One hundred students each year make Yale the most stimulating place in the world to study medicine. Each chooses Yale for a hundred different reasons; this book is about a few of them. Our class size of 100 allows us to nurture each student’s own interests, ambitions, and vision of how the art and science of medicine can contribute to the world. What’s your reason for choosing Yale?
"Medicine at Yale is about more than numbers."

“The numbers tell us what an outstanding school we have: number of grants, number of applicants, number of awards, number of medical breakthroughs. But what makes us extraordinary is that we never lose sight of the whole person behind the numbers—whether that person is the patient, the doctor, or the student.”

Robert J. Alpern, M.D.
Dean and Ensign Professor of Medicine
More than 80 years ago, the Yale School of Medicine embarked on a new approach to education, based on the premise that “the medical student is a mature individual,” as a 1928 Curriculum Committee put it. Highly motivated and self-directed, students were to take an active role in acquiring not just a set of facts but habits of inquiry and a capacity for critical thinking that would last a lifetime. This approach was so distinctive that it became known as “the Yale System.”

The Yale System has endured through myriad changes in biomedical knowledge, the nature of clinical practice, and technology, but it retains its reliance on student initiative, its emphasis on scientific investigation, its respect for individuality, and its encouragement of cooperation rather than competition.

What does all this mean in practice?

> Every M.D. student must complete a thesis that represents a substantial body of original research. The thesis project teaches students to wield the tools of scientific investigation and places students in close, collegial contact with faculty from day one.

> In the first two years, students track their own progress through optional self-assessment tests midway through each course and mandatory final examinations called qualifiers. The grades on these tests are known only to the individual student, and there are no grade point averages or class ranking. The rare student who fails to achieve mastery has many options for assistance in getting up to speed.

> Class attendance at lectures is not recorded, and students are expected to make responsible decisions about the best use of their time.

> Students are encouraged to explore their own interests in medicine and advance at their own pace within the Yale curriculum. About half complete the M.D. program in four years, and half take an optional, tuition-free fifth year to pursue additional clinical electives, thesis-related research, or international medical experiences. Several students each year pursue dual-degree programs with other Yale schools and departments.

The Yale System embodies the school’s commitment to educating leaders who will advance the science and practice of medicine. Such leadership requires the ability to think critically and creatively, to work collaboratively with others, and to take responsibility for lifelong learning. Judging by both the satisfaction of our current students and the extraordinary success of our graduates, the system works.
Yale has turned anatomy on its head. Traditional anatomy courses begin with comprehensive lectures, overly detailed dissections and long nights memorizing terms. It all seems rather abstract until students see patients. So why not start with the patients? That’s what course director Lawrence J. Rizzolo, Ph.D., associate professor of anatomy and experimental surgery, asked himself. He redesigned the course and made Yale the first medical school to teach anatomy using a surgical case model. Students begin the course by performing actual operations on their cadavers under the guidance of faculty surgeons. For example, they learn about the heart’s structure by performing heart transplants. Hands-on learning is supplemented with lectures, study groups, and a wealth of web-based resources. Outcome measures show that students are retaining more information under the new model.

Rizzolo and his colleagues have published on this unique approach and field inquiries from other medical schools that would like to explore it. The sum of medical knowledge increases rapidly, but the time students spend in medical school is a constant. More efficient ways to learn are essential. The case-based approach does not only teach basic anatomy more effectively; students are simultaneously practicing clinical reasoning skills, gaining experience reading images, and negotiating the complexities of working in teams. Experience with the cadavers is also an early and important opportunity for students to address the issues of death and dying that they’ll confront throughout their careers. The course culminates in a Service of Gratitude for the cadaver donors, who, through a final act of generosity, became great teachers themselves.

At Yale, “bedside manner” is not an add-on to physician training but an integral part of the concept of patients as whole people. From the very beginning, a Yale medical education reminds students not to lose sight of the whole patient. In one first-year exercise, students are asked to interview a family member about a medical event and then to think about the psychosocial factors that came into play. At the end of the surgical clerkship, students must interview patients after surgery to gain a complete understanding of the experience. Classes build in discussions not just with medical experts but with nurses, social workers, and chaplains. This distinctively Yale approach to medical training makes our graduates better, more observant, more effective doctors.
“With only 100 students in a class, every student is an individual. There’s not just one model of success. Students are encouraged to be themselves, and to find out who they want to be in the future.”

Nancy Angoff, M.D., M.P.H.
Associate Dean for Student Affairs
When you study medicine at Yale, New Haven is a gateway to the world. You don’t walk through that gateway alone. The Office of International Medical Student Education oversees an integrated global health curriculum that runs throughout your time in medical school. Like the rest of your Yale medical education, the study of global health issues is deliberately planned to keep the focus on both patients and doctors as whole people.

First year. A year-long elective on the social, political, and economic determinants of global health presents lectures on subjects ranging from maternal mortality to the political uses of psychiatry. The course is codirected by students and meets biweekly over dinner. Another elective, Introduction to Research Methods in Global Health, focuses on field-based research in low-resource countries. This workshop is particularly relevant for students who are planning to apply for Downs Fellowships (see #9), which fund summer research projects abroad.

First summer. First-year students may apply for Downs Fellowships to conduct research abroad during the following summer. Many of the projects become the basis for the thesis.

Second year. Throughout your second year at Yale, you participate in a course called The Modules, studying mechanisms of disease in 13 organs or systems. Included is discussion of illnesses that you would not find in New Haven. Students may also choose clinically oriented elective courses in tropical medicine, pediatrics, and mental health.

Third year. During their clinical clerkships, you will encounter patients whose paths to New Haven began in many varied parts of the world. The New Haven area is a diverse enough community that students can gain exposure to a panoply of global health issues without leaving the city.

Fourth and fifth years. Clinical electives in Argentina, China, England, Peru, South Africa, Thailand, Uganda, and Zambia take students out of their comfort zone and put them into “one of the most intense and thought-provoking experiences I have had in years,” as one student put it. The international clinical electives are no vacation: attending physicians from Yale run many of the programs in resource-poor and highly stressed situations. The Internal Medicine rotation at Mulago Hospital in Uganda, for example, confronts students with the sickest patients—about half of whom are infected with HIV—in a country with an annual per capita income of $280. Robert Rohrbaugh, M.D., who heads the Office of International Medical Student Education, lists some benefits for students: “They’ll be able to practice what they’ve learned at Yale in different settings. They’ll be seeing patients with different presentations of illness. They’ll develop an awareness of the social and political factors in health and disease. They learn a basic cultural competency.” Most students receive financial support for travel and living expenses associated with international clinical electives.

9. Downs Fellowships

Each year, the Wilbur Downs International Health Student Travel Fellowship supports 15 to 20 Yale students who undertake a summer of health-related research primarily in low- and middle-income countries. Downs Fellows carry out research in the context of their host countries’ culture, health problems, and resources, with the intellectual support and practical assistance of Yale faculty members. Students also have host-country sponsors who serve as mentors during their time abroad. Downs Fellows present their research findings and experiences at a fall symposium and poster session. Many fellows further develop their studies into a thesis or dissertation. Recent research subjects have included circumcision and HIV prevention in Peru, lead exposure among children in Uganda, patient education about HIV in Vietnam, and emergency contraception in South Africa.
10. HAVEN FREE CLINIC

In the spring of 2004, Yale students in medicine, public health, nursing, and the Physician Associate Program conceived of a free clinic to serve the neediest people of their city. By November 2005, the students had found space and financial backing, enlisted volunteer attending physicians from the Yale faculty, arranged for referrals to Yale-New Haven Hospital, established links to social and educational services, scheduled bilingual student translators (mostly in Spanish, the language spoken by 85 percent of the clinic’s patients), and opened the doors of HAVEN, New Haven’s first stationary free clinic for the uninsured. Today, HAVEN—which stands for Health, Advocacy, Volunteerism, Education, Neighborhood—is open every Saturday morning year round and helps hundreds of patients in the course of the year. Some students do their Primary Care Clerkship by volunteering at HAVEN; many more work there on an occasional basis. Because appointments normally last at least an hour—not the usual 10 or 15 minutes allotted in standard practice settings—students as well as patients have an exceptional experience not often available in today’s medical practices.

11. HUNGER AND HOMELESSNESS AUCTION

If you’d like your medical school experience to include lessons in sushi making, belly dancing, or “being a Southern gentleman,” mark your calendar for the Hunger and Homelessness Auction. Yale health professions students organize a massive annual auction to benefit local programs that serve hungry or homeless people. “Massive” is the operative word for the enterprise that nets as much as $30,000 for New Haven organizations annually. Lessons are a common auction item, as are homemade culinary treats. Popular faculty take high bidders out to dinner and an evening of theater. More conventional offerings have included a week in a London flat and a vintage Epiphone guitar.

The auction itself is the highlight of a year-round process where students raise awareness about the social and economic needs of New Haven’s diverse population. A student committee reviews grant applications from local non-profits to decide exactly how the auction proceeds will be put to work helping New Haveners. And while hunger and homelessness remain difficult problems to solve, organizers hope they’re challenges that, one day, will be going, going, gone.
Professor Linda Mayes, M.D., at the Child Study Center has been studying the problems of mothers with substance abuse disorders in forming emotional attachments to infants and toddlers. When she wanted to study the neural circuitry of parental attachment in these cases, she began the project under the auspices of the Yale Center for Clinical Investigation. Her project meets all the aims of the center: it is innovative and important, it takes an interdisciplinary approach to a disease, it has clear implications for therapeutic interventions, and it has clear applications in the New Haven community.

Clinical research is a crucial part of the translational process, and Yale has created a comprehensive infrastructure to support the movement of scientific discoveries “from bench to bedside.” Clinical trials—that is, research with humans—are complicated by the inescapable fact that you cannot control people the way you control laboratory specimens. The Yale Center for Clinical Investigation brings together the tools and staff needed to support clinical trials across the medical campus: expertise in areas from regulatory issues to biostatistical analysis, nursing and laboratory services, inpatient and outpatient facilities, and community outreach specialists, to name a few.

YCCl takes its charge a step further, “from bedside to community.” Central to the center’s mission is an emphasis on community-based research and engagement, with the goal of extending Yale findings to improve the health of the region we are a part of. YCCl’s efforts range from working with Yale Cancer Center on the creation of a statewide cancer network to collaborations with community-based partners, to advocacy on health policy issues. So far, the focus has been on five main areas: cancer, obesity, diabetes, heart health, and sexual health.

Crucial to both stages of YCCl’s mission is training new generations of researchers in the theory and techniques of clinical, translational, and community-based research. The Robert Wood Johnson Clinical Scholars Program—Yale’s is one of only four in the U.S.—trains physicians to think beyond healing the individual patient to healing the health care system itself. Research fellowships are also available to M.D. and M.D./Ph.D. students to support a year-long intensive training core in the YCCl.

“YCCl is the infrastructure of Yale’s culture of collegiality and creative interaction,” says Robert Sherwin, M.D., director of YCCl. “By building bridges between departments and highways to core services, by breaking down barriers to collaboration, YCCl expands the possibilities for team approaches to the important health problems facing our nation.”

Robert Sherwin, M.D., Director of YCCl

During the Vietnam War, men who had served as corpsmen returned home with considerable skills. But there was no professional path to put those skills to use. Yale was one of the pioneers of the physician associate profession, admitting its first class of PA students in 1971. The program trained them in trauma care, though today that role is much broader. Maximizing the strengths of each health profession and preparing students to practice in a team is a critical part of a Yale medical education. Some of the best teachers you’ll encounter will surely be fellow students, and many of those will come from the PA Program, Department of Epidemiology and Public Health, Nursing, and the Graduate School.
14. 
Translational Research

“To make translation work, you need a way to connect physicians and basic scientists, and that is best done by people with both interests who are willing to work in the middle.”

Jordan Pober, M.D., Ph.D. 
Director of the Human and Translational Immunology Program

How long does it take for a great idea in the lab—or a major finding that makes it to the cover of *Nature*—to make a difference in the lives of patients? That depends on the speed of translation.

Jordan Pober, M.D., Ph.D., professor of immunobiology, dermatology, and pathology, often points out that, while current cell biology or genetics texts bear little resemblance to their mid-1980s predecessors, many sections of medical textbooks are much the same as students found them two decades ago.

Pober was acutely aware of this knowledge gap early on, and in 2000 he founded the Interdepartmental Program in Vascular Biology and Transplantation (*vbt*), one of the nation’s first research programs explicitly focused on translational research. Ten years on, *vbt* (now Vascular Biology and Therapeutics) is a vibrant program that includes 35 faculty members, drawn equally from basic science and clinical departments. It’s a rich area of science at Yale, and one that matches dozens of Yale medical students with faculty mentors for thesis research.

One of the original goals of the *vbt* program was to improve outcomes for organ-transplant patients by building on basic research. But in the eyes of Pober, translation is a two-way street: intimate knowledge of the biology of disease gained in the clinic must guide the future direction of basic biomedical research if the insights from laboratory experiments are to be speedily applied to clinical medicine.

Pober now heads the program in Human and Translational Immunology (*HTI*), which has researchers working on human immunology connected with clinical researchers in a variety of medical departments. By removing roadblocks to clinical research, Pober, his *HTI* colleagues, and their students hope to see Yale discoveries turned into treatments for a wide range of diseases, from diabetes and cancer to heart disease and stroke. They are certain to change the course of science and medical care. Who knows? You might even help rewrite the next edition of that textbook.

Research in the Vascular Biology and Therapeutics program looks closely at the mechanisms present in the cells lining blood vessels.

15. 
Breakthroughs

Just a few of Yale’s medical firsts:

1896  Arthur Wright publishes first X-ray in the U.S.
1942  First successful clinical use of penicillin in the U.S.
1942  First use of chemotherapy as a cancer treatment
1949  First artificial heart pump prototype (now at the Smithsonian)
1957  Continuous electronic fetal heart monitoring invented
1960  First newborn intensive care unit
1975  Lyme disease identified at Yale
1978  First insulin pump for diabetes
1980  First transgenic mouse
1997  Discovery of a mechanism of protein folding, a step toward understanding neurodegenerative and other diseases
1997  Discovery of the mechanism of innate immunity
2008  Discovery of the first reliable method for early detection of autism
1990s/2000s  Discovery of the genes responsible for responsible for high blood pressure, osteoporosis, dyslexia, macular degeneration, Tourette syndrome, and Crohn’s disease

From top: An X-ray made by Yale physicist Arthur Wright in 1896; Sewell artificial heart prototype; the Lyme disease vector, *Ixodes scapularis* (or deer tick); mouse; DNA sequence.
With almost 1,000 beds and 3,200 physicians, Yale-New Haven serves more than 54,000 inpatients and over half a million outpatients each year. The hospital includes Yale-New Haven Children’s Hospital, Yale-New Haven Psychiatric Hospital, and Smilow Cancer Hospital. The National Institutes of Health have recognized these facilities for the excellence of the Cancer Prevention Research Unit, Cancer Information Service Center, Comprehensive Cancer Service, Digestive Disease Research Center, Child Health Research Center, Clinical Research Center, and Claude D. Pepper Older Americans Independence Center.

In part because of the emphasis on translational research in the School of Medicine, the school’s relationship with Yale-New Haven Hospital is a particularly collaborative one when it comes to building clinical programs. Physicians and scientists work closely and respectfully, and medical students on rotations are encouraged to participate in deliberations.

Yale-New Haven Hospital is Connecticut’s largest, with a Level 1 trauma center and close to 1,000 beds.

The name says a lot: it’s both an internationally renowned university teaching hospital and a front-line city hospital. That means on rounds you will encounter patients from all economic strata, and you can’t lose sight of the tremendous societal forces affecting health or the great variety of professional roles you take on with different patients.

Students come to Yale to study with some of the greatest names in medicine. But on two magical nights in February, they are clearly emulating Stephen Colbert and Weird Al Yankovic. The Second Year Show is a collection of song parodies and comedy skits in which other medical school classes—and more often faculty—get spoofed. The humor is entirely affectionate, if not entirely tasteful. Professors attend the show and sometimes even pay for the privilege of playing themselves on stage. But the organizers and stars are second-year students. The show is a chance for them to have fun and blow off some steam together before studying for the boards and going their separate ways to clinical clerkships.

The show’s tradition stretches back at least to 1949 with “The Four Years for What Follies.” Dean Vernon W. Lippard threatened to cancel it in the 1950s after an especially PG-13 production. Students had reportedly “passed the bedpan” to solicit money at the show. Today, ticket sales go to support New Haven charities.

In 2009, Thomas A. Steitz, Ph.D., won the Nobel Prize in Chemistry for untangling a mystery. His models of the ribosome—the organelle responsible for manufacturing proteins—look like many skeins of brightly colored yarn, hopelessly knotted and intertwined. The Sterling Professor of Molecular Biophysics and Biochemistry set out to map the ribosome, an enterprise that involved plotting every twist and turn. “It seemed a little like climbing Mount Everest. We knew it was doable in principle, but we did not know if we would ever get there,” he reflected. He led an interdisciplinary team to that summit and produced the first map of the ribosome’s large subunit in 2000. Understanding its structure has already led to the development of a new class of antibiotics, currently in clinical trials, that targets bacterial protein synthesis. The new drugs may prove effective as a new weapon in the battle to conquer drug-resistant infections.
A quarter of a million office visits each year. Another 120,000 adult and pediatric emergency visits. Over 50,000 inpatient stays. Yale physicians offer advanced care in more than 160 clinical specialties and subspecialties, drawing patients from around the world. Yale medical students have broad opportunities to learn the art of medicine from outstanding doctors working in the finest of facilities and, even more important, working in multidisciplinary teams to provide the most seamless, comprehensive care possible.

At the head of this operation is David Paige Smith Professor David J. Lefell, M.D., who serves both as CEO of the Yale Medical Group and deputy dean for clinical affairs. He manages to fulfill these functions while maintaining a busy skin cancer practice—using the sophisticated Mohs surgery technique—and a research agenda as well. What makes Dr. Lefell such a convincing advocate for clinical excellence is his own commitment to giving priority to the needs of his patients. He is working hard to see that vision of medicine instilled in all aspects of physician training at Yale.

AIDS Care Program
Shortly after the Centers for Disease Control first identified AIDS in 1981, Yale-New Haven Hospital set up the AIDS Care Program, one of the first in the nation. The program has become a model for the provision of integrated outreach, testing, care, and clinical trials. Today its span reaches from neighborhoods in New Haven to St. Petersburg, Russia.

Advanced Cardiac Care
Yale is a leader when it comes to assessing the best approaches to cardiac treatment, and its interventional cardiology service has one of the best “door-to-balloon” times in the country. Medical students learn state-of-the-art care in the catheterization lab, which conducts 3,100 procedures a year, and on the electrophysiology service, which offers radiofrequency ablation, focal atria and pulmonary vein ablation, trans-septal catheterization, and defibrillator implantation.

Yale Craniofacial Center
Cleft lips and palates are the most common disfiguring craniofacial anomalies—problems in the growth of the bones of the head. Yale’s Craniofacial Center, led by John Persing, M.D., is internationally recognized for its advanced, multidisciplinary approach to craniofacial deformities, from the most common to the rarest.

Outpatient Parathyroid Surgery
Carmalt Professor of Surgery Robert Udelsman, M.D., M.B.A., thinks about every surgery he performs on at least five different levels at once. How can he make this procedure faster and surer? What can students learn from this procedure? How can the hospital be more efficient? How can we better manage all aspects of the patient’s dealings with the hospital, from parking to scheduling? How does this procedure advance our scientific understanding? Underlying every one of those questions is his sensitivity to the entire experience of the patient, and the future patients of the doctors he trains.
20. ADVISORS

In a program as individualized as Yale’s, students need advisors to make sure they get exactly what they want and need from their medical education. YSM’s mentoring program works in many dimensions:

> Each student works with an academic advisor over the four or five years of medical school, meeting one-on-one and in groups to discuss their program of study. The advisor writes the student’s dean’s letter for residency applications in the final year.

> Advisee groups get together regularly, providing an opportunity for students at different stages of their education to interact more closely and to mentor their peers.

> The program complements other mentoring activities, in particular the guidance provided by thesis advisors for student research (#44) and by clinical tutors, who work with students in groups of four during the first two years (#36).

21. RECOGNITION

Yale University faculty are among the world’s most accomplished biomedical scientists and physicians.*

1
in NIH research funding per faculty member

2
Nobel Prizes

17
Howard Hughes Medical Institute Investigators

60
Members of the National Academy of Sciences

39
Members of the Institute of Medicine

352
Active patents for Yale inventions

45
Yale-founded biotech companies in greater New Haven

$557.9
million
Total medical school research funding from...

2,033
grants and contracts

*data as of 6/30/10

22. HIGH-END INSTRUMENTATION

At Yale, you work with the best technology—in the lab and the clinic. Richard Lifton, M.D., Ph.D., recently took advantage of that fact with lifesaving results. A 5-month-old boy couldn’t gain weight and was dangerously dehydrated. His medical team in Turkey asked Lifton, who is chair and Sterling Professor of Genetics, to search the infant’s DNA for a marker that would help them diagnose the illness. Half a world away, Lifton’s group determined that the baby had congenital chloride diarrhea, which is manageable with diet and medication. The case, using next-generation DNA sequencing to quickly and completely map the infant’s “exome,” marked the first time that a patient has been diagnosed, and treated, based on a comprehensive genetic scan.

That giant step for medicine was made possible by the Yale Center for Genome Analysis, uniquely equipped with 12 Illumina sequencing machines. The machines dramatically accelerate the process of gene sequencing and yield results that will be affordable enough to be used clinically in the not-too-distant future. The center is indispensable to researchers studying the genetic basis of disease. Projects focusing on multiple sclerosis, autism, and addiction all rely upon it.

Core research facilities like the Center for Genome Analysis provide faculty and students throughout Yale with the sophisticated technology and expert consultation they need to advance science.

Other cores include:

- Proteomics
- Cell, Molecular, MR, and PET Imaging
- Cell Sorting/Flow Cytometry
- High-Throughput Cell Biology
- Small Molecule Screening
- Biostatistics & Informatics

The Yale Center for Genome Analysis is located on West Campus.
Professor Gail D’Onofrio, M.D., chair of the Department of Emergency Medicine and chief of the Emergency Department at Yale-New Haven Hospital, chose her field for the excitement and satisfaction of saving lives in crisis situations. Yet today she focuses as much on preventing emergencies as responding to them. In the Yale tradition, she greets every condition—individual or social—with a question: So many of the injuries we see are the result of alcohol and drug abuse; will the brief interventions we have time for in the emergency department make a difference? Are women receiving the education they need to avoid heart attacks? Can we change the lives we save into healthier ones? Questions lead to exploration and, often, new solutions.

Each year, with the resources of a Level 1 trauma center supporting them, Yale’s Emergency Medicine faculty handles 100,000 adult emergency visits, from patients who may have anything from a life-threatening injury to undiagnosed cancer. The specialty of emergency medicine draws on knowledge and skills not only across the full spectrum of medical problems but also in public health areas such as disaster preparedness, epidemics, and screening for substance abuse. As the point of access to the health care system for millions of people, emergency departments confront and help manage a host of social issues. Emergency medicine may be the ultimate example of thinking globally and acting locally.
When the federal government limited its support for human embryonic stem cell research, Connecticut set up a fund to make sure that investigations here continued and awarded more than $13 million to Yale. So when President Obama expanded federal funding in the spring of 2009, the Yale Stem Cell Center was in full operation: new core facilities for stem cell culture, imaging, cell sorting and analysis, and genomics; 12 labs at Yale were involved in stem cell research; and about 40 faculty members throughout the university were affiliated with the YSCC.

Director Haifan Lin, Ph.D.—whose work was listed by Science as one of the top 10 breakthroughs of 2006—says, “Few other places have been focusing on really understanding the inner workings of stem cells. We think we can and believe that by doing that we will generate more impact and speed the development of cures. Stem cell research is still in its infancy. Our center is a new baby that has been born, but now we need to feed it and let it grow up. One thing we know is that this baby is full of potential.”
A CLOSER BOND

“What’s so great about the school is that it’s based on relationships—between you and your classmates, you and the faculty, you and the patients. You grow and develop as a person because of those relationships. Yale has been an adventure for me, not just a means to an end.”

Jason Frangos, Class of 2009

First-year students in the “Molecules to Systems” course study biologic structure and function with faculty, some of whom helped establish the field of modern cell biology.
Match Day is always a joyful moment at Yale. Our students have a strong record of residency placements in the wide variety of venues they seek out. Medical school at Yale prepares them for the nation’s most competitive residency programs, as reflected in the list at right. Yale graduates continue on to succeed in a diverse array of careers, including all the clinical subspecialties, health care policy, biotechnology, international medicine, and leadership in academic medicine. Approximately 25 percent of the school’s alumni hold faculty positions.

Top 15 hospitals the Class of 2010 are attending for internship/residency:
- Harvard Affiliated Hospitals 35
- Brigham and Women’s Hospital 16
- Massachusetts General Hospital 9
- Beth Israel Medical Center 5
- Harvard Longwood Training Program 3
- Massachusetts Eye & Ear Infirmary 1
- Children’s Hospital of Boston 1
- Yale-New Haven Hospital 15

Percent of class attending these hospitals 78%
In addition to the M.D./Ph.D. program (See #39), joint degree programs in collaboration with Yale’s other outstanding graduate and professional schools are attractive options for many students.

The possibilities include:

- **M.D./J.D.** Prospective students must apply separately to the Yale School of Medicine and Yale Law School for the six-year M.D./J.D. joint degree program.

- **M.D./M.B.A.** See #33

- **M.D./M.Div.** Students apply to the six-year joint degree program with the Yale Divinity School for a variety of reasons, from an interest in bioethics to an intention to conduct international missions of healing.

- **M.D./M.H.S.** See #32

- **M.D./M.P.H.** Several students each year enroll in a five-year program that gives them a Master of Public Health degree along with their M.D. degree. The program is designed for students interested in biostatistics, epidemiology, and health care management, and other aspects of public health.

### JOINT DEGREES

#### 32. MD/MHS PROGRAM

In medical school, Matthew Vestal, M.D. ’10, M.H.S. ’10, learned that one form of epilepsy may be preventable. The world learned it, too. Vestal was part of a team whose research showed that rats with a predisposition to absence epilepsy never developed severe seizures if given anticonvulsant medications early enough. Even after the medications stopped, the rats’ seizures were greatly reduced. It was the first time any form of epilepsy had been prevented.

Vestal graduated with an M.D. and a master’s degree in health science research. The five-year program features an intensive research experience. The final year is fully funded through fellowships arranged by the Office of Student Research.

Vestal wanted to “bridge the divide” between laboratory research and clinical care. Though children outgrow absence epilepsy, they are left with a high risk of teen pregnancy, alcoholism, and other problems. Vestal led human neuroimaging studies aimed at detecting risk early, when preventive treatment is effective. “He was the driving force; it was his project,” says his faculty mentor, Hal Blumenfeld, M.D., Ph.D., professor of neurology, neurobiology, and neurosurgery. The M.D./M.H.S. program offers access to resources and a wealth of faculty guidance, but students design their own projects. “There is no other place that I know of that has this kind of operation,” says Blumenfeld.

Planning a career in academic medicine, Vestal already has publications and the experience of writing a successful million-dollar grant with Blumenfeld. His Howard Hughes Research Training Fellowship provided support for him to attend conferences, where he was often a presenter. He says he was able to capitalize on the opportunities he found here to get a head start in academic medicine. The world of medicine is full of urgent problems begging solutions, and “Yale,” he says, “is your oyster.”

Matthew Vestal, who matched in neurosurgery at Harvard’s Brigham and Women’s Hospital, talks about his fifth-year project with mentor Hal Blumenfeld.

### 33. MD+MBA

Vivek Murthy, M.D./M.B.A. ’03, gives his patients his best: some days, as an academic hospitalist at Boston’s Brigham and Women’s Hospital; others, as a social entrepreneur changing health care delivery. Yale prepared him to marry both halves of his life into a powerful whole.

“I was able to actually see opportunity more clearly in the world around me,” explained Murthy. “I saw opportunities for creating change, both in the hospital and in the world outside.”

He co-founded Doctors for America, a non-profit that engages physicians and medical students in shaping health care policy. The idea came to him during the 2008 presidential election while listening to campaign leaders, with not a physician among them, debating competing national health care reform plans. He also co-founded a social network for scientists, Epernicus, to connect researchers and facilitate collaboration. Customized versions are used by Glaxo-Smith Kline and others. Finally, he’s developing systems to increase efficiency and safety in clinical research.

Most M.D./M.B.A. graduates, like Murthy, remain in clinical medicine, said Program Director Howard Forman, M.D., M.B.A. The five-year curriculum of classes, internships, and international experience positions them to have a strong and immediate impact. The experience “catalyzes your career,” says Forman, a professor of diagnostic radiology and public health.

Students have extended interactions with health policy leaders, for example, White House Special Advisor Ezekiel Emanuel, M.D., and former Food and Drug Commissioner David Kessler, M.D., also a former dean of the School of Medicine. But Murthy was most influenced by his classmates. “I derive a lot of motivation from meeting other problem solvers,” he said.
Dr. Lee knows that members of minority communities often bring particular concerns and face special challenges along with the universal demands of professional training. Since 1988, the Office of Multicultural Affairs has provided support for minority students and worked to increase sensitivity to minority concerns in the medical school as a whole, recognizing that a diverse student body helps train doctors for the pluralistic world in which they will serve. Under Dr. Lee’s leadership, the office conducts recruitment, retention, and outreach programs. It provides educational support and serves as a touchstone for student groups such as the Yale Student National Medical Association (twice in recent years the Chapter of the Year of the national SNMA), Asian Americans in Yale Medicine, and the Latino Medical Student Association. The university’s Office of LGBTQ Resources coordinates support for the campus’ lesbian, gay, bisexual, transgender, and queer community.

These groups provide forums for discussion, an organizational structure for service to the school and the New Haven community, and academic and social support programs for individual students. Other associations throughout Yale University—including cultural centers, religious organizations, and a wide variety of student societies—offer students a wide network of contacts and support.
A basic mystery of biochemistry is this: How do newly synthesized proteins fold into their mature, functional shapes? Arthur L. Horwich, M.D., Sterling Professor of Genetics and HHMI Investigator, discovered a molecular machine called the “chaperonin” that helps the process along within cells. Recently, his research on chaperonins has led him to study human neurodegenerative disorders such as Lou Gehrig’s disease (amyotrophic lateral sclerosis), in which proteins misfold and aggregate. Dr. Horwich uses experimental approaches ranging from crystallography to transgenic model systems in his efforts to “see something that’s not been seen before.”

PTSD represents a complex inter-relationship between mind and brain, experience and neurobiology. Understanding the physiological changes that underlie PTSD is leading psychiatrists to new treatments. Yale researchers have already identified a gene that increases susceptibility to PTSD and are in the midst of clinical trials of medications they hope will provide improved symptom relief.

For John Krystal, M.D., Robert McNeil Jr. Professor of Translational Research and chair of Psychiatry, this is an essential mission. “We are at a critical moment in the lives of the soldiers who have made sacrifices on behalf of every American citizen,” he said. “We as a country have to decide whether we are going to return the favor by supporting our soldiers and respecting the sacrifices they have made by making sure they get the treatment they need and by making sure we can improve the treatments we are offering them.”

At YSM, you meet your first patient in your second week of school. “You won’t wait until you’ve heard a year or two of lectures on doctoring before you see a patient,” says Margaret Bia, M.D., director of the Clinical Skills Training Program. Yale medical students take a “Preclinical Clerkship,” in which they meet weekly during their first two years, in groups of four, with their clinical tutor, who observes them taking histories and performing physical exams. “You can imagine how intense that mentoring relationship becomes,” says Bia. Students learn communication skills, from social-history-taking to breaking difficult news. They confront “standardized patients”—actors who play the part of patients—as well as real ones. “By the time they get to Step 2 of the U.S. Medical Licensing Exam, in which they examine 10 standardized patients in a day and formulate diagnoses and treatment plans, our students are well prepared.”

Helping a young patient at Yale-New Haven Hospital (above)
“People hear Yale and they think it’s going to be intimidating. They don’t realize how incredibly accessible the faculty is, and how easy it is to get matched with a lab.”

Cecily Williams, M.D./Ph.D. student

The National Institutes of Health supports the training of M.D./Ph.D. students at 40 institutions around the country, and the Yale System makes this an especially apt place to pursue such training. The Yale tradition of close interaction between clinicians and basic scientists and between faculty and students means that M.D./Ph.D. students experience collaboration at its best. Yale’s flexibility allows students to tailor programs to their individual interests. And because the M.D. curriculum already integrates thesis research with clinical work, it is conducive to a joint degree program. Through the Medical Scientist Training Program, M.D./Ph.D. students receive financial support for tuition, living stipends, and health fees until completion of the program.
As a resident in anesthesiology in the mid-1990s, Laura Niklason, M.D., Ph.D., had an idea. In the operating room, she would witness vascular and heart surgeons searching their patients for spare veins to use as grafts, often finding only vessels of very poor quality. “I’d think, if we could grow new arteries, then we wouldn’t have to harvest them from patients and subject them to such an invasive procedure.”

At the time, researchers were just starting to understand how to get blood vessel cells to form microscopic tubes in a petri dish. In addition to her residency, Niklason was working as a postdoc in Robert Langer’s lab at MIT. One day she walked into Langer’s office and announced, “I’m going to grow an artery in the laboratory.” He said, “That’s great, Laura. You do that.” It took a while, but in the third year of her project, Niklason began to make progress. She seeded blood vessel cells onto polymer tubes and pumped a nutrient solution through the tubes. By mimicking the natural forces that blood generates when it flows through real vessels, she had found a way to produce strong, supple artificial arteries. Since coming to Yale in 2006 as an associate professor of biomedical engineering, she has had a chance to develop her work further in animal models, to create vessels that can be stored for implantation into any patient at a later date. Her research has expanded to include the engineering of lung tissue.

Biomedical Engineering at Yale, says department Chair Mark Saltzman, Ph.D., has two related goals: first, the use of the tools and methods of engineering to better understand human physiology and disease; second, the development of new technologies for diagnosis, treatment, and prevention of human disease. Saltzman himself has focused on new technologies for time-release drug delivery, including a method for delivering chemotherapeutic drugs directly to brain tumors. Other researchers are developing new methods of diagnostic imaging, vaccine and drug delivery, and tissue engineering for applications from spinal cord repair to liver transplantation. “We have cell biologists and immunologists and surgeons and pathologists and bioengineers all working together in an ideal environment for interdisciplinary work,” he says. “I think that’s a very rare happening among universities.”

Laura Niklason, above. Mark Saltzman, below.

At Yale School of Medicine, investigators have identified genetic bases for:

Hypertension
Dr. Lifton’s genomic analyses of extreme cases of disease in patient populations around the world, which have become a model for gene hunters, have revealed more than 15 genes that are crucial in the regulation of blood pressure and the body’s salt balance.

Crohn’s disease
Associate Professor Judy Cho, M.D., who made the first identification of genes involved in inflammatory bowel disease (ibd), recently identified a gene mutation that can protect against Crohn’s disease, one form of ibd.

Tourette syndrome
In a finding named a top scientific breakthrough by the journal Science, Donald J. Cohen Associate Professor Matthew State, M.D., Ph.D., and Associate Professor Nenad Sestan, M.D., Ph.D., identified the first genetic mutation associated with Tourette syndrome.

Macular degeneration
In pioneering whole-genome association studies, Associate Professor Josephine Hoh, Ph.D., and her colleagues have identified genes that raise the risk of age-related macular degeneration, the leading cause of blindness in the developed world.

At Yale an exhilarating place to enter the fray.
44. THE THESIS

Since 1839, the Yale School of Medicine has required M.D. students to complete a thesis based on original research. The thesis requirement grew out of the recognition that the scientific process of investigation, attentive observation, interpretation of data, and critical evaluation of literature are as fundamental for a doctor making a diagnosis as for an investigator advancing the frontier of medicine. Thesis projects also have a hugely beneficial side effect: by the time they apply for residencies, all students have worked very closely with at least one member of the faculty, who can therefore report in convincing detail on the student’s abilities. “What makes it work is the faculty-student pairs. It’s a great synergy,” said John N. Forrest Jr., M.D., director of the Office of Student Research. “The value of the thesis is not the concept of trying for a scientific career, but to teach that all physicians are scientists.” Students have written their theses on topics including “From Mueller to Miller: Determining Standards for Decisions Regarding Critically Ill Newborns” to “Mitral Cell Dendritic Development in the Mouse Main Olfactory Bulb” and from “Thinking Outside the Black Box: Current Policies and Problems with FDA’s Highest Drug Safety Warning” to “The Role of Matrix Metalloproteinases in Axon Guidance and Neurite Outgrowth.”

Medical students get a chance to present and discuss their thesis work at Student Research Day, which takes place each May.

The school’s Office of Student Research provides guidance and financial support, including:

- Assistance in identifying research topics and finding mentors
- An annual Student Research Day poster session and presentations, followed by the Farr Lecture by world-class scientists
- Summer research stipends and short-term student research stipends
- One-year student fellowships, which enable students to spend a fully funded fifth year doing laboratory, translational, or clinical research.

Farr Lecturers
Arnold Relman
Anthony S. Fauci
Sidney Altman
Sydney Brenner
Joseph L. Goldstein
Francis S. Collins
Judah Folkman
Joseph L. Goldstein
Alfred G. Gilman
Robert J. Lefkowitz
Richard P. Lifton
Paul Greengard
Edward J. Benz Jr.
Story C. Landis
Arthur Horwich
Jeffrey Friedman
Jack Elias
David Nathan
Stuart Orkin
Lewis Landsberg

43. THE GREAT PIZZA DEBATE

It is a truth universally acknowledged that New Haven has the best pizza in the United States, maybe the world. But Pepe’s or Sally’s? We’ll just have to keep testing them both until that question is resolved.*

* Hey, what about Modern on State Street?

42. NEW ENGLAND

“No one tells you how beautiful New Haven is, or the area around the city. In 10 minutes you can go for a walk on the beach in the summer, or pick apples in October, or cross-country ski in the winter. Spring is just plain gorgeous.”

Clockwise from top: Sleeping Giant State Park; Lighthouse Point on Long Island Sound; the New Haven Green, the center of the city’s nine squares.
A CLOSE-KNIT COMMUNITY

“We don’t think of patients as collections of body parts, and we don’t think of doctors that way either. For that reason, we encourage our students to reflect on all aspects of their training and practice, from power relationships—with patients, with colleagues, with superiors—to dealing with death and dying. And, of course, because we are such a small school, the faculty can know each student as a whole person. Students will grow to be better doctors if they do not lose their individuality.”

Margaret Bia, M.D.
Professor of Medicine and Nephrology and Director of the Clinical Skills Training Program

Clinical instruction includes classes that equip students to communicate with patients and provide compassionate care at the end of life.
Conventional microscopy is limited in resolution by the diffraction limit of light (about 200 nanometers), and small details are lost. Various new ‘nanoscopes’ beat the light barrier and offer high resolution, 3-D views of living cells over time. Researchers can observe and manipulate basic biological processes on the organelle and molecular level. For example, one student is watching how the vesicles of a fat cell react to insulin. Yale is not only one of the few institutions to have these technologies; it is improving them. Scientists like Toomre and Bewersdorf are working to make it faster and more useful to researchers.

The late George Palade, a Nobel laureate who founded the Department of Cell Biology in the 1970s, pioneered electron microscopy. The department’s history combines excellence in imaging with fundamental discoveries. Today’s research using Yale’s super-resolution capabilities has implications for neurological disorders, cancer and type 2 diabetes. Seeing life in unprecedented detail may help answer some of medicine’s biggest questions.

Students interested in the cutting edge of cell imaging have the opportunity to do research with scientists who are pushing the limits of the field. The device at left is a Leica STED super-resolution microscope, one of only three in the United States in 2010.

“The cutting edge doesn’t have to be high tech. Mary Tinetti, M.D., for example, has been studying ways to reduce the risk of falls among the elderly. Such routine health issues have long been overlooked in medical research, but Tinetti, a MacArthur fellow and director of the Yale Program on Aging, designed a clinical study that demonstrated how a set of ordinary interventions—increased hydration, exercises, changing doses of medications—could significantly reduce the rate of falls and prevent future disability and functional decline. Published in the New England Journal of Medicine and other journals, Tinetti’s work could improve millions of lives. Such close attention to the patient, questioning of assumptions, and creative thinking about how to improve life for a broad population—these have been the hallmarks of the Program on Aging for decades, and they are the underlying lessons of a Yale medical education.

One clinical counterpart to the Program on Aging is the Dorothy Adler Geriatric Assessment Center at Yale-New Haven Hospital. The Adler Center staff of geriatricians, geriatric psychiatrists, nurse case managers, patient care assistants, physical therapists, and neuropsychologists helps patients and their families develop comprehensive plans to preserve their quality of life, manage their clinical care, and link them with other resources in the community. Another model program is the hospital’s Acute Care for the Elderly Unit, which integrates the work of specialists from many fields to provide the complex care that elderly inpatients often require. Programs such as these have put Yale-New Haven Hospital among the top 10 hospitals in the country for geriatric medicine.
Museums & Galleries
Beinecke Rare Book & Manuscript Library
Creative Arts Workshop
Eli Whitney Museum
John Slade Ely House
New Haven Museum and Historical Society
Peabody Museum of Natural History
Yale Center for British Art
Yale Collection of Musical Instruments
Yale University Art Gallery

Theatre
Little Theater
Long Wharf Theatre
Shubert Performing Arts Center
The University Theatre
Yale Cabaret
Yale Repertory Theatre (left)

Festivals
Celebration of American Crafts, Nov.–Dec.
Cherry Blossom Festival, April
International Festival of Arts and Ideas, June–July
Concerts on the Green, July
New Haven Jazz Festival, August

In 1988, Chair Richard Flavell founded the first academic unit in the U.S. devoted to research in immunology. He also plays a rau-
cous lead guitar in a "biorock band" called the Cellmates.

Yale wrote the book on it: Janeway’s Immunobiology has outlived its original lead author, the renowned Yale professor Charles Janeway, M.D., but still carries his name. Janeway was part of the exceptional group of immunobiologists that has made Yale a leader in studies of the immune system, from the molecular level to the therapeutic. Janeway himself pioneered exploration of the innate immune system (the power behind the adaptive immune system).

In the 1990s—a dark time for the sciences in Russia—Dr. Janeway’s work found its way into the hands of Ruslan Medzhitov, Ph.D., then a graduate student at Moscow University. Janeway’s theories about the immune system put Medzhitov on a career path that led eventually to Yale, where he and Janeway discovered the role of Toll-like receptors as the central players in the innate immune system. Today, as the David W. Wallace Professor of Immunobiology at Yale, Medzhitov is exploring the possibility that Toll-like receptors trigger chronic inflammation that is at the root of diseases from coronary artery disease to Alzheimer’s.

Throughout the department, faculty are working on basic science with highly practical application. For example, Sterling Professor Richard Flavell, ph.d., was awarded $17 million in the first round of the Gates Foundation’s Grand Challenges in Global Health grants, to generate a mouse with a rudimentary human immune system that could be used in testing vaccines against diseases prevalent in the developing world. The project fits Dr. Flavell’s definition of a good research project: “It is curiosity-driven, pursuing such basic questions as ‘How does the body work?’ But we always study this using diseases that matter. And what we try to do is to force ourselves to ask the question, ‘Is this an important problem?’” The mouse will allow researchers to pretest weakened live vaccines for safety and effectiveness before human trials with an unprecedented level of confidence.

Yale’s Department of Immunobiology – one of the few freestanding immunobiology departments in the world – is now looking at the molecular, cellular, and genetic mechanisms of flu, AIDS, Lyme disease, genital herpes, chlamydia, asthma, and autoimmune diseases, including inflammatory bowel disease, diabetes, systemic lupus erythematosus, and multiple sclerosis. They are also studying the role of immunology in organ transplantation and graft versus host disease and developing ways for the immune system to attack tumors. With a distinguished faculty, a long-standing partnership with the Howard Hughes Medical Institute, advanced facilities in the medical school’s newest buildings, the department offers unmatched training in the basic and translational science of immunology.

New Haven is a small city, but that only means that its world-class museums and galleries, its great repertory theaters, and its active schedule of festivals are all affordable and easily accessible. There is more music, art, film, and drama in any given week than you can possibly fit in your schedule.
“This is an audacious undertaking,” declared NIH Director Francis Collins, M.D., Ph.D., back when he signed on as head of the Human Genome Project. Perhaps you can’t teach audacity, but at Yale we certainly encourage it. That’s one reason this relatively small medical school has such a long list of distinguished alumni. If you’re around on reunion weekend or browsing the pages of the alumni magazine, you’re likely to meet a head of state, a college president, a U.S. senator, or one of the many medical school deans, biotech innovators or health system reformers who studied at the Yale School of Medicine. (Collins got his Ph.D. at Yale and was a post-doctoral fellow in Human Genetics at the medical school in the early 1980s.) Some say Yale physicians thrive in leadership roles because the Yale System prepared them to be independent and original thinkers.

Others believe the school’s commitment to service drives so many to have a broad and lasting influence. Assistant U.S. Secretary for Health Howard K. Koh, M.D., M.P.H., went to Washington to help his own patients. “I’ve seen too many patients suffer preventable suffering and die preventable deaths,” he said. “The only answer to that challenge is promoting prevention through public health.”

Whether leading a federal agency, inventing a better way to deliver care, or treating patients on the front lines of medicine, Yale alumni engage at the highest level. Passionate curiosity and a deep resolve to improve human health are the hallmarks of every student who walks through the doors of the Sterling Hall of Medicine. These qualities bind classmates to each other and to the generations of students who came before them.

Bringing medical care where there was none

Kinari Webb, M.D., who graduated from the School of Medicine in 2002, is making Borneo a healthier place. Her clinic near Gunung Palung National Park provides the only health care available in one of Indonesia’s most remote areas. Her patients can earn credits and discounts by working in the clinic’s organic gardens or opting out of illegal logging. Webb spent 10 years preparing to open Alam Sehat Lestari, Indonesian for health and everlasting nature, always envisioning it as both a clinic and conservation program. Last year, 74 people who had been blind regained vision through cataract surgery there, a new four-wheel drive ambulance took a woman to the nearest city in time for an emergency C-section, and 10 acres of newly planted trees at the forest’s edge were reaching for the sky.

West Campus

Everyone uses the same word to describe West Campus: “Transformative.”

Yale made the largest property acquisition in its history in 2007, when it bought the former Bayer research center, a 136-acre complex six miles from Sterling Hall of Medicine. The property came with more than 400,000 square feet of high-end laboratory space, ready to welcome scientists. Even planning to build such a facility from scratch would have taken years.

The major investment in acquiring West Campus wasn’t real estate, says Dean Robert Alpern, M.D. It is and will be “filling that space with remarkable investigators,” a process that will unfold over a number of years. West Campus is rapidly becoming home to internationally known faculty, using state-of-the art equipment to conduct research on everything from microbial diversity to cancer biology. Those are the research areas central to two of the new institutes planned for West Campus; others will be focused on systems biology, chemical biology, and “biodesign” (a collaboration between cell biology and engineering).

Sophisticated new core facilities give Yale faculty and student researchers the tools to conduct high-throughput gene sequencing, chemical screening, and RNA interference studies, and student research opportunities abound at West Campus. It is an integral part of Yale, but it is also a neighborhood with a vibe of its own, where wild turkey share the lawns with humans. The campus features Yale’s newest child care center, school outreach programs run by the Peabody Museum, and a nature trail. Many of the university’s library, art and natural history holdings are stored at West Campus, which is also home to a major digitization project for the university’s collections.
“No other school has more intense and sustained interaction between students and faculty. And because faculty work so closely with students, they don’t need to quiz students to find out what they know, and they don’t need grades to assess their progress. This in turn means that there’s great room for individuality; students stand out for their own special talents and abilities and interests, not how well they do on the same tests as everyone else.”

James Jamieson, M.D., Ph.D.
Director, M.D./Ph.D. program

“We see not students, but future colleagues.”

Dennis D. Spencer, M.D.
Cushing Professor and Chair of Neurosurgery

“We get it.

“There’s great room for individuality; students stand out for their own special talents and abilities and interests, not how well they do on the same tests as everyone else.”

Students connect with faculty during a seminar on palliative care, top, at the White Coat Ceremony, and at the Hunger and Homelessness Auction.

“We see not students, but future colleagues.”

Dennis D. Spencer, M.D.
Cushing Professor and Chair of Neurosurgery

“We the faculty gets working with students.”

Nancy Angoff, M.D., M.P.H.
Associate Dean for Student Affairs
In the 1990s, Yale boasted of the number of drugs in the pipeline from university labs to major pharmaceutical companies. Today, a laboratory discovery is as likely to lead to the startup of a company designed around a particular line of research. Yale has put substantial resources into fostering startups, which it sees both as a way to bring useful products to market and a means of boosting the New Haven economy. Over 30 new companies have been incubated through Yale’s Office of Cooperative Research, attracting well over $3 billion in investments.

Joseph Schlessinger, Ph.D., the William H. Prusoff Professor and chair of the Department of Pharmacology, is a prime example of the biomedical entrepreneurs who are leading Yale’s efforts in this area. Renowned for his work on the signaling pathways that communicate to a cell whether or not to divide and grow, Schlessinger has started three companies to pursue the therapeutic applications of his basic science research. These companies have already produced two new cancer drugs.

“I’m from New York City, and New Haven is close enough that I could go home a lot, and my family could come here. But I found everything I needed here. I got to do lots of community service—I worked as a patient translator, for example—and still finished in four years. But I liked it so much I’m staying for my residency.”

Luz Jimenez, Class of 2009

The Medical Historical Library is the showpiece of the comprehensive Harvey Cushing/John Hay Whitney Medical Library, through which students can access virtually every medical publication in the world via its document delivery services. And the Cushing/Whitney Library is just one part of the 13 million-volume Yale University Library System. Medical students make particular use of the Kline Science Library, but they can also explore unparalleled collections ranging from the law library to the Beinecke Rare Book and Manuscript Library. None of these libraries is more than a short walk from the medical school.

The Medical Library is an important component of a Yale medical education. During orientation week, each student is introduced to his or her “personal librarian” — a library staff member who will work closely with about 20 students. Throughout the student’s time in medical school, librarians will recommend resources for thesis research and patient care questions, and provide instruction in the use of relevant technologies. This unique program augments more general seminars on evidence-based practice and information management that are scheduled in all four years.

Sherwin Nuland, M.D. from Doctors: The Biography of Medicine, 1988
Today 18 people will die in the United States waiting for an organ transplant. That’s not a statistic Sukru Emre, M.D., can live with. The internationally known surgeon was recruited in 2008 to build Yale’s small transplant program into a leading one. The number of organ transplants performed here climbed dramatically, with an outstanding success rate. The transplant initiative creates new hope for patients at Yale and beyond, as Emre and his colleagues advance the field so that more lives can be saved, even with the limited number of donated organs available.

“The liver regenerates, as the ancient Greeks already knew,” explains Emre. “Remember Prometheus, whose liver grew back each time it was eaten by an eagle? We can identify eight segments within the liver, each of which has its own blood supply, bile duct, and venous return. These can all function independently. So what I do is cut the liver into two pieces. Most commonly, we share one liver between one adult and one child. We have recently started sharing one liver between two adults.”

This “split liver” technique makes it possible for a living person to be a donor. “Both the donor’s liver and the recipient’s will grow back to normal size in about eight weeks, and when the recipient is a child, the liver grows along with the child,” says Emre.

Organ transplants are difficult in part because they affect so many of the body’s systems. By the same token, building a strong transplant program affects departments throughout the medical center.

“Remember Prometheus, whose liver grew back to normal size in about eight weeks, and when the recipient is a child, the liver grows along with the child,” says Emre. "These are complicated enterprises. I say that transplantation is not a discipline but a complex matrix of disciplines, including surgery, medicine, hepatology, infectious disease, pharmacology, pathology, nursing, and psychology," says Emre. "These are a few of the organizations in which medical students act locally:"

- Bio2
- Columbus House
- Walk-In Clinic
- Committee Overseeing Volunteer Services
- Downtown Evening Soup Kitchen
- Educational Care Clinic at Clifford Beers
- Community Mental Health Clinic
- Funny Bones at Yale
- HAVEN Free Clinic
- Health Professional Recruitment Education Program (HPREP)
- HIV Intervention and Prevention Corps
- Neighborhood Health Project
- Nutrition Detectives
- Youth Science Enrichment Program

Yale medical students have a strong commitment to social responsibility, and every year they take on important projects, from promoting access to medicines in developing countries to defending torture victims. These are a few of the programs including the Howard Hughes Medical Institute, the NIH, the Sarnoff Foundation, the Doris Duke Charitable Foundation, and Yale. A living stipend is included.

Why would you want to spend an extra year in medical school? As you peer ahead down the formidable road into the medical profession, a fifth year of medical school might seem like the last thing you would sign up for. But about half of Yale medical students do, and many of them earn a master’s of health science research in addition to their M.D. Some are pursuing in-depth research on their thesis topic. Some are exploring clinical electives and subinternships. All are demonstrating how much they love their experience at the Yale School of Medicine.

If you do choose to complete your medical education over five years rather than four, Yale will not charge you tuition for the fifth year. In fact, 20 to 25 students each year are awarded fifth-year research fellowships from organizations including the Howard Hughes Medical Institute, the NIH, the Sarnoff Foundation, and the Doris Duke Charitable Foundation, and Yale. A living stipend is included.
Students argue a lot during their clerkship in Obstetrics, Gynecology, and Reproductive Sciences. In a weekly “Controversial Topics” session, they debate issues such as water birth and hormone replacement therapy. Each side presents studies supporting its position, followed by rebuttal and discussion. Though many students give voice to their inner Perry Masons, the debates are not a test of oratory skill. “In the end, we want the evidence to prevail,” explained Assistant Professor Jessica Illuzzi, M.D., who directs the clerkship. She devised the format because students often returned from clinical placements curious, even puzzled, about why a physician made a given choice. The Department of Obstetrics, Gynecology, and Reproductive Sciences is a national leader in research and clinical care, so students would expect that their professors could easily answer their questions. But Illuzzi saw that students would learn more by finding their own answers. “There are more controversial topics in our field than in others,” said Illuzzi. Without research definitively supporting one side, physicians must be rigorous in evaluating evidence. Debating helps students do just that.

It’s not unusual for a debater to declare afterward: “I’m arguing against the side I believe in!” That itself is a learning experience, added Illuzzi, as students must challenge their preconceptions. Debaters arrive prepared and passionate. Illuzzi believes this enthusiastic response is linked to the inquiring, independent bent she sees in students who choose Yale. “It’s in their nature already.”
What would medical school be without a literary magazine, a swing society, and a symphony orchestra? Here’s a partial list of student organizations. The list will be different by the time you come to Yale, but the energy level will be the same.

63. AMERICAN MEDICAL STUDENT ASSOCIATION

64. ASIAN PACIFIC AMERICAN MEDICAL STUDENT ASSOCIATION

65. ATRIUM LITERARY MAGAZINE

66. LATINO MEDICAL STUDENT ASSOCIATION

67. COMMITTEE FOR THE WELL-BEING OF STUDENTS

68. YALE MED PLAYERS

69. GAY STRAIGHT MEDICAL ALLIANCE

70. GLOBAL HEALTH WORKING GROUP

71. HIV INTERVENTION AND PREVENTION CORPS

72. MEDICAL STUDENT COUNCIL

73. MEDICAL STUDENTS FOR CHOICE

74. NEIGHBORHOOD HEALTH PROJECT

75. NEPAL HEALTH EQUITY INITIATIVE

76. PEER ADVOCATES

77. PHYSICIANS FOR A NATIONAL HEALTH PROGRAM

78. PHYSICIANS FOR HUMAN RIGHTS

79. STUDENT NATIONAL MEDICAL ASSOCIATION

80. THE ULTRASOUNDS ACAPELLA GROUP

81. YALE HEALTHCARE AND LIFE SCIENCES CLUB

82. YALE JOURNAL OF BIOLOGY AND MEDICINE

83. YALE MED SOCCER

84. YALE MEDICAL CAMPUS TRAFFIC SAFETY GROUP

85. YALE MEDICAL STUDENT PSYCHIATRIC SOCIETY

86. YALE SWING SOCIETY

87. YOUTH SCIENCE AND ENRICHMENT PROGRAM

88. Transatlantic ALLIANCE

A unique partnership between the Yale and University College London was inaugurated in the fall of 2009. Involving the affiliated hospitals of the two institutions as well as the schools themselves, the broad collaboration spans basic biomedical research, medical education, and clinical care. Two distinguished cardiologists, Michael Simons, M.D., professor of medicine and cell biology and chief of cardiovascular medicine at Yale, and John Martin, M.D., professor of cardiovascular medicine at UCL, conceived the arrangement as a way to enhance the capabilities of their institutions, both leading medical research centers. In joint clinical programs, the institutions are exchanging expert physicians to treat patients at both sites and share clinical information. Meanwhile, the universities have begun joint research projects in genetics and cardiovascular medicine, with more on the horizon in areas including cancer biology, drug discovery, nephrology, and neuroscience. Yale and UCL also hope to create a coordinated program for Ph.D. students from the two schools.
“No class rank takes completely off the table how well you’re doing compared to the person sitting next to you. You don’t need to position yourself in a curve; you benefit from helping those around you. It’s in the best interests of my patients and the world that the person sitting next to me is the best possible doctor.”

Aaron Feinstein, Class of 2011
5. Challenge: Walk two blocks in any direction on Yale’s campus without passing a building where someone is doing great science.

The university is completing a $1 billion program of investment in the sciences, investment that can be seen in a parade of sleek modern buildings, equipped with everything on a researcher’s wish list. Yale is fortunate to house its graduate and professional schools on one campus, so the medical school is truly integrated with the full spectrum of scientific resources available throughout the university. You may find yourself working with a professor who is an engineer, environmental scientist, or computational biologist. At Yale, we know that no single discipline has cornered the market on innovation. So our faculty work in interdisciplinary teams and encourage you to do likewise.

The Yale scientific community includes:

1. **Combined Program in the Biological and Biomedical Sciences.** An interdisciplinary program that offers Ph.D. and M.D./Ph.D. students access to all the bioscience resources at Yale.

2. **Faculty of Arts and Sciences.** Home to nationally known science departments, including Chemistry; Computer Science; Ecology and Environmental Biology; Molecular Biophysics and Biochemistry (which has a presence on the medical campus as well); and Molecular, Cellular, and Developmental Biology.

3. **Peabody Museum.** Yale’s astounding natural history collection, a rich resource for scholars of evolutionary biology.

4. **School of Engineering and Applied Science.** A world-class biomedical engineering program that uses technology to advance medicine, with labs on both sides of campus.

5. **School of Forestry and Environmental Sciences.** A graduate school exploring how the health of the biosphere affects human health.

6. **School of Management.** Partner in the M.D./M.B.A. Program and in many research efforts focused on health care. Faculty expertise includes health care reform and modeling to estimate and prepare for the impact of various public health emergencies, including bioterrorism.

7. **School of Nursing.** A leader in chronic illness research and the birthplace of the hospice movement in America.

8. **School of Public Health.** One of the oldest public health schools in the country, with a history of training leaders.

9. **West Campus.** Yale’s largest property acquisition ever, a complex where interdisciplinary teams use the most sophisticated equipment available to advance science. It’s a 6 mile shuttle ride from Sterling Hall of Medicine.

Geneticist and NIH Director Francis Collins did his Ph.D. research in the Department of Chemistry. Frank Ruddle, Ph.D., worked on the creation of the first transgenic mice in Kline Biology Tower. Nobel laureate Sidney Altman, Ph.D., has his lab on Kline’s fourth floor, just across the quad from fellow Nobelist Thomas A. Steitz, Ph.D. The Biomedical Engineering department occupies a glassy new building a block away. “Science Hill,” just across campus from the Yale School of Medicine, expands the intellectual reach of the school, and medical students can take courses and conduct research there. M.D./Ph.D. candidates pursue their graduate studies via Yale’s Combined Program in the Biological and Biomedical Sciences (BBS), which is specifically aimed at facilitating access to the university’s array of bioscience resources without standard academic boundaries.
New Haven has its share of Zagat-rated restaurants. But at lunchtime, Cedar Street is where the sizzle is. About 40 vendors offer fresh fare from sidewalk carts. With that many options you don’t ask, “Do any of them have pad thai?” You ask, “Which one has the best pad thai?” If Thai isn’t your thing, there’s Indian, Middle Eastern, Ethiopian, Mexican, and other cuisines. The chefs are international and the food tends to be authentic, with the possible exception of the “New Haven Roll” at the sushi cart. And, yes, there are places to get a green salad or a grilled chicken sandwich, too.

Dining “a la carts” is a popular way to grab lunch on the run without sacrificing taste or blowing your budget. On a warm day, students and faculty turn the lawn outside Harkness into a picnic ground. As spring stretches into summer, you might even get a free side of live music.

was a fraction of what it is today and the number of women on the faculty could be counted on one hand. Today, like many medical schools, women make up half the student body, but women still face special challenges at med school. We continue to provide neutral, confidential counseling to women at YSM, to offer an annual lecture series, and to sponsor various forums to bring women in the school together. And we have a program to match current women students with role models and mentors.”

Merle Waxman, M.A.
Associate dean and director of the Office for Women in Medicine
“Any course at Yale is open to you. When I first got here and I was feeling completely saturated by the science I was learning, I audited a course on Renaissance poetry. It was great.”

“I am a Nigerian immigrant, and I was so happy when I found I could go speak Yoruba with a Yale professor—and he was so happy to speak with me.”

“Awesome people. Awesome access.”

*Yale medical students*
Nothing requires more scientific ingenuity than studying the workings of the brain. How can you tell what a boy with autism is seeing when the disorder is, foremost, an inability to communicate? How can you examine, much less operate on, a brain in seizure? How can you examine the biological underpinnings of schizophrenia?

Yale researchers are making progress on all these questions, and one tool is functional magnetic resonance imaging (fMRI), which allows you to watch the brain in action. Yale has the most advanced equipment available and a cadre of talented, skillful, and knowledgeable experts to develop new ways to use such technology.

The Autism Program at Yale brings together professionals from the fields of clinical psychology, neuropsychology and neuroimaging, child psychiatry, speech-language pathology, social work, genetics, psychopharmacology, and psychiatric nursing. Recognized by NIH as an Autism Center of Excellence, the program is headed by Ami Klin, Ph.D., Harris Associate Professor of Psychology and Psychiatry. Klin and his colleagues have created investigative techniques that have led to current understanding of autism as an impairment of the “social brain,” the structures and functions in the brain that allow people to form emotional and cognitive attachments to other people.

The Yale Epilepsy Surgery Program, currently directed by Dennis Spencer, M.D., Harvey and Kate Cushing Professor of Neurosurgery, comprises neurosurgeons, neurologists, neuropsychologists, neuroradiologists, neuropathologists, epidemiologists, pediatricians, biomedical engineers, and specialist nurses. The team has been able not only to improve surgery but has developed novel imaging tools to co-register many kinds of functional data and use this data to direct the placement of electrodes, as well as special catheters to analyze chemical changes.

Functional MRI not only advances our understanding of the brain; it can change society’s judgments of individual character. Take, for example, dyslexia. Generations of children with dyslexia have been seen as lazy or stupid as they struggled to learn how to read. No one can continue to hold that view in light of the findings of Sally Shaywitz, M.D., Ratner Professor of Learning Development, and Bennett A. Shaywitz, M.D., professor of pediatrics and neurology. The Shaywitzes discovered “functional lesions” in the left occipito-temporal and parietotemporal regions of the brain, which correspond exactly with physical lesions in people who have lost the ability to read because of a stroke or brain tumor. Overcoming these functional deficits requires effort and assistance beyond the normal. Sally Shaywitz sums up the impact of their findings, “The passion that drives my husband and me is really the knowledge and experience of what the cost is to individuals. This isn’t an academic abstraction; it’s about real people who have to live with something that people don’t see. That’s why it’s a wonderful thing that we now have the ability to see the brain at work, to actually see what is happening at the most basic levels.”

Sally Shaywitz, M.D.
Ratner Professor of Learning Development

“The passion that drives us is the knowledge and experience of what the cost is to individuals. This isn’t an academic abstraction; it’s about real people who have to live with something that people don’t see.”

It’s not about getting power; it’s about questioning it. Just before they start on the wards, rising third-year medical students and advanced-practice nursing students spend a day in discussions of power and control in health care relationships. “We don’t want them to assume that the patterns they find in their clinical rotations are ‘the way it’s supposed to be,’” says Associate Dean for Student Affairs Nancy Angoff, M.D., M.P.H., who directs Power Day. “We want them to recognize the misuse of power and to be prepared to deal with it. We want them to think about relations between members of the hospital staff, between care providers and patients—especially when race or gender are added to the mix. We want them to be ready to make changes.”

It’s not about getting power; it’s about questioning it.
If poetry is what is lost in translation, the whole person is what is lost in numbers. One of the ways we get back to the whole person is through the humanities. “In the last century, the science of medicine has been the focus of medical education,” says Thomas Duffy, M.D., Director of the Program for Humanities in Medicine at Yale. “We are trying to bring the art of medicine back into the balance.”

A few examples:

> A yearlong biweekly lecture series brings a humanistic perspective to medicine. A recent series opened with “Akhenaton: The Androgynous Pharoah” and ended with a presentation by residents in the writer’s workshop conducted by physician-authors Richard Selzer, M.D., and Lorence Gutterman, M.D.

> An art elective has encouraged students to explore anatomy through drawing, painting, and photography, capturing something that is missed in the process of dissection and analysis.

> Atrium, the student literary and arts journal.

> The Yale Journal for Humanities in Medicine, an online journal that publishes essays (“The Leaf Blower as Metaphor”); poetry (“Emotional Fugue in a Supermodel World”); and book reviews and has a companion blog (http://blog.yjhm.org).

> West Campus. In Yale’s West Campus, a portion of the space is devoted to the most advanced medical research technologies and another portion to the arts. Call it planned serendipity: interactions between the two domains are expected to be productive and inspirational.

> Workshop on Observational Skills. Over a decade ago, Professor of Dermatology Irwin Braverman, M.D., began using paintings to train Yale medical students to pay close attention to detail. Today, a mandatory class for first-year students meets in small groups at the Yale Center for British Art each spring. The class aims to “jump-start the special diagnostic skills” that usually take physicians years to develop, according to Dr. Braverman. Taking students out of their familiar setting removes some of the assumptions that might limit perception and lets them notice particulars that they would otherwise miss. The effectiveness of the program has been demonstrated—and published in JAMA—and the course has been adapted by other medical schools, business schools, and police departments, including the NYPD and Scotland Yard, training their officers to be more astute observers.

The Yale Medical Humanities and the Arts Council ensures that projects such as these are sustained and expanded, engaging people throughout the university and beyond at the intersection of health, culture, and society.
“Yale med students are the most amazing group of people you’ll ever be with. I knew that when I did the Service at Yale orientation and found the second-years so incredibly organized, with such good leadership skills. And then throughout the medical school, students really set the tone—as a group they are so mature, responsive, committed to the community. The friends you make here are one of the best reasons to come.”

Molly Weiner, Class of 2012
Bicentennial Year

The School of Medicine is celebrating its Bicentennial in 2010–2011 with a series of lectures and special publications, a documentary film, a community fair, and a symposium exploring the biomedical sciences. An illustrated book about the school, “Medicine at Yale: The First 200 Years,” will be available from Yale University Press in November 2010.

The Bicentennial provides an opportunity to reflect on the achievements of the past two centuries and the ways in which medicine has changed since 1810. Then, life expectancy in New Haven was less than 40 years, and medical knowledge was derived from concepts that have long since been discounted. During the school’s evolution, a largely unscientific occupation handed down through apprenticeship has become one of the most education-intensive, rigorously scientific, and highly regulated professions.

As American medicine looks ahead to improving health care, unraveling the mysteries underlying disease, and optimally preparing the doctors of the coming decades, Yale will continue to meet the challenges of a changing medical landscape.

For information, see medicine.yale.edu/ysm200