

Yale Medicine

Levin steps down as
Yale's president

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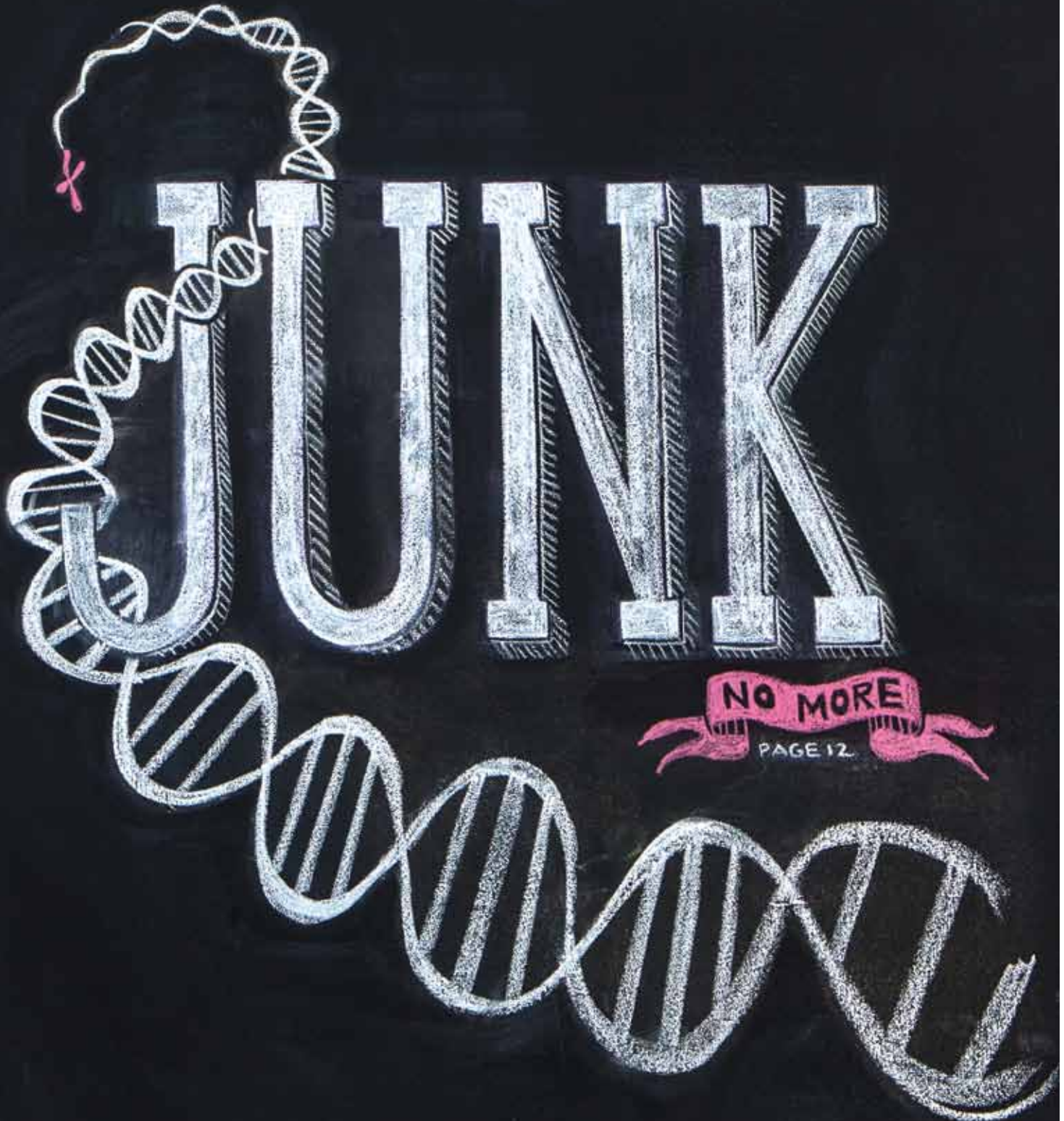
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More students opt
for fifth year

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winter 2013



WINTER 2013

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*Chalk Illustrations by Jennifer Stockwell,
photos by Kelly Jensen*

On the Web
yalemedicine.yale.edu

On our website, readers can submit class notes or a change of address, check the alumni events calendar, arrange for a lifelong Yale e-mail alias through the virtual Yale Station, and search our electronic archive.



HOW TO REACH US

Yale Medicine welcomes news and commentary. Please send letters (350 words or fewer) and news items to *Yale Medicine*, 1 Church Street, Suite 300, New Haven, CT 06510, or via e-mail to ymm@yale.edu, and include a telephone number. Submissions may be edited for length and content.

VISIT US ON THE WEB

Our new website is up and running—and the feedback has been wonderful! Visit us at yalemedicine.yale.edu and peruse the newest issue or issues going back to 1998.

How words can give comfort

It's Day Two of the Hospital of Saint Raphael becoming part of Yale-New Haven Hospital. Since I came to the United States of America five years ago, New Haven has been my home and Saint Raphael's, my family. I walk in—it's the same building, mostly the same people, the same routine, but also there is a distinct difference. New ID badges, new e-mail IDs, and new policies; the familiar place is suddenly a bit alien. I am on the medicine consult service; and in between doing a preoperative evaluation and placing an NG tube in an anorexic patient, I find myself wandering toward the library. There are a myriad of things to read, especially in the journal section. My eyes fall on a colorful journal on the lowermost shelf of the rack. I pick it up—it's *Yale Medicine*, Winter 2012. I had never noticed it before. As I browsed through its 33 pages, I found myself reading every page of it and actually enjoying it.

The article that caught my attention was "Doctors Who Write," by Cathy Shufro. That article struck a chord with me, made me happy, and somehow made me feel like I belong. It is amazing to see how words can give comfort. In this time of transition from the Hospital of Saint Raphael to Yale, where there was a sense of unfamiliarity, this article made me feel that there are people at Yale who enjoy what I enjoy—writing! I felt like some of the things said by Richard Selzer and Dagan Coppock came right out of my head—I had thought them but never said them. It felt calming. This is exactly what I needed today. I wanted to share my experience with you and thank you, for you have made me feel excited and hopeful about my Day Two—and my upcoming days as a part of Yale-New Haven Hospital.

Safia Siddiqui, M.D.
 Clinician-educator
 Department of Medicine
 Yale-New Haven Hospital

Tribute to Arthur Ebbert rekindles memories

What a wonderful tribute to Arthur Ebbert in the Autumn 2012 edition of *Yale Medicine*! ["A gentle man," *Yale Medicine*, Autumn 2012] Art was very special. I met him prior to my arrival at Yale for my surgical residency in July 1970. As did Art, I graduated from the University of Virginia (UVA) undergraduate and medical schools, and had met Art at UVA alumni events while still a student in Charlottesville. His love for UVA and his adopted Yale were pervasive, and I enjoyed seeing him throughout my six years as a house officer in New Haven. The article in *Yale Medicine* portrayed him beautifully and captured his humility and grace.

I also want to thank you for the cover picture showing the aerial view of the Medical School campus. While I was a house officer, my wife and I lived in a house at 796 Howard Avenue and our "Memorial Unit" newborn daughter spent the first six months in that house. When these buildings were torn down in later years to make room for new construction, I was saddened that I had no pictorial remembrance of that old neighborhood on Howard Avenue. How wonderful it was to look at the cover honoring Art Ebbert and to view that house that was so important to me and my family in the mid-1970s. You see, having Art Ebbert at Yale and in my life continues to give me such rich memories.

Frederick L. "Rick" Greene, M.D., HS '76
 Clinical Professor of Surgery
 UNC School of Medicine
 Chapel Hill, N.C.

Great cover and great story about a great man!! I have keen memories of Dr. Ebbert's arrival at Yale in 1953 during my second year. My wife Rose was a secretary in the Yale Diagnostic Clinic for Dr. Beeson and she met Dr. Ebbert before I did. Her initial comment was "What

a charming man!" He indeed was a charm for the School of Medicine with his 34 years of devoted service.

William Narva, M.D. '56
 Rear Admiral, U.S. Navy (Ret.)
 Los Angeles, Calif.

Photo dating incorrect

As usual, *Yale Medicine* is splendid. I well recall Arthur Ebbert, M.D., and you have nicely and aptly summarized his key role at the school.

I might point out the incorrect dating of the full-page spread aerial photograph of the medical school campus on the second and third pages. It shows the medical school on Cedar Street, the hospital, and a bit of what was then named Grace-New Haven Hospital. However, Harkness Hall, the residence for medical students, is missing from the photograph—which shows a large empty field next to the pediatric section of the school. I lived in Harkness for four years beginning in 1956, the first year it opened. Since the caption says, "as it appeared during the 1960s," that is incorrect. Harkness was in place in the 1960s and there was no empty field between Grace-New Haven Hospital and the medical school.

Thank you for publishing the photograph, which reminded me of a glorious four years—the most important time of my life.

Malin Dollinger, M.D. '60
 Rancho Palos Verdes, Calif.

FROM THE EDITOR

Many alumni wrote to point out the incorrect dating of the photograph mentioned above. As best we can determine, the photograph was taken about 1954.

CORRECTION

The End Note in the Autumn 2012 issue of *Yale Medicine* incorrectly identified the student in the photograph. Her correct name is Lara Rosenbaum.

We regret these errors.

No shortage of breaking news

People often ask how we come up with ideas for the articles that appear in *Yale Medicine*. There's no easy answer to that question. Ideas might come from a chance conversation, a tip from a scientist or clinician, or a writer's familiarity with a beat. We observe, discern patterns, develop a hypothesis, then look for information to confirm or deny that hypothesis—like scientists, we sometimes find ourselves following a path that leads nowhere. For this issue we had an abundance of important breaking news stories with significance not just for the medical school, but for the university and New Haven.

In August we learned that President Richard C. Levin would be stepping down after 20 years at the helm of the University. Two months later the Yale Corporation unanimously chose Provost Peter Salovey as his successor.

In September came the news, long anticipated, of Yale-New Haven Hospital's acquisition of the Hospital of Saint Raphael. Over the years we've covered the history of medical care in New Haven and the evolution of the city's various hospitals through mergers and acquisitions. Now only one hospital remains in the city.

And both feature stories attest to a new age in medicine. The ENCODE project, in which Yale faculty played a key role, has advanced knowledge of those regions of the genome derisively called junk DNA, even though it's been known for years that they are vibrant and active areas of the genome. And the School of Medicine and Yale-New Haven Hospital have begun to implement an electronic medical record (EMR) format that is expected to revolutionize not just the practice of medicine but medical research as well.

Finally, in our student pages we explore a phenomenon we've been observing for a few years now—more and more students are opting to stay on for a fifth year at the School of Medicine. The reasons why may surprise you.

John Curtis

SECOND OPINION BY SIDNEY HARRIS



"I'M PRESCRIBING A MUCH MORE EFFECTIVE TYPE OF LEECH."

yale medicine

*Alumni Bulletin of the
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MICHAEL MARSLAND

Levin's legacy endures at the School of Medicine

President Richard C. Levin steps down after 20 years. Provost Peter Salovey will take the helm in June.

When Richard C. Levin took office as president of Yale in 1993, the university faced several challenges. Among them were an infrastructure desperately in need of repairs and renovations, high crime rates in New Haven that made it hard to recruit students and faculty, and talk of eliminating entire departments because of a budget crisis. While these pressing issues needed to be addressed, Levin also held a vision of Yale as a truly global

institution. And preeminence in science and medicine was essential to reaching that goal.

“We are among the handful of centers in the nation and the world that have assumed leadership in the basic biological sciences, the understanding of human health, the treatment of human disease, and the education of scientists and medical practitioners,” Levin said in a 1996 speech. “As our fourth century begins, we must aspire to continuing leadership in the life sciences, which hold so much promise for human health and our nation’s future prosperity.”

In August 2012 Levin announced that after 20 years of leading the university, he would step down at the end of the current academic year. (In November, the Yale Corporation, in a unanimous vote, named Provost Peter Salovey, Ph.D. ’86, to succeed him.) Levin noted in a message to the Yale community that the time is right for a change in leadership. The university, he said, is in a much stronger position than it was 20 years ago. Many institutional goals—the five-year Yale Tomorrow campaign; renovations of the residential colleges; managing the 2008 financial crisis; funding for the new School of Management campus; achieving critical mass on the West Campus; and launching Yale-NUS College in Singapore—have been reached or are close to realization.

At the School of Medicine Levin has left a legacy of investments in new research buildings as well as recruitments of leading scientists and physicians that have strengthened its clinical, educational, and research missions. In January 2000 Yale announced an unprecedented \$500 million investment in science and engineering. Less than a month later Levin announced an additional \$500 million for the School of Medicine over the coming decade.

“He had a very clear vision that science was critical to the future of Yale University,” said Dean Robert J. Alpern, M.D., Ensign Professor of

OPPOSITE Richard Levin (right) announced in August that he would step down after 20 years as president of Yale. Peter Salovey (left) was named to succeed him.

Medicine, who came to Yale in 2004. “Rick felt that medicine was already strong and that with the right investments it could become really strong. He was committed to having a great medical school and was very good at tying his decisions to that vision.”

Those investments created the infrastructure for modern biomedical science—new laboratories, core technology facilities, and high-tech teaching centers. The opening of two new buildings—the 457,000-square-foot Anlyan Center for Medical Research and Education and the 120,000-square-foot Amistad Street Building—freed older spaces for new uses, and permitted reorganization and renovation across the medical campus. New space led to an increase in medical school faculty, which in turn led to an increase in the school’s annual grant funding over the same time period, from about \$140 million to about \$540 million. Support of medical research has had a spinoff effect, nurturing a biotech industry in New Haven, which is now home to several companies formed on the basis of discoveries made in Yale labs.

In another advance for scientific and medical research, the university in 2007 purchased the former Bayer Healthcare North American pharmaceutical headquarters, now known as West Campus, adding more than 1.5 million square feet of building space to the university, including 450,000 square feet of laboratory space. Rather than use these facilities as spillover space for existing programs, Levin believed that the campus should provide opportunities for innovative biomedical and clinical science programs

that cross disciplinary boundaries. “I remember him saying that this should not be just more of the same,” Alpern said. “It should allow us to do something different and distinctive.” The West Campus is now home to new biomedical research centers as well as core technology facilities. “This has transformative potential, frankly, only some of which we can envision today,” Levin reflected when planning began for the West Campus. “We’ve given our successors an opportunity to dream in ways we can’t imagine today.”

In selecting Salovey to succeed Levin, members of the Yale Corporation cited his leadership skills and his knowledge of Yale, as well as his own scholarly accomplishments. Salovey, the Chris Argyris Professor of Psychology, has also served as chair of psychology, dean of Yale College, and dean of the Graduate School of Arts and Sciences; and has longstanding links to the schools of medicine and public health. In 1997 he became the first deputy director of the Center for Interdisciplinary Research on AIDS. He is well known for his research on the concept of emotional intelligence and studies of effective health communications.

“While Rick Levin will be missed greatly, Peter Salovey will be an excellent successor,” Alpern said. “I am confident that he will continue Rick’s commitment to science and medicine, while defining his own specific agenda and implementation plan.”

—Marc Wortman and John Curtis

et cetera . . .

GENDER BIAS PERSISTS

“Whenever I give a talk that mentions past findings of implicit gender bias in hiring, inevitably a scientist will say, ‘That can’t happen in our labs because we are trained to be objective,’” said Jo Handelsman, PH.D., the Frederick Phineas Rose Professor of Molecular, Cellular and Developmental Biology, and a Howard Hughes Medical Institute professor.

She tested that belief among colleagues at several research-intensive institutions who received the same application—ostensibly from an undergraduate applying for a job as lab manager—which was randomly assigned a male or female name. Scientists of either sex were more likely to hire the man than the woman, more willing to mentor him, and willing to pay him \$4,000 more. Handelsman published her findings on Sept. 24 in the *Proceedings of the National Academy of Sciences*.

Regarding her colleagues’ insistence that gender bias couldn’t happen in their labs, said Handelsman, “I had hoped that they were right.”

—John Curtis

LOTTERY TICKETS MAY POSE RISK

Youngsters who receive instant lottery tickets as gifts tend to start gambling earlier in life, perhaps putting them at risk for gambling disorders as adults, Yale researchers reported on Sept. 19 in the journal *Adolescent Health*.

A survey of about 2,000 Connecticut high school students found that children and adolescents who received scratch lottery tickets tend to have more permissive attitudes about gambling than those who did not receive such gifts. Researchers also reported an association between the age of gambling onset and the severity of problem gambling among those who received lottery tickets.

“Our research suggests that family members and friends should consider the possible negative impact of giving children or adolescents lottery tickets as gifts,” said Marc Potenza, PH.D. ’93, M.D. ’94, HS ’98, FW ’99, professor of psychiatry, neurobiology and child study, and senior author of the research.

—J.C.

Hospital of Saint Raphael becomes a new campus of Yale-New Haven Hospital

About three years ago Marna Borgstrom, M.P.H. '79, president and CEO of Yale-New Haven Hospital (YNHH), and Christopher O'Connor, then the newly appointed president of the Hospital of Saint Raphael (HSR), began meeting over lunch to explore synergies that would allow the two hospitals to provide the best possible health care to the New Haven community. Both executives saw advantages in collaboration over competition. "We talked about ways we could work together," Borgstrom said.

Both CEOs, however, had other concerns on their minds. More than 90 percent of YNHH's beds were occupied, straining its capacity. The only place to build was upward, but a new patient tower would cost about \$650 million and take up to seven years to construct. Six blocks away, HSR was spending more than it was taking in—about 70 percent of its patients were on Medicaid or Medicare. Over time the two CEOs came to recognize that a partnership made sense for both institutions.

On September 11, O'Connor and Borgstrom, surrounded by staff from both hospitals, elected officials, New Haven's mayor, and representatives of the Sisters of Charity of St. Elizabeth, signed a document that made official YNHH's purchase of Saint Raphael's. At one minute after midnight the next day, HSR became the Saint Raphael Campus (SRC) of YNHH, which absorbed 3,400 of its employees.

The solution for HSR, said O'Connor, "was to partner with a

hospital that was already well known to our staff and physicians. It will drive efficiency and effective use of medical resources. It will address financial challenges we face while providing an innovative opportunity to invest in services right here in New Haven."

"We believe that as one unified hospital, we'll be able to enhance access to high-quality health care resources in a more cost-effective manner," Borgstrom said. "This integration will be critical to meeting the extraordinary health care challenges that lie ahead."

To judge by those present at the ceremony in a YNHH auditorium, the acquisition is a win-win for all. Under the terms of the agreement YNHH paid \$160 million for HSR. With only 300 of HSR's 511 beds occupied, YNHH has more room for patients. Most jobs at HSR will be preserved—though about 200 layoffs, mostly in administration, are expected. The agreement maintains HSR's Catholic values and traditions, which have been in place since it was founded by the Sisters of Charity in 1907. The transaction turned YNHH into one of the largest hospitals in the country, with 1,519 beds.

"As we conducted our deliberations as a board, it became clear that the integration of these two hospitals would provide a unique chance to reshape the delivery of health care in the state," said Joseph Crespo, chair of the board of YNHH. "Not only that, with the wave of health care reform that is sweeping our nation, we felt that this could serve as a model for the nation as well."

Mayor John DeStefano Jr. cited the importance of the two hospitals and the

School of Medicine to the city—New Haven has 11,600 jobs in medicine as well as 42 bioscience companies. "The combination of medical school and clinical practice of the hospital is essential to not just the city's economic well-being, but to the state," he said.

But for the staffs of both hospitals, the heavy lifting was just beginning as they integrated two hospitals with different ways of doing things. Decisions to be made ranged from the mundane—where to find bed linens and cafeteria trays—to such complex topics as new reporting relationships for medical staff, media policies for communications officers, and seniority and job descriptions. Also on the agenda is expanding the planned implementation of an electronic medical records system at YNHH to cover HSR. In the runup to the acquisition more than 1,300 policies and procedures were standardized.

At the time of the signing it was not yet clear which departments would be headquartered in which hospital, though emergency departments and intensive care units will remain open in both. A command center was set up at SRC to answer questions that might arise. The center also ensured that such essential services as patient care, admissions, medical records, purchasing and supplies, support services, information technology and telephones, and payroll and billing will continue without interruption.

Aiding in the transition, noted O'Connor, who became executive vice president and COO of the Yale New Haven Health System, are strong ties between the two hospitals. About 80 percent of HSR's physicians were

et cetera ...

SMOKING BANS AND ALCOHOL

Banning smoking in bars and restaurants can cut down not only on tobacco-related illnesses but also on alcohol abuse, according to a study by Yale researchers.

Using data from a national alcohol survey, the Yale researchers compared remission rates of individuals with alcohol use disorder (AUD) in states that enacted smoking bans in establishments that serve alcohol with rates in states without such bans. In the states where smoking bans were in effect, there was an 11 percent increase in remission of AUD. States with public drinking bans also had a lower rate of new cases of AUD—7 percent versus 11 percent in states without bans. These changes seemed to be most pronounced in men and young people as well as in smokers.

“We wanted to see if separating smoking and drinking in public drinking venues changed drinking behavior,” said Sherry McKee, PH.D., associate professor of psychiatry and senior author of the study published in September in the journal *Drug and Alcohol Dependence*. “It does.”

—John Curtis

ENZYMES AT WORK

Yale scientists have captured views of an enzyme’s working parts that show the operation of its chemical mechanisms.

“We caught the intron in action,” said principal investigator Anna Pyle, PH.D., the William Edward Gilbert Professor of Molecular, Cellular, and Developmental Biology and professor of chemistry. Pyle’s lab reported in the October 26 issue of the journal *Cell* on 14 crystal structures that appear at different stages of catalysis in a group II intron—a ribozyme involved in RNA splicing.

One of RNA’s major functions is to copy genetic information so that ribosomes, the cellular protein factories, can decode it. An early step in that process is splicing—breaking RNA apart and recombining its pieces to produce a protein.

“Whenever splicing gets messed up, you’ll find a disease that results,” said Pyle, a Howard Hughes Medical Institute investigator. “Until now we haven’t really understood the splicing reaction chemically.”

—J.C.



ROBERT LISAK

already accredited at YNHH. The chief of staff and senior vice president for medical affairs at YNHH, Peter N. Herbert, M.D. '67, had previously served as chair of the department of medicine at HSR. Alan Kliger, M.D., a senior vice president at Saint Raphael, has also worked at Yale, where he served on the clinical faculty and is now a vice president and chief quality officer of the Yale New Haven Health System.

—John Curtis

Marna Borgstrom and Christopher O'Connor signed the agreement that sealed Yale-New Haven Hospital's purchase of the Hospital of Saint Raphael.

Return to poetry

Cardiologist Barry Zaret composes poems about a life in medicine, dusk in the Berkshires, and his late wife.

Every time he updates *Clinical Nuclear Cardiology*, the textbook he co-wrote, Barry L. Zaret, M.D., adds new material. But when he sits down to revise a poem, he does the opposite.

“You start big and you get smaller and smaller,” says Zaret, the Robert W. Berliner Professor Emeritus of Medicine,

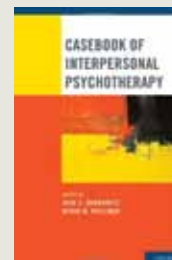
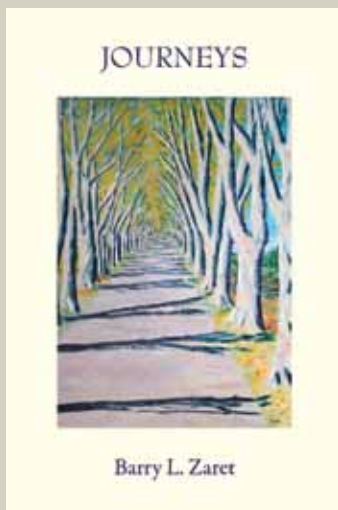
who was Yale’s long-time chief of cardiovascular medicine until 2004. “It has to have the right cadence, and there’s got to be an economy of words. It’s amazing, the time you can spend on simple changes.” He reworks the poem over time. “You need to let the poem mature.”

Zaret’s first book of poetry, *Journeys*, touches on themes from the writer’s Jewish heritage and

a life in medicine, and on the beauty of Massachusetts’ Berkshires. Nine poems in a section titled “In the Land of Cancer” tell the story of his wife Myrna’s illness and death from cancer in 2010, and of the grief and renewal that followed. Among Zaret’s favorite poems in the collection are “My Father’s Kosher Butcher Shop”; a description of dusk called “Berkshire Light”; and “Paper Plate Pesach,” about his first Passover without Myrna after 47 years of marriage.

Until Zaret returned to poetry eight years ago, he had not written a poem since contributing to his Far Rockaway High School yearbook in 1958. In recent years, he’s been setting his alarm for 4:30 a.m. so he can write before heading down to the School of Medicine. Weekends, he paints at his house in the Berkshires. His oil painting, “The Road from St. Remy to Arles,” appears on the cover of *Journeys*.

—Cathy Shufro



The Great Manchurian Plague of 1910–1911: The Geopolitics of an Epidemic Disease

by William C. Summers, M.D., PH.D., professor of therapeutic radiology, of history of medicine and science, and of molecular biophysics and biochemistry (Yale University Press) In this case study, the author first sets the scene in Manchuria, then describes the epidemic that began in 1910 when plague was transmitted from marmots to humans and killed as many as 60,000 people in less than a year. Summers examines the actions and interactions of the multinational doctors, the politicians from three countries, and the ordinary citizens who confronted the outbreak.

Casebook of Interpersonal Psychotherapy

edited by John C. Markowitz, M.D., and Myrna M. Weissman, PH.D. '74 (Oxford University Press) This book addresses the use of interpersonal psychotherapy (IPT), a modality that has been developed to build social skills as well as relieve psychiatric symptoms on the understanding that interpersonal problems contribute to many mental disorders. The authors provide detailed case studies that illustrate how psychotherapists use IPT to treat patients with a range of conditions and complications that include mood, anxiety, eating, and personality disorders. The book examines different contexts for practicing IPT, including group therapy, inpatient settings, and telephone therapy.

Becoming a Consummate Clinician: What Every Student, House Officer and Hospital Practitioner Needs to Know

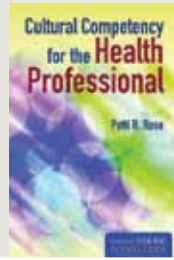
edited by Ary L. Goldberger, M.D. '74, HS '77, and Zachary D. Goldberger, M.D. '04 (Wiley-Blackwell) In an era in which the learning curve in medicine is increasingly steep, this text features real-world examples in hospital-based medicine to help both practitioners and students improve their clinical skills and learn to communicate more effectively as they assess, integrate, and present clinical information. The authors offer strategies for attending physicians to help their trainees develop critical thinking skills. The book is available in an online edition as well as in print.

A Diffident Doctor

by Hugh L. Moffet, M.D. '57 (Two Harbors Press) The author’s personal story presents a snapshot of history, culture, politics, and major events during the time span from his early childhood in Illinois in the 1930s to medical school at Yale, a pediatrics practice in Wisconsin, and retirement in Nevada beginning in 1998. The author’s presentation of American medical practice over the past 50-plus years reveals changes in diagnostic methods and medications—as well as in infectious diseases themselves.

Biomental Child Development: Perspectives on Psychology and Parenting

by Frank John Ninivaggi, M.D., FW '77, assistant clinical professor in the Child Study Center and of psychiatry (Rowman & Littlefield Publishers) The biomental perspective provides



a holistic view of child development that incorporates biological and emotional dimensions. The book provides parents with a basic understanding of normal psychological development based on current findings from psychology, psychiatry, and neuroscience. The author maintains that positive parenting encompasses diverse styles arising from differences among both children and caregivers. Parents, grandparents, and other caregivers can use this guide to achieve a working understanding of child development at each stage in the young person's life.

21st Century Global Mental Health

by Eliot Sorel, M.D., FW '75 (Jones & Bartlett Learning) This textbook examines the subject of global mental health, its integration with public health and primary care, the progress to date, and the challenges that remain. The book addresses the increasing prevalence of mental disorders, the fragmentation of health systems, the pervasive stigma of mental illness, and the persistence of worldwide discrimination against the mentally ill.

Lifetime and Fortune: A 20th Century Neurosurgeon's Journey

by Edward R. Lang, M.D. '60 (Xlibris Corporation) Lang is a retired neurosurgeon born in the Hyde Park neighborhood of Chicago's South Side. In this autobiography, the author describes his childhood, college years, his medical education and residency, and his later career. He also gives an account of extensive travels to the British Isles, Europe, Scandinavia, and China.

Cultural Competency for the Health Professional

by Patti R. Rose, M.P.H. '85 (Jones & Bartlett Learning) This text underlines the importance of cultural competency for allied health professionals, and describes the process of assessment, training, and evaluation. It provides students in the health professions with important information about cultural competency as well as practical insights in applying this knowledge in day-to-day work with patients from different cultural backgrounds.

Smith's Patient-Centered Interviewing: An Evidence-Based Method, 3rd ed.

by Auguste H. Fortin, M.D., associate professor of medicine; Francesca C. Dwamena, M.D.; Richard M. Frankel, Ph.D.; and Robert C. Smith, M.D. (McGraw-Hill Professional) This text has been updated and expanded by a multidisciplinary team of medical experts, and presents a step-by-step method for mastering every aspect of the medical interview. The book discusses ways to obtain accurate biomedical facts from patients as well as critical personal, social, and emotional information.

The descriptions above are based on information from the publishers.

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HAROLD JAFFE

The mystery of HIV

Only five men were listed in the first official recognition of what would become a worldwide pandemic: five gay men from Los Angeles with a rare pneumonia who were described in the Centers for Disease Control and Prevention's (CDC) *Morbidity and Mortality Weekly Report* of June 5, 1981. The first cause suspected was "poppers," nitrite inhalants popular with gay men.

Harold W. Jaffe, M.D., told the story of solving the "medical mystery" that was HIV at the Beaumont Medical Club Lecture on October 26. The associate director of science at the CDC described working as an epidemic intelligence officer on a disorder that did not yet have a name.

Through detective work that included tracing webs of sexual partners, Jaffe and his colleagues recognized that the illness was spread through sexual contact and contaminated blood products.

"Sometimes we think of public health as kind of mechanical and dry, but it isn't," said Jaffe, who also screened depictions of himself in *And the Band Played On*, a 1993 movie about the AIDS crisis. The story of AIDS, Jaffe said, shows the "power of the epidemiological method to understand and control a disease even before we knew the cause."

—Cathy Shufro



JACK HITT

Evidence in our language

Evidence of individual identity almost as incriminating as a fingerprint can be gleaned from how we use language.

"A lot of us litter our writings, our texts, our e-mails, and our letters with a little bit of ourselves," said author and storyteller Jack Hitt. As forensic linguistics has become more accepted in American courtrooms, he said, testimony from linguists has sealed both convictions and acquittals. Hitt, who gave the James Kenney Lecture in September for the Program for Humanities in Medicine, wrote an article about the topic for *The New Yorker* in July.

In one case, although the physical evidence was not overwhelming, a jury found a man guilty of killing his family based largely on the linguistic constructions in anonymous threatening e-mails sent before the murders. Consistently misplaced apostrophes and fused spellings ("goodtime") were identical to material that the suspect was known to have written.

Forensic linguists look "for any kind of unconscious pattern," Hitt said. They also listen to voice recordings for "the beats in that sentence and the pause in that comma."

Experts have delivered a split verdict. "Half the body of forensic linguistics doesn't think that forensic linguistics should be involved in criminal cases," Hitt said.

—John Dillon

The Civil War Wounded in Photographs

By Natalie Villacorta



In this 1864 photo of a ward at Harewood Army Hospital in Washington, D.C., wounded soldiers lie under mosquito nets over their beds. Reed Bontecou, M.D., the hospital's head surgeon, commissioned photographs of his patients to document surgical practices. Ninety-eight of those photographs found their way to the School of Medicine's Medical/Historical Library.



MEDICAL/HISTORICAL LIBRARY

Seated in profile, the young men pose as they would for family portraits. On closer inspection of the oval gold-lined frames, the serene faces are scarred, bald spots divided by deep canyon-like cuts, shoulders swollen around bullet craters. These are the “after” photos, taken after the men had left their homes to fight for the Union or the Confederacy, and after they were wounded, carrying the scars of the American Civil War for the rest of their lives.

“This is one moment in this person’s life,” said Heidi Knoblauch, a doctoral candidate in the History of Medicine program, who is examining Yale’s collection of 98 photographs taken during the Civil War at Harewood Army Hospital in Washington, D.C. “To piece together what happens after this moment, how people live with their wounds afterwards, how that patient experience either carries with them or doesn’t carry with them, has been a motivating factor for me.”

Knoblauch’s photo analysis will comprise one chapter in her dissertation on the use of photography in American medical practice from 1839 to the eve of World War II.

Locked away in the stacks of the Cushing/Whitney Medical Library, these Civil War photographs are one of four collections of enlarged photographs commissioned by the head surgeon at Harewood, Reed Bontecou, M.D., a pioneer in the art of clinical photography. Yale’s collection is now used as a teaching tool

in several classes, including “Photo Memory in the U.S.,” taught by Laura Wexler, Ph.D., professor of American Studies and Women’s, Gender, and Sexuality Studies.

Knoblauch noticed that most of the scholarship on the photos focuses on Bontecou and the practice of surgery rather than on the patients he photographed. “By focusing on him, we’ve kind of lost the patients’ narratives,” Knoblauch said. Investigating the lives of the men in Bontecou’s photos is a way for Knoblauch to enter into that patient experience, she said. “Being wounded gave them a record; it attached a visual image to their name, something that a lot of Civil War soldiers did not get,” she said.

On the backs of the photos are short biographies of the soldiers—both Union and Confederate—containing personal and medical information. Knoblauch also searched census data and military and pension records; she will use the individual stories to tell the larger story of what it was like to be a wounded Civil War veteran.

Robert A. Butcher, a 21-year-old laborer from Philadelphia who served in an infantry company, suffered two saber cuts to his skull during a battle at Burke’s Station, Va., in April 1865. He complained of severe headache and sensitivity to light and noise, but left Harewood at his own request and lived for 68 more years, moving among veterans’ homes across the country from Milwaukee to the Chesapeake Bay.

Aaron Detweiler, an 18-year-old corporal in a Pennsylvania infantry company, was shot in his upper right arm during the battle of Hatcher’s Run, Va., in March 1865. He went on to become a doctor and later drowned in a place called Devil’s Hole.

“It’s a different story because it shows not only the tragedies of the war, but also the resilience. A lot of these people live until 1910, 1930—and just thinking about how they go on has been interesting for me,” Knoblauch said.

The photographs will be part of an exhibit curated by Knoblauch titled “Portraits of Wounded Bodies.” They will be on display in the rotunda of the Medical Library from January through April 2013. The cases in the foyer of Sterling Hall will provide background on medicine during the Civil War, including maps of and information about Harewood Hospital as well as a biography of Bontecou.

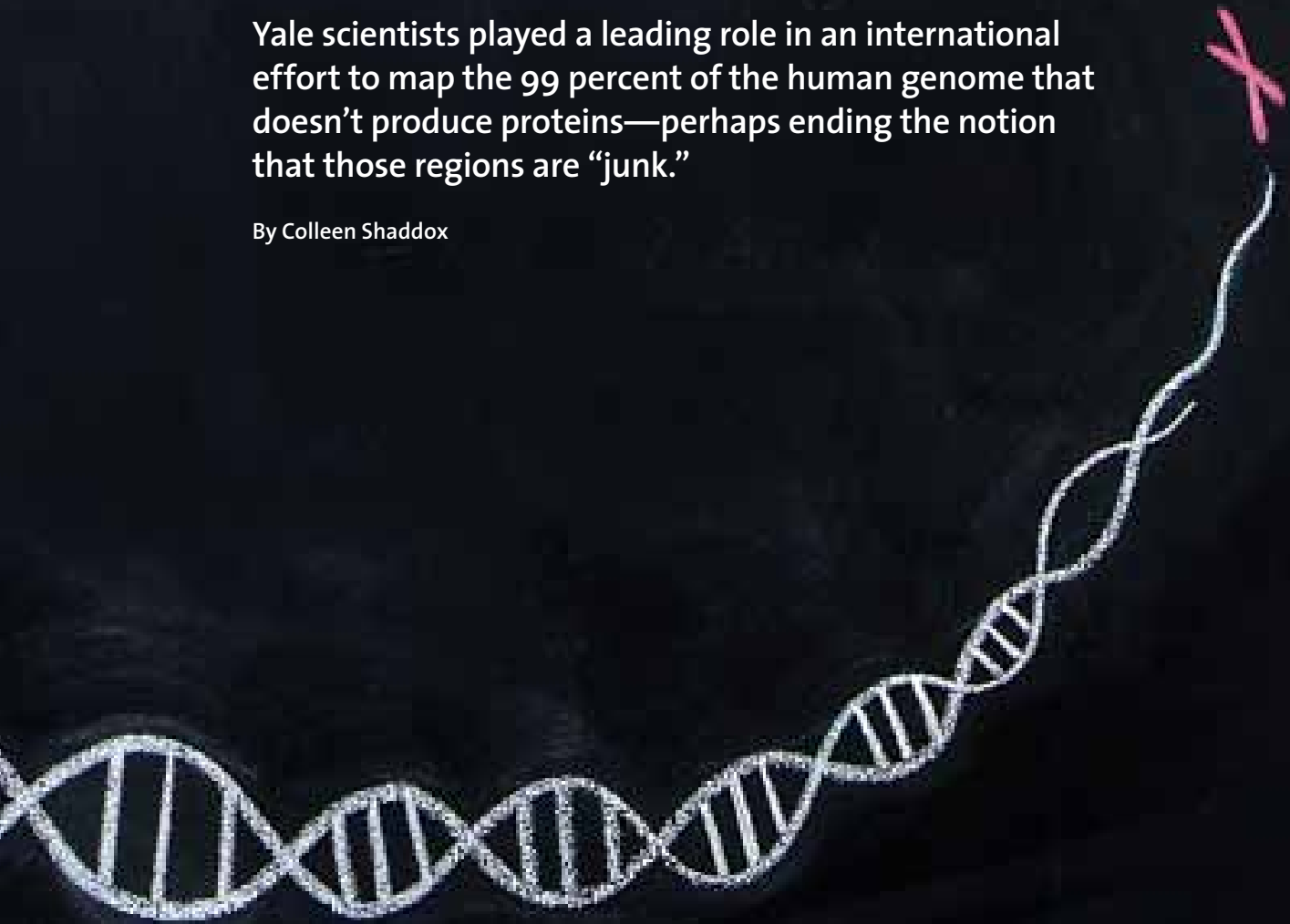
Natalie Villacorta is a student at Brown University and was *Yale Medicine’s* 2012 writing intern.

ABOVE Although the photographs documented surgical practices, they also included information about the patients. From left: Judson Spofford, a private in the 10th Vermont Regiment, was almost killed by a Minié ball at Fort Stedman, near Petersburg, Va.; Robert A. Butcher, 21, a private in the 82nd Pennsylvania, was wounded in April 1865 when Confederate cavalrymen struck his head with sabers; Cpl. Aaron Detweiler served in the 198th Pennsylvania Regiment, Co. G, and was wounded in the arm in battle in Virginia in 1865; far right, an unidentified soldier.

Junk no more

Yale scientists played a leading role in an international effort to map the 99 percent of the human genome that doesn't produce proteins—perhaps ending the notion that those regions are “junk.”

By Colleen Shaddox



R.I.P., junk DNA: not the DNA as such, but the moniker that has described it in a misleading fashion for years. Scientists have long known that vast swatches of the human genome don't produce proteins. They have also known that these sections are nonetheless active. How much of the genome produces proteins was not known until the first draft of the Human Genome Project, released in 2000, tallied the coding regions of the genome. Only about 1 percent—roughly 21,000 genes—codes for proteins. And the other 99 percent?

The National Human Genome Research Institute (NHGRI) began a follow-up to the Human Genome Project in 2003. With a budget of \$288 million, the Encyclopedia of DNA Elements (ENCODE) would map that 99 percent and catalogue its functional elements for a better understanding of the genome and its role in human biology and disease. ENCODE enlisted 440 researchers at 32 institutions in the United States, the United Kingdom, Spain, Singapore, and Japan, who communicated via wikis, Google docs, and two face-to-face meetings each year. The researchers began with a pilot project that would study just 1 percent of the genome while gauging research methods and technologies. Their findings, published in *Nature* and *Genome Research* in 2007, showed that the project could identify and characterize functional elements in the genome. In the next phase, the consortium went beyond the initial 1 percent and covered the whole genome by studying 147 cell types and performing more than 1,600 experiments.

In September the findings from those experiments were published in such journals as *Nature*, *Genome Research*, and *Genome Biology*. This research announced all ENCODE, “gives the first holistic view of how the human genome actually does its job.”

The consortium found biological activity in 80 percent of the genome and identified about 4 million sites that play a role in regulating genes. Some noncoding sections, as had long been known, regulate genes. Some noncoding regions bind regulatory proteins, while others code for strands of RNA that regulate gene expression. Yale scientists, who played a key role in this project, also found “fossils,” genes that date to our nonhuman ancestors and may still have a function. Mark B. Gerstein, PH.D., the Albert L. Williams Professor of Biomedical Informatics and professor of molecular biophysics and biochemistry, and computer science, led a team that

unraveled the network of connections between coding and noncoding sections of the genome.

Arguably the project's greatest achievement is the repository of new information that will give scientists a stronger grasp of human biology and disease, and pave the way for novel medical treatments. Once verified for accuracy, the data sets generated by the project are posted on the Internet, available to anyone. Even before the project's September announcement, more than 150 scientists not connected to ENCODE had used its data in their research.

“We've come a long way,” said Ewan Birney, PH.D., of the European Bioinformatics Institute (EBI) in the United Kingdom, lead analysis coordinator for ENCODE. “By carefully piecing together a simply staggering variety of data, we've shown that the human genome is simply alive with switches, turning our genes on and off and controlling when and where proteins are produced. ENCODE has taken our knowledge of the genome to the next level, and all of that knowledge is being shared openly.”

Big data, big questions

The day in September that the news embargo on the ENCODE project's findings was lifted, Gerstein saw an article about the project in *The New York Times* on his smartphone. There was a problem. A graphic hadn't been reproduced accurately. “I was just so panicked,” he recalled. “I was literally walking around Sterling Hall of Medicine between meetings talking with *The Times* on the phone.” He finally reached a graphics editor who fixed it.

An academic whose scholarly and personal interests focus on information and how we make sense of it, Gerstein had run up against the juggernaut of the 24-hour news cycle. But in the end, he helped *The New York Times* get it right, just as he'd played a role in helping the international consortium of ENCODE scientists interpret the vast expanse of data that they uncovered. The concept of “big data,” an amount of information so large that it challenges efforts to store and use it, is key to ENCODE and to Gerstein's work generally. “It's really a very transformative idea in terms of how people approach experiments and how people think about analyzing things,” he said. He likened a rich data resource to a great piece of literature, “something that's kind of transcendent and speaks to many different people.” It can inspire and answer many questions. “I do think that

particularly for genomic data sets,” he said, “the value of the data set goes beyond the initial question.”

Given the new availability of incredibly large data sets, a scientific supergroup with high levels of collegiality and collaboration was essential to the success of ENCODE. Having one group carry out the project allowed for a uniformity of method and reporting that was critical, said Michael Pazin, PH.D., program director in functional genomics at NHGRI. Imagine the confusion caused by a map where thick blue lines sometimes represent interstate highways and other times rivers. But there is ample room for small projects to emerge based on the availability of the new resource, added Elise Feingold, PH.D. '86, program director in genome analysis at NHGRI. “I don’t think (consortia are) ever going to substitute for the individual researcher and these small collaborations,” she said.

Gerstein took to the collaborative process, according to Birney. “Mark likes to find a scenario where everyone gets along without compromising the science. This is not always as easy as it sounds, and takes some effort talking to people. Like all of us, Mark has some characteristic phrases, and I would always know that Mark didn’t quite agree on something when he would start, ‘Wouldn’t you say, Ewan, that ...’, and then he’d be into some point,” Birney said.

New technology paves the way

ENCODE would have been unthinkable without the technology and methodology to gather, store, and analyze enormous data sets. When Gerstein began his career things were different. He’d majored in physics and wanted to pursue a science that was driven by advances in computer technology. But there was no clear pathway to do that. He completed his doctorate at Cambridge, which is now home to the EBI. “There was no EBI,” recalled Gerstein. “There was no program in bioinformatics. I did a program in chemistry.” He wondered whether he’d stay in academia because most universities did not have even a single bioinformatics position.

In 1996, however, Donald Engelman, PH.D., the Eugene Higgins Professor of Molecular Biophysics and Biochemistry, saw the need for computational expertise at Yale and recruited Gerstein. “I and others in the department were concerned about computation and its role in research,” remembered Engelman, who was not involved in ENCODE. “There would be an enormous explosion of information to deal with as genetic

information became available and more structural information became available. Someone who can use those enormous databases is key.”

In those days, though, the tools for uncovering those data were still being discovered. When Valerie Reinke, PH.D., associate professor of genetics, was in college, she’d often draw diagrams of cells on cocktail napkins to illustrate points to her friends who were not science majors. “It always amazes me that there are people who don’t want to know how their bodies work,” she said. Reinke was part of the modENCODE project, which focused on functional element identification similar to ENCODE, only in such model organisms as the fruit fly *Drosophila melanogaster* and the roundworm *Caenorhabditis elegans*. Reinke specializes in roundworm, which shares many genes with humans. About a fifth of the worm’s genome codes for proteins, making it easy to identify noncoding functional elements. The tools for discovering the fine details of what was happening in those sketches she drew in college were still evolving when she was a student. By 2000, when she joined the Yale faculty, microarray technology, which allows scientists to analyze expression of multiple genes in a single experiment, was brand-new. As with personal computing, DNA sequencing technology has rapidly grown more powerful, faster, and cheaper.

In 2007, as the ENCODE pilot project was ending and the next phase was getting started, next-generation sequencing technology became available. “That was really a remarkable confluence of events that we were able to take advantage of and was really a game changer for the project,” remembered Feingold.

The evolution of the technology is making it practical to look at genetics on an individual level, said Reinke, where information could be used to formulate treatments tailored to a particular patient. “We haven’t even begun to scratch the surface,” she said. “There are so many questions.”

One thing is clear. ENCODE will have profound implications for personal genomics. Each of us gets a double set of genes, with one copy, or allele, coming from each parent. Being able to determine allele-specific expression “brought home the idea of what you might call a personal annotation,” Gerstein said. “We think that this personal annotation is the next phase for genomics.”

This personal annotation, notes Gerstein, can raise ethical issues. Would you want an employer or health

insurer to know about your susceptibility to a degenerative illness? These kinds of questions don't stop at the molecular level, when Foursquare lets the world know in which Starbucks you're enjoying a coffee and a friend can share on Facebook a picture from the office holiday party that you'd rather never saw the light of day. "I do think a big aspect of information technology, both big data and computing, is this erosion of privacy," said Gerstein.

The myth of junk DNA

Some early press coverage credited ENCODE with discovering that so-called junk DNA has a function, but that was old news. The term had been floating around since the 1990s and suggested that the bulk of noncoding DNA serves no purpose; however, articles in scholarly journals had reported for decades that DNA in these "junk" regions does play a regulatory role. In a 2007 issue of *Genome Research*, Gerstein had suggested that the ENCODE project might prompt a new definition of what a gene is, based on "the discrepancy between our previous protein-centric view of the gene and one that is revealed by the extensive transcriptional activity of the genome." Researchers had known for some time that the noncoding regions are alive with activity. ENCODE demonstrated just how much action there is and defined what is happening in 80 percent of the genome. That is not to say that 80 percent was found to have a regulatory function, only that some biochemical activity is going on. The space between genes was also found to contain sites where DNA transcription into RNA begins and areas that encode RNA transcripts that might have regulatory roles even though they are not translated into proteins.

But helping people grasp the massive import of ENCODE proved a challenge. "People don't think that creating a resource is a sexy endeavor," said Feingold.

"It's so easy to either overpromise or undersell," agreed Pazin. On the one hand, he did not want to make claims that ENCODE would quickly lead to cures for diseases like cancer. On the other, he didn't want the public to ignore the discovery because it was too technical to understand. That's why the "useful shorthand" of junk DNA so often came up in coverage, said Feingold.

Hopefully, ENCODE will help put an end to the notion of junk DNA. The project not only assigned general classes of functions to areas of the genome but also showed the

complexity of how those areas interact. The project revealed the genome's organizational hierarchy, with top-level regulators wielding vast influence while "middle managers" often have to collaborate to regulate genes.

There was no "Eureka!" moment, said Gerstein, who called the findings "the opposite of a discovery." Instead, there were years of gathering and interrogating data to create a map of the vast majority of the genome. As many researchers have found, these noncoding regions are alive with regulatory activity that plays a critical role in human disease, though some of the functioning that was documented did not have such obvious applications.

His team, Gerstein said, took a different path from those of others involved in the project.

"Most of the project is more oriented on annotating elements," he said. "Our unique perspective was to make it a network."

If it were simply a genetic encyclopedia, ENCODE would catalogue its entries in isolation from one another. The *Abaco Islands* reside next to *abacus* in a conventional encyclopedia because that's how the words fall alphabetically—not because the topics identified by the words have any intrinsic relationship. Knowing how different parts of the genome work together is far more powerful than simply compiling a parts list.

Through computational analysis, Gerstein's lab broke apart the "hairball" of the regulatory networks to find working relationships. He developed statistical models that identified regulators located far away from the genes they influence. He found that the way the human genome is organized is not so different from the way humans organize themselves. Gerstein likens transcription factors that have considerable regulatory influence to top-level managers. As might be the case with their human analogues, these elite transcription factors tend to be conservative.

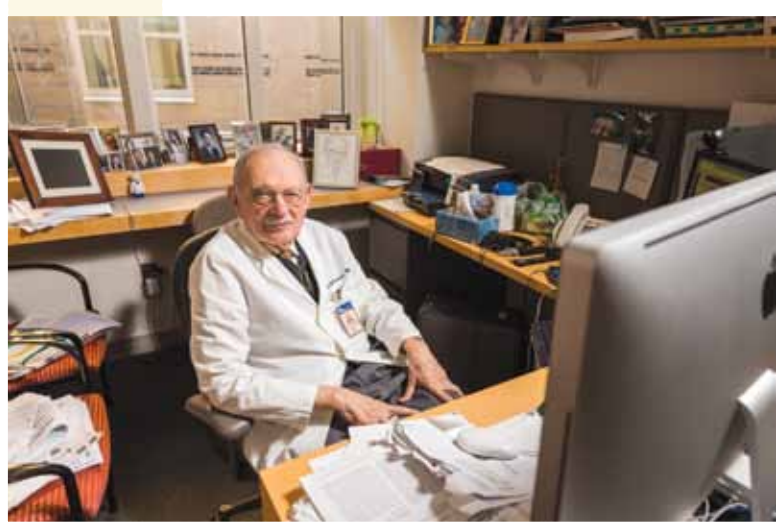
"What does *conservative* mean? *Conservative* means they're more preserved. There's less variation," said Gerstein. "It's sort of natural that in that kind of context, you don't want them to change as much."

The less influential transcription factors, which he terms "middle managers," are less conservative and more likely to work cooperatively than their peers. Often these middle managers will co-regulate a gene, easing the flow of information in what would otherwise be "a bottleneck."

Valerie Reinke studies the roundworm *C. elegans* and focuses on functional element identification in that organism. Advances in technology made the ENCODE project possible, she says, and are making it practical to look at genetics on an individual level. "We haven't even begun to scratch the surface," she says.



During his long career, geneticist Sherman Weissman has focused on genome-wide mapping of gene activity and chromosome structure in humans. "We have so much data, and a very large part of it hasn't been fully exploited," he says.



Mark Gerstein played a key role in an international project that elucidated many of the functions of the 99 percent of the human genome that does not code for proteins. Gerstein and his team unraveled the complex network of working relationships among genes and their regulators.

There is less interaction between the top-level transcription factors and the bottom-level, least influential transcription factors than one would expect to happen by chance. The human genome is not egalitarian.

Gerstein and colleagues at the Sanger Center, the University of California at Santa Cruz, and Cold Spring Harbor Laboratory on Long Island also found about 12,000 pseudogenes—fossil genes dating back to our non-human ancestors—which at first glance appear to be dead. But it turns out that some pseudogenes, while they no longer code for proteins, are quite animated. “They’re very much on the edge between living and dead,” said Gerstein.

In some people, these pseudogenes are turned into actual genes. “What’s going on here? Is this a gene that’s being born?” he asked. Pseudogenes open a window on the history of our species. Some of these fossil genes may still be players in the regulatory network.

The impact on medicine

What will ENCODE mean for human health, and how soon will this genomic encyclopedia inform treatment? There is no easy answer to that critical question, according to Sherman Weissman, M.D., Sterling Professor of Genetics.

“I grew up with the field,” said Weissman, whose research interests include genome-wide mapping of gene activity and chromosome structure in humans. Weissman contributed to ENCODE through collaborations with former Yale professor Michael Snyder, PH.D., a leader in the field of functional genomics who is now at Stanford.

Knowing the molecular basis of a disease carries no guarantee that a cure is imminent. Linus Pauling, PH.D., linked sickle cell disease to an abnormal protein in 1949, making it the first genetic disease for which the molecular basis was known. But, Weissman noted, there is still no cure for it. On the other hand, survival rates for chronic myelogenous leukemia are improving thanks to Gleevec, a drug based on oncogene study that received FDA approval in 2001. Weissman is optimistic that genetic information could lead to effective treatments for Alzheimer disease, which he terms “simpler than cancer.”

“We have so much data, and a very large part of it hasn’t been fully exploited,” he said. “We’re really bumping up against the ceiling in some practical ways.”

One of the project’s findings is that genetic changes linked to disease occur between genes in places where ENCODE has identified regulatory sites. It’s still not clear how variations in these areas contribute to disease. “Some people were surprised,” said Pazin, “that disease-linked genetic variants are not usually in protein-coding regions. We expect to find that many genetic changes causing a disorder are within regulatory regions, or switches, that affect how much protein is produced or when the protein is produced, rather than affecting the structure of the protein itself. The medical condition will occur because the gene is aberrantly turned on or turned off or abnormal amounts of the protein are made. Far from being junk DNA, this regulatory DNA clearly makes important contributions to human health and disease.”

“It’s important to realize that these findings won’t be taken forward by people like Mark or myself—rather we have to empower clinical researchers to use this data,” said Birney of the EBI. “I think ENCODE will have a big impact on medical research—in particular, genome-wide association studies have a really remarkable overlap with ENCODE data outside of protein-coding genes, and this is leading to all sorts of new hypotheses of how these diseases operate.” **YM**

—Colleen Shaddox is a freelance writer in Hamden, Conn.





JOHN CURTIS

Yale's Epic challenge

The health care system embraces electronic medical records and takes on a monumental task.

By Bruce Fellman

In early October, Gary E. Friedlaender, M.D., a specialist in musculoskeletal oncology who chairs the Department of Orthopaedics and Rehabilitation, was in Australia for meetings. Yet even 9,000 miles away from his office in New Haven, Friedlaender could stay in touch with his Yale Medical Group (YMG) practice and access information about his patients, including charts, notes, and X-rays.

"I was able to take out my laptop, receive information, generate orders, and talk to other providers about patient care," said Friedlaender, the Wayne O. Southwick Professor of Orthopaedics and Rehabilitation and professor of pathology. "Everything I needed was at my fingertips, and I can now connect wherever I happen to be."

The reason is Epic, a suite of electronic medical record (EMR) applications that is being implemented throughout the Yale New Haven Health System (YNHHS): at Greenwich, Bridgeport, and Yale-New Haven hospitals, as well as at YMG and the Northeast Medical Group (NEMG) community practices.

"Epic will transform the way we teach and practice medicine, both at Yale and around the country and the world," said Dean Robert J. Alpern, M.D., Ensign Professor of Medicine. "The Epic EMR will help us achieve a higher quality of care than ever before."

PREVIOUS PAGE On a rainy day in October 2011, Yale Internal Medicine Associates became the first practice in the Yale Medical Group to implement the Epic electronic medical records system. Marie Follo (seated), director of practice management, worked with staff on that first day.

The implementation process began in July 2010 when senior YNHHS, YMG, and School of Medicine administrators met with officials from Epic Systems, a Wisconsin-based software company, to sign a \$250 million contract that would transform health care delivery throughout the medical center. The EMR has been in use since October 2011, when Yale Internal Medicine Associates (YIMA) became the first YMG practice to start using the Epic ambulatory application. As of December, 388 providers in 76 practices were up and running on Epic with the numbers increasing each week. Yale-New Haven Hospital (YNHH) is scheduled to go live in early February and the entire rollout will be completed by September 2013.

Orthopaedics went live in March 2012, so Friedlaender can log onto Epic, even from “down under,” and have all the information he needs in one place. “We were drowning in paper,” he admits, “and all too often, we couldn’t find what we needed in a timely way. The Epic EMR corrects all that. It’s indispensable to improving the health care of the future.”

Enough people, from doctors to front-desk professionals, have incorporated the EMR into their workflows to corroborate these assessments. One key observer and present Epic user is David J. Leffell, M.D., deputy dean for clinical affairs, and the David P. Smith Professor of Dermatology and professor of surgery. When the contract was signed, Leffell was YMG’s CEO and played an instrumental role in the selection of Epic. His practice went live with the software in July—but as he and countless others have discovered, the process is easier said than done.

“The implementation was painful,” Leffell admitted. “There’s a steep learning curve. It’s not as customizable as we’d like, and it’s clear that our aspiration for a totally paperless world is not achievable. But even now—this early in the project—the pluses outweigh the minuses.”

Those advantages are considerable. There’s immediate secure electronic access to a patient’s medical history, including vital signs, medications, allergies, lab test results, and X-rays. Then there’s the ease and speed of the EMR system’s interactions with providers and patients alike, along with such “smart” features as warnings about drug interactions and information about treatment protocols. Pharmacies, thanks to an e-prescribing provision, no longer puzzle over a physician’s handwriting, and staffers don’t have to hunt down errant charts. Through MyChart, an

application that YNHHS included as part of its Epic implementation, patients can log into their own account to view their records and test results, interact with their providers, schedule appointments, and even pay bills. (More than 7,000 patients had signed up for MyChart by December.) And the wealth of data in the system will provide a mother lode of digital information to find more cost-effective ways to improve care.

As if these reasons aren’t compelling enough, there’s also a financial incentive. Within the American Reinvestment and Recovery Act, the \$789 billion federal stimulus legislation of 2009, was a provision called the Health Information Technology for Economic and Clinical Health (HITECH) Act. HITECH makes available up to \$20 billion to doctors and hospitals that institute EMRs and demonstrate what federal officials term “meaningful use” of the new technology. These benchmarks include using the EMR for a certain percentage of medication orders, entering demographic information, recording vital signs, noting smoking status, and maintaining an active medication allergy list, among other things. By meeting these requirements, physicians can become eligible to receive up to \$44,000 in Medicare money over five years. But to garner the full \$44,000 payment, each physician has to be using a certified EMR like Epic and hitting meaningful use targets by no later than this year.

An increasing number of YNHHS providers have done just that, and there is another powerful reason not to wait. Providers who choose to sit on the EMR sidelines or don’t achieve meaningful use by the end of 2015—and don’t qualify for a waiver—will be hit with a noncompliance penalty that amounts to 1 percent of Medicare payments in 2016, to rise to 5 percent in 2020. (There are Medicare penalties for hospitals, but no Medicaid penalties for either providers or hospitals.)

With the federal government encouraging and supporting the use of electronic medical records, it was time for all parts of YNHHS to act. YNHH, which was using separate EMR systems in the inpatient and outpatient clinic areas, was looking for a single integrated system. YMG, which still lived largely in the paper-records universe, wanted to go electronic.

After lengthy reviews and consideration of several candidate systems, a due-diligence committee chose the EMR software developed by Epic Systems, whose product is rated tops in evaluations by independent consultants. The integrated suite of software for both inpatient and ambulatory services is used by around 270 health care organizations worldwide, including Kaiser Permanente, the Cleveland Clinic, and Weill Cornell Physicians. Many academic medical centers, from the University of Wisconsin Hospital and Clinics to Dartmouth-Hitchcock, are also part of the Epic community. When a plethora of implementations currently under way are complete, about 250,000 physicians—one in every four in this country—will be working in an Epic system.

Yale's "Manhattan Project"

Epic was chosen, and thus began what Leffell called "our equivalent of the Manhattan Project—an incredibly complicated process that exceeds anything we've ever attempted by orders of magnitude."

The entire Epic model system, as the company calls it, consists of 19 separate but fully integrated components, from billing and scheduling modules to inpatient and ambulatory applications. But Epic is not simply plug-and-play software. It has to be built, or "personalized," to fit the needs of each organization.

Over the summer and fall of 2010, YNHHS hired nearly 200 staffers and sent them to Epic's campus in Wisconsin for training and certification. Then Team Epic, led by project director Lisa Stump; Steven Schlossberg, M.D., YMG's chief medical information officer; and Daniel Barchi, chief information officer at the School of Medicine, settled into headquarters in Stratford, Conn., and began working nonstop on what became known as the "collaborative build." Meeting regularly with a YNHHS Providers Advisory Group and subject matter experts well-versed in every conceivable aspect of the health care system from billing to bed planning, pharmacy consultation to patient care data, the team reviewed all aspects of the software with the people who'd be using it. At various points in the process, it was time for a "stoplight" vote on each part of the proposed Epic workflow. The vote was taken by a show of cards: green for "Okay, this will work for us," and red for "Let's stop and think about this."

There were thousands of votes as everyone involved in the project weighed in and shaped the end result. In addition to creating a system that seemed to meet the workflow needs of its users, the collaborative build had another critical result. It brought people, many of whom had never worked together, out of their silos. "We're building an EMR, but the true power of the Epic project may lie in helping us to form better teams that will transform our health care culture," said Edmund F. Funai, M.D., former professor (adjunct) of obstetrics, gynecology, and reproductive sciences, and then a member of the Epic project's interim leadership committee.

Their efforts were showcased in May 2011 at an event called the Work Flow Walk Through. This preview of the ambulatory application—there was a separate walk-through for the inpatient hospital side—attracted hundreds of future Epic users and left many favorably impressed by the



TERRY DAGRADI (2)

TOP When the orthopaedics department launched its EMR in March 2012, it benefited from the lessons learned by other departments. Chair Gary Friedlaender discussed the system with staff.

ABOVE Implementation of the systems was challenging as staff adapted to a new way of keeping records and had to create patient files by transferring paper records to computers.

A new electronic medical record will replace paper files that now hold patients' medical histories. Trevor Lewis, a senior administrative assistant in orthopaedics, looked over patient records.



HAROLD SHAPIRO

potential power of the system. YIMA, the pioneer practice, prepared to go live that fall.

While Epic team members met with practice representatives and fine-tuned the software, there was hardware to be installed and there were extensive training sessions for everyone who'd be using the application. In addition, before the switch was flipped and the Epic login appeared on computer screens, staffers began what for many is an ongoing effort to abstract pertinent data from paper records and enter the information into a patient's EMR.

A steep learning curve

The Epic era began on a rainy Wednesday morning, October 19, 2011, at YIMA headquarters on the third floor of the Yale Physicians Building. There were festive balloons, coffee and pastries, and enough Epic systems specialists in place to make the transition smooth and seamless.

It didn't work out quite that way. As Leffell noted, the learning curve was steep. For example, right after go-live,

productivity at YIMA dropped by about 50 percent. This was anticipated and factored into the implementation timetable. But the goal of returning to normal within a month or so eluded many YIMA physicians, nurses, medical assistants, and other staffers, as it would do in other practices.

In part, the decline in productivity was due to the sheer complexity of the software, which allows different ways to accomplish the same task. "As the very first Yale practice to go live, our transition to Epic was a struggle," said Matthew Ellman, M.D., YIMA's practice director. "But although some challenges remain a year later, we are now reaping the benefits of immediate and easy access to clinical results, rapid communication among staff and with patients, and the convenience and improved safety of e-prescribing."

To be sure, working electronically and having to enter data via a keyboard on a computer screen rather than by hand in a notebook (or dictated into a tape recorder) is such a massive change in how a practice does business that slowdowns and snafus are inevitable. But some practices had easier

transitions than others. Epic's debut last March in orthopaedics was certainly not pain-free. "We walked through the fire," said practice manager Connie Rinaldi. But the flames were more a simmer than a conflagration, and they didn't burn for long because, Rinaldi continued, "We reached out to other departments to learn what worked, and we decided that we'd find solutions of our own to pass along."

The strategy was a success, and almost all the providers were able to get back up to 100 percent of their pre-Epic productivity levels within a month. But there was a cost, noted Maureen Carey, R.N., who manages the nursing staff: someone had to enter all the new data that Epic requires, and the process could add as much as 15 minutes to each appointment. The extra work, Rinaldi explained, is being managed by shifting the responsibilities of the existing medical assistants. Sending now-superfluous file cabinets to an off-site storage facility has had an unexpected benefit. "Everyone now has adequate desk space," she said. Moreover, Rinaldi and Carey expect the extra work to be temporary; as increasing numbers of patient records become part of the Epic system, the time-consuming data entries will no longer be necessary.

And computer makes three

Adding a computer to the doctor-patient encounter has not proven as disruptive as many providers had feared, said orthopaedic surgeon Jonathan Grauer, M.D. '97, a self-confessed Epic partisan. "Everybody in the beginning was nervous that having to work on a computer while the patient was in the examining room would compromise the quality of the interaction, and it felt a little strange and awkward at first," Grauer confessed.

But there are ways to blunt the oft-stated worry that the physician is taking care of a computer rather than a person, such as taking notes on paper and then transferring the data into Epic when the office visit is complete. In fact, there's research about ways to minimize computer intrusiveness; YIMA was able to incorporate such findings into the design of its examination rooms because the practice was moving to new offices in advance of going live. The trick lies in maintaining a triangular setup, with the computer equipment set off to one side so that the monitor doesn't get in the way of eye contact between doctor and patient.

Dickerman Hollister, M.D., a Greenwich oncologist, may even be taking a cue from sports bars by hanging a large monitor on a wall where everyone in the room can see what's on the screen. "I can type pretty fast, and I can be on the keyboard and facing patients at the same time," he said. "They can see what I'm doing and work with me. Epic definitely enhances our communication and better informs my patients about their care."

The ability of the system to quickly generate office-visit summaries for patients, as well as useful health care information about a particular concern, has helped change

doubters into fans. "The presence of a computer in the room is part of the price we pay for the portability of health care information," said Grauer. "We're all trying to find ways to deal with it."

Indeed, there's no longer any real choice. "EMR use is mandated by federal authorities for everyone who's in the Medicare and Medicaid arena," said Friedlaender, "so EMRs are going to be a part of our professional life. The real question we should be asking—and trying to answer—is how do we use them to maximize the quality of care we're providing?"

There are a number of ways to address this concern: some of them local, others more global. The Epic implementation required everyone involved in the process to take a hard look at workflow. Working in Epic means following the application's workflow and entering office visit data in a certain predetermined order.

"Epic imposes a discipline on a doctor's daily activities that's very beneficial, in both the short and long run," said Leffell. Using the EMR has already resulted in improvements in such areas as the way calls from patients are received, routed, and acted upon; the thoroughness of documentation; and the turnaround time for notes. "We're now able to get our notes into everyone's hands the next day—it used to take a week or two," said Grauer. "With Epic, the retrievability of all that information is just fantastic."

Hollister, who logs in from home over morning coffee, explained that the EMR "makes me more efficient. It brings me up to speed before rounds and makes it less likely I'll get surprised."

And Friedlaender, besides touting Epic's ability to provide 24/7 access to complete patient care information, offers perhaps the most compelling reasons of all to make the electronic leap. "Epic reminds us that we're creating an electronic medical record that belongs to the patient—it's not a private, inaccessible dossier," he explained. "And the EMR allows us to keep track of how well we're doing for our patients. If this transparency is threatening, then the anxiety is well deserved. As providers, we need feedback; and if Epic provides a nudge, so be it. In the end, we'll be glad we have this powerful tool available to us." **YM**

—Bruce Fellman is a writer in North Stonington, Conn.



Marina Picciotto



Joan Steitz



Hugh Taylor



Henry Binder



Judy Cho

Neurobiologist elected to IOM

MARINA PICCIOTTO, PH.D., the Charles B.G. Murphy Professor of Psychiatry and professor of neurobiology and of pharmacology, has been elected a member of the Institute of Medicine, the branch of the National Academies charged with providing science-based advice on medicine and health to policymakers, professionals, and the public at large.

Picciotto is an authority on the molecular underpinnings of tobacco and alcohol abuse, depression, and eating behaviors, with a particular interest in the role of nicotinic acetylcholine receptors (nAChRs). In addition to playing a role in tobacco addiction, nAChRs have been implicated in Alzheimer disease and in the dysfunctional sensory processing characteristic of schizophrenia. Picciotto has also studied the effects of nicotine exposure during gestation and adolescence on learning and memory and on the neuropeptide galanin. Galanin modulates ACh release and may exert a protective effect against addiction to such drugs as cocaine, amphetamines, and opiates.

Picciotto graduated from Stanford University in 1985 with a degree in biological sciences and received a PH.D. in molecular neurobiology from The Rockefeller University in New York City in 1992. She joined the Yale faculty in 1995 after completing a postdoctoral fellowship at the Institut Pasteur in Paris.

Picciotto, who is vice chair for basic science research in the Department of Psychiatry and associate director of the School of Medicine's M.D./PH.D. program, also serves on the National Advisory Council of the National Institute on Drug Abuse.

Yale professor honored with two awards

JOAN A. STEITZ, PH.D., Sterling Professor of Molecular Biophysics and Biochemistry and a Howard Hughes Medical Institute investigator, has received the 2012 Pearl Meister Greengard Prize of Rockefeller University, which recognizes outstanding achievements of women scientists; and the 2012 Vanderbilt Prize in Biomedical Science. The latter prize, established by Vanderbilt University School of Medicine in 2006, honors nationally and internationally known women scientists who have "a stellar record of research accomplishments" and who have contributed significantly to the mentorship of other women in science. Prize winners receive a \$25,000 honorarium; visit Vanderbilt to meet with faculty and deliver a Discovery Lecture; and serve as mentors to women who are pursuing graduate studies in the biomedical sciences at the Vanderbilt School of Medicine. Steitz will receive the prize in May.

The Pearl Meister Greengard Prize, created by Nobel laureate and Rockefeller professor Paul Greengard, PH.D., includes a \$100,000 honorarium.

Steitz earned her doctorate in biochemistry and molecular biology from Harvard in 1967. Following a postdoctoral fellowship in Cambridge, England, she joined the Department of Molecular Biophysics and Biochemistry at Yale. Steitz is perhaps best known for discovering and defining the function of small nuclear ribonucleoproteins (snRNPs), cellular complexes that play a key role in splicing and processing pre-messenger RNA—the earliest product of DNA transcription.

School of Medicine names new chair of ob/gyn

HUGH S. TAYLOR, M.D., HS '92, FW '98, was named chair of the Department of Obstetrics, Gynecology, and Reproductive Sciences at the School of Medicine, and chief of obstetrics and gynecology at Yale-New Haven Hospital, effective October 1, 2012. Taylor has served as professor and vice chair of obstetrics, gynecology, and reproductive sciences, and as chief of reproductive endocrinology and infertility. Taylor's research has been funded by the NIH for more than 20 years. He is the editor in chief of the journal *Reproductive Sciences* as well as editor of *Endocrinology*. He serves on the board of directors of the American Society for Reproductive Medicine (ASRM), where he is president-elect of the endometriosis interest group; he also serves on the governing council of the Society for Gynecologic Investigation (SGI). Taylor received the President's Achievement Award from the SGI in 2008.

As chief of reproductive endocrinology and infertility, Taylor has expanded the clinical capability and geographic reach of this critical service. Under his leadership, the section has established itself as a national leader, reflected in Taylor's role as clinical director of the Society for Assisted Reproductive Technology, the organization that governs in vitro fertilization practice in the United States. He has been recognized as Mentor of the Year by the American Congress of Obstetricians and Gynecologists and as Honoree of the Year by the Endometriosis Foundation of America. He has received multiple research awards from the ASRM, the SGI, and the Endocrine Society.

Chair endowed for GI studies

HENRY J. BINDER, M.D., professor emeritus of gastroenterology, and his wife, Joan W. Binder, have endowed a full professorship for a physician-scientist in the field of gastroenterology. JUDY H. CHO, M.D., was named the first Henry J. and Joan W. Binder Professor of Gastroenterology.

Binder has devoted his career to studying gastrointestinal disorders and diarrheal diseases—a major problem in many developing countries. He came to Yale as a postdoctoral fellow in gastroenterology in 1963. He had developed an interest in the field while a student at New York University School of Medicine, where he stayed on as an internal medicine resident at Bellevue Hospital. Binder was director of the General Clinical Research Center at Yale-New Haven Hospital for 21 years and established two NIH-supported training programs. Binder maintains an active clinical practice at the School of Medicine that focuses on patients with inflammatory bowel diseases and unexplained chronic diarrhea. In recent years, with support from the Gates Foundation, Binder has worked to reformulate oral rehydration solution—a recipe that combines salt, sugar, and water in the proper ratio—for the treatment of diarrhea in children.

Cho, professor of medicine (digestive diseases) and of genetics, is the director of the Inflammatory Bowel Disease Center. Her research seeks to identify genetic variations that affect susceptibility to and expression of inflammatory bowel disease.



Daniel DiMaio



Thomas Gill

Andrew
Goodman

Valentina Greco



Gil Mor



Jamie Morano



Clarence Sasaki

Daniel C. DiMaio, M.D., PH.D., the Waldemar Von Zedtwitz Professor of Genetics and scientific director and deputy director of Yale Cancer Center, has been appointed to a five-year term on the Board of Scientific Advisors of the National Cancer Institute (NCI). The board assists and advises the director of the institute, with a primary focus on oversight of the full portfolio of the NCI's extramural programs. The board also provides advice on scientific policies and reviews concepts for research and related activities supported by the NCI.

David S. Fischer, M.D., clinical professor of medicine (oncology), received the Richard Blumenthal Patient Advocate for Life Award from the Connecticut Hospice during its Legacy Ceremony on September 23. Fischer helped to found Connecticut Hospice, the first hospice in the country, in 1974.

Thomas M. Gill, M.D., Humana Professor of Medicine (Geriatrics) and professor of epidemiology and of investigative medicine, received the 2012 Joseph T. Freeman Award from the Gerontological Society of America. The award, a lectureship in geriatrics, is conferred on a physician prominent in both research and practice in the field of aging. The award was presented at the society's annual meeting in San Diego in November.

Andrew L. Goodman, PH.D., assistant professor in the Department of Microbial Pathogenesis and at the Yale Microbial Diversity Institute on the West Campus, has received a 2012 NIH Director's New Innovator Award. Presented by the National Institutes of Health, the honor is intended to encourage new laboratories to launch innovative biomedical and behavioral research. The \$1.5 million, five-year award will enable Goodman and his team to develop new approaches to understand the effects of the body's resident bacteria on human health. Goodman's team will use mice raised without any intestinal microbes of their own to investigate whether differences in the composition of bacterial communities in the gut—as well as differences in human genome sequences—affect drug metabolism.

Valentina Greco, PH.D., assistant professor of genetics and of dermatology, received an R01 grant from the National Institutes of Health for her project, "Live Imaging of Skin Regeneration." The five-year grant for \$1.9 million will fund high-resolution live imaging studies of the cellular and signaling mechanisms that govern tissue regeneration in hair follicle stem cells. Greco is a member of the Signal Transduction Research Program at Yale Cancer Center.

Valerie Horsley, PH.D., the Maxine F. Singer, PH.D. '57 Assistant Professor of Molecular, Cellular, and Developmental Biology, has received a Presidential Early Career Award for Scientists and Engineers, the highest honor bestowed by the

U.S. government on outstanding scientists and engineers beginning their independent careers. Horsley received the honor for her studies of the extrinsic regulation of epidermal homeostasis. She is one of 20 scientists to receive the award in 2012.

Gil G. Mor, M.D., PH.D., professor of obstetrics, gynecology, and reproductive sciences, received the 2012 *American Journal of Reproductive Immunology* Award for outstanding contributions to reproductive immunology. The award was conferred by the American Society for Reproductive Immunology at a joint international conference in Hamburg, Germany, in May.

Jamie P. Morano, M.D., M.P.H., a third-year fellow in the program of infectious diseases in the Department of Internal Medicine, was selected as a *New England Journal of Medicine* Gold Award Winner for her essay on technology and medicine titled "HIV/AIDS 2.0," as part of the journal's 200th anniversary. Morano works with Frederick L. Altice, M.D., HS '89, on issues of identification, screening, and treatment of HIV, hepatitis C, and latent tuberculosis among immigrant groups and other underserved populations. Morano also served as the elected representative of the infectious disease section on the School of Medicine's Graduate Medical Education Committee for 2011-2012.

Don Nguyen, PH.D., assistant professor of pathology, received an R01 grant from the National Cancer Institute for his project, "A Novel Lineage Specific Metastasis Suppressor Pathway in Lung Cancer." The five-year grant for \$1.1 million will fund research into the ways in which fundamental molecular circuits that control airway development are rewired during lung adenocarcinoma metastasis. Nguyen is a member of the Signal Transduction Research Program at Yale Cancer Center.

John D. Roberts, M.D., director of the Adult Sickle Cell Program at Yale-New Haven Hospital, received the Harry Hynes Award from the Community Clinical Oncology Program (CCOP), in the Community Oncology and Prevention Trials Research Group, a program within the NCI's Division of Cancer Prevention. The CCOP is a network for testing and validating medical interventions against cancer and for delivering the benefits of scientific discovery to the public and community physicians. The award honors excellence in research related to community clinical oncology programs.

Clarence T. Sasaki, M.D. '66, HS '73, the Charles W. Ohse Professor of Surgery (Otolaryngology), has been named president of the American Laryngological Association (ALA). The ALA is one of the premier organizations in otolaryngology and is a major supporter of research, education, and academic issues related to laryngology.

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Med school on the five-year plan

At a time when some are calling to shorten medical school, many Yale students are extending it.

Like most of his classmates, Julius Oatts is staying on at the School of Medicine for a fifth year of study. This option, available for more than 20 years, has become increasingly

popular, with as many as two-thirds of each class adding a year to their medical studies, primarily to do research. For Oatts, an extra year gives him the chance to try on the lifestyle of a physician-scientist. “It’s easy to say you’re interested in patient care and research in the beginning of med school, but this is the first time that I have seen what the day-to-day of that is like, both the challenges and the benefits,” Oatts said, who’s doing research in ophthalmology. “You take a project and it’s yours for the year.”

At a time when some are calling to shorten medical training, more than half of Yale students are choosing to extend it. A March 21 article in *The Journal of the American Medical Association* called for a reduction in medical training by 30 percent by 2020, arguing that the lengthy and expensive training is a driver of high health care costs. Other articles call for accelerating medical education to address physician shortages, citing lack of evidence that longer training makes a better doctor. Dozens of schools are putting this theory to the test with six- to seven-year combined BS/MD programs. Some medical schools are offering students a three-year plan. Yale students are sticking around, however, to carry out research, bolster residency applications, explore career options—or maybe take one last year to focus on things other than medicine. While some other medical schools offer additional time for predefined research projects, Yale is unique in the absolute freedom it gives students.

The first students to take a fifth year to do research did so in the 1980s. For many years the number held steady at about half the class. In 2007, however, three-quarters of the class stayed on for a fifth year. About half the next year’s class took a fifth year; in subsequent years the number of students staying on has hovered between two-thirds and three-quarters of each class—65 students who started with the



Julius Oatts stayed on for a fifth year at the medical school, an increasingly popular option for medical students. Oatts spent the year working with a mentor in ophthalmology and getting a feel for the life of a physician-scientist.

Class of 2011, and 57 who began their studies with the Class of 2012.

Originally devoted to a year of full-time research, the fifth year was born out of a recognized decline in physician-scientists, said John Forrest, M.D., HS '67, professor of medicine and director of the Office of Student Research. Meanwhile, the months available for research in the four-year curriculum had slipped over the years from about 11 to five and a half as new requirements were added.

“Students who conduct 12 months of full-time research receive full fellowships of \$24,000 to \$28,000 per year. These fellowships are supported by grants from the Howard Hughes Medical Institute, our NIH CTSA-TL 1 grant, the Doris Duke Charitable Foundation, the American Society of Nephrology, the American Heart Association, and Yale-endowed one-year research fellowships,” Forrest said. “Many funding agencies supporting research are alarmed at the national decline in physician-scientists and have stepped up to the plate. They recognize that careers as physician-scientists often begin in medical school, particularly at research-intensive institutions such as ours.”

About half the students taking a fifth year spend only part of the time doing research in what's called a partially funded or “flexible” fifth year. Their months of full-time research are funded at the NIH predoctoral rate. The year might include research and rotations abroad. Students also audit undergraduate classes and do elective rotations—two went to culinary school and wrote a nutrition curriculum for the medical school. Others take the

year, or more, to earn a joint degree in public health, public policy, business administration, or theology.

“If there's 70 people that do it, there's 70 different things that they'll get out of it and put into it,” said Michael Soule, M.D. '12, who spent his fifth year researching substance abuse treatment in correctional facilities, serving on the admissions committee, and taking a class on his favorite poet, Wallace Stevens. “Literature and writing keep me afloat as a person,” said Soule, who began his residency in psychiatry at Massachusetts General Hospital last summer.

Zahir Kanjee, M.D. '11, studied art history, Spanish, European literature, and kept up with *The New England Journal of Medicine*. He also squeezed in workouts, time with friends, and three months in South Africa researching drug-resistant TB. Kanjee, now an internal medicine resident at Brigham and Women's Hospital in Boston, said students have dubbed the four-year route at Yale “the accelerated track.”

The fifth year at Yale is tuition-free, though some students may need additional loans to cover living expenses. The payoff, they said, is immeasurable. It's been called the best year of medical school by many. “It's a wonderful opportunity that most med students don't get,” Kanjee said. “It made me a better person, a better doctor, a happier and more complete person.”

But with more than half the class adding a year to already lengthy training, is there simply too much to do in four years at Yale? For some students, the four-year track is too overscheduled to make a career decision, conduct in-depth research, and take advantage of what Yale offers outside the med school.

“One of the biggest things that I think drives our students to take a fifth year is that there isn't enough time in the third year to make a career decision,” said Nancy Angoff, M.P.H. '81, M.D. '90, HS '93, associate dean of student affairs. The third year, with its

required clerkships in the core areas of medicine, has a tight schedule.

That's one reason Mei Elansary, M.D. '12, who started a residency in pediatrics at Children's Hospital Boston after graduation, took a fifth year. “My third-year exposure wasn't quite enough to decide if [pediatrics] was for me,” so an elective in pediatric emergency medicine during her fifth year helped finalize the decision.

Students who take a fifth year also tend to finish medical school with numerous publications and national meeting presentations on their résumés. “They've heard it will help their residency applications, especially in fields where there is a lot of pressure to do research in that area and publish,” Angoff said.

A framework for overhauling the curriculum is now under way and will likely give students additional time for research and electives. Opinions are mixed among faculty and students as to whether this change will affect the number of students who stay on for an extra year. Some insist that the fifth year, symbolic of the medical school's culture of independent research and a thesis, isn't going to change.

“Treating students with the understanding that we are going to be professionals who are all interested in different things, and putting the resources behind us to pursue our interests at the depth that we want—that trust and commitment to the students is reflected in the fifth year,” Soule said. “I think it's really a reflection of the greater ethos of the school.”

—Sonya Collins



JOHN CURTIS

Kyeen Mesesan Andersson uses mathematical models to predict the paths of infectious disease.

Doing the math to fight infectious disease

An infectious disease specialist applies mathematical modeling to predict the paths of deadly viruses.

Kyeen Mesesan Andersson, M.D. '07, PH.D. '07, has always liked math. She knew from childhood, too, that she wanted to be a scientist. At Brown University she began her undergraduate studies with physics and switched to molecular biology. Then, just before graduation, a “life-changing” class in vaccine development set her on a path that led through infectious disease research and medicine before returning her full circle to math.

First stop: two years as an emerging infectious diseases fellow with the Centers for Disease Control and Prevention, where Andersson worked as a virologist on the dengue fever vaccine development team, devising mutant clones that might weaken the virus and be incorporated into a vaccine. At a conference, she met an official in the U.S. Army Medical Research Institute of Infectious Diseases who offered to send her to Peru so she could gain clinical experience with the disease.

She spent a month in the Amazon port of Iquitos, where she saw many people infected by the virus she knew so well from the lab. Seeing the clinical picture, she became fascinated by the possibility of bridging the gap between science and medicine. That clinched her decision to apply to M.D./PH.D. programs.

Andersson entered the School of Medicine in 1999. At an AIDS conference during medical school she

discovered a third approach to infectious disease: one of the speakers was Sir Roy Anderson, PH.D., a British epidemiologist known for his predictive mathematical models of Creutzfeldt-Jakob disease and AIDS. “I remember being absolutely amazed that you could use math to forecast disease growth and disease processes,” Andersson said. She was hooked.

Under faculty advisors David A. Paltiel, PH.D., professor of public health, and Linda M. Niccolai, PH.D., associate professor of epidemiology, Andersson spent three years in South Africa creating a mathematical model of the HIV epidemic in Soweto as well as surveying adults on their sexual risk-taking behaviors. Her aim was to predict whether changes in behaviors that resulted from taking an HIV vaccine would have an effect on the HIV epidemic.

Policymakers deciding on new disease interventions can't wait the years that it takes to collect and analyze data, so they may rely instead on mathematical simulations, Andersson explained. No one knows, for instance, whether people who have received a partially effective HIV vaccine would take more or fewer precautions, nor the effects their post-vaccination behaviors might have on the virus' spread. Andersson's PH.D. thesis created a model to answer just such questions. A vaccine that's merely 30 percent effective, she found, could still save lives. Three large clinical trials in Africa had shown that male circumcision could reduce transmission of HIV from women to men. Intrigued by those findings, she also modeled male circumcision and HIV transmission in Soweto, and found that an adult male circumcision program could greatly reduce the expected number of new infections. Those results made world headlines after she presented them at the 16th International AIDS Conference in Toronto in 2006.

After graduating from Yale she signed on as a postdoctoral fellow at the School of Public Health and explored the gender dynamics of HIV-preventive

An alumnus' singular calling to medicine and ministry

“Go to church this Sunday” was the prescription that Benjamin R. Doolittle, M.Div. '94, M.D. '97, wrote for a patient addicted to heroin. “Bring the church bulletin to our next appointment,” he said.

The patient had wanted to attend church but feared that the congregation would judge her. So Doolittle gave her the little push he knew she needed. She came to the next appointment, bulletin in hand, glad she had gone. “The cure for addiction is never a pill,” said Doolittle, associate professor of medicine and of pediatrics at the School of Medicine. A person’s spirit must be renewed, their self-esteem rebuilt, and their shame released. “Medicine is this fusion of science and emotion and spirituality. As physicians we are more than technicians.”

Though he wears a white coat on weekdays and a black robe on Sundays, he sees these two roles as “one singular call.”

“I don’t see myself as a physician during the week and a minister on the weekend—there’s just me,” he said.

Ever since Doolittle felt “the call” in his senior year at Yale College, where he studied biology and philosophy, he knew he wanted to pursue both medicine and the ministry. He was attracted to the “fix-it mentality” in medicine, but his volunteer work at a New Haven soup kitchen and a children’s theater program led to a love for community outreach that he could harness as a minister. “What’s so great about medicine is the stories and the relationship building that happen, and that very much feels like a ministry,” he said.

He enrolled in divinity school first to get his “spiritual life squared away,” knowing that once he began medical school it would be tough to take a break. The seeds of his spirituality had been planted while growing up in Schenectady, N.Y., where he had attended a Protestant church; but it had

circumcision programs. Her new model showed that while widespread male circumcision could reduce new infections, it could also *increase* new infections among Soweto women. The reason? Circumcised men may skip condoms—and women there may lack the power to demand their use.

Since 2010, Andersson has continued developing mathematical models at the Futures Institute in Glastonbury, Conn., for clients like the Gates Foundation, UNAIDS, and health ministries overseas. She and her husband Richard, a South African engineer who works at Yale’s Office of Cooperative Research, are the parents of 2-year-old Amelia and 1-year-old Alexis.

Partly because of her four-year delay between college and medical school, Andersson, 39, decided to forgo residency training. “In an ideal world, I would have done both clinical medicine and research,” she said. “I chose to do what was closest to my heart.” She had once asked her mentor at Brown, Anne De Groot, M.D., how she juggled research, family, and a medical practice.

“That’s when I discovered that she had an ex-pro-hockey-player husband who was raising both kids and keeping house,” Andersson recalled, laughing.

Though she misses clinical care, Andersson loves the power of mathematical modeling. A recent question from one of the institute’s clients underscored that for her.

“When Bill Gates comes and asks you, ‘How much is it going to cost to treat everyone in the world [who has HIV]?’” she noted, “it’s probably for a good reason.”

—Jenny Blair

been truly awakened during a gap year in Paris between high school and college. Doolittle spent many lonely afternoons wandering the streets and sitting inside beautiful cathedrals. “I realized that I needed other emotional and spiritual resources for a sense of peace and happiness because I didn’t have the familiar anchors of my home,” he said. “Slowly, a sense of faith and prayer life became real to me.”

In Doolittle’s first year of divinity school, one of the deans asked him to preach a few sermons for an inner-city church that was between ministers. He had no prior preaching experience; however, Pilgrim Congregational Church was on the verge of closing and couldn’t afford a pastor. Why else would they take a medical student for a minister? Doolittle joked. Or even worse: a resident.

The night before that first Sunday he borrowed a black robe and drank nearly a gallon of coffee to stay up writing the sermon. He took a scene from *Butch Cassidy and the Sundance Kid* in which the title characters are shooting at a target, and related it to faith: “If you follow your instincts and heart, instead of overthinking, you will hit the target.” The congregation asked him to preach the next Sunday, and every Sunday all through his medical school days. “I would have to write my sermons on hospital note paper,” he said.

Doolittle often told the stories of the wards from the pulpit; conversely, in the hospital he offers his patients spiritual counsel. And theological and medical problems may overlap and become indistinguishable. A patient with HIV, certain she was going to die, turned to faith. When her health

started to improve, she stopped taking her medications, convinced that God had healed her. Her viral load crept up and her T-cell population diminished. Doolittle urged her to resume her medications, and now she sees medicine not as separate from her faith but as “a gift from God.”

Doolittle continues in his dual roles. On the medical school faculty he is the program director of the Combined Internal Medicine and Pediatrics residency program. As the minister of social action at South Church in New Britain, he provides support for the church’s outreach programs, much like the work he did as president of the cabinet of Dwight Hall as an undergraduate. He also officiates at the weddings of students and faculty. This August he officiated at the wedding of two recent graduates, Matthew Vestal, M.D. ’11, and Heather Speller, M.D. ’11, at a vineyard in Stonington, Conn.

—Natalie Villacorta

Familiar Faces

Do you have a colleague who is making a difference in medicine or has followed an unusual path since leaving Yale? We’d like to hear about alumni of the School of Medicine; Physician Associate Program; and the medical school’s doctoral, fellowship, and residency programs. Drop us a line at yym@yale.edu or write to Faces, *Yale Medicine*, 1 Church Street, Suite 300, New Haven, CT 06510.



TERRY DAGRADI

With degrees in both theology and medicine, Benjamin Doolittle offers spiritual counseling and medical care.



Howard Ozer

Steven
ScheinmanDouglas
Wallace

Paul Rothman



Rahn Bailey



Jeffrey Lyness

Sara Nayeem
and George Bell

1970s

C. Norman Coleman, M.D. '70, was honored with a University of Vermont Alumni Achievement Award at the annual Reunion & Homecoming weekend on October 5. Coleman graduated from the University of Vermont in 1966 with a bachelor of arts in mathematics. He trained in internal medicine at the University of California, San Francisco; in medical oncology at the National Cancer Institute; and in radiation oncology at Stanford University.

Coleman is associate director of the Radiation Research Program in the Division of Cancer Treatment and Diagnosis and special advisor to the director of the National Cancer Institute.

Howard Ozer, M.D. '75, PH.D. '75, has been named director of the University of Illinois Cancer Center. Ozer joined the faculty there in 2010 as the Eileen Lindsay Heidrick Professor in Oncology and chief of hematology/oncology, and has served as interim director of the cancer center since January 2011. Ozer is internationally known for research in the development of hematopoietic growth factors and cytokines and for clinical trials of biological therapies for leukemia and lymphoma.

Steven J. Scheinman, M.D. '77, HS '80, FW '84, was named president and dean of The Commonwealth Medical College in Scranton, Pa., as of September 10. Scheinman had been professor of medicine and pharmacology

at SUNY Upstate Medical University and served as its senior vice president and dean of the College of Medicine from 2004 to 2011.

Douglas C. Wallace, PH.D. '75, a genetics researcher who founded the field of mitochondrial genetics in humans, received the 2012 Genetics Prize of the Gruber Foundation in November. Wallace was honored for his groundbreaking achievements in helping scientists understand the role of mitochondria in the development of disease and as markers of human evolution. He received the award in New Orleans at the annual meeting of the American Society of Human Genetics.

1980s

Paul B. Rothman, M.D. '84, was appointed in December 2011 as the 14th dean of the Johns Hopkins University School of Medicine and second chief executive officer of Johns Hopkins Medicine, a combination of an academic medical center and a health system with a global reach. Rothman, a rheumatologist and molecular immunologist, previously served as dean of the Carver College of Medicine at the University of Iowa and as leader of that university's clinical practice plan. He succeeds Edward D. Miller, M.D., who retired after 15 years as both dean and the first CEO of Johns Hopkins Medicine.

1990s

Rahn K. Bailey, M.D., FW '95, associate professor and chair of the Department of Psychiatry and Behavioral Sciences at Meharry Medical College, was installed as president of the National Medical Association (NMA) on July 31 at the association's 2012 Annual Convention and Scientific Assembly in New Orleans. NMA is the largest and oldest national organization representing African-American physicians and the patients they serve. A graduate of Morehouse College, Bailey received his medical degree from the University of Texas Medical Branch in Galveston, Texas. He completed his residency in psychiatry at the University of Texas at Houston and completed a fellowship in forensic psychiatry in the Department of Psychiatry at the School of Medicine.

Jeffrey M. Lyness, M.D., HS '90, professor of psychiatry, became the senior associate dean for academic affairs at the University of Rochester School of Medicine and Dentistry on July 1. Lyness, who was appointed associate dean for academic affairs a year ago, has been director of curriculum for medical student education since 2008 and medical director of continuing medical education since 2010. He is past president of the American Association for Geriatric Psychiatry.

William Pao, PH.D. '97, M.D. '98, was honored for his leadership in lung cancer research by Joan's Legacy: Uniting Against Lung Cancer at its "Strolling Supper with Blues and News" gala in New York City in November.

Pao is director of the Division of Hematology and Oncology, director of Personalized Cancer Medicine, and professor of medicine, cancer biology, and pathology/microbiology/immunology at Vanderbilt University.

2000s

Sara M. Nayeem, M.D. '06, M.B.A. '06, and George W. Bell IV, M.D., were married on August 11 in Alexandria, Va. Nayeem works at New Enterprise Associates, a venture capital firm in Chevy Chase, Md., where she directs the firm's investments in biopharmaceutical companies. Bell is a cardiologist at CardioCare, a clinic in Chevy Chase.

2010s

Alisse K. Hauspurg, M.D. '12, and Adam J. Janicki, M.D., were married on June 2 in Stonington, Conn. The couple met as undergraduates at the University of Pennsylvania. Hauspurg is a resident in ob/gyn at Women and Infants Hospital of Rhode Island in Providence. Janicki received his medical degree from Tufts and is a resident in emergency medicine at Rhode Island Hospital in Providence.

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Festus Olumiywa Adebajo, M.D. '60, HS '63, professor emeritus of pediatrics at Eastern Tennessee State University, died in Johnson City, Tenn., on June 25. He was 81. Adebajo was the first Nigerian to graduate from Yale University and the first Nigerian to complete an M.D. and residency training at Yale.

Richard J. Apell, doctor of optometry, died on May 30 in Madison, Conn. He was 90. Apell was head of the Optometric Department of the Gesell Institute of Human Development in New Haven between 1950 and 1960.

Edith M. Beck, M.D. '48, died on August 17 in Greenwich, Conn. She was 91. Beck was chair of the general medical section at Greenwich Hospital for many years and had been a clinical instructor at the School of Medicine.

Allan A. Brandt, M.D. '51, died in Milford, Conn., on May 1. He was 89. As director of Emergency Medical Services at Milford Hospital, Brandt was instrumental in establishing the city's first Emergency Medical Services Council whose efforts allowed Milford to be a pioneer participant in the national 911 system.

Jane B. Cadbury, M.D. '43, one of the first women to juggle a career as a physician with raising children, died on July 7 in Framingham, Mass. She was 94. Cadbury was one of only three women in her medical school class and became the first woman to be promoted to district director of the Saint Louis County Health Department in the early 1960s. After moving into public health she spent more than 20 years as a physician in the health service at the University of Wisconsin–Milwaukee.

Anthony P. Cipriano, M.D., HS '69, died on May 25 at his home in Branford, Conn. He was 96. As a captain in the Army Medical Corps during World War II, Cipriano landed on the beaches

of Normandy on D-Day, witnessed the liberation of Paris, and was wounded in the Battle of the Bulge. On his return to New Haven, he became one of the first specialists in internal medicine. In 1969 he completed a residency in dermatology at Yale and practiced in New Haven and East Haven until he retired in 2003 at the age of 87.

John Dana Clark, M.D., died on June 30 in Madison, Conn. He was 79. Clark had been chief of anesthesiology at Yale-New Haven Hospital and an assistant clinical professor of anesthesiology at the School of Medicine.

John P. Ferguson Jr., M.D. '39, a retired obstetrician/gynecologist, died on June 30 in Springfield, Mo. He was 97.

Edward J. Gerety, M.D. '54, a retired thoracic and cardiovascular surgeon, died on September 7 in Albuquerque, N.M. A fighter pilot in the Marine Corps during World War II, he was 93.

George W. Greenman, M.D., FW '59, HS '65, died on May 16 in Tucson, Ariz. He was 85. A retired psychoanalyst, Greenman began his career as a pediatrician but later completed a medical residency in psychiatry at Yale-New Haven Hospital.

Henry H. Jones, M.D. '43, HS '46, professor emeritus of radiology at the Stanford University School of Medicine, died at his home on campus on August 11. He was 95. Jones was a key member of the team that built the department into a powerhouse in the field. He was the first chief of the radiology service at the Palo Alto Veterans Administration Hospital, now the Veterans Affairs Palo Alto Health Care System. Jones was a founding member of Physicians for Social Responsibility and a leader in the movement to eliminate the threat of nuclear war and weapons of mass destruction.

Edith M. Jurka, M.D. '44, died on May 19 in Clearwater, Fla. She was 96. A longtime resident of Croton-on-Hudson, N.Y., Jurka had a private practice in psychiatry.

Jerome "Jerry" Kaye, M.D. '44, a retired pediatrician, died on May 28, in Boulder, Colo. He was 93. Kaye practiced pediatrics in Phoenix from 1947 to 2002 and was part of a group of doctors who helped make Phoenix Children's Hospital a reality.

Frederick Martin Lane, M.D. '53, HS '59, a former clinical professor of psychiatry at the Columbia University College of Physicians and Surgeons, died on June 12 in New York City. He was 84.

Walter E. Needham, PH.D., who served in the departments of psychiatry, psychology, and neurology at the School of Medicine, died on June 6 at his home in Madison, Conn., after a long battle with cancer. He was 76.

Eveline B. Omwake, M.A., died in Black Mountain, N.C., on August 19. She was 100. Omwake was assistant professor in the Child Study Center from 1952 to 1964 and also served as the director of the center's Laboratory Nursery School.

Fitzhugh C. Pannill Jr., M.D. '45, died on June 30 in New Braunfels, Texas, after a brief illness. He was 90. In 1965 Pannill was named dean of the new University of Texas Medical School at San Antonio, where he recruited faculty, students, and staff to establish what was soon recognized as a world-class medical institution. In 1973 he was recruited to the State University of New York at Buffalo, where he served as vice president of health affairs, acting dean, and professor of medicine.

William L. Roberts, M.D., PH.D., HS '91, FW '95, medical director at ARUP Laboratories and a professor at the University of Utah School of Medicine, died in Salt Lake City on July 26 following a

year-long battle with brain cancer. He was 52. In 1998, Roberts joined the University of Utah and ARUP as assistant professor in clinical chemistry, and he became a full professor in 2007.

Richard H. Saunders Jr., M.D., HS '49, a retired professor of medicine, died at his home in Middlebury, Vt., on August 12. He was 93. Saunders helped to create the University of Massachusetts Medical School in Worcester, Mass., where he was professor of medicine and associate dean from 1969 to 1982.

Paul H. Seton, M.D. '52, HS '53, a retired psychoanalyst, died of pneumonia in Northampton, Mass., on May 22. He was 88. Seton had been director of counseling services at Smith College, taught at the Smith College School of Social Work, and maintained a private psychoanalytic practice.

Roy B. Sherman, M.D. '58, HS '61, of Winsted, Conn., died on June 13, his 83rd birthday. Sherman had been chief of anesthesiology at Winsted Memorial Hospital.

Bernard Snow, M.D., HS '61, a retired psychiatrist who practiced in New Haven for many years, died at Yale-New Haven Hospital on September 10. He was 81.

Marc J. Taylor, M.D., HS '66, FW '68, of Southbury, Conn., died on June 5 at Smilow Cancer Hospital in New Haven. He was 75. Taylor was head of the liver study unit at the VA Connecticut Healthcare System in West Haven. He had been a clinical associate professor of medicine at Yale and attending physician at Waterbury Hospital.

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JOHN CURTIS

Art exhibit honors anatomy lab donors

Unused cubbyholes outside the anatomy labs in The Anlyan Center have become home to student works of art that honor the donors who contributed their remains for medical training. Students who completed anatomy studies in 2012 worked in teams to create small boxes that reflect their feelings about their work with the donors.