not all radiation oncology programs are alike. Some provide better exposure to stereotaxic radiotherapy and radiolabeled monclonal antibody therapy; others are stronger in intracavitary, interstitial, and intravascular brachytherapy. Certain areas of this specialty—like pediatric radiation oncology or brachytherapy—are relatively uncommon in practice and are offered only in major university-based institutions. The technology within this specialty is not only expensive, it is rapidly evolving. As a result, because not every academic medical center has each type of treatment modality, residency experiences differ across the many programs and hospitals.



RADIATION ONCOLOGY 2002 MATCH STATISTICS

- 188 applicants competed for 97 positions
- 140 US seniors and 48 independent applicants ranked at least one radiation oncology program
- Program directors ranked 11.2 candidates for each available position
- 97.9% of all positions were filled in the initial Match
- The successful applicants: 89.6% US seniors, 7.2% foreign-trained physicians, and 3.2% osteopathic graduates
- Unmatched rate for US seniors applying only to radiation oncology: 17.9%

Source: National Resident Matching Program

Because of the varying exposure to different forms of radiation therapy that different training programs offer, some residents choose to enter a fellowship program. Fellowships can provide advanced clinical training in nearly any subspecialty in the field, including head and neck disease, gynecologic oncology, central nervous system radiation, and pediatrics, among others. They are generally 1 to 2 years long. Typically, you hone your clinical skills, develop a professional niche, and become an expert at your chosen area of subspecialization.

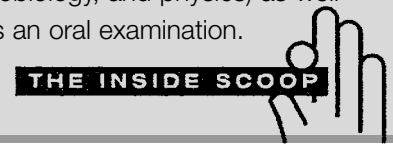
In radiation oncology, fellowships

also take the guise of further expertise in a technique rather than traditional subspecialization in an organ system or population base. The more common types of these fellowships include brachytherapy, intensity-modulated radiotherapy, charged particle therapy, radiosurgery, and hyperthermia. Many people became aware of brachytherapy as a treatment for prostate cancer (in which radioactive seeds are permanently implanted in the intact prostate) after Rudolph Giuliani, the former mayor of New York City, underwent this procedure in 2000. As modern physicians continue to refine this modality, and other equally promising techniques, you will need greater surgical dexterity and skill to attain expertise. Because many medical centers do not offer enough volume to provide adequate training for the interested resident, a fellowship can remedy the situation. Brachytherapy procedures for the head and neck are also common, and breast brachytherapy is poised to become another area of demand.

Many radiation oncologists are research-minded folks. If you want to pursue laboratory or clinical research in your medical career, there are many research fellowships available. Some trainees participate in the Leonard Holman Research Pathway, a program offered by the American Board of Radiation Oncology since 1999. This program combines training in clinical radiation oncology (and radiology) with extensive time spent conducting radiation research. Applications are generally

RESIDENCY TRAINING

Residency in radiation oncology requires a total of 5 years of postgraduate training. There are currently 78 accredited programs in the United States. The first year (PGY-1) consists of a separate internship—preliminary medicine, surgery, or transitional year. Radiation oncology is an outpatient-based specialty, so most residents work about 60 hours per week with most weekends off except during call periods. On-call requirements typically last for 1 week at a time, during which the resident takes call from home and only comes to the hospital for an emergency. Despite the relatively benign work hours, residency training in radiation oncology is academically intense. Assignments, case presentations, and participation at conferences are required and frequent. A great deal of outside reading—particularly using the scientific literature—is necessary. To earn board certification after residency, you must pass three components of a written examination (clinical, radiobiology, and physics) as well as an oral examination.



accepted during the internship year. Candidates participating in this pathway can still complete their clinical training within the normal length of residency (5 years).

WHY CONSIDER A CAREER IN RADIATION ONCOLOGY?

Although no medical school requires a clinical rotation in radiation oncology, more and more medical students are deciding on it as their specialty. The number of residency applications for the small number of positions remains at an all-time high, which unfortunately means that many well-qualified candidates may find themselves without a training position in this specialty. Radiation oncologists recognize that it is a great privilege to care for patients suffering from cancer. After all, they provide more than just medical treatment—radiation oncologists are always a source of comfort and hope.

For many aspiring physicians, this hospital-based specialty has the perfect mix: intimate, one-on-one patient contact; new technology that is developing everyday; good working hours; and a high level of intellectual stimulation. Because radiation oncologists interact with physicians, patients, technicians, and other personnel on a daily basis, this specialty requires excellent communication skills. It is a narrow specialty with a singular focus—the cure of cancer through radiation therapy—yet has enough facets to suit a variety of interests, from teaching to research to clinical care.

Although this specialty can be emotionally draining, particularly when your patients finally succumb to their disease, the cases of successful treatments are some of the most rewarding and satisfying moments of your professional life. Being a radiation oncologist is an exceptionally fulfilling way to practice medicine. You take the latest scientific research and apply its promising discoveries to your patients. You relieve their discomfort, improve their quality of life, and always serve as a beacon of hope.

ABOUT THE CONTRIBUTOR

Dr. Stephanie E. Weiss is a chief resident in radiation oncology at the Sidney Kimmel Cancer Center of The Johns Hopkins Hospital. A native New Yorker, she earned a BA in English and psychology from Franklin and Marshall College and completed postbaccalaureate premedical studies at Columbia University. She then packed her snorkeling gear for medical school at St. George's University School of Medicine in Grenada. Dr. Weiss' professional interests include pediatric radiation oncology, central nervous system disease,

and stereotactic radiation. She and her husband enjoy skiing, traveling, and spending time with friends and family. She can be reached by e-mail at stephew03@yahoo.com.

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31 RADIOLOGY

Derek Fimmen

With the discovery of the x-ray, the specialty of radiology was born. It has rapidly grown into an advanced, highly cerebral discipline encompassing a variety of high-tech imaging modalities. If you want to serve at the forefront of diagnostic and therapeutic interventions, and be the physician to whom clinicians turn for advice, then take a closer look at radiology.

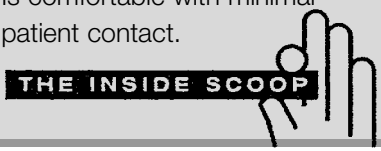
Radiology is the branch of medicine in which radiologic images are interpreted for the prevention, diagnosis, and treatment of disease. Technological advances in medical imaging—and its growing role in the diagnosis and management of disease—have transformed radiology into one of the premier fields of modern medicine. Many of the greatest achievements in health care have come from radiologists. Now new imaging modalities are being used to pioneer faster, better, and safer procedures. These exciting technological advances, along with the income potential and relatively humane lifestyle, make it no surprise that radiology has become an increasingly popular and selective specialty.

THE ORIGINS OF RADIOLOGY

Before the discovery of the x-ray, the only way for doctors to peer inside the human body was to open it up through painful surgery or autopsy. Radiology's beginnings, when scientists first obtained a noninvasive glimpse of internal structures, date back to late nineteenth century Germany. At the University of Wurzburg, Professor Wilhelm Roentgen and his younger colleague, Philip Lenard, were investigating the properties of cathode rays. In these studies, Lenard observed a glow on a fluorescent screen placed near a partially evacuated glass tube. Using his partner's techniques, Roentgen duplicated this fluorescent phenomenon on his own. By November 1895, he observed that these rays of lights could pass through some substances but would leave shadows of others. When he placed his hands in the rays' path, Roentgen discovered that he could see the

WHAT MAKES A GOOD RADIOLOGIST?

- ✓ Likes working with his or her mind.
- ✓ Enjoys learning about new technology.
- ✓ Has excellent interpersonal skills.
- ✓ Is an intellectual and visually oriented problem solver.
- ✓ Is comfortable with minimal patient contact.



faint shadow of his bones. He documented that bones, as well as glass made from lead, could stop these rays. Because magnets or prisms could not deflect or refract the light rays, Roengten excluded the possibility of the rays being either cathode rays or a form of visible light. He concluded that these rays were previously unknown and thus referred to them by the variable X.

The first x-ray ever taken was when Roentgen exposed his wife's hands for 15 minutes to these mysterious x-rays. The result was a photographic plate of Mrs. Roentgen's wedding ring floating around her finger. After publishing several radiographs (including this now famous image of his wife's hand) in the journal of the "Physio-Medical Society of Wurzburg," Roentgen became an instant international celebrity. Within the month, his work was translated into several languages and published in Science and The New York Times. Physicians could now "internally" examine patients by looking at x-rays, which was hailed all around the world as a major accomplishment.

The impact of Roentgen's work is still evident today. Those mysterious x-rays became known as roentgen rays, and the American Journal of Roentgenology has become one of the specialty's premier journals. When the first Nobel Prize in physics was awarded in 1901, the committee chose only to honor Roentgen. Although Lenard had published research as early as 1895 regarding the fluorescence he observed, Roentgen was the one who further investigated the origin and nature of this fluorescence and was the first to use this phenomenon to create anatomic images. Interestingly, Lenard did receive a Nobel Prize in 1905 for his work with cathode rays, but still furious over previous events, he used this speaking opportunity in Stockholm to denounce the 1901 decision. During his last interview in 1945, Lenard insisted that x-rays were his baby and that Roentgen had been only the midwife.

A CLOSER LOOK AT MODERN RADIOLOGY

Today, x-rays are just one of many different kinds of imaging modalities available for the diagnosis of disease. To expose anatomic parts, radiologists are no longer

limited to using radiation. One of the other imaging techniques in their arsenal is ultrasound, which is unique in that its origin is in the physics of sound, as opposed to light. The concept of using sound waves to obtain images of covered objects goes back as far as the 1870s. Ultrasound has never been able to provide the same sharpness possible with other forms of imaging. But physicians use ultrasound for a diversity of applications, such as viewing a growing fetus, looking for stones obstructing the gallbladder, and detecting potentially fatal blood clots within the deep veins of the leg.

First demonstrated in London in 1971, CT scans provide a level of anatomic detail that was previously unimagined. Computed tomography uses collimated beams of x-rays, which are sent to a series of detectors that in turn transmit signals to a computer for translation into images. Although the technology was initially limited by the data storage capacity of early 1970s computers, this obstacle was quickly overcome. By 1981, there were over 1300 CT scanners in the United States and their use had gained acceptance by the National Institutes of Health. Computed tomography has since become one of the most commonly used imaging modalities in modern diagnostic radiology, with which radiologists can examine almost every internal structure. Its diverse applications include diagnosing pathologic processes ranging from colon cancer to hemorrhaging within the brain.

Seeking to improve their ability to look inside a patient's body, radiologists established many of the theoretical and practical aspects of magnetic resonance imaging (MRI) by the 1980s. Drawing from the principles of nuclear magnetic resonance (NMR), which is used in chemistry, MRI uses magnetism—just like x-rays require radiation—to produce images. MRI also benefited greatly from the development of CT, because many mathematical problems involved in translating masses of data into computerized images had already been worked out. MRI rapidly gained widespread acceptance within the medical community. Now radiologists could examine many disease processes in even greater detail. Some examples include herniated intervertebral disks, intracranial lesions, obstructed bile ducts, and ligament tears of the knees and shoulders.

Radiologists in the area of nuclear medicine obtain anatomic images from internal sources of radiation. Many in this field have worked hard to develop positron emission tomography (PET). During radioactive decay, the nucleus emits positrons (the positive antiparticles of electrons) with protons and neutrons. When a source of radiation is placed within the human body, the presence of these particles can be recorded. The development of PET scanning and its applications in monitoring cancer growth is proceeding at an incredibly fast

rate. By looking at whether or not cells light up during the study, radiologists can determine whether or not tumors are rapidly growing or responding to treatment.

As you can tell, radiology is the perfect specialty for physicians who want to be at the forefront of medical technology. Radiology makes it possible to diagnose increasing numbers of diseases simply through imaging. When this is not possible, clinicians often turn to more invasive (and painful) means of diagnosis, such as colonoscopy, bronchoscopy, and laparotomy. Even so, radiologists sometimes have to cause discomfort to generate the most accurate imaging study possible, whether it is injecting contrast into a patient for better delineation of anatomic structures, making them drink barium for an upper gastrointestinal swallow study, or giving a barium enema to examine the colon.

Improved imaging techniques, combined with the development of various catheters, have given rise to a field known as interventional radiology. This subspecialty enables radiologists to do much more than just diagnose. These specialists use medical images to help guide small instruments such as catheters through blood vessels or other anatomic pathways in the percutaneous treatment of disease. With these invasive techniques, interventional radiologists are in many ways similar to surgeons. They scrub in, gown up, and perform procedures that are often invasive enough to require general anesthesia. Some examples include draining abscesses, opening blocked areas of the cardiovascular system, creating vascular shunts in the liver, and inserting various devices into patients requiring long-term vascular access (for things like chemotherapy, antibiotics, or dialysis). As you can see, these radiologists combine the fundamentals of diagnostic radiology with the technical and clinical skills of a surgeon.

Since 1895, when Wilhelm Roentgen first captured an x-ray, the promise of imaging has remained astonishing. Radiology has grown into a multimodality of high-tech imaging using some of the most advanced instrumentation in the world. The remarkable pace of technological advance and the promise it holds for the future have made radiology an incredibly exciting specialty.

THE SCIENCE OF RADIOLOGY

Radiologists must command a great deal of information. In this specialty, there is an increased emphasis on many of the basic sciences. The study of medical physics, for example, is so fundamental to radiology that residents are required to take a physics test as a part of the board certification process. Radiology, however, is more than just studying magnetic field gradients and trying to understand

how the complex technology of x-rays, CTs, MRIs, and PET scans actually works. You have to know many clinical and basic sciences—from pathology to internal medicine—inside and out. Many doctors agree that radiologists are among the most knowledgeable and academic physicians around. Few disagree with their diagnostic reasoning and level of understanding of human disease.

Of the basic sciences, anatomy and pathology are two of the most crucial disciplines. You will become an expert on the name and location of essentially every single anatomic structure in the human body. You have to be able to identify almost every artery, vein, bone, and muscle that exists. You have to memorize anatomic landmarks such as the ligament of Treitz, the segmental anatomy of the lungs, the structures of the brain, countless normal anatomic variants, and much more. As a radiologist, you will not only know anatomy well, but also be able to visualize and understand anatomic relationships on a spatial, three-dimensional level. When interpreting images, radiologists draw on their memory to recognize abnormalities, maintain focus on the smallest of details, and be able to extrapolate from radiologic findings into differential diagnoses.

As expert diagnosticians, radiologists must have a detailed understanding of disease processes and be able to formulate differential diagnoses regarding every organ system. They must prepare for consultations by almost every type of subspecialist, such as internists, surgeons, pediatricians, and obstetricians. For example, pulmonologists often request assistance in evaluating lung nodules. If an older man with a long history of smoking receives a chest x-ray that shows a nodule, radiologists first use their knowledge of anatomy (e.g., the segments of the lung) to identify the location of the lesion. They then use their knowledge of medicine to come up with a differential diagnosis (malignancy, pneumonia, granuloma, etc.) based on the precise nature of the radiologic finding.

This process can be more complex than most people realize. Radiologists first describe the appearance of the lesion in radiologic terms (e.g., upper zone predominant reticulonodular pattern). They then guide the clinician to a more likely diagnosis by combining information from the clinical history, physical examination, and laboratory data with the radiologic findings. Radiologists have to meet the challenge of appropriately labeling states of health, normal anatomic variation, and disease.

BEING A CONSULTANT PHYSICIAN

Radiologists' role as behind-the-scenes consultants with limited patient contact has led to many misconceptions about the specialty. It is wrong to think of it as

a field in which one is isolated from others and has no need for good communication skills or bedside manner. The increased invasiveness of radiology means there are opportunities for extensive direct clinical involvement with patients, if you so desire. Radiologists are consulted by almost every type of clinician, so they are in continuous discussions with a variety of colleagues. Because radiology is a referral-based specialty, your success depends on being able to communicate findings, both in writing and orally, in a clear, timely, and helpful manner. Remember: radiologists spend a great deal of time dictating reports, editing preliminary drafts, and discussing cases directly with the clinicians.

It is important to understand what it means to work behind the scenes as a technical consultant. Radiologists often contribute to the diagnosis and management of disease without ever meeting or examining the patient. Except among physicians, their role is one of relative anonymity. In the days after President Ronald Reagan was shot, for example, little attention was paid to the physicians who provided his anesthetic care, the clinicians that appropriately managed his antimicrobial therapy, or the radiologist that helped to locate the bullet. A great deal of press, however, was given to the surgeon displaying the bullet fragment he had removed from the President's chest. Although Radiology may lack the glamour of plastic surgery, the drama of emergency medicine, and the personal bonding of family practice, it is a field in which the rewards come from your daily challenges and accomplishments.

As the physician who is consulted by so many other physicians, radiologists have come to be known as "a doctor's doctor." They must be able to assist in the diagnosis and clinical management of a great diversity of pathology. Radiology is thus ideal for those who love to read, explore, and teach. To play this role in the management of disease is a great privilege, but it also requires a great deal of personal sacrifice as well as a commitment to a lifetime of learning. Be prepared for an extensive amount of reading on a daily basis.

Clinicians seek out consultations with radiologists for two reasons: (1) help with a diagnosis (the interpretation of a particular imaging study) or (2) advise on the best and most appropriate imaging study to order. Radiologic imaging gives clinicians additional evidence that will supports or weighs against a particular diagnosis. Every physician, therefore, needs the radiologist. Neurologists rely heavily on brain CTs and MRIs to diagnose neurologic disease. Critical care specialists rely on radiologists to evaluate endotracheal tube and central line placement on chest x-ray. If an emergency medicine physician suspects that a patient may have acute appendicitis (because the patient came into the ED with fever and right lower quadrant abdominal pain), she or he may order a CT scan of the ab-

domen. If the radiologist is able to identify a normal appendix, then this is excellent evidence against the diagnosis of appendicitis. If it were not for radiologic testing, a patient such as this might end up having his abdomen opened in the OR when it did not necessarily have to be.

A GLIMPSE INTO THE FUTURE: TELERADIOLOGY

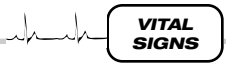
The last decade has brought with it substantial growth in the sharing of information among networks of hospitals and clinics. Teleradiology—the ability to read digitized radiologic images from different locations—is a flourishing part of the technology that has made this possible. The ability to diagnose and treat disease from a distance is becoming more and more common. Despite legal, regulatory, and reimbursement policies that have acted to slow the growth of teleradiology, we have seen telecommunication's role in the delivery of medical care continue to expand.

As networks between hospitals and clinics become easier to set up and maintain, we will continue to see significant growth in the sharing of telemedical resources. Sharing medical technology is a cost-effective way to distribute expertise; it decreases the overall cost to each component in the system. It also, of course, gives a greater number of patients access to physician groups with additional expertise. Small hospitals can access a greater pool of resources by linking themselves with tertiary care facilities, and the larger institutions can increase their population base and volume of interpretations.

Teleradiology can decrease the waiting time for radiologic interpretations. There are clinics in which images can be obtained, transmitted to a distant site, and interpreted in a prompt, thorough, and detailed manner by radiologists with established expertise. The ability to interpret images from all corners of the earth has even made night coverage possible by radiologists practicing during daytime hours in distant locations.

LIFESTYLE CONSIDERATIONS AND PRACTICE OPTIONS

Many of today's medical students are seeking careers in specialties that afford them time to raise a family and pursue outside interests. It is no secret that radiology—with its humane and more regular working hours—is often referred to as one of the lifestyle fields. Choosing radiology for this reason alone, however, is a mistake. First of all, many tales of the cushy lives of radiologists are exaggerated. And times are changing. The expanded role of imaging places increased demands



RADIOLOGY
EMPLOYMENT DATA

- Distribution among all physicians: 1.0%
- Practice type: 80.6% in private practice; 9.8% in academics
- Median patient care hours per week: 50.2
- 21.6% experienced difficulty in securing their preferred employment position
- 68.8% report that their salary is equal or higher than expected

Source: American Medical Association

MEDIAN
COMPENSATION

Radiology-Diagnostic	$302,704
Radiology-Interventional	$356,000
Radiology-Neuro-Interventional	$324,595

Source: American Medical Group Association

on all radiologists. The role of the radiology resident-on-call has become very demanding in many academic institutions. Recent data suggests that, over the last decade, the workloads of radiologists in both private practice and academics have increased dramatically.[1]

After the completion of residency, however, you do have a great deal more control over your lifestyle. Radiology offers opportunities to work full time, or part time, in both private and academic settings. Opinions differ regarding the advantages and disadvantages of private versus academic radiology. While factors such as academic interests, research opportunities, and teaching responsibilities are fundamental considerations in deciding between the two paths, there are important differences. Many radiologists state, as a generalization, that in private practice one has to work three times as hard to make twice as much. One study found that the workload in relative value units for academic radiologists is approximately 35% less than that of their private practice counterparts.[2]

During the early 1990s, amidst misguided forecasts of a surplus of radiologists, applications to diagnostic radiology residency programs decreased dramatically. By the late 1990s, once the flaws in these projections became apparent, radiology again became a highly competitive specialty. Furthermore, most surveys of physician income per specialty show that radiologists are among the highest paid of all physicians. In recent years, the number of applicants, and the percentage of US seniors left unmatched from the specialty, has continued to rise.

ALTERNATIVE PATHWAYS TO BECOMING A RADIOLOGIST

Today, securing a residency position in diagnostic radiology is no easy feat. However, medical students should know that there are alternates to the standard pathway of residency training in radiology. Several programs around the country have experimented with combining radiology training with other specialties, or providing some form of prespecialization during residency. (These alternate pathways are subject to change on a year-to-year basis.)

The combined triple-specialty training program in neurology, radiology, and neuroradiology requires a total of 7 years (see Chapter 7). It leads to board certification in neurology and diagnostic radiology, as well as a certificate of added qualifications in neuroradiology. The goal of these programs is to prepare physicians to serve as leaders in both academic and clinical settings in the image-guided diagnosis and treatment of neurologic disease.

A second alternative for training is the clinical pathway for "vascular and interventional radiology." The American Medical Association officially recognized interventional radiology as a medical specialty in 1992 and today there are more than 5000 interventional radiologists in the United States. This growth prompted the Society of Cardiovascular and Interventional Radiology to address the lack of training options for individuals interested in obtaining broader clinical and research experience. A pathway has been created for trainees interested in the clinical diagnosis and care of patients with diseases commonly treated by interventional radiologists. Six years of training (preferably at a single institution) satisfies the requirements for diagnostic and interventional radiology. Planning for this pathway should occur as a medical student or during the PGY-1 year.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Newly trained residents in radiology can choose to subspecialize in more narrow areas of radiology. Is this a popular option? A recent study found that although the majority (72%) of diagnostic radiologists are generalists; subspecialization, however, is a growing trend.[3] Among new graduates, more than 70% choose to pursue fellowship training before entering the job market. The following ACGME-accredited fellowships generally require 1 to 2 additional years of training. In addition, it is important to be aware that fellowship training is available in areas other than those approved by the ACGME. Examples include modality-based fellowships dedicated to further study of computed tomography or magnetic resonance imaging.

VITAL SIGNS

RADIOLOGY 2002
MATCH STATISTICS

- 1380 applicants competed for 920 positions
- 938 US seniors and 442 independent applicants ranked at least one radiology program
- Program directors ranked 13.5 candidates for each available position
- 97.9% of all positions were filled in the initial Match
- The successful applicants: 86.4% US seniors, 4.8% foreign-trained physicians, and 2.4% osteopathic graduates
- Unmatched rate for US seniors applying only to radiology: 11.1%

Source: National Resident Matching Program

Abdominal Radiology

This fellowship provides expertise in the application and interpretation of CT, ultrasonography, MRI, and the use of interventional techniques for diseases involving the abdomen and pelvis. Abdominal radiology includes the study of the gastrointestinal tract, hepatobiliary system, genitourinary tract, and intraperitoneal and extraperitoneal abdominal organs.

Cardiothoracic Radiology

This fellowship provides expertise in the application and interpretation of imaging examinations and interventional procedures related to the lungs, pleura, mediastinum, chest wall, heart, pericardium, and the thoracic vascular system. The imaging methods and procedures include plain films, fluoroscopy, CT, MRI, ultrasound, and interventional techniques such as image-guided lung biopsies.

Endovascular Surgical Neuroradiology

This fellowship is generally 2 to 3 years. You gain expertise in combining catheter-based interventional techniques with various forms of radiologic imaging for the diagnosis and treatment of central nervous system pathophysiology. Fellowship training provides experience in the clinical management of patients with neurologic disease as well as the technical training to perform endovascular surgical neuroradiology procedures. Examples of these procedures include the treatment of cerebral aneurysms and arteriovenous malformations, as well as the embolization of neoplasms. These rigorous training programs usually contain 1 year of diagnostic neuroradiology and 2 years of neurointerventional training.

Musculoskeletal Radiology

This fellowship is ideal for those who want to learn more about the application and interpretation of imaging examinations and procedures as they relate to the analysis of the musculoskeletal system, including bones, joints, and soft tissues. The imaging methods and procedures include, but are not limited to, plain films, CT, ultrasonography, radionuclide scintigraphy, MRI, arthrography, and image-guided percutaneous biopsy techniques.

Neuroradiology

This fellowship comprises the study of diseases related to the central nervous system as well as diseases of the head and neck. You will gain additional experience in the selection, interpretation, and performance of a diverse set of neuroradiologic examinations and procedures. Fellowship training includes the study and use of imaging modalities such as plain films, CT, MRI, and angiography related to the brain, spine and spinal cord, head, neck, and organs of special sense.

Nuclear Radiology

Nuclear radiology is defined as a clinical subspecialty of radiology involving imaging by external detection of radionuclides in the body for diagnosing disease. Fellowship programs in nuclear radiology provide advanced training in the medical uses of radionuclides for a wide range of in vivo

RESIDENCY TRAINING

Residency in radiology requires 5 years of postgraduate training. There are currently 193 accredited programs. The first year consists of a broad-based clinical internship, usually an internal medicine or transitional program. During the 4 years of radiology training, residents complete monthly rotations in abdominal imaging, neuroimaging, thoracic imaging, pediatric imaging, musculoskeletal imaging, mammography, nuclear medicine, ultrasound, and interventional radiology. Call schedules vary greatly between programs, although most are front loaded, with significantly less call during the last year of training. Many programs have instituted a night float in which residents are on call for 2 to 4 weeks at a time, usually from 7 PM to 7 AM. Resident responsibilities during call hours vary among institutions, but most are responsible for interpreting plain films, CT, MRI, and performing ultrasound. For more complex procedures or cases, there is usually some form of backup provided by a senior resident, fellow, or attending. The process of taking call, and being the only radiol-

(*continued*)

ogist in the hospital, puts the resident in the position of being responsible for expertise in all aspects of imaging and being asked to rule out everything from appendicitis to pulmonary emboli.

imaging. Examples of these procedures include studies ranging from bone scans to nuclear cardiology to PET scanning.

Pediatric Radiology

In this fellowship, radiologists become experts in the pediatric applications of imaging techniques. These programs provide experience in all forms of diagnostic imaging as they pertain to the unique clinical and pathophysiologic problems of the newborn, infant, child, and adolescent. You draw on your medical knowledge of growth, development, and congenital disease. This is a highly clinical fellowship that involves close work with the department of pediatrics.

Vascular and Interventional Radiology

The unique clinical and invasive nature of practice in vascular and interventional radiology requires special training and skills. Vascular and interventional procedures are guided by a number of imaging modalities such as fluoroscopy, angiography, CT, and ultrasonography. This fellowship provides experience in the evaluation and management of patients requiring imaging guided procedures, experience in performing the procedures, and an understanding of the medical and surgical alternatives.

WHY CONSIDER A CAREER IN RADIOLOGY?

With medical imaging having potential applications in almost every disease process, radiology has become a field of incredible diversity. Diagnostic radiology has come to include modalities like ultrasound, CT, MRI, and PET. Radiology offers many avenues for intellectual curiosity. In this specialty, a physician can still choose to study and specialize in almost any organ system—pediatric or adult. You can also decide to be incredibly invasive procedurally and involved clinically or choose to have little patient contact. Advances in teleradiology have created opportunities for people to work not only from home, but also from distant corners of the earth.

The diversity that radiology has acquired over the last century, as well as the growing role of imaging in health care, has made the radiologist indispensable.

Technologies such as CT and MRI are relatively recent additions to modern medicine, yet they have revolutionized heath care. One can only imagine what is to come. A great deal of work, for example, is currently being done with molecular imaging. Along with gene targeting, molecular imaging carries the hope of applying imaging to the physiologic processes of disease at the cellular and genetic levels. The incredible pace of technological advance within new and existing imaging modalities, in combination with their seemingly infinite applications to patient care, makes radiology an incredibly exciting field to be a part of.

Deciding on a specialty is an attempt to define both present and future priorities, balance influences from friends, family, and colleagues, and ultimately, to select a path. But choosing wisely is not easy. Often times, and for countless reasons, residents leave one specialty for another. You can, however, maximize the chances of being happy with the final decision by educating yourself about a variety of specialties and honestly evaluating your priorities. If after all this, you find yourself attracted to a career in radiology, then definitely work hard and try to gain exposure as early as possible to this exciting specialty.

ABOUT THE CONTRIBUTOR

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UROLOGY

Jane Lewis

If you want to operate on patients, urology is one of the best surgical specialties around. Other than hearing jokes about the Viagra phenomenon, most medical students have had little experience with urology. It is a highly focused area of medicine that treats diseases of a more sensitive nature—the urinary and male genital systems—and has rather good treatment outcomes. It is a specialty where you can have long-term relationships with patients (yet not be their primary care physician), where you can perform surgery and procedures (yet still get a decent night's sleep), and where you can truly help improve patients' quality of life.

AN OVERVIEW OF UROLOGY

Urology is a surgical subspecialty focusing on the urinary tract of men and women, as well as the reproductive system of men. A common perception of urologists is that they operate on men's "private parts" and, well, that's about it. Although urologists do in fact operate on the male genitalia (penis, testicles, and scrotum), there is much more to the practice of urology than the penis. They are experts on the diagnosis and management of diseases involving the kidney, ureters, prostate, bladder, urethra, and male genitalia.

Urologists are masters of everything that has to do with the passage of urine, from its production in the kidney to its release through the urethra. They surgically correct problems such as obstructing posterior urethral valves in newborn boys or bladder outlet obstruction caused by benign prostatic hypertrophy in elderly men. Urinary tract infections, which affect every age group and can be quite destructive, make up a large proportion of cases seen by urologists, especially if it progresses to a worrisome infection of the kidney itself (pyelonephritis). These UTIs could actually represent serious underlying problems of the urinary system. Urologists, therefore, make use of sophisticated testing (laboratory urine analysis,

urodynamic flow studies, cystoscopy) to make diagnoses and begin formulating treatment plans.

In the pediatric population, the focus is on male and female congenital abnormalities. The urinary tract is affected by congenital anomalies more than any other organ system. This means undescended testicles (cryptorchidism), ureters poorly implanted into a bladder such that urine refluxes back to the kidneys (vesicoureteral reflux), bladder exstrophy, and the technically difficult arenas of cloacal malformation and intersexuality. Certainly, a general practice urologist will feel comfortable treating some of the more minor conditions, but will likely refer the more complex cases to specialists in pediatric urology.

Kidney stones (nephrolithiasis), which form in both women and men, fall under the expertise of the urologist. Some nephrologists also have an interest in treating patients who form stones, but once a stone is obstructing the urinary system, it is up to the urologist to take it out. Stone surgery dates back to some of the medical writings of Hippocrates. Certainly a lot has changed since then; with the recent advent of endoscopic technology, minimally invasive techniques can be used to fragment stones and allow passage of the bits without making an incision. Now urologists use high-tech tools like rigid and flexible ureteroscopy, percutaneous stone extraction, and extracorporeal shockwave lithotripsy to treat kidney stones (especially if obstructed and causing infection). For those who like video games, that hand-eye coordination will now come in handy. Open extraction of stones has generally fallen out of favor.

Incontinence affects the elderly in our population, as well as younger people with neurologic problems or spinal cord injury, regardless of gender, and can hamper patients' lives terribly. Treating incontinence is one area where a urologist can make a significant impact on a person's quality of life. Imagine being afraid to leave the house because you are worried about wetting yourself. This is crippling to some. Armed with advanced diagnostic techniques such as urodynamic studies, the urologist can assess the underlying cause of the incontinence and offer either medicines or surgery to keep the person dry.

Sexual dysfunction is a significant part of the practice of urology. Historically, the focus has been on male dysfunction but more recently, urologists have also thrown their hat into the complicated world of female sexual dysfunction, as popularized by the now famous urologist Jennifer Berman. In the male world, there are medical treatments for impotence such as Viagra and, if those fail, surgical options such as implantable penile prosthesis. In the female world, medical and surgical interventions are still being investigated. Obviously, this is another area where the urologist can make a huge impact on a patient's quality of life.

Two areas of urology that are somewhat rare but certainly could be areas of focus for the motivated are renal transplantation and traumatic reconstruction. Some urologists take on a role in the world of kidney transplant, either as the primary transplant surgeon or as a member of the transplant team, for example, performing the donor nephrectomy. This depends on the medical center, however. It is not a part of all urologists' practices and would need to be sought out as an area of interest. Trauma is another area that is not uniformly experienced in the various training programs. Urologists are key members of the trauma team in the operating room (for patients who have urethral ruptures or renal damage). They draw on advances in renal tract imaging to evaluate quickly for any trauma to the urinary tract. Urethral reconstructive surgery combines interesting aspects of urologic anatomy and plastic surgery.

Urologists also deal with a significant number of cases of malignant disease in their practices. Unless specifically specialized in another aspect of urology, prostate cancer in men is a urologist's major clinical issue. The search for bladder cancer or kidney cancer brings in many male and female patients when they have blood in their urine. Men are surgically treated for testicular or penile cancer by urologists. Fair assumption—cancer is where the big surgery exists in adult urology. Although urologists perform the anatomic surgical resection of the tumor (or implant radiation seeds), they work closely with medical oncologists in developing chemotherapy treatment plans. As already mentioned, because of the stress this sometimes causes, some patients are referred to the local teaching hospital where a specialist in urologic oncology can perform the surgery and take care of these patients afterward.

Most students are aware that urologists are experts on diseases of the prostate. But the prostate is not always affected by cancer; in fact, most older men have benign prostatic hypertrophy (BPH)—an enlargement of the prostate. Many end up having problems with voiding because of their big prostate, which can be very uncomfortable and can even lead to acute urinary retention. Urologists, once again, offer medical, and if necessary, surgical interventions to ease the passage of urine.

UROLOGY IS BOTH MEDICINE AND SURGERY

Although urology is definitely considered to be a branch of surgery, it overlaps with many other disciplines. Urology requires some working knowledge of general surgery and its subspecialties, gynecology, internal medicine (particularly nephrology and endocrinology), pediatrics, neurology, and radiology.

WHAT MAKES A GOOD UROLOGIST?

- ✓ Prefers working with his or her hands.
- ✓ Enjoys being an expert in a very specialized area of medicine.
- ✓ Is an independent and outgoing thinker.
- ✓ Likes seeing the immediate results of treatment.
- ✓ Has excellent manual dexterity and hand-eye coordination.

Every urologist has trained in general surgery for at least 1 year. Some urologists even completed full general surgery training and then decided to specialize in urology. The training and knowledge base in general surgery is essential. For starters, surgical interns learn the basic techniques—how to hold the scalpel, how to move the "Bovie" (electrocautery), how to grasp the needle driver, how to tie knots, and where your hands should be and when. Also, a surgical intern learns the concepts of postsurgical inpatient care. For example, these young doctors begin to recognize a postoperative ileus and the proper time to insert a nasogastric tube. Fluid management in the postoperative period can be absolutely critical and requires an understanding of the concepts of third-spacing as well as cardiovascular restrictions. Wound care, including managing drains of all kinds, is another important concept for all surgeons—general or specialist—to master.

Gynecology and obstetrics has much overlap with urology, considering the anatomic location. A urologist focusing on female urology shares some of the same patients as a gynecologist subspecializing in urogynecology. Even the general urologist, however, must have a complete understanding of male and female pelvic anatomy. And while a urologist would never perform a hysterectomy or a cesarean section, they could certainly become involved if the gynecologist or obstetrician inadvertently opened the bladder or transected a ureter.

Internal medicine—particularly nephrology and endocrinology—is important to the urologist given the overlays with adrenal, renal, and testicular disorders. If a patient presents to the hospital in renal failure, the urologist is often consulted to participate in the workup. In the elderly, the renal failure may be due to a combination of prerenal, intrarenal, and postrenal obstruction. As far as endocrinology is concerned, urologists should have a working sense of male hormones, essential to any infertility workup, as well as the workings of the adrenal glands, given that someone with an adrenal mass may initially present to them for diagnosis.

Knowledge of pediatrics is important if the urologist will be focusing his or her career on children. But certainly during the residency training, unlike a general medicine resident who will spend no time at a children's hospital, a urology resident spends approximately 6 to 8 months taking care of children. Of course, it is specific to urologic care, but taking care of children is different than taking care of adults and these differences must be learned. Fluid management is different, medicine dosing is different, comorbidities are different, and in general, kids have much higher physiologic reserve and therefore can look well up until the moment they crash.

Neurology is a field that plays into the urology database, in that people with spinal cord injuries, congenital or acquired, inevitably have bladder dysfunction. Having a working knowledge of the nervous system, particularly as it relates to the pelvic organs, becomes paramount in treating a neurogenic bladder.

Finally, it is essential for urologists to have an understanding of the radiologic imaging that a urologic patient may undergo. As with any surgical specialty, diagnosis is often predicated completely on what the scan looks like. For example, if a man with testicular pain and no palpable mass is sent for a scrotal ultrasound, and a small testicular mass is noted, he will immediately get a workup for testicular cancer. Based on the ultrasound findings alone, he may require counseling for surgical excision. Another example: a woman who has been in a car accident whose CT scan shows an incidental, irregular 4-cm renal mass that enhances with intravenous contrast. Based on these findings alone, she is diagnosed with probable renal cell carcinoma and offered surgical excision. Renal function for patients with an atrophic looking kidney can be assessed using nuclear medicine. For example, a dimercaptosuccinic acid scan, a radioisotope that binds to renal parenchyma, gives a sense of how well the kidneys are filtering blood, the left compared to the right.

Medical students considering a career in urology must accept that this specialty is definitely still a surgical field. In some European countries, urology has been divided into two tracts: operative urology and office urology. In the United States, some think that urology is headed toward that same division. In the meanwhile, however, urologists still manage both sides of the operating room. In reality, a community practice urologist may opt to refer all big open cases to an academic center (e.g., cystectomy with neobladder construction). This referral pattern has evolved due to the amount of work these bigger cases entail and the poor reimbursement standards. This means that a typical community urologist only performs straightforward open surgery (e.g., radical retropubic prostatectomy, occasional nephrectomy), minor procedures (e.g., vasectomy, circumci-

sion), and endoscopic surgery (e.g., cystoscopy, ureteroscopy, transurethral resection of bladder tumor or prostate, lithotripsy).

UROLOGY OUTSIDE THE OPERATING ROOM

There are certainly many nonoperative aspects of urology. A typical clinical day could include any number of patients, such as the following.

Patient 1: A 76-year-man, complaining of increased urinary frequency and nocturia (night-time urination) five times a night. His most recent prostate-specific antigen (PSA) level is 0.9. On examination, his prostate feels benign but is large. He empties his bladder and you perform a bladder scan showing 50 mL of urine in his bladder. Diagnosing him with likely benign prostatic hypertrophy, you prescribe a trial of alpha-blockers and ask to see him back in a month to assess improvement in his symptoms.

Patient 2: A 58-year-old man, complaining of inability to maintain an erection during coitus, getting gradually worse over the past year. He is a long-term smoker and type II diabetic. His cardiac status is good and he takes only cholesterol and blood pressure-lowering drugs in addition to metformin (his diabetic medication). Diagnosing him with likely erectile dysfunction due to poor vasculature, you offer him a trial of sildenafil and ask to see him back in 2 months.

Patient 3: A 44-year-old woman, complaining of pelvic pain and urinary frequency, says she has been treated for presumptive urinary tract symptoms by her primary care physician but there has been no relief. She is otherwise healthy but exasperated by this ongoing pain. You send a urine sample to the lab for urinalysis and culture and to pathology to check for malignancy. You determine that after urinating, she has a post-void residual of 25 mL, so you schedule her for an in-office flexible cystoscopy, suspecting interstitial cystitis but wanting to rule out any abnormalities.

Patient 4: A 62-year-old man, referred for persistent microhematuria found on routine physical exam urinalysis. He has a 50 pack year history of tobacco use, controlled hypertension, and no physical complaints. After a physical examination, you send his urine off to the laboratory for a repeat urinalysis and assessment for malignancy and then schedule him for a CT scan of his kidneys, ureters, bladder to look for lesions and for an in-office flexible cystoscopy to evaluate his bladder for tumors.

Patient 5: A 53-year-old man who you have seen previously for an elevated PSA. When his primary care physician checked it 6 months ago, it had risen from 2.5 to 4.1 over the course of a year. You performed ultrasound-guided prostate needle biopsy on him last week and now the patient is here to discuss treatment options. After a lengthy discussion, he decides that he would like to have surgery performed. Because you are nearing retirement and slowing down your surgical practice, you introduce him to the bright young partner in the group who performs at least two prostatectomies a week.

THE DOCTOR–PATIENT RELATIONSHIP

Most surgical specialists are simply consultants who treat an acute surgical problem and then send the patient back to their primary care physicians. Urologists, however, do form long-term relationships with their patients. While patients would never treat their urologist as their primary care physician, if they have bothersome voiding symptoms, sexual dysfunction, or cancer, none of these things are an easy fix. Patients with bladder cancer meet their urologist for a workup after their first episode of gross hematuria, for example, and then potentially go to the operating room for cystoscopy with a follow-up transurethral resection of their bladder tumor. Then, depending on the pathology, they either return to the operating room for a cystectomy or to the clinic for weekly intravesical therapy. This could mean follow-up cystoscopies every 3 to 6 months for a few years then yearly cystoscopy for the rest of his or her life.

If a patient with voiding dysfunction is referred to the urologist for evaluation, he or she could be started on a medicine, sent for urodynamic studies, or treated for a urinary tract infection. Regardless, the patient needs to come back to talk about the improvement or worsening of symptoms and then another move will be made. Possibly an older man could end up going to the operating room for a transurethral resection of his prostate, or to the clinic for transurethral microwave therapy of his prostate, but many of these patients do very well on medical therapy and continue to have checkups for years and years. Likewise, women with incontinence may either see the urogynecologist or the urologist and have an ongoing relationship, assessing the wetness for years.

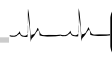
The patient with sexual dysfunction requires all the interview finesse and sensitivity a physician has. The urologist must be very comfortable talking about sex and all its accoutrements to make the patient feel comfortable, truly uncover all the symptoms, and get to the best diagnosis and treatment. Once again, this

If you crave more excitement in your urology career, the academic setting would probably be the best fit. Or, if you want to see trauma and be called into the hospital at 2:00 AM for the intraperitoneal bladder rupture after a motor vehicle accident, or the penile reattachment or urethral reconstruction after a knife injury, your choice should be a busy urban academic trauma center. One could even choose a rural trauma center where farm equipment can cause some fairly interesting injuries.

An academic career at a nontrauma hospital might mean having a very interesting surgical practice, where the community urologists refer their difficult cases to you. You could be operating every day, or nearly every day, and doing a wide variety of cases—cystectomy with a range of urinary diversions, prostatectomy, pelvic surgery for a mass that nobody else wants to tackle, repair of ureteric injuries from other surgeons, and revision of a urethral sling because a 60-year-old woman is still bothered by her stress urinary incontinence.

Most urologists with academic careers spend a fair amount of time dedicated to clinical research. Some hold positions in which they mostly see patients in the clinic, operating occasionally, referring the big open cases to colleagues, and then spending the rest of their time in research endeavors. These academic urologists generally have established themselves as experts within their research field—for example, male sexual dysfunction—and nearly all the clinic patients they see are there precisely for that reason. Every once in awhile, these specialists may go to the operating room, for instance, to place a penile prosthesis.

Most residents, however, choose a career in the private sector. The salaries are higher and the demands are different from the academic world. A group practice will be looking for a junior partner, perhaps because their practice is getting too big for all of them to handle, or perhaps because one of the senior partners is stepping back his patient load with his eye on retiring. Regardless, each group will have different expectations of the junior partner, his or her responsibilities, and how exactly he or she will become a full partner. Some physicians may be partners only in economics and overhead but not in patient-care responsibilities. Some practices may be so tight knit that the entire group rounds together every morning at the hospital, seeing whatever inpatients they collectively have, treating all group patients as if they were their individual patient. A urologist desiring a part-time job in a group practice so that he or she can have time for family is not unheard of.



MEDIAN COMPENSATION

Urology	$276,798

Source: American Medical Group Association

This is a field of professionals who, in general, are nice people, married, the least likely of any surgical specialists to divorce, interested in some hobby outside of medicine, and fairly laid back. Also, given the nature of the anatomy dealt with, most urologists are required to have a pretty good sense of humor.

SPECIAL SPECIALISTS: UROLOGISTS WHO ARE WOMEN

Urology is certainly a specialty that is heavily dominated by testosterone—both its area of expertise (male genitalia and urinary systems) and the predominantly male patients and physicians. Given this environment, most women interested in a surgical career may have some hesitation about selecting urology. Patients are often surprised when they encounter a female urologist. Some may ask you "When did they start letting women do this?" or "Does your mother know you do this?" Despite this, for the most part, however, men appear to be comfortable with female doctors. Certainly, if the doctor is uncomfortable, the patient will be uncomfortable, regardless of gender.

The demand for women in the field has grown so much recently that women in urology training programs begin fielding job offers well before they are finished with their training. These are inevitably from group practices of urologists, all male, who have had women call asking if they can see a woman doctor. When the answer is no, those women take their business elsewhere if they can.

Of course, the struggle for the general practice woman in adult urology is to see male and female patients. Naturally, women sometimes need a major open surgery such as a nephrectomy or cystectomy, but for the most part, their complaints have to do with voiding dysfunction. This means a woman practicing in general adult urology may end up being a "female urologist," even without doing a year's fellowship training, and maybe without even wanting that focus. Certainly, this is avoidable with awareness and careful planning with the partners.

Being a woman in a surgical field has its own set of personal demands. Men and women, both, are challenged in many ways as residents. Women have some added disadvantages, which obviously have to do with our biologic role with birthing babies. In today's day and age, it is unfortunate that this is still an issue. While any employer is legally required to provide maternity leave, your co-workers are not guaranteed as a replacement while you are gone. This could potentially seed resentment if the delivery date is during a particularly stressful time for the department. The same numbers of patients keep coming in, and there may be fewer physicians to take care of them.

Many women have dealt with this challenge by carefully timing pregnancy

during dedicated research time, so that your absence hurts only you and your curriculum vitae. Some department heads even find creative ways to support the remainder of the house staff if a female resident was not able to plan the pregnancy perfectly. Still, most female surgical residents do not attempt to have a baby while in residency training

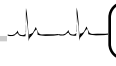
Another interesting phenomenon is the single female surgical resident. For unclear reasons, there are many super, bright, beautiful, dedicated women who are single. True, nobody has a lot of time for socializing and meeting new people. True, training in surgery is likely a bit threatening to the weaker members of the opposite sex. And true, professional women regardless of career in our culture are staying single longer and longer.

FELLOWSHIPS AND SUBSPECIALTY TRAINING

Many urologists desire extra training in one particular aspect of the field. This means applying for post-residency fellowship training. They generally last 3 years: 2 years of research plus 1 year of clinical subspecialty training.

Endourology and Laparoscopic Surgery

The buzzword in all surgical specialties nowadays is "minimally invasive." In urology, there is a similar effort to develop techniques by which surgeons can operate on the genitourinary system without actually opening the pelvic cavity. Endourology includes advanced training in laparoscopic urologic surgery, percutaneous kidney surgery, and ureteroscopy. Laparoscopy is still relatively new to the urology world, and not all training programs afford residents enough experience to then feel comfortable offering patients a fair choice between a laparoscopic and an open procedure. Hence, endourology fellowships are currently very much in



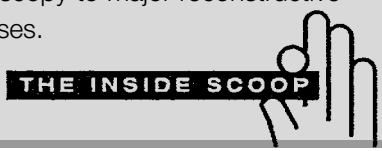
UROLOGY 2002 MATCH STATISTICS

- 336 applicants competed for 233 positions
- Candidates submitted an average 33.8 applications and received 10.3 interviews
- 100% of all positions were filled in the initial Match
- Match rates: US seniors (80%), US graduates (38%), women (73%), foreign-trained physicians (23%)
- Unmatched rate for US seniors applying only to urology: 20%

Source: American Urological Association

RESIDENCY TRAINING

Residency in urology requires 5 years of postgraduate training. There are currently 121 accredited programs. The residency begins with 1 year of general surgery training followed by 4 years of clinical urology. In the final year, the resident functions in the capacity of chief resident. Like any surgical specialty, residency in urology is very time consuming and intense. It requires a high level of commitment for excellent patient care, professional development of operative skills and a teamwork mentality, and job responsibilities taking priority over many personal matters. However, call schedules are generally more benign than for other surgical subspecialties. Monthly rotations include general urology and each of its subspecialties (pediatric, oncologic, and renal transplant, among others). Residents also gain a significant amount of outpatient experience in the urology clinic. Upon completion, every new urologist is qualified to perform any operative procedure from minor surgeries like endoscopy to major reconstructive cases.



demand. Most fellowships are 1-year programs integrating both clinical and research experiences.

Female Pelvic Medicine and Reconstructive Urology

Remember—women constitute a large portion of the patients seen by urologists. If you are interested in helping women with voiding dysfunction and pelvic prolapse, you should consider this fellowship, which combines both urology and gynecology experience. You will become an expert in all kinds of female reconstructive surgery, such as urethral suspensions, slings, artificial urinary sphincters, and urethroplasty. Women, after all, have their own special set of urologic problems, including stress urinary incontinence, urethral diverticuli, and chronic urinary tract infections. In their practice, these subspecialists evaluate patients using diagnostic tools like cytoscopy and urodynamic studies. The fellowship generally lasts for 2 years (including both clinical and research experience). New therapies for these disorders are constantly refined every year.

Infertility and Sexual Dysfunction

Many men suffer from sexual dysfunction and infertility. Subspecialists in this area become experts in the use of prosthetic devices, artificial urinary sphincters, and the surgical correction of con-

genital problems. Because of advances in medical therapy for sexual dysfunction, these urologists develop an in-depth understanding of both endocrinology and reproductive physiology. The area of sexual dysfunction is now expanding from men to also include women. Infertility focuses only on the male side, working in conjunction with the gynecologists who are fellowship-trained in infertility.

Pediatric Urology

This fellowship is perfect if you love kids and are interested in pursuing pediatric urology, likely in an academic setting. Estimates suggest a population of one million people to support one pediatric urologist. Hence, the jobs are mostly limited to large referral centers, usually academic hospitals. These are also the centers that train pediatric urologists. The clinical training is usually 1 year in length. This year will be preceded by either 1 or 2 years of research, depending on the program. Obviously, if you are headed into academics, time in research is essential.

Urologic Oncology

If you have a particular interest in cancer, this fellowship provides the opportunity to develop additional expertise in the treatment of cancer in the genitourinary tract. Once again, 1 to 2 years of research precede a clinical training year. This means not only developing laboratory research skills, enhancing one's understanding of the cancer disease process, but also developing prime surgical skills to tackle what usually are the most challenging of urologic surgeries. Of note, most chairmen of academic urology departments have a focus in urologic oncology.

WHY CONSIDER A CAREER IN UROLOGY?

The specialty of urology is constantly changing. Much of this change has been the result of improved technology. Refinements in ureteral and renal endoscopic surgery have already revolutionized the therapy of urinary tract stones and, together with the new generation of extracorporeal lithotriptors, have made many of the traditional surgical and even endoscopic approaches to the problem of renal and ureteral calculi largely obsolete.

The results of other traditional urologic procedures, specifically vasovasostomy and hypospadias repair, have improved in selected cases with the use of the

surgical microscope. Skill and experience using the surgical microscope will undoubtedly be an important part of urologic practice in the future. Lasers are in their infancy but will influence the practice of urology in the management of neoplasms and, in a somewhat different context, the management of ureteral calculi. Many urologic operations that were done by open surgery in the past can now be performed through the laparoscope. The development of new cancer chemotherapeutic agents has significantly altered therapy for some urologic cancers.

If you enjoy gross anatomy, are a hands-on person, and thrive on interviewing patients about sensitive topics, perhaps urology is for you! These specialists operate (or treat medically), often enacting a cure, and then move on to the next diagnostic problem at hand. You will be joining a field in which the joy of operating can meet the pleasure of some long-term patient relationships in a practice of the intensity you choose. By treating diseases of the urogenital system, as a urologist, you will have the extraordinary privilege of improving your patients' quality of life.

ABOUT THE CONTRIBUTOR

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Internet Resources Guide

Medical Education and Licensing

Accreditation Council on Graduate Medical Education (ACGME)—*www.acgme.org*
American Board of Medical Specialties—*www.abms.org*
American Medical Association—*www.ama-assn.org*
Association of American Medical Colleges—*www.aamc.org*
Council of Medical Specialty Societies—*www.cmss.org*
Federation of State Medical Boards—*www.fsmb.org*
National Board of Medical Examiners—*www.nbme.org*
United States Medical Licensing Exam—*www.usmle.org*

The Match

Educational Commission for Foreign Medical Graduates—*www.ecfmg.org*
Electronic Residency Application Service (ERAS)—*www.myeras.aamc.org*
National Resident Matching Program—*www.nrmp.org*
San Francisco Matching Program—*www.sfmatch.org*

Major Specialty Organizations

American Society of Anesthesiologists—*www.asahq.org*
American Academy of Dermatology—*www.aad.org*
American Academy of Family Physicians—*www.aafp.org*
American Academy of Neurology—*www.aan.com*
American Academy of Ophthalmology—*www.aao.org*
American Academy of Orthopaedic Surgeons—*www.aos.org*
American Academy of Otolaryngology—Head and Neck Surgery—*www.entnet.org*
American Academy of Pediatrics—*www.aap.org*
American Academy of Physical Medicine & Rehabilitation—*www.aapmr.org*
American Association of Neurological Surgeons—*www.aans.org*
American Association of Plastic Surgeons—*www.aaps1921.org*
American College of Emergency Physicians—*www.acep.org*
American College of Obstetricians and Gynecologists—*www.acog.org*
American College of Physicians—American Society of Internal Medicine—*www.acponline.org*
American College of Radiation Oncology—*www.*
American College of Radiology—*www.acr.org*
American College of Surgeons—*www.facs.org*
American Psychiatric Association—*www.psych.org*
American Society of Clinical Pathologists—*www.ascp.org*
American Urological Association—*www.auanet.org*
College of American Pathologists—*www.cap.org*

Other Useful Web Sites

CareerMD—*www.careermd.com*
Fellowship and Residency Electronic Interactive Database (FREIDA)—*www.ama-assn.org/go/freida*
Internship and Resident Information Site (IRIS)—*www.i-r-i-s.com*
MedCAREERS—*www.aamc.org/medcareers*
Physician's Guide to the Internet—*www.physiciansguide.com*
ResidentWeb—*www.residentweb.com*
Scutwork.com (residency program reviews)—*www.scutwork.com*
The Student-Doctor Network—*www.studentdoctor.net*