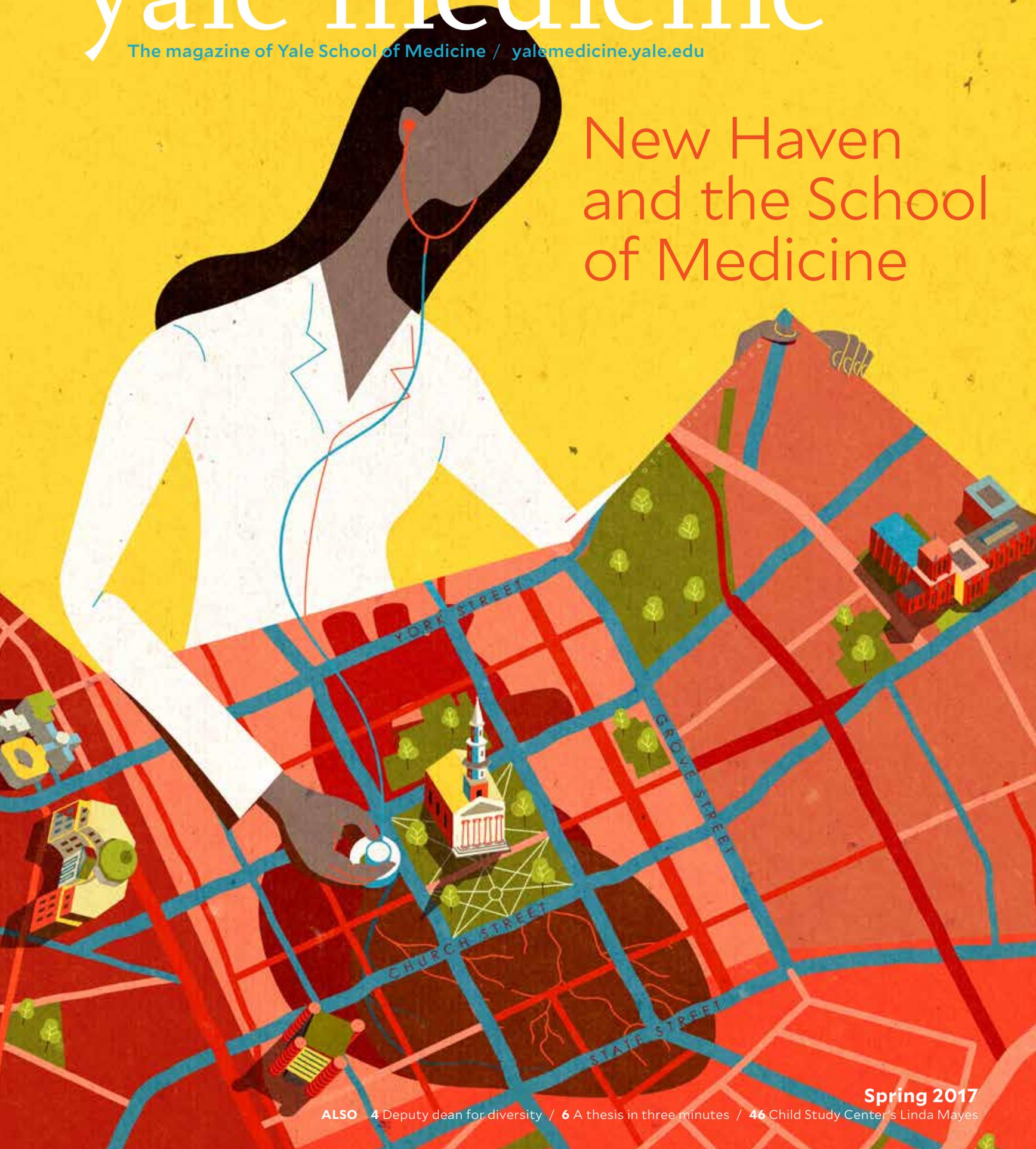


yale medicine

The magazine of Yale School of Medicine / yalemedicine.yale.edu

New Haven and the School of Medicine



Spring 2017

ALSO 4 Deputy dean for diversity / 6 A thesis in three minutes / 46 Child Study Center's Linda Mayes





Features

- 12/ **Seeking better health: Yale and New Haven**
For years the School of Medicine has worked with community organizations to address the city's major health issues. *By Christopher Hoffman*
- 18/ **Learning from the community**
How Yale researchers learn to ask the right questions. *By Jill Max*
- 24/ **A witness to hunger**
At the annual Hunger & Homelessness Auction, Yale students hear firsthand what it's like to be hungry. *By Bruce Fellman*
- 26/ **Mental health, better schools, and the trauma of violence**
How the School of Medicine and community partners work together for a healthier New Haven. *By Jeanna Canapari*
- 32/ **How Yale and New Haven are building a future together**
Bio Haven: Research nurtures a local bioscience industry. *By Steve Hamm*
- 38/ **Caring for New Haven's refugees**
Medical students help refugees navigate the health care system. *By John Curtis*

spring 2017 departments

2 Letters / 3 Dialogue / 4 Chronicle / 9 Round Up / 40 Capsule / 42 Faces / 46 Q&A / 48 Books / 49 End Note

Exclusionary policy hard to understand

I write concerning the article [*Yale Medicine*, Winter 2017] on the distinguished late Carolyn Slayman, Ph.D., deputy dean for scientific affairs. The article includes a description of her earning her Ph.D. at Rockefeller University, “where only one woman was admitted to each entering class of 15. At a dinner at the home of the president, a classmate asked why this was so, and the answer came back, ‘Because that is the right number.’” (Presumably, this was in the early 1960s.)

I find such a gender exclusionary policy difficult to understand, and perhaps now it is out of date.

I much enjoyed *Yale Medicine* and the coverage of its broad activities in which the school is engaged. Please keep me on your mailing list.

*James B.D. Mark, M.D., HS '60
Professor of Cardiothoracic Surgery Emeritus, Stanford University School of Medicine, Stanford, Calif.*

Medicine and the humanities

Congratulations on the excellent *Yale Medicine*, Winter 2017 edition. I was interested in the comment, page 21, regarding the Yale Medical Symphony Orchestra, along with the picture on pages 36-37 of the quartet. In about 1970, when my prior mentor Philip Bondy, M.D., was chair of medicine, he invited me to return to Yale to give a seminar. He told me he could not join me for dinner because of another engagement. When I wandered through Harkness Hall to meet a friend, there was Phil leading and participating in a string quartet with students. Faculty involvement with students in making music certainly goes back to the Bondy era. It is always good to read about the Yale School of Medicine and to learn how it remains a leader in education, research, and humanity.

*James Scheuer, M.D. '56
University Chair of Medicine Emeritus, Distinguished Professor of Medicine Emeritus, Albert Einstein College of Medicine and Montefiore Medical Center*

We can do better with single-payer

Cathy Shufro’s review of *EMBRACE*, by Gilead Lancaster, M.D. [*Yale Medicine*, Winter 2017], encouraged me to read it. Although well-intended, the author made two significant errors in his approach to universal health coverage. He strongly believes that for-profit insurers still have a role, even after years of bad experience by patients, hospitals, and physicians. For-profit insurers are known for cherry-picking customers, steering patients away from specialists, and denying and rationing care for profit. Second, he favorably compares his approach to the Canadian single-payer program and leaves out H.R. 676, Expanded and Improved Medicare for All Act, which has 79 co-sponsors in the U.S. Congress. With input from Physicians for a National Health Program (PNHP.org), H.R. 676 offers comprehensive care for all, is not linked to employment, and would establish a universal single-payer health care system. This means medical, surgical, mental health, dental, prescriptions, hospitals, and long-term care, with no out-of-pocket costs. Numerous studies have demonstrated that this could be done with the same amount currently spent on health care. In 2013, United Health axed their contract with the 1,200-physician Yale Medicine practice, causing harm to many. We can do better with single-payer simplicity.

Harvey Fernbach, M.D., M.P.H. '71, Physicians for a National Health Program

SECOND OPINION
BY SIDNEY HARRIS



“WE’VE FINALLY COMPUTERIZED YOUR FILES. NOW WE JUST HAVE TO GET THEM OFF FACEBOOK.”

Editor

John Curtis

Contributing Editors

Robert Forman
Steve Hamm
Kathy Katella-Cofrancesco
Kathleen Raven

Senior Writers

William Hathaway
Ziba Kashef
Jill Max
Karen Peart
Cathy Shufro

Contributors

Jeanna Canapari
Sonya Collins
Bruce Fellman
Christopher Hoffman
Ashley P. Taylor

Art Director

Jennifer Stockwell

Copy Editors

Elaine Alibrandi
Rebecca Frey, Ph.D.
Anne Sommer

Mailing List Inquiries

Claire M. Bessinger
Communications Coordinator
Cheryl R. Violante
Website Coordinator

Printing

The Lane Press

Correspondence

Editor, *Yale Medicine*
1 Church Street, Suite 300
New Haven, CT 06510-3330
Telephone: 203-785-5824
Facsimile: 203-785-4327
Email: yym@yale.edu
Yale Medicine is distributed to alumni, faculty, students, and friends of Yale School of Medicine.

Yale School of Medicine

Robert J. Alpern, M.D.
Dean and Ensign Professor of Medicine
Mary Hu
Associate Dean for Communications and Chief Communications Officer
Charles Turner
Director of Medical Development
Deborah Jagielow
Director of Alumni Affairs

Abbreviations used in *Yale Medicine* include HS to denote the final year of residency for house staff, FW for the final year of a fellowship, and YNH for Yale New Haven Hospital.

Yale SCHOOL OF MEDICINE

Copyright © 2017
Yale School of Medicine. All rights reserved.

twitter.com/YaleMed

facebook.com/YaleMed

instagram.com/YaleMed

Send letters and news items to
Yale Medicine, 1 Church Street, Suite 300, New Haven, CT 06510 or email yym@yale.edu.
Please limit letters to 350 words and include a telephone number. Submissions may be edited for length.

The medical school and the city

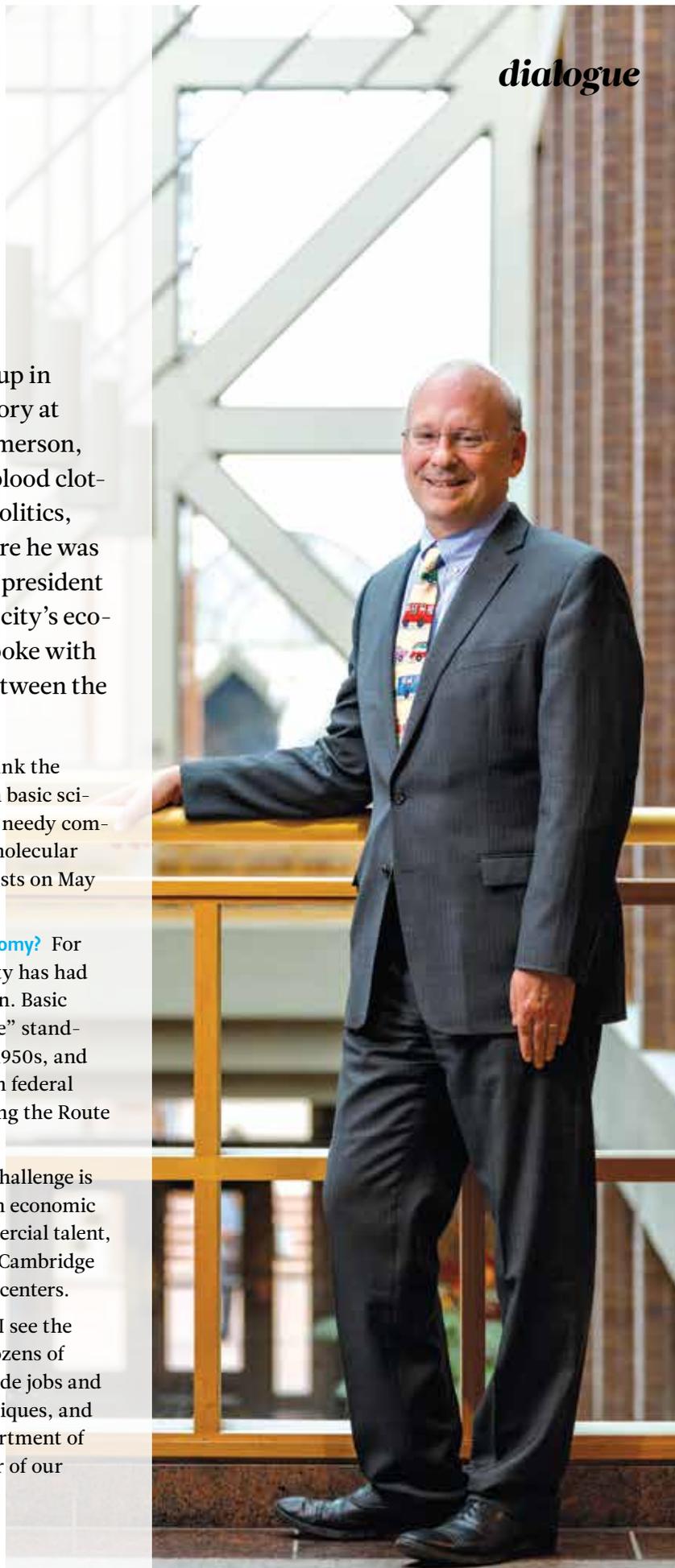
MATTHEW NEMERSON, M.P.P.M. '81, grew up in New Haven, spending many an hour in a laboratory at the School of Medicine where his father, Yale Nemerson, M.D., was a leading researcher in the science of blood clotting. After college and stints in journalism and politics, Matthew Nemerson returned to New Haven where he was the founding vice president at Science Park, and president and CEO of the Chamber of Commerce. Now the city's economic development administrator, Nemerson spoke with *Yale Medicine* recently about the relationship between the School of Medicine and the city of New Haven.

How do you see the School of Medicine's role in the city? I think the school has always tried to balance world-class research in basic science with a commitment to helping the diverse and often needy community outside its front door. My dad could go from the molecular level of factor XII to manning the MASH tents at the protests on May Day 1970.

What role has the School of Medicine played in the city's economy? For more than half a century, a lot of redevelopment in the city has had to do with reconnecting the medical campus to downtown. Basic research and thinking about medicine from a "Big Science" standpoint have been strategically important to Yale since the 1950s, and giving the Cedar Street campus room to grow and bring in federal research dollars was part of the motivation behind building the Route 34 Connector.

Do you see the city emerging as a bioscience hub? The city's challenge is to match the enormity of Yale's bioscience research with an economic foundation that can support startup activity, attract commercial talent, and keep companies here. We have to be competitive with Cambridge and San Francisco and other great bioscience and research centers.

How has New Haven benefited from the bioscience industry? I see the biosciences as having a huge multiplier effect. We have dozens of bioscience companies and the med center itself that provide jobs and stimulate the economy. We have restaurants, unique boutiques, and popular entertainment venues. We have a wonderful assortment of housing. A world class stature in bioscience is a key driver of our strong urban economy.





Deputy dean for diversity

DURING HIS UNDERGRADUATE DAYS at the University of California, Berkeley, Darin A. Latimore, M.D., felt like an outsider. He was out of his socioeconomic league. A debilitating autoimmune disease kept his mother, a home health aide, from working, so Latimore had an after-school job, paid the bills, shopped for groceries, and ran the household. His classmates didn't know what to make of a black student who was majoring in microbiology and immunology and didn't play sports. While they debated whether to buy a BMW or a Volvo, he drove a rattletrap with mismatched tires.

Even before entering college, he had received little encouragement. His high school English teacher told him he'd flunk out of Berkeley because he wrote so poorly. His family discouraged him from attending such an elite institution and urged him to go to community college so that he could continue to contribute financially.

He blossomed as a student and resident at the University

of California Davis School of Medicine, where mentors encouraged his passion for teaching and potential for leadership. Nevertheless, during residency he felt a need to prove himself to colleagues and patients, some of whom objected to being treated by a black doctor. Latimore initially shied away from academic medicine and instead worked with HIV/AIDS patients, becoming a staff physician with The Permanente Medical Group in South Sacramento. There, he trained medical students and

residents, many of whom shared his experiences of isolation and discrimination. Hoping to create a more welcoming environment, he wrote a job description that led to his inaugural position as director of medical student diversity at UC Davis in 2008.

"The first time I met Darin he gave a presentation on being black and gay, and I was so impressed at how he portrayed his experience and shared it with others," said Nicole Sitkin, then an undergrad at Davis and now a third-year medical student at Yale who chairs the Dean's Advisory Council on LGBTQI+ Affairs. Latimore rose to become associate dean of student and resident diversity, helping to expand the definition of diversity to include underrepresented Asian-American groups and those who are economically disadvantaged. When he started, about 20 percent of medical students at UC Davis were black or Latino. By the end of his tenure, approximately 43 percent of UC Davis medical students met his broader definition of diversity.

Now he holds a similar position at Yale, where he's the medical school's first chief diversity officer. His job is to address the lack of gender and minority diversity—especially among faculty—and improve a climate that many view as less than inclusive and respectful. In doing so, he will apply a broad definition of diversity that includes gender, gender identity, sexual

orientation, ethnicity, socioeconomic status, and those who have different abilities.

Although medical school faculty diversity in the United States has been increasing, it has not kept pace with the diversity of medical students or society in general. At the School of Medicine, almost half the students are women and 60 percent are nonwhite. At the assistant professor level, 47 percent of faculty are women and 30 percent are nonwhite. But the higher up on the career ladder, the further those numbers fall. Fewer than a quarter of professors are women, and just 14 percent are nonwhite.

But Latimore sees his role expanding outside the medical campus. At a recent town hall, Latimore was on a fact-finding mission to hear about student and faculty concerns regarding diversity, inclusion, and social justice. To his surprise, about a third of those attending came from New Haven's black and Latino communities, and their unexpected presence changed the conversation. Latimore, who is in his element in front of a crowd, not only rolled with the change in plan but embraced it. "Diversity is the easy part," he said, "because it's just numbers." Inclusion, on the other hand, means fostering a culture in which people have the tools they need to succeed. While he told his audience that he will partner with New Haven residents to lift the health of the community,



his vision goes beyond providing health care—he believes that Yale has an obligation to partner with the New Haven community to address issues of education, poverty, and unemployment.

Since his arrival in January, Latimore has met with department chairs to learn how they view diversity and inclusion and to identify problems. At the same time, faculty, residents, graduate students, postdoctoral fellows, and students from the schools of medicine, nursing, and public health have sought him out. "Everyone wants a light shined on an issue," he said, whether it's leadership,

inequality, a need for transparency, or a desire to be heard and respected.

Latimore is working with such groups as the Minority Organization for Retention and Expansion; the Committee on the Status of Women in Medicine; the Committee for Diversity, Inclusion, and Social Justice; and the Dean's Advisory Council on LGBTQI+ Affairs. Under his stewardship, the Office of Multicultural Affairs will become Diversity, Inclusion, Community, and Equity, with an expanded staff to make it accessible to a larger number of students. He has begun standardizing faculty search criteria and plans to implement unconscious bias training for search committees, eventually expanding it to all faculty members. Over the longer

The first deputy dean for diversity and inclusion, Darin Latimore, defines diversity with a broad sweep to include gender, gender identity, sexual orientation, ethnicity, socioeconomic status, disadvantaged individuals, and those who are differently abled.



ONLINE EXCLUSIVES

Just a few months into his tenure as the School of Medicine's first deputy dean for diversity and inclusion, Darin Latimore met with students, faculty, and residents of New Haven at a town hall on the medical campus. The talk moved away from Yale and to relations between the med school and the city.

For more on the town hall, visit yalemedicine.yale.edu/townhall

term, his plans include forming a diversity committee to develop a strategic plan with a timeline and metrics to track progress. “We need data,” he said. “You do not change what you do not measure.”

When Latimore started at UC Davis, he assumed he could change the world. Today, he realizes that change comes slowly and is brought about by cultivating relationships and finding common ground in order to move forward. “I believe that unless we have an inclusive environment, diversity will be a revolving door,” he said. “To make a long-term dent, we need to create an environment where everyone feels they can fly.”

—Jill Max



A thesis in three minutes

The poster plastered around the Yale campus was succinct: Three Minutes, One Slide, Big Ideas.

This was the three-minute thesis competition. Graduate students and postdocs would have just 180 seconds to boil their research down to its basics, with just one slide to illustrate their thesis.

On April 13 the 11 finalists in the first such competition at Yale made their elevator pitches before about 50 people in The Anlyan Center auditorium. Their research ranged from building artificial lungs, to the possibility of life elsewhere in the universe, to conservation issues in China, to the origins of the notion of corruption.

“The skills you have perfected today will be very valuable going forward. Just being able to explain what you study to your parents, to your friends, to your taxi driver will help people understand the excitement and value of academic research,” said Lynn Cooley, Ph.D., dean of the Graduate School of Arts and Sciences, the C.N.H. Long Professor of Genetics, and professor of cell biology and of molecular, cellular, and developmental biology.

Cooley led a panel of judges that included Eileen O'Connor, vice president for communications at Yale; Angelika Hofmann, who teaches a course in scientific writing for postdocs; and Kyle Gibson, a producer for ABC News Nightline and winner of several Emmy Awards. They ranked the students based on criteria including the clarity of their presentation, the accessibility of their language, and their stage presence.

The first student on deck, Alexander Engler, who studies biomedical engineering, got right to the point. “I am here to tell you how we can grow you a new lung,” he said.

Engler was one of 11 finalists in the competition's third and final day. Previous rounds had reduced the field from 30 students and postdocs. A tie led to 11 instead of 10 finalists.

The process started weeks earlier with proposals from 40 students and postdocs. The 30

students who made that first cut then went on to prepare their pitches with one-on-one help from staff at the Office of Career Strategy, which sponsored the competition. Matthew Piva, a graduate student in neuroscience and a McDougal Graduate Career Fellow, organized the event with four other McDougal Fellows.

The idea for the three-minute (3MT) competition emerged from the University of Queensland in Australia in 2008. Over the next two years it spread to other universities in Australia and New Zealand, and since 2011, 3MT competitions have been held at more than 350 universities in 59 countries. This was the first time one has been held at Yale.

Daniel Jones, the only humanities student in the finals, said that his first draft clocked in at 15 minutes. “It wasn't going to work,” he said. “I had to take out all the stuff I thought was the best stuff.” The history student argued that corruption and democracy were born at the same time, along with the concept that a public position is not for private gain. His slide included a red Make America Great Again cap, the symbol of Donald Trump's presidential campaign.

“Being able to communicate your research in a short amount of time before a non-specialist audience is important,” said Lily Zeng, a student in the School of Forestry & Environmental



Studies. Her presentation was about reconciling conservation efforts with social benefits for indigenous communities when protecting sacred forests in China. “It forces you to have a better understanding of your own work. It’s really easy to hide behind jargon and buzzwords.”

Lindsey Stavola, who’s completing her Ph.D. this year in cellular and molecular physiology, found herself rehearsing everywhere. While she cooked her morning oatmeal in her microwave—set to three minutes—she ran through her presentation.

Stavola took first prize, an Apple Watch, for her presentation on finding ways to prevent cyst growth in kidneys that can enlarge the organ from the size of a fist to the size of a football. “Imagine if you had to spend the rest of your life attached to a machine,” she said. Polycystic kidney disease, she said, can be fatal, requires dialysis, and can only be cured through transplantation. Her solution involves controlling polycystin,

a channel in kidneys that normally sends electrical signals but can go awry. “I am searching for the key to open the polycystin channel in order to send a message,” she said.

Levi Smith, a student in cell biology, won second place for his research on Alzheimer’s disease. The disease, he said, leads to a “dying brain poisoned by amyloid beta.”

Yangqi Gu, a student in molecular, cellular, and developmental biology, took third place for his study of how bacteria defy the laws of physics to attach themselves to human skin.

—John Curtis

Lindsey Stavola, who’s about to graduate with a degree in cellular and molecular physiology, won first place for her presentation on cystic kidney disease. Lynn Cooley led the judging.



ONLINE EXCLUSIVES

Just days before the U.S. missile attack on Syria, experts discussed the ongoing humanitarian crisis in that country on Global Health Day. It has provoked, according to experts, the worst refugee crisis since World War II.

For more on Syria, visit yalemedicine.yale.edu/syria

Brain scans as predictors of suicide

Suicide is this country’s 10th leading cause of death. Among teens and young adults, it is the second leading cause of death. About half of those diagnosed with bipolar disorder, whose moods swing from manic to depressed, will make a suicide attempt, and as many as one in five will die by their own hands. Yet mental health practitioners have traditionally had only such subjective measures as patient interviews to gauge the risk of suicide. Now new imaging technologies can discern brain patterns that suggest an increased risk of suicide.

In a study of patients with bipolar disorder, Yale researchers led by Hilary P. Blumberg, M.D., the John and Hope Furth Professor of Psychiatric Neuroscience, found three indicators linked to suicidal behavior that can be tracked through imaging technology.

“The identification of brain circuits involved in risk for suicide can lead to new ways to identify who is most at risk, and, hopefully prevent suicides,” said Blumberg of the study published in *The American Journal of Psychiatry*, in January.

In their study, researchers found that in teenagers and young adults with bipolar disorder who have made suicide attempts, white matter—the brain’s connective wiring—has decreased structural integrity in areas that regulate emotion. Those who

attempted suicide also had less gray matter in the frontal-limbic system where impulses and emotions develop, as well as in the frontal cortex, which helps regulate those feelings and behavioral responses. Researchers also observed a third difference. Using measurements of real-time blood flow between different areas of the brain, an indicator of connectivity and interaction among brain regions, they found that people who had attempted suicide at least once showed less connectivity between the limbic amygdala and the frontal cortex. “The findings suggest that the frontal cortex is not working as well as it should to regulate the circuitry,” Blumberg said. “That can lead to more extreme emotional pain, difficulties in generating alternative solutions to suicide, and greater likelihood of acting on suicidal impulses.”

Previous research has hinted at these findings, but with important exceptions, Blumberg said. First, very few imaging studies have been done in adolescents and young adults who have attempted suicide. Second, no research team thus far has studied suicide by evaluating patients via three imaging techniques—structural and functional MRIs and diffusion tensor imaging—taken in one sitting from a specialized MRI machine.

The next step will be to recruit individuals in other age groups as well as those with other mental disorders who are at risk of suicide, Blumberg said. The

current study, though it showed significant differences between groups, was small. It included 26 participants diagnosed with bipolar disorder with at least one previous suicide attempt, 42 men and women with bipolar disorder with no history of suicide attempts, and 45 people in a healthy comparison group with no mental disorder diagnosis and no suicide history, all between ages 14 and 25.

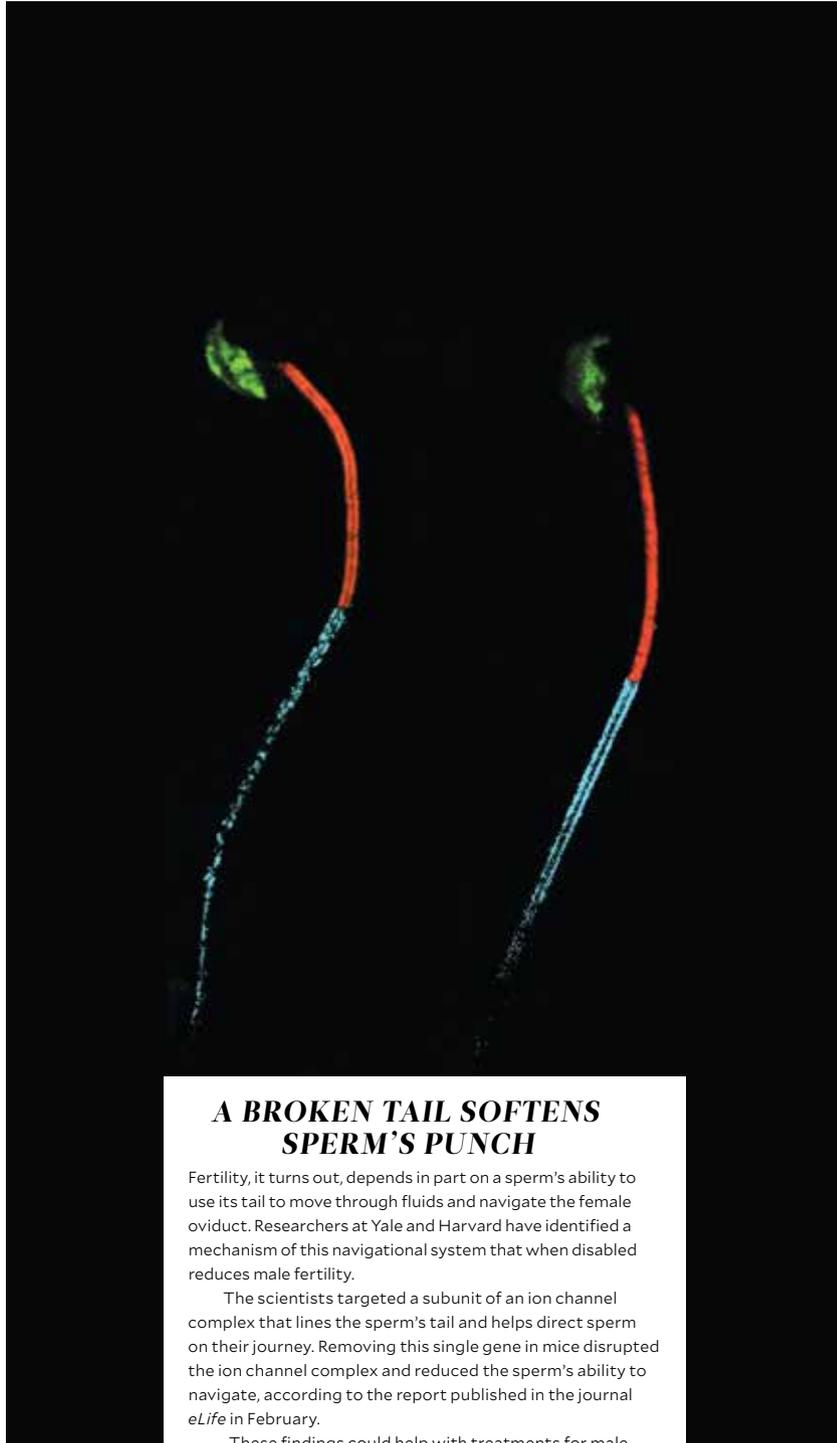
In the burgeoning field of brain imaging, this study “is important because it identifies differences in brain areas that show who might be more likely to act on suicidal thoughts,” Blumberg said. Will MRI scans of a suicidal and non-suicidal person reveal differences? “We’re not there yet,” Blumberg said. “There are no established values in brain measurements.” That goal still remains the point of this research. Blumberg also noted that many paths lead toward suicide, from a weakened ability to self-regulate emotions to sudden tragic life events.

Blumberg and colleagues have already initiated research that follows adolescents over time to record brain changes correlated with suicide attempts, and they hope to pursue further study. This might also provide insight into the subjective experiences of suicide ideation and why those thoughts occur in the first place, she said. “Each day we lose people to suicide,” Blumberg said. “We try to go as fast as we can—it feels like we are racing against the clock.”

—Kathleen Raven

round up

a collection of recent scientific findings



A BROKEN TAIL SOFTENS SPERM'S PUNCH

Fertility, it turns out, depends in part on a sperm's ability to use its tail to move through fluids and navigate the female oviduct. Researchers at Yale and Harvard have identified a mechanism of this navigational system that when disabled reduces male fertility.

The scientists targeted a subunit of an ion channel complex that lines the sperm's tail and helps direct sperm on their journey. Removing this single gene in mice disrupted the ion channel complex and reduced the sperm's ability to navigate, according to the report published in the journal *eLife* in February.

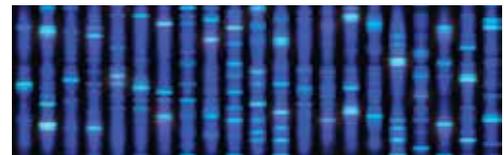
These findings could help with treatments for male infertility or provide a target for development of male contraceptives, said lead author Jean-Ju L. Chung, Ph.D., assistant professor of cellular and molecular physiology.



A DEADLY VIRUS RECRUITED TO FIGHT CANCER

In 1969 Lassa fever almost killed Jordi Casals-Ariet, M.D., a renowned virologist at the School of Public Health. Now Yale scientists see the often-fatal virus as a possible cure for ovarian cancer. According to Anthony N. van den Pol, Ph.D., '77, professor of neurosurgery, it's "like using penicillin from a fungus to fight bacteria." Many human tumors, van den Pol said, lack a strong innate immune response, making them susceptible to viruses. In mice, he found that a virus based on a combination of genes from Lassa virus and vesicular stomatitis virus was successful in treating experimental gliomas. Now he's working with Gil Mor, M.D., Ph.D., professor of obstetrics, gynecology, and reproductive sciences, to see whether it will have the same effect on ovarian cancer.

"A virus doesn't have a brain, but it has an evolutionary mission to find cells to infect," van den Pol said. "Viruses replicate and seek and destroy on their own. They don't need to know where the tumors are but seem able to find most if not all of them by random 'attempts' at infection."



GENES CONFER INTELLIGENCE ... AND INCREASE AUTISM RISK

Genetic variants that have persisted through human evolution appear to enhance intellectual accomplishment while increasing the risk of autism spectrum disorders, Yale researchers reported in a study published in the journal *PLOS Genetics* in February. The variants appear to have been conserved to a greater extent than mere chance would suggest. Typically, variants that curtail reproductive success drop out of the gene pool quickly, while those that enhance survival remain for generations. "In this case, we found a strong positive signal that, along with autism spectrum disorder, these variants are also associated with intellectual achievement," said first author Renato Polimanti, Ph.D., associate research scientist.

"The idea is that during evolution these variants that have positive effects on cognitive function were selected, but at a cost—in this case, an increased risk of autism spectrum disorders," said co-author Joel Gelernter, M.D., Foundations Fund Professor of Psychiatry and professor of genetics and of neuroscience.

New Haven and the School of Medicine

IN JANUARY 1824, the body of a 19-year-old fever victim vanished from her burial site in West Haven. The young woman's outraged family knew immediately where to look and headed for the corner of Grove and Prospect streets in New Haven, then home to Yale's medical school. Indeed, the West Haven constable who led the search soon found the body hidden under paving stones in the basement. The furor grew, and soon some 600 people armed with pistols and daggers were storming the campus, demanding punishment for the perpetrator, a student who had purloined the body to study anatomy. The Governor's Foot Guard had to quell the riot.

The relationships between the School of Medicine and New Haven have always been complex, surpassing the standard town-gown rivalries. While the city has benefited from a world-class medical center, it has also viewed the school with mistrust. Too often, people in the community felt that they were seen as guinea pigs for research and nothing more.

That changed some years ago as medical researchers recognized that promoting good health meant looking beyond the details in a patient's chart. The social determinants of health—where we live, whether we're poor or well-off, our access to health care, the stressors in our lives—all play a role in our well-being. The Robert Wood Johnson Foundation Clinical Scholars Program acted on that understanding by partnering with New Haven communities to find out which issues were important to them and what research needed to be done.

In this issue of *Yale Medicine*, we take a look at the myriad ways in which the presence of the School of Medicine affects the larger New Haven community, from taking care of patients and examining the impact of gun violence to promoting the city as a hub of biotech research.

Seeking better health: Yale and New Haven	12
Learning from the community	18
A witness to hunger	24
Mental health, better schools, and the trauma of violence	26
How Yale and New Haven are building a future together	32
Caring for New Haven's refugees	38







Seeking better health: Yale and New Haven

For years the School of Medicine has worked with community organizations to address the city's major health issues.

BY CHRISTOPHER HOFFMAN



In the early 1970s, Maria Melendez, recently arrived from Puerto Rico, saw that there were no Spanish-speaking doctors serving her new neighborhood of Fair Haven. With others in the community as well as local groups, she launched a campaign that led first to nursing visits and then to the establishment of the Fair Haven Community Health Center.

MARIA MELENDEZ KNEW SOMETHING HAD TO BE DONE. It was the early 1970s, and New Haven's Fair Haven neighborhood was changing. As Latinos moved into the homes once occupied by Irish and Italian blue-collar families who had moved to the suburbs, health care lagged. The neighborhood had no Spanish-speaking doctors, recalled Melendez, who came to the city from Puerto Rico in the mid-1960s to be with her husband. The few medical services available tended to focus on children.

Determined to meet the larger health needs of her community, Melendez joined with members of the local chapter of the Alliance for Latin American Progress to start a free clinic. The city provided \$5,000 for malpractice insurance and offered the nurse's office at a local elementary school. Volunteers from the Yale School of Nursing staffed the makeshift clinic three nights a week. The New Haven Foundation, a precursor of the Community Foundation for Greater New Haven, provided seed money.

"We were looking to provide something more than immunizations for the community," Melendez recalled.

Almost 50 years later, that humble operation has grown into the Fair Haven Community Health Center. The clinic now treats about 17,500 patients a year at four locations and operates five school-based health clinics with an annual budget of about \$19 million. Funded through a combination of federal and state grants, Medicaid, and private insurance, the clinic accepts all patients. For \$25, uninsured patients—sometimes undocumented immigrants—can see a doctor.

"We don't turn anyone away," said Suzanne Lagarde, M.D., HS '77, FW '80, the center's chief executive officer, a specialist in gastrointestinal diseases, and a former faculty member at the School of Medicine.

Fair Haven Community Health Center is just one star in a constellation of health organizations created in the last 50 years to serve New Haven's many underserved residents. They include the even larger Cornell Scott-Hill Health Center in the city's Hill neighborhood, which serves about 36,000 patients a year. Provision of health care in New Haven has long linked the community with health care providers at Yale. Not only have community health centers benefited from collaborations with the School of Medicine and Yale

New Haven Hospital, but Yale clinicians and researchers have worked with and learned much from the city's residents while seeking to treat and prevent disease. Yale faculty, residents, and students have tackled such issues as asthma, traffic, postnatal care, diabetes, drug addiction, and HIV/AIDS.

"Our ties to Yale and Yale New Haven Hospital are long and deep," said Michael Taylor, chief executive officer of the Cornell Scott-Hill Health Center. "If Yale were not here, we would need double the health center's funding."

Cross-pollination between Yale and the community has led to real progress in such areas as infant mortality, but health problems persist. New Haven remains a city where poverty and chronic diseases are intertwined. The city's minority residents suffer disproportionately from such serious and often preventable illnesses as diabetes, high blood pressure, obesity, asthma, and heart disease. Rates of chronic disease far exceed those of the state as a whole and those of surrounding communities, according to DataHaven, a local nonprofit. In many cases, the gap is shockingly wide: 11 percent of New Haven's 130,000 residents have diabetes, compared to 5 percent in the outer-ring suburbs. More than a fifth of city residents suffer from food insecurity, compared to 7 percent in outer-ring communities.

A closer look at the data reveals that those problems are concentrated in the city's eight poorest neighborhoods, all of which have largely minority populations: West Rock, Newhallville, Dixwell, Dwight, West River, the Hill, Fair Haven, and Quinipiac Meadows. About a quarter of the people in those neighborhoods suffer from asthma, double the state rate, according to a 2015 DataHaven study. The incidence of diabetes—13 percent—is nearly twice that of the state as a whole.

The economic gap is equally yawning. As of 2015, the city's eight poorest neighborhoods had an unemployment rate of 22 percent compared to 5 percent for the rest of the city, according to DataHaven. Connecticut may have the nation's fourth highest median household income—\$65,753—but that figure falls by more than half in neighborhoods like the Hill, where the picture grows even bleaker—one area of central Fair Haven reports a median household income of just \$19,485, according to the website City-Data.com. Unemployment there is 24 percent, and almost 46 percent of residents live below the poverty line.

As the saying goes, your ZIP Code reveals more about your health than your genetic code.

Maria Melendez

“To keep growing and growing to what we have become is beyond my imagination. We’ve served the community with pride.”

LOOKING AT THE BIG PICTURE

In the face of such challenges, health care professionals and researchers in New Haven have in recent years adopted a new approach. They have been incorporating the realities of their patients’ daily lives into treatment plans, said Marjorie S. Rosenthal, M.D. ’95, M.P.H., co-director of the National Clinician Scholars Program at Yale, and director of the program’s Community Research Initiative. The program teaches Yale trainees principles of epidemiology and biostatistics, as well as how to work with community partners to identify critical challenges to the health of individuals and communities.

A physician can tell a diabetic to take a daily walk, she said, but what if gunfire on the street keeps people indoors? And what good is it to recommend a diet that includes fresh fruits and vegetables in food deserts where produce is unavailable? “If we are not looking at the bigger issues, we won’t be able to do our jobs as doctors,” Rosenthal said. “This is not just frosting on the cake. This *is* the cake.”

The approach doesn’t focus only on such negatives as violence, lack of fresh food, and a poor understanding of nutrition, Rosenthal added. Medical

professionals also need to know what works—community gardens that provide good inexpensive food, and walking trails for exercise—and leverage those positives, she said.

COOKING, GARDENS, AND EXERCISE

Desiree Williams couldn’t get her diabetes under control. Her A1C glucose level was a sky-high 16, nearly three times that of a nondiabetic. She didn’t understand it. She didn’t eat a lot of sweets, so why were her numbers so bad?

At the Cornell Scott-Hill Health Center, Williams enrolled in a new nutrition and cooking class for people with the same problem. It was a revelation. Carbohydrates, she learned, were the culprit. A Southerner, Williams was eating way too much of the rice that she’d grown up eating. “I wasn’t a junk food junkie,” Williams, 56, said. “I was a carb junkie.”

Williams not only learned what to avoid, but how to read labels and cook healthier food. She no longer put sugar and other unhealthful ingredients in her beloved collard greens. The result: Williams cut her A1C glucose level by more than half and lost 10 pounds. She’s eager to learn even more and wants

Cornell Scott-Hill Health Center to start similar classes for pre-diabetic kids.

“I think I’m going to take every last cooking class they have,” Williams said. “It wasn’t like going to school. These people were my friends, and they were looking out for me.”

The health center’s six-week cooking and nutrition classes, introduced last year, are part of a growing trend in tackling chronic diseases prevalent in New Haven’s poorer neighborhoods. The course teaches patients which foods to eat, which ones to avoid, how to read labels, and how to cook healthier meals, said Natalie Lourenco, P.A.-C., director of wellness education and outreach at the center.

“I think we all have the goal of treating things holistically, but practically speaking, it’s always a challenge,” Lourenco said. “People have 15 minutes with their doctor, and they’re given a prescription. The cooking and nutrition course is an opportunity for us to take more time and reinforce the other things that need to happen.”

On the other side of the city, Fair Haven Community Health Center has a similar program, Lagarde said. The center teaches people with diabetes about nutrition and cooking, holds exercise classes at an elementary school, and encourages people to grow their own vegetables at one of the neighborhood’s urban farms, even providing a farmer to teach them. “In the fall, we have a dinner from the farms,” Lagarde said. “It’s worthy of a four-star restaurant.”

Others are expanding the concept. Lee Cruz, a director of community outreach at the Community Foundation for Greater New Haven and a member of the Chatham Square Neighborhood Association in Fair Haven, wants doctors to understand the realities of life in a poorer community. Physicians need to know the difficulties people face in obtaining fresh food, exercising, and getting to an appointment, he said. But they also must understand such community assets as Fair Haven’s network of community gardens. That gets them “out of their bubbles” and better informs their care, he said. That requires more than handing out pamphlets and engaging people at a table for 30 seconds. “In my experience,” Cruz said, “what has to happen is you have to build the relationships first.”

To that end, Cruz has worked with Yale to sponsor walking tours of Fair Haven for medical students and residents so they can get to know the neighborhood and its people. The tours have proven a big hit, he said.

Cary Gross, M.D., director of the National Clinician Scholars Program at Yale, heartily endorses Cruz’s approach and the Fair Haven walking tours program. It’s just one of many innovative efforts that Gross and his colleagues in the scholars program are pursuing to better understand and attack the root causes of chronic disease and inequity in health and health care in New Haven. The approach of focusing on specific diseases and identifying the best pharmacologic therapy—the biomedical model—has reached its limits, Gross said. Medical professionals must understand the lives of their patients if they are going to make a lasting impact on improving their health and well-being, he said.

“This is one of the things that makes the scholars program special—we are training nurses and physicians to conduct research that will drive change. Often, we work at these large institutions, but we’re not familiar with the surrounding neighborhoods,” Gross said. “This is getting us out of the ivory tower and into the real world.”

PERSISTENT RACIAL AND ETHNIC INEQUITIES

When Cruz takes residents and students in the health professions on walking tours of Fair Haven, he starts along the banks of the Quinnipiac River at a memorial to the 29th Connecticut Colored Regiment, whose members served in the Civil War. He wants to remind the future doctors of the injustices that black men and others have faced in this country. He wants them to keep that in mind when they face disproportionate rates of chronic illnesses among the city’s minorities.

Addressing those persistent racial and ethnic inequities is a focus of the Community Foundation for Greater New Haven, the region’s largest grantor and a longtime supporter of a wide variety of public health programs and organizations in the city.

“The community overall is getting healthier,” said Christina Ciociola, M.S.W., M.P.H., the community foundation’s senior vice president for grant making and strategy. “Everyone is getting healthier, but these disparities still exist. We’re trying to understand what that’s about.”

One way that the foundation is tackling the problem is the Healthy Start Program that seeks to reduce the black infant mortality rate in New Haven. At one

point in the mid-1980s, the city's infant mortality rivaled that of a Third World country, Ciociola said. Healthy Start works with mothers to teach them skills and connect them with services to assure that their babies are healthy and thriving, said Kenn Harris, the community foundation's vice president for community engagement and director of New Haven Healthy Start.

The program, which recently celebrated its 20th anniversary, has cut the infant mortality rate for black babies about in half, Harris said. Mothers who participate in the program have infant mortality rates lower than those in the state's outer-ring suburbs, he added.

But the program, which accepts mothers of all races and ethnicities, has 38 percent black participation, below its goal of 50 percent. The reason: blacks are less likely to engage with health care professionals. Harris attributes that to a long history of medical professionals judging blacks. The dearth of black health care professionals—Latinos are more likely to encounter Latino doctors and nurses—is another factor, he said. He attributes the stubborn inequity in outcomes at least in part to the legacy of racism.

"The impact of racism, not just being called a name, is still there," Harris said. "The trauma gets passed on."

OPIOIDS AND IMMIGRATION

For 53-year-old Candida Saunders, the trouble began after her mother's death. She became depressed and anxious, and her physician prescribed Xanax. She graduated to heroin and soon found herself a full-blown addict. The drug, she said, is everywhere. "You can get it on any street corner," Saunders said.

Luckily, Saunders got help. She learned of the Cornell Scott-Hill Health Center's drug rehabilitation program and decided it was worth the trek from her home in Waterbury. The center put her in treatment and on methadone, and she has been off heroin for two and a half years. "I came here and got a lot of help that I needed," Saunders said.

Ask Taylor, CEO of the Cornell Scott-Hill Health Center, about his biggest concern for the future, and he answers without hesitation: the crisis of opioid abuse. The clinic's treatment facilities are at capacity and would need to triple in size to meet the exploding demand.

"I will say it's on everyone's lips these days," Taylor said. "As a substance use treatment provider, we've been very aware of increased use for years, but the growth we've seen in the last year or two is off the charts."

Driving the problem is fentanyl, a highly potent cheap synthetic heroin, much of it from Mexico, that has flooded the region, Taylor said. It's also a big concern of the city, especially after 17 overdoses—including three fatalities—in one 24-hour period last year, said New Haven Director of Health Byron Kennedy, M.P.H. '01, M.D. '04, Ph.D. '04. "Something as small as a grain of sand could be sufficient to kill a person," Kennedy said.

In Fair Haven, Lagarde said her biggest concern is treating undocumented immigrants. The neighborhood has the largest concentration of undocumented immigrants in the city, and they make up a significant percentage of her clients. President Donald J. Trump's immigration crackdown is pushing those patients into the shadows and threatens to make treating them even more difficult, she said.

Amid the never-ending challenges, it's easy to forget just how much has been accomplished in the last five decades. Maria Melendez hasn't. She never dreamt the small clinic she helped found in an elementary school nurse's office would grow to provide health care to thousands of neighborhood residents.

"To keep growing and growing to what we have become is beyond my imagination," said Melendez, who has worked at the clinic since its inception. "We've served the community with pride."

Whatever obstacles may lie ahead, Melendez is confident that Fair Haven will meet and overcome them. "Our goal when we started was to provide services that people need and really appreciate," she said. "We are there to serve the community." [/yale medicine](#)

Christopher Hoffman is a freelance writer in North Haven, Conn.



Learning from the community

How Yale researchers learn to ask the
right questions.

BY JILL MAX



During Game Day at New Haven's Barnard Environmental Studies Magnet School in March, Will Boateng of New Haven played basketball with 6-year-old Carlton Williams Jr. of West Haven. The goal of Game Day is to bring the community together.

ABOUT SIX YEARS AGO, the Yale Center for Clinical Investigation (YCCI) approached Sandra Trevino, executive director of Junta for Progressive Action, about partnering with Yale in clinical research. Junta is the oldest Latino community-based nonprofit organization in New Haven, and requests from Yale researchers seeking access to the city's Latino population or to use Junta's name to recruit volunteers were common. But Trevino often found the researchers unwilling to share information or engage in a meaningful way. Expecting the same "one-way street," Trevino referred the request to a staff member and didn't give it a second thought.

Her resistance turned to enthusiasm, however, when YCCI called her, along with other Junta staff members and leaders from the African Methodist Episcopal (AME) Zion Church. They wanted the community leaders to provide input on study design and recruitment materials for a research project on asthma. "I saw they were doing the walk and not just the talk," Trevino says.

When studies include a diverse population and engage community members, the research leads to more effective treatments and interventions. The Cultural Ambassadors program—as YCCI's collaboration with Junta and the AME Zion Church is known—is an example of how Yale researchers engage with New Haven's community, which is more than 60 percent black or Latino.

"Health care providers may not know what it feels like to live with a disease and the challenges patients face," says Marjorie S. Rosenthal, M.D. '95, M.P.H., associate professor of pediatrics, co-director of the National Clinician Scholars Program (NCSP), and a former Robert Wood Johnson Foundation (RWJF) Clinical Scholar, who has been involved with research in the community. "Researchers have missed the mark at times by not asking their research participants about those questions before they start the research."

Community-engaged research—a collaboration between researchers and community partners—is gaining ground as an effective way to conduct research that will translate into practice. It takes place across such School of Medicine departments as emergency medicine; internal medicine; laboratory medicine; neurology; obstetrics, gynecology, and reproductive

sciences; pediatrics; and psychiatry; as well as the School of Public Health and the School of Nursing. Such initiatives as the Cultural Ambassadors program and the NCSP—a two-year research fellowship that has physicians and nurses working with community members—nurture partnerships that pave the way to better health. These collaborations have led to increased recruitment in clinical trials, improved trust between Yale and New Haven residents, and programs that use research findings as the basis for interventions that improve the health and well-being of the community.

BUILDING TRUST

Like Trevino, Reverend Dr. LeRoy O. Perry Jr., pastor of St. Stephens African Methodist Episcopal (AME) Zion Church in Branford, Conn., was initially skeptical of the Cultural Ambassadors program. He knew the history of morally questionable research done on blacks like the Tuskegee Syphilis Study. Distrust of the medical establishment has kept nonwhites out of clinical trials—they comprise fewer than 5 percent of participants in studies supported by the National Institutes of Health. With minorities suffering disproportionately from cancer, diabetes, cardiovascular disease, HIV/AIDS, and other ailments, their presence in clinical studies is crucial.

In 2008 YCCI learned through focus groups that blacks and Latinos were wary of clinical research. People who volunteer for clinical trials, participants believed, were drug addicts, desperate, uninformed, and incurable. Focus group members thought that they would be taken advantage of because of their race or class, were concerned that research is dangerous, and worried that researchers are less than forthcoming about the risks of clinical trials. On top of these concerns, discrimination and disparities in health care contributed to this mistrust of the medical establishment. Focus group participants also saw Yale as unapproachable and distant. YCCI took heart in one finding, however. Participants indicated that they might take part in research if they heard about it through family members, friends, churches, health centers, community centers, or health fairs.

The Cultural Ambassadors program follows a model devised by the Mayo Clinic in Rochester, Minn., in which local Hmong residents (refugees from Southeast Asia) were enlisted to recruit members of their community for clinical research. YCCI expanded on this idea to create the Cultural Ambassadors program in 2011 in partnership with Junta, which serves more than 4,600 families, and AME Zion, which has 17 local churches serving 5,000



Game Day brought four New Haveners together to play *Sorry*: Linda Quinn (in Yale sweatshirt); her grandchildren Cali'rose Borrero, 18 months, and Bella Marie Borrero, 5; and Bridgett Williamson.

families. The first order of business was to host training sessions that brought Yale faculty together with Junta and AME Zion representatives to discuss the design and implementation of research; regulations and laws that protect research participants; animal-based research; scientific misconduct; and the importance of participating in clinical research, especially for minorities. “The training was essential, because without it, you can’t answer questions regarding such issues as safeguards, informed consent, anonymity, and efficacy,” says Perry.

Fielding questions is one way that the Cultural Ambassadors inform their communities about clinical research. Through daily contact with parishioners and clients, AME Zion pastors and leaders and Junta staff members direct people to Yale research studies, sometimes even searching for studies online

at yalestudies.org or calling YCCI to inquire about appropriate clinical trials. At fairs and community events, they bring their message to large groups of people. Armed with fliers and brochures in English and Spanish, they meet with people to broach the idea of participating in research, and they guide them through the process.

Cultural Ambassadors also meet monthly with researchers to learn about a study or to weigh in on a research protocol. The ambassadors have helped recruit participants for studies on the early detection of such conditions as learning disabilities, asthma, diabetes, cancer, and glaucoma. Many of these studies are aligned with health concerns identified as community priorities.

During these encounters, Cultural Ambassadors and researchers learn from one another. The ambassadors

pepper the researchers with questions, but also explain how issues are perceived in their communities and the best way to approach potential research volunteers. They also advise investigators on study design. In a recent meeting about a study to use iPhones to improve diabetes management, the group suggested increased surveillance of patients with risk factors, intake interviews to assess barriers to care management, and a buddy system in which a friend or relative would receive alerts about a patient's blood sugar. "I really feel like it is a true partnership, where our voices do matter and what we say is making a difference in the decisions that are being made in this larger institution," says Trevino, who, along with other Cultural Ambassadors, has appeared in recruitment ads for clinical research.

The program, which has recently been adopted at Duke University, has improved minority participation in research. When Cultural Ambassadors are involved in studies, minority participation averages between 37 and 65 percent. When they're not involved, minority participation drops to between 2 and 3 percent. Beyond that, the level of trust between the community and the School of Medicine has increased—Cultural Ambassadors now encourage members of their community to participate in research, helping to dispel some of the myths that they themselves had believed just a few years ago.

TIME, TRIAL, AND ERROR

Long before the Cultural Ambassadors program, School of Medicine researchers had been engaging with residents, involving them in what is now known as community-based participatory research (CBPR). For more than 40 years, Yale was a site of the RWJF Clinical Scholars Program, a two-year fellowship that includes community-partnered research. This program is being phased out in 2017, but Yale and three other institutions have established their own version of the program, the National Clinician Scholars Program (NCSP).

Under the RWJF program, a 30-member community advisory steering committee comprising leaders and representatives from New Haven community organizations, the City of New Haven, community health clinics, and Yale faculty, meets every month to establish research priorities, work with researchers on study design, and build community-academic partnerships.

"The relationship has been one of evolution and a learning exchange," says Natasha Ray, M.S., core services manager of New Haven Healthy Start at the Community Foundation for Greater New Haven. She co-chairs the committee with Marcella Nunez-Smith, M.D., M.H.S. '06, associate professor of medicine and of epidemiology, core faculty member of the NCSP, and a former RWJF Clinical Scholar.

The value of this collaboration became apparent about the time of Hurricane Irene in 2011, which coincided with an upswing in gun violence in New Haven. It occurred to Barbara Tinney, M.S.W., co-chair of the steering committee, and Nurit Harari, M.D., FW '13, then an RWJF Clinical Scholar, that the response to natural disasters might also work for gun violence. "That was transformative," says Emily Wang, M.D., associate professor of medicine (general medicine), "to think of gun violence as something that can be prepared for and mitigated."

Beginning in 2014, Wang, a second pair of RWJF scholars, and Maurice Williams, a YCCI staff member, trained 17 community members in New Haven's Newhallville and West River neighborhoods to gather data from more than 150 neighbors. They asked not only about exposure to gun violence but also about whether their neighbors prepared for it. Most had heard a gunshot, a third had witnessed a shooting, and nearly 60 percent had lost a friend or family member in a shooting. Most of their neighbors had established a family plan that included discussing gun violence with their children or buying burial insurance. "Unless you include community members from beginning to end and honor their skills and expertise, you won't get to the right questions," says Wang, who is a core faculty member of the NCSP. "We would never have thought of including questions about preparedness without their input."

The study found a connection between a community's ability to leverage social ties and rebound from adversity, and lower exposure to gun violence. The next set of scholars, Alicia Agnoli, M.D., M.P.H., and Anita Arora, M.D., M.B.A., is taking the research a step further, trying to strengthen bonds among community members, over half of whom knew none or a few of their neighbors. Through trial and error, they settled on a monthly intervention—Game Day—the brainchild of Ann Greene, a community research liaison with the NCSP and a West River resident, and Victoria Spell, also a community resident.

At the Game Day held in March at the Barnard Environmental Studies Magnet School on Derby Avenue, about 50 West River residents ranging from

toddlers to grandparents gathered to play games, shoot baskets, and socialize over pizza. Intended to reinforce the notion that West River is a safe neighborhood in which to socialize, it was an opportunity for them to get to know one another on a deeper level. “We don’t have a lot of places for children and families,” says Joseph Vidro, who walked to Barnard in the freezing weather with his 13-year-old son. “We get to know each other as a village so we can help each other out. It’s great that the community comes together.” Greene has noticed a change in the way her neighbors interact. “I found that we have much more intimate and interesting conversations than we ever did when we just ran into each other on the sidewalk,” she says.

Along the same lines, researchers looked into which skills residents possess and which they’d like to learn. “In neighborhoods like mine,” says Greene, “people don’t realize how much human gold there is, how many talents, because they’re not necessarily tied to a degree or high-status occupation.” Like Game Day, Skills Day brings people together and encourages neighbors to help each other. Follow-up research will determine whether these activities have increased resilience and strengthened bonds. In another arm of the research, Wang and Andrew Papachristos, Ph.D., associate professor of sociology, are using police data on gun violence to identify pockets of residents of high-risk areas who have never been involved in gun violence. The idea is to identify those characteristics that protect neighborhoods from violence and figure out how to apply that knowledge elsewhere.

A WIDESPREAD PROBLEM

While gun violence is often concentrated in certain areas, homelessness remains an issue in New Haven—in 2016, more than 600 people were living in emergency shelters, transitional housing, or on the streets. In 2010, RWJF Scholar S. Ryan Greysen, M.D., M.H.S. ’11, M.A., now at the University of Pennsylvania Perelman School of Medicine, wondered how the homeless people he saw in the emergency department made the transition from the hospital to the shelter. Working with the Columbus House shelter, he surveyed homeless clients and found that they often left the hospital without a clear understanding of how to obtain prescription medications or

follow up with health care providers. Often, he found, they were discharged too late to be admitted to a shelter. When Greysen’s fellowship ended, Kelly M. Doran, M.D., M.H.S. ’13, now at New York University School of Medicine, continued the project, gathering data from the hospital to determine how to improve health care for homeless patients after discharge.

As of 2013, Columbus House has a Medical Respite Program—the first in Connecticut. Up to 12 clients can recuperate from surgery, an illness, or an injury in a private room while receiving skilled nursing care from home care organizations. They also get help connecting to community services, transportation to appointments, and assistance with finding housing.

Medical respite is a new field. There are only about 70 programs in the country, with differing models of care. Alison Cunningham, chief executive officer of Columbus House, was at first skeptical, but she offered the program unused space on the shelter’s third floor. Before the program started, hospital readmission rates for homeless people in New Haven were 51 percent. Today, they’re down to 17 percent, and only 4 percent of respite patients return to the streets. The program also saves Medicaid about \$12,000 per patient. “It has opened our eyes to a different way of thinking of the relationship between housing and health care, and how important it is for people’s health for them to be stably housed,” says Cunningham. The program, she added, would not exist without the RWJF Scholars.

Ensuring that health care solutions meet the most pressing needs of the community is one of the goals of community-based research. At a recent Cultural Ambassadors meeting, Paul Taheri, M.D., M.B.A., deputy dean for clinical affairs and CEO of Yale Medicine, sought the group’s input on possible ways to reduce the burden of chronic diseases in the community. The conversation was a first step in thinking about what kinds of studies to design, the type of data that would need to be collected, and how the community could help. Ambassadors asked questions and offered suggestions about how to delve deeper into New Haven’s health issues. Taheri plans on meeting with the group again during the process of designing a research study. Says Junta’s Trevino: “Our partnership has shown me that our needs matter and our voices are heard.” [/yale medicine](#)

Jill Max is a senior communications officer at the School of Medicine.



A witness to hunger

At the annual Hunger & Homelessness Auction, Yale students hear firsthand what it's like to be hungry.

BY BRUCE FELLMAN

Last autumn, on November 17 at Café Med, the crowd at the School of Medicine's 24th Annual Hunger and Homelessness Auction grew quiet as Kim Hart, a 55-year-old lifelong New Haven resident, came to the microphone to provide a firsthand look at what it means not to have enough to eat. Hart, who lives in the Beaver Hill section of the city, took her listeners back to 2011, a harrowing moment when the only things left in the cupboard were "a two-pack of ramen noodles, a half loaf of bread, and some peanut butter and jelly." She used what she had to feed her then-11-year-old son.

"I was hungry," she told the audience, "but I didn't eat until he'd had enough."

The modest meal over, the boy looked up and said that while he was grateful—he knew other people had less—he wished they could have meat. "As a mom, this broke my heart—he shouldn't have to live like that," Hart said quietly, tearing up at the memory.

There's a photograph from that time—a snapshot of a youngster with sad and haunting eyes—that was part of a recent exhibit called *Witnesses to Hunger CT* at the Legislative Office Building in Hartford. The program

featured images and stories from 15 state residents, each among the one in seven Connecticut residents who, according to End Hunger CT, regularly don't get enough to eat. Six years ago, Hart and her son became statistics.

"We were comfortable," she explained in an interview with *Yale Medicine*. "My husband's disability check paid the rent, we had food stamps, and I was working part-time as a telemarketer. We didn't have a lot, but we had enough."

In 2011, Hart's husband passed away suddenly, and making ends meet proved a struggle without his income. Later that year Hart's job ended when the telemarketing company moved to Indiana.

With a meager unemployment check the only money coming in, Hart's life became endless treks to the area's food pantries. "Once you dig yourself in, it becomes so hard to get out," she said. But Kim Hart is nothing if not a consummate optimist, and the first thing she did was confront her diet. "I became educated about food, and the more I learned, the angrier I became," she said. "I realized that the food I should be eating and feeding my son was not what I could afford."



Kim Hart knows what it is to be hungry. After her husband died and she lost her job, she and her young son relied on unemployment benefits, food stamps, and food pantries. She is now an advocate and activist, and serves on the New Haven Food Policy Council.

The organic aisles in the local supermarket might have been out of reach, but Hart learned how to make healthier choices with what was available and to cook in a healthier way. “I don’t fry anything anymore, and while it took a while for my son to accept this, we now both know it’s for our own good and not to punish us. Whole-wheat pasta, rye and pumpernickel bread, a baked sweet potato—the darker the food, the more nutritious,” she declared. “I wasn’t taught this growing up, but now I embrace this.”

Hart soon learned to visit local farmers’ markets where, she discovered, she could double the purchasing power of her SNAP benefits and buy fresh fruits and vegetables. (SNAP stands for Supplemental Nutrition Assistance Program, which replaced what were once called food stamps.) “The fact that I could get two pounds of collard greens for \$1.39 instead of one pound ... it was a big secret and not advertised, but since I learned this trick, I tell everyone I know,” Hart said.

She has also turned this ongoing education into political activism. She was appointed to the New Haven Food Policy Council, the city government’s volunteer advisory group that, according to its mission statement,

works to “build a food system that nourishes all people in a just and sustainable manner.”

Hart is involved in such council efforts as a partnership with the American Heart Association’s ANCHOR program to help improve the already-existing food pantries. “We’re telling people about the importance of good eating and heart health—how it all ties together,” she said. “Everything starts with knowledge.”

Hart is also working on programs to end food insecurity, including a proposal to start a supper program in area schools. “A child in need might eat lunch at school, but there may be nothing to eat at home,” she said, counseling physicians to ask their patients about food availability and hunger issues. “You can’t learn anything if you’re hungry—in the long run, ignorance is very expensive.”

Despite the seeming intractability of the problems she continues to face, Hart remains upbeat. “I am a woman of faith,” she declared. “Hope and faith keep me going.” *yale medicine*

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



Mental health, better schools, and the trauma of violence

How the School of Medicine and community partners work together for a healthier New Haven.

BY JEANNA CANAPARI



Stacy Downer once worked on Chapel Street at a check cashing business where customers also paid their bills. She helped her customers make budgets and plan expenses, skills she uses in her work at the New Haven Mental Health Outreach for MotherS, which connects mothers to mental health services so they can combat depression.

FROM HER WINDOW at a downtown check cashing business just off the New Haven Green, Stacy Downer had a front-row seat to her community. Through her interactions with her customers, she saw how they struggled and how hard they worked to get by. “I started to see that things were not right,” she recalls. She could predict when the people who were selling the food, clothes, and shoes she bought on the street outside would come in each month to use the business’ bill paying service. “They would pay \$50 here and \$50 there, just so they could have \$300 in their pocket for the month,” Downer observed. “They needed help.

“I started learning little things that would help me keep money in my pocket, and not always be so stressed out,” she says. “I started helping my customers do the same thing. When they came in, they would give me all their bills, and I started writing budgets for them. Sometimes right there at the window.” Her sharp financial sense led to a promotion to manager, but a downturn in the economy shuttered the check cashing business, and Downer lost her job.

Shortly after, she was recruited by the New Haven Mental Health Outreach for MotherS, or MOMS, Partnership, which links eight government and non-profit agencies, including the School of Medicine. Housed at the Department of Psychiatry and the Yale Child Study Center, the MOMS Partnership connects mothers to mental health services to help them combat depression.

MOMS is one of many community partnerships that allow the School of Medicine to engage with the New Haven community. Some, like MOMS, help women in need; others, like the Yale Child Study Center’s Comer School Development Program, help children succeed in the public schools. All the School of Medicine’s partnerships link Yale experts with people in the community poised to help others: another, the Child Development-Community Policing Program, partners New Haven police officers and Yale clinicians, who arrive together at crime scenes to counsel children who have witnessed violence. These partnerships loop in a variety of stakeholders to work above and beyond the capacities of traditional institutions, and use innovative approaches to fill gaps in services.

AN AMBASSADOR FOR MENTAL HEALTH

“We have taken many approaches to address maternal depression in the last decade or more in New Haven, and those approaches weren’t yielding tremendous results in terms of changing outcomes for families,” says Megan V. Smith, M.P.H. ’00, Dr.PH., principal investigator and director of the MOMS Partnership. “The partnership started out of a general recognition that there was a need for innovation in the area of maternal depression and maternal mental health.”

One of those innovations is the position of Community Mental Health Ambassador. Downer, the former check cashing manager, is one of 10 ambassadors, all mothers from the New Haven community who are trained to work side by side with Yale clinicians to provide counseling and other services, including job training and connections with housing. Ambassadors are employed by Yale, as well as by the Clifford Beers Clinic and the New Haven Health Department, both MOMS Partnership members. “We employ mothers from New Haven who might have had experience in a nail salon, or a hair salon, or who have worked in a customer service profession,” says Smith. The job builds on these women’s natural empathy and leadership skills from previous jobs, like Downer’s work helping customers and neighbors with budgeting.

Ambassadors teach mothers vital skills and strategies to manage their stress and depression, find better jobs, and become more effective, less harried parents. They have also been trained to employ such mental health strategies as cognitive behavioral therapy, or CBT, one of the most efficacious treatments for depression, according to Smith. “In CBT, they give mothers concrete examples of the skills we are trying to teach, so they can apply skills that we teach to experiences that mothers may actually have,” says Smith.

When she speaks to women, Downer shares her own experiences raising her children in downtown New Haven. “Before I got the job at the check cashing place, I was homeless. I was living in a shelter, and I was pregnant,” she says. “And there was no help.” Sharing her own story, she says, makes her more effective.

On a winter evening, Downer and a colleague attended a community event at the Wilson Branch of the New Haven Public Library in the Hill neighborhood, a few blocks from the School of Medicine campus. The room around them buzzed with activity: Volunteers helped people prepare tax returns; children ran around; women held a dance class. And a woman

Gail DeBlasio, Brennan-Rogers School Principal

“Our test scores are going up slowly but steadily. We still have kids in crisis, but we are not going backward. We are moving forward.”

approached Downer’s table to find out more about MOMS Partnership services.

Depression is a severe problem for women in distressed communities like the Hill. According to a 2016 report published by the MOMS Partnership, 71 percent of women interviewed in New Haven reported needing help managing sadness. In the Hill neighborhood alone, 87 percent of mothers felt they had poor emotional health. But many fear asking for help. “One of the barriers that prevents women from seeking mental health services is that they are afraid their children may be removed from their care,” says Smith. “That’s a real fear.” There is also a stigma in the community, Smith says, about asking for mental health help.

To remove some of that stigma, MOMS brings their services to places where women may gather, like community events at the library. The program also runs five “hubs” around New Haven at such places as the Stop and Shop on Whalley Avenue and a public school in West Rock. At these dedicated centers for mental health and job training services, the Partnership offers classes on parenting, stress management, and financial health.

So many programs, Downer says, come and go from New Haven without having made any real impact. “Over the years, they have broken down the resolve of moms in the community. They are not trusted,” she says. “I say to the moms, ‘I want you to understand that someone is out here, and they are here for the long haul.’”

A PARTNERSHIP THAT HAS ENDURED

Starting in the 1960s, James P. Comer, M.D., M.P.H., the Maurice Falk Professor of Child Psychiatry in the Child Study Center, saw that cultural institutions that had sustained black families were eroding and putting children at risk.

“There was a decline in the power of the family and in the church community,” he recalls. “The old corner drugstore gave way to Walgreen’s. The policeman on the beat was no longer on the beat, and he was no longer a friend of your family.”

While some families in the face of racism and poverty were able to create home cultures that protected children and helped them thrive, not all could. Many black children were underperforming in school and getting into trouble. These problems required a new way of thinking that challenged the way institutions connected with their communities. “The schools had that potential that nobody else had,” Comer says. “We needed institutions to change so that they became part of the family, and the family became part of the schools.”

Comer saw that students from poor areas were not lost causes, as public schools had assumed, but had what it takes to be successful in school. What they lacked was the preparation that would move them into readiness. Schools, Comer realized, needed to address six developmental pathways: social-interactive, psycho-emotional, ethical, cognitive, linguistic, and physical. The solution was a community partnership—the Comer

School Development Program (SDP), a collaboration between the Yale Child Study Center and the public schools of New Haven—that pioneered the idea that children should be taught according to the principles of child development.

During her 25 years in New Haven schools as a teacher and magnet resource coach, and now as a principal of the Brennan-Rogers School, Gail DeBlasio has seen how important it is to understand the tenets of child development to reach children, particularly those who are vulnerable. “I think sometimes we forget as adults that we are better able to compartmentalize our hurt, but as kids, those wounds fester, and they erupt in the classroom and come out as difficult behaviors. We assume it’s a child misbehaving, and not a child in crisis, or a child who has had enough.”

DeBlasio is applying Comer principles at Brennan-Rogers, a low-performing Pre-K through eighth grade magnet school in New Haven’s West Rock neighborhood, where 20 percent of its more than 500 students require special education services. Children often have water bottles at their desks to support their physical development. They take “Brain Breaks” and get up to toss a ball around while shouting out math facts. During daily morning meetings, students talk about problems with other children, or stresses from outside school that might affect their learning. Building from those discussions, students are then asked to mediate disputes between fellow students. Those meetings “brought SDP into the classroom by dealing with children’s psychological and ethical pathways,” says DeBlasio. “Learning how to disagree in an agreeable manner, being able to identify and express what’s bothering them, and learning how to articulate that properly—those are all skills that we take for granted that kids have, but they have to be built.”

As in all Comer schools, Brennan-Rogers has a School Planning and Management Team of administrators, teachers, support staff, and parents to guide the core goals of the school. Comer schools also have two community-centered teams: The Student and Staff Support Team plans interventions around students who are not performing successfully in the classroom. The Parent Team, which is more inclusive than a traditional parent-teacher organization, involves any

parent who wishes to develop activities that enrich the school’s social and academic programs.

“The whole notion of bringing the community into the school,” says DeBlasio, “really started with the Comer program.” That notion extends to classrooms, where students have a say in how classrooms are run: At the beginning of each school year, students draft classroom rules. “They are invariably tougher than I would have been,” DeBlasio laughs.

In 1968, Comer and his team initiated the SDP in the two lowest-income and lowest-achieving elementary schools in New Haven, where 70 percent of students’ families were receiving federal assistance. After three years, Comer said, the climate the program aimed to create had taken hold; after seven years, attendance improved, and the number of behavioral problems dropped. By 1979, Comer wrote in a 1988 *Scientific American* article, fourth-grade students were up to grade level, and by 1984, fourth-graders in both schools ranked third and fourth in New Haven on the Iowa Test of Basic Skills.

The Comer model has since been implemented in more than 1,000 schools in 26 states, the District of Columbia, Trinidad and Tobago, South Africa, England, and Ireland. Twenty-eight New Haven schools still use the Comer model, and most of the district’s 46 schools have had some training with the program.

At Brennan-Rogers, DeBlasio has seen incremental change thanks to the Comer principles. “Our test scores are going up slowly but steadily,” she says. “We still have kids in crisis,” she says, “but we are not going backward. We are moving forward.”

HELPING CHILDREN COPE WITH VIOLENCE

When children are exposed to violence, a quick response is of the essence: it helps reduce the damaging, lasting effects of witnessing violence and allows the recovery process to begin.

As first on the scene, police officers may also be the first to establish the order and safety that is the first step to a child’s recovery. The officers are there well before mental health and social services professionals can provide crucial early intervention.

Twenty-five years ago, Steven Marans, M.S.W., Ph.D., Harris Professor in the Child Study Center, saw an opportunity to connect clinicians and police officers so that children get the help they need. In 1991, he founded the Child Development-Community Policing (CD-CP) program, a partnership between the Yale Child Study Center and the New Haven Police Department. The

program is housed in the Childhood Violent Trauma Center (CVTC) led by Marans. The program's three goals are to keep children and families safe, provide a sense of security, and offer services to help with recovery.

Children who witness or experience violence are at risk of anxiety disorders, post-traumatic stress disorder (PTSD), alcohol and drug abuse as adolescents, and antisocial behavior. Later in life they may themselves inflict violence on others. "Instead of sitting in our consulting rooms way down the road when kids are already struggling, we reached out to the police," says Marans. Police, he adds "recognized that they were not going to arrest their way out of the cycle of violence. And they reached out to us."

Under the CD-CP, clinicians from the Child Study Center respond with police to emergencies that involve children who are victims or witnesses to violence or disaster. Clinicians can help police discern signs of trauma that might not be obvious. "The blank stare of a child doesn't mean that they are OK," says Marans, "but that they are very much not OK." When police recognize that children need help, they may use breathing exercises and other therapeutic techniques to alleviate anxiety.

Two-person teams of police officers and clinicians follow up with visits to children and their families at their homes in the days following traumatic events. The teams look for symptoms of traumatic stress, and then invite the children and families to the program's clinic for an intervention. The Child and Family Traumatic Stress Intervention (CFTSI), developed at the Child Study Center, increases communication and family support with the aim of decreasing the effects of post-traumatic stress in the peri-traumatic phases, within 30-45 days of a traumatic event or abuse.

A 2009 study at Yale found that children who participated in CFTSI were 65 percent less likely to experience symptoms of full PTSD after three months compared to children who did not undergo the intervention. CFTSI training is offered to other agencies beyond Yale that aim to help children affected by violence, and is now used by clinicians around the country.

In the past 25 years, the program has extended its reach to other communities not only around the nation but around the world. Through a partnership with the International Association of Chiefs of Police, CD-CP

provides law enforcement officers with materials and resources to promote the best practices and methods that the program has developed through their long experience in New Haven. The CD-CP also offers a round-the-clock consultation service in which clinicians provide guidance over the phone to police officers at the scenes of emergencies.

For police officers and clinicians, learning to walk in each other's shoes has been invaluable, most of all to the families that they are now able to help. "When one gets to learn firsthand about the experience of others," Marans says, "It changes the way you look at the world."

Community partners exemplify the notion that what is necessary to fix a community is already present within it. James Comer looks to the present shortage of primary care physicians in the United States as an example. "We are going to have a huge shortage of doctors because people say they can't import them," he says. "Well, what do you mean, you can't import them? They're here, they're walking the street, they're in your schools right now. You just mishandle the way you develop them."

"They did a good thing harvesting us from the community," says Stacy Downer. "I'm going to be passionate. This is my community. I love New Haven like I love my kids. I grew up here, and I intend for my kids to grow up here. Of course I am going to advocate for this agency that I feel I can trust, so I put my best foot forward." [/yale medicine](#)

Jeanna Canapari is a freelance writer in Guilford, Conn.



How Yale and New Haven are building a future together

Bio Haven: Research nurtures a local
bioscience industry.

BY STEVE HAMM



The Mill River in New Haven's East Rock neighborhood is a favorite spot for Craig Crews. On his morning jogs there, he tackles problems from the lab—turning ideas into therapies. As a scientist and entrepreneur, he straddles the worlds of discovery and business that are at the heart of the city's plans for economic development.

CRAIG CREWS, PH.D., does some of his best thinking during early morning jogs along New Haven's Mill River. The two-mile run along the river that meanders through woods and marshes near his home in the East Rock neighborhood allows Crews' mind to wander—and to fix on new ideas.

Those ideas feed his work at his lab on Yale's Science Hill, where his team of 18 researchers is inventing science at the intersection of biology and chemistry. Their goal is to transform medicine with a radically new approach to treating disease.

His morning runs also take him to the earliest days of industry in New Haven, past the Whitney Armory where, in the late 1700s, Eli Whitney produced one of the seminal ideas of the industrial revolution—the notion that things could be manufactured more reliably and efficiently by using interchangeable parts. Crews has always admired the pioneers of industries, including Whitney and Thomas Edison, and he's proud that his hometown has been at the forefront of one industry after another, from guns and clocks to horse carriages and hardware. "Here in New Haven there's a long history of practical innovation—embracing technology and having an impact," he says.

In fact, Crews is cut from the same cloth as Whitney and Edison. He is not only a leading medical science researcher, but also an entrepreneur. Arvinas, the company he started four years ago, uses ideas from his lab to develop therapies for treating cancer. Crews also helps other Yale researchers—and their inventions—make the journey from the lab to the marketplace.

The manufacturing industries of New Haven's past have faded or disappeared, and today's primary drivers of the local economy are Yale University and Yale New Haven Hospital. Together, they employ more than 24,000 people. But for years, leaders at Yale and the city have encouraged the rise of a new industry, biotech, to stimulate job growth and economic dynamism. And, since medical science research is the essential ingredient for fostering a biotech industry, and health care is essential for a high quality of life, they see Yale School of Medicine at the center of things. "We want to create a seamless economy of health care, and over a 60-year period the city has had a series of successful strategic plans to accomplish this, to link innovation to commerce, and the city and the medical campus to

downtown," says Matthew Nemerson, M.P.P.M. '81, New Haven's economic development administrator who started his career in the city in 1983 as the first head of development for Science Park.

New Haven's biotech community has seen fits and starts, but today it is achieving critical mass. Upwards of 50 biotech and medical device companies employ more than 5,000 people in greater New Haven. Venture capital firms and large pharmaceutical companies have invested more than \$700 million in startups—and these startups have attracted another \$5 billion in equity investments. Yale, the state, and the city have established programs aimed at helping student and faculty inventors become entrepreneurs. And New Haven itself has become a more attractive place for young scientists and engineers to live. More than 2,000 housing units have been built or renovated in or near the downtown area in the past decade, so people can walk to the city's abundant museums, theaters, pubs, cafés, and restaurants.

Optimism is on the rise. More than 300 entrepreneurs, faculty members, students, investors, real estate developers, government officials, and Yale administrators turned out for the Dec. 13 holiday party of Connecticut United for Research Excellence (CURE), the bioscience industry's advocacy group. CURE president Susan Froshauer, Ph.D., FW '89, an entrepreneur-in-residence at Yale's Office of Cooperative Research where she's working on two Yale startups, later said that "the energy was the best I've seen. People were effervescent with hope."

Challenges remain, however. Growing biotech companies have insatiable appetites for laboratory space. Tweed New Haven Airport needs an upgrade to make it easier for venture capitalists and pharma company executives to get to the city. New Haven still has an image as a crime-ridden city, a reputation that could deter scientists from moving here. And then there's government funding. If politics and budget pressures reduce funding of basic research at Yale, the biotech engine will sputter.

For New Haven's biotech industry to grow and prosper, more collaboration is required involving Yale, the state, and city governments, real estate developers, local schools, venture capitalists, and educational leaders, says William Ginsberg, president of the Greater New Haven Foundation and a member of the board of Yale New Haven Hospital. "I'd like to see a very clear leadership strategy for the entire community," says Ginsberg, who first envisioned a biotech industry emerging here when he was the city's economic development director in the 1980s.

Nothing embodies the coming of age of New Haven's biotech industry more than the shiny new 14-story tower at 100 College Street with the name "Alexion" emblazoned across the front. Former faculty member Leonard Bell, M.D. '84, launched Alexion Pharmaceuticals in Science Park 25 years ago—based on his research at Yale. The company develops drugs for combating very rare diseases. He left the university to become the company's CEO, and only recently retired. Alexion quit New Haven for Cheshire, a suburb 17 miles to the north, 15 years ago, but when it needed to grow again and was lured by government incentives, it returned to its roots in 2016. Approximately 1,000 people work at the global headquarters in New Haven and Alexion expects to continue to grow in Connecticut. "New Haven is a changed place," Bell explains. "And we believe our success and our presence here will be great for Yale, for the community, and for people who want to locate here."

The building at 100 College Street spans Route 34, so it bridges New Haven's downtown and the medical school and hospital. The crossroads location brings new attention to the shared interests that bind town and gown. No one is more aware of that interplay than Robert J. Alpern, M.D., dean of the School of Medicine and Ensign Professor of Medicine. And while he believes that the most important thing the medical school can provide for New Haven is outstanding medical care, he's also attuned to the benefits that come from research funneling into local startups.

But rather than abandoning their labs to become entrepreneurs, Alpern says it's preferable to stay in the lab and advise the biotech companies that license inventions and take them to market.

Craig Crews provides a model for that approach. Like 100 College Street, Crews is a bridge between the university and the business community. He spans the two worlds, but he still lives in the lab.

FOCUSING ON IMPACT

For bioscience innovations to have a major impact on society, there are two essential elements: great ideas and great ambitions. Crews has both.

He joined the Yale faculty in 1995 at a time when deep explorations of the interface between chemistry and biology were just beginning. (He's now the Lewis B. Cullman

Professor of Molecular, Cellular, and Developmental Biology, with appointments in the departments of chemistry and pharmacology.) Soon after he established his lab, Crews hit on the big idea that has shaped much of the work since then. At the time, scientists were exploring the use of chemicals from nature as models for developing cancer-killing therapies. Crews and the team studied natural compounds, and armed with those findings, tweaked the human body's ubiquitin/protease system to attack diseases at the cellular level. They created synthetic compounds that mimic nature, searching for those that would block harmful proteins or dispose of them with minimal side effects. And they struck gold.

The science harnesses the human body's system for routinely targeting damaged proteins and breaking them down into small peptides and then into amino acids for reuse. Crews and his team developed a technology they call Proteolysis-Targeting Chimeras (PROTAC), which tags harmful proteins so they will be degraded by the proteasome—the body's quality control system. Crews calls this a "seek-and-destroy mission."

These days, Crews says, the most exciting project at the lab is an effort to use PROTAC technology to degrade kinases, enzymes that play a key role in cell growth and metabolism. PROTAC uses the characteristics of kinases to remove disease-causing proteins. As a result, PROTAC-based drugs may well outperform current drugs for attacking a wide range of diseases.

On a Monday morning in March, Crews took his seat at the head of a table for his lab's weekly meeting in a conference room on the 12th floor of Kline Biology Tower. About 20 students and researchers sat on chairs around the periphery as Saul Jaime-Figueroa, Ph.D., a research associate scientist, discussed the ability of a family of PROTACS to degrade kinases. Crews peppered him with friendly but probing questions. Finally, pleased with the team's progress, he reminded them of a core belief: "When you do anything with commercial potential, we owe it to you guys and to Yale to file for patents."

BUILDING COMPANIES

In popular mythology, bright young scientists with big ideas raise capital, launch startups, and become the CEO. That's Leonard Bell's story. And today, Bell and Alexion provide inspiration for other Yale medical researchers: become an entrepreneur, run a company, and maybe become rich in the process. But because the skills and mindset of research and business are so different, it's the rare scientist who can make the transition to running a successful startup company.

Fortunately, there are alternative paths for researchers who want to shepherd their discoveries from the lab to the clinic. For one thing, they can launch companies, hand them over to professional managers, and take part-time science advisory roles. That was Crews' route, first with a company called Proteolix, and now with Arvinas.

In recent years, the business model for developing new therapies has undergone a dramatic upheaval. Previously, most large pharmaceutical firms typically developed drugs from scratch, guided them through regulatory approvals, and took them to market. Now, these companies increasingly leave much of the exploratory work to research-based startups, then buy companies or their intellectual property after ensuring that the drugs have a good chance of passing muster with regulators.

The industry shift makes the relationships between academic inventors and startups even more important. As Arvinas' chief scientific advisor, Crews participates in a 90-minute review every Tuesday morning, where he gives feedback on new directions for research. (Arvinas, headquartered in Science Park at Yale, is a 10-minute walk from his lab.) Arvinas has two therapies that it hopes to put into clinical trials next year—oral treatments for breast and prostate cancer—but the company is now looking at other diseases.

Crews is also the company's "storyteller," according to Sean Cassidy, Arvinas' chief financial officer. At a biotech industry conference in January 2017, Crews explained PROTAC to potential business partners in speed-dating briefings that lasted from morning until night. According to John Houston, Arvinas' president of R&D, Crews' presentations were instrumental in piquing the interest of several large companies, which are now talking to Arvinas about forging partnerships.

The company already has drug development deals with two industry giants, Genentech and Merck, which have committed to investing more than \$700 million. Those partnerships prompted Arvinas to boost hiring, and the company considered leaving New Haven. "We were busting at the seams," says CFO Cassidy. Instead, they expanded into adjacent space in Science Park.

Another alternative to the quit-the-university route for researchers is taking advisory roles with one or more startups. Many biotech companies have advisory

boards, but another inventor with close ties to Yale has gone a step further by including academic researchers as key players in the companies he starts.

Jonathan Rothberg, Ph.D. '91, professor (adjunct) of genetics, was one of the pioneers of next-generation gene sequencing. Last year, Rothberg received the National Medal of Technology and Innovation from President Obama for this achievement. At his Guilford-based startup incubator, 4Catalyzer, each of his four new companies leverages genetics and advances in artificial intelligence to develop drug therapies and medical devices. And each of them benefits from a scientific advisory council that includes faculty from Yale and other elite institutions. The researchers and clinicians help identify new therapies, help design them, and in some cases, help test them in clinical trials.

One of the new companies, LAM Therapeutics, has two drugs in clinical trials. The company was co-founded by Yale geneticist Tian Xu, Ph.D., the C.N.H. Long Professor of Genetics and professor of neuroscience at Yale, and is based on technologies invented in his lab. Xu plays an active role as an advisor.

A SUPPORT SYSTEM FOR ENTREPRENEURS

Qin Yan, Ph.D., associate professor of pathology and director of the pathology department's epigenetics program, dreams of following in Crews' footsteps and starting a company to take his ideas into clinical practice. Yan knows biology, but he doesn't know how to be an entrepreneur. Fortunately, he's getting a lot of support from Yale—and mentorship from Crews—to help him find his way.

Several years ago the university, with financial backing from the state, established the Yale Center for Molecular Discovery on its West Campus. There, a dozen chemists, biologists, and computer scientists test compounds developed by Yale and University of Connecticut researchers, for their potential as therapies. The idea is that by using this process, researchers can more quickly identify valuable molecules. That way, the researchers can focus on their work and gather the evidence they need to win backing from venture capitalists.

Crews, who was involved in setting up the center, saw that such would-be entrepreneurs as Yan needed more help, so last year he created a companion program, called PITCH, to guide faculty members toward success in biotech. Advisors help researchers draft business plans and craft their pitches to investors.

Yan says PITCH has given him confidence. "If all goes well," says Yan, "we hope to form the company next year."

The Center for Molecular Discovery, the PITCH program, and the Blavatnik Fund for Innovation at Yale, a \$10 million grant from the Blavatnik Family Foundation aimed at fostering entrepreneurship in the life sciences, are three elements of a broader biotech agenda shared by Yale, the state, and the city. Some real estate developers are deeply involved, too. For instance, Winstanley Enterprises not only developed 100 College Street but also contributed \$100,000 toward a new city partnership with Southern Connecticut State University to guide more residents into bioscience careers.

For Yale, the focus on technology transfer and local entrepreneurship began with former Yale President Richard Levin in the mid-1990s. He believed that Yale needed to engage more in the local economy. Between 2006 and 2016, 233 medical school faculty members were awarded patents—many of which have been licensed to businesses. During the past 15 years, Yale’s Office of Cooperative Research (OCR) has helped launch an average of four to five local, venture-backed startups per year. To date, more than 50 startups based on Yale intellectual property have raised more than \$700 million in venture capital.

OCR and its companion program, the Yale Entrepreneurial Institute, run a wide variety of programs aimed at helping students and faculty establish companies. They make investments in startups and manage the Blavatnik Fund. They also introduce faculty to venture capitalists. The most recent major success: Lieping Chen, M.D., Ph.D., the United Technologies Corporation Professor in Cancer Research, raised \$67 million last year for his startup NextCure. It was the largest initial funding ever for a New Haven-area biotech company. “We’re helping to create a density of interactions—people bumping into each other,” says Jon Soderstrom, Ph.D., managing director of OCR. “You have to have molecules bouncing off each other, because that’s how you create bonds.”

Yale supports other programs aimed at promoting entrepreneurship. For instance, its Center for Biomedical and Interventional Technology, with partial funding from the state, brings together engineers, scientists, clinicians, and entrepreneurs to develop novel approaches to address unmet health care needs. In January, about 200 aspiring entrepreneurs participated in its Healthcare Hackathon. The winner was a

smartphone app that reads the facial expressions of military veterans at risk for post-traumatic stress disorder and alerts others if they show distress.

What’s in it for Yale? Not only does the university collect revenues from its patents (\$8.3 million last fiscal year), but the potential for faculty researchers to participate in the startup economy is a major plus for recruitment and retention. Also, many students want to explore entrepreneurship in parallel with their studies. Rothberg, the gene-sequencing pioneer, urges the university to brand itself as an incubator for entrepreneurship, which could strengthen both the university and the community. “We have a huge competitive advantage because of the medical school and the life sciences,” he says.

For New Haven, the biotech cluster represents the best opportunity for fostering a startup economy—and creating both scientific and supporting jobs. That’s why the city has made redeveloping the land between downtown and the medical school a top priority. Alexion’s headquarters is part of a much larger initiative, Downtown Crossing, which is aimed at adding new office, residential, and laboratory space, and increasing pedestrian traffic along the Route 34 corridor. The Route 34 highway project in the 1950s cut the city in half. Now government, Yale, and the business community are knitting it back together.

For now, most of the trend lines are positive, and the people who are intent on building a flourishing biotech community in New Haven see a path forward. They speak of making the entire bioscience innovation chain, from lab to marketplace, more “systematic.” The process of inventing in the academic laboratory must become faster—partly with the help of computer simulation, artificial intelligence, and data analytics. Scientists and engineers with great ideas must learn to be entrepreneurs. And ideas, capital, talent, and lab space must be brought together more efficiently.

To Crews, New Haven possesses a historic opportunity to create a competitive advantage over other places. “The process of moving science into the marketplace can’t be ad hoc. You have to fill the pipeline in a systematic way,” he says. “It’s like Eli Whitney and interchangeable parts, or Edison harnessing creativity on an industrial scale. We have to do the same—filling the innovation gap in the pharmaceutical industry and accelerating the founding of biotech companies.” [/yale medicine](#)

Steve Hamm is a managing editor at the YSM Office of Communications.



Caring for New Haven's refugees

Medical students help refugees navigate the health care system.

BY JOHN CURTIS

IN THE FALL OF 2016, Tara Torabi met her first patient over the phone, a woman in her 30s with a muscle weakness that has stymied doctors. Since then Torabi has called her patient on the phone every week to check in and make sure she has transportation to her appointments and is taking her medications. Sometimes she calls just to make sure she's OK.

When she calls, there's always a third person on the line, an interpreter fluent in English and Arabic. The patient is a refugee from Iraq, and Torabi is a first-year medical student serving as her patient navigator.

Torabi is one of 18 medical students participating in the second year of a program that pairs them with patients from the School of Medicine's refugee clinic for adults. The refugees, mostly from Afghanistan, Iraq,

Syria, and Sudan, are referred through New Haven's Integrated Refugee & Immigrant Services (IRIS), the largest of Connecticut's three resettlement agencies.

"I have always felt that service is important," said Torabi, who came with her family from Iran at the age of three and knows what it's like to arrive in a strange country. "By participating in service activities, you really feel more connected to the community. It is an integral part of your education."

The clinic (there's another one for children) started about 10 years ago when a resident at Yale New Haven Hospital, herself an immigrant from Iraq, saw a need for services geared toward refugees. Two years ago, residents and medical students launched a pilot program to help patients navigate what can be a complex

health care system. All refugees go through a health vetting before they enter the United States, but they also need a domestic vetting on arrival. The screenings check for tuberculosis and other diseases, and ensure that the patients have been vaccinated. “The idea is not to keep them from entering the country,” says Ani Annamalai, M.D., assistant professor of psychiatry and of internal medicine, and director of the clinic, “but to get them the necessary treatment.”

Many patients, said Amir Mohareb, M.D., HS '17, are also at risk of post-traumatic stress disorder. “Even the most resilient refugees end up struggling to assimilate here,” said Mohareb, the resident leader for the program. “There is some level of psychological distress in every refugee.”

The clinic sees up to 250 families each year, about five patient visits each week. After their screening for medical conditions, the families are integrated into the health care system. That’s where the patient navigators enter the picture. Since the pilot program was launched in 2015, it has grown from 10 student volunteers to 18. Paul Bourdillon, a third-year medical student and one of the program’s two coordinators, said that it provides a clinical experience for “preclinical students who haven’t had much patient contact, but have some medical knowledge and some understanding of the way the medical system works.” The patient navigators, added Amandine Godier-Furnemont, a second-year student and the other program coordinator, serve as “a bridge between physicians and patients.”

Chris George, the director of IRIS, said that the relationship with Yale has made his organization the envy of other resettlement groups around the country—New Haven has a world-class medical center with staff dedicated to helping refugees on a regular basis. The resettlement process helps families find jobs, learn English, find their way around the city, find apartments, and learn about health through nutrition and wellness classes. IRIS also refers patients to the refugee clinic.

Last year, IRIS went from resettling about 240 people per year to 530. “The world was facing the largest refugee crisis ever,” George says.

Among the families resettled last year was Torabi’s patient, who came with her mother, husband, and children. The first time Torabi met her patient in

person was at a medical appointment in January. “It was slightly awkward because the translator wasn’t there,” Torabi says. “It was difficult to connect, but there are other ways to communicate. You can smile and touch their shoulder.”

Her patient, Torabi said, was grateful for her presence. “Just showing up is important. Just showing someone that you care about them is meaningful, even if it seems like a small thing.”

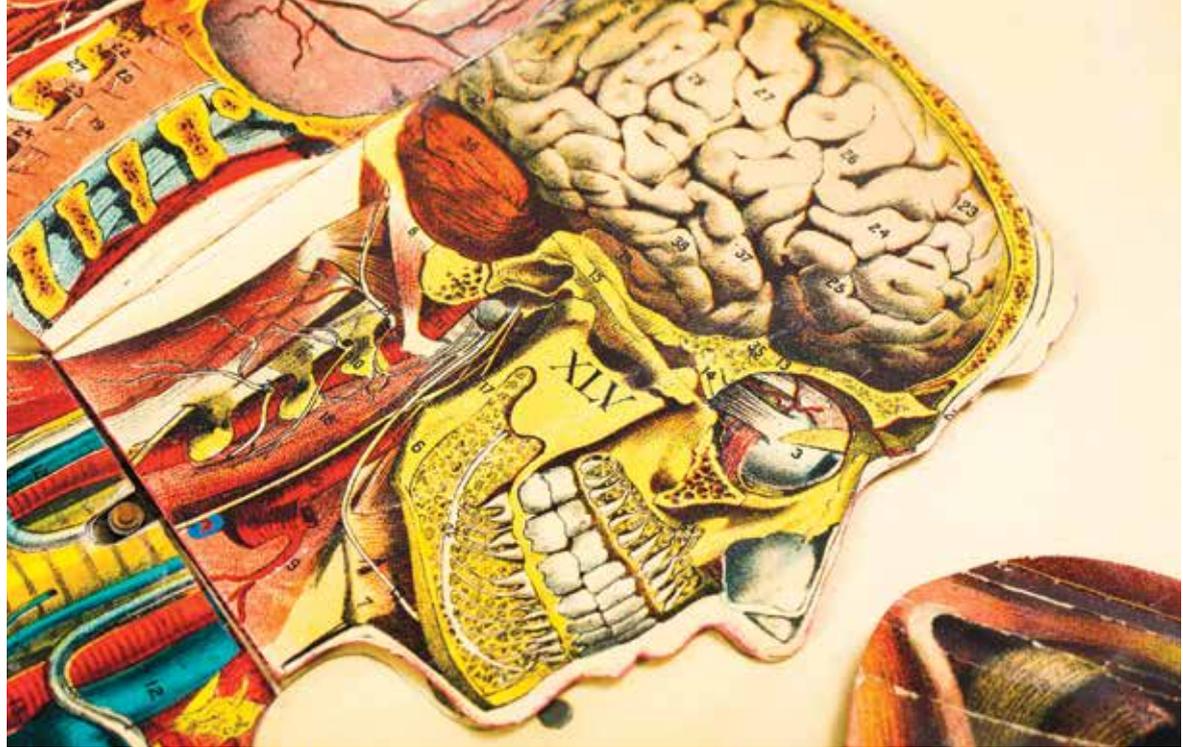
Torabi helped her patient arrange an appointment with a neurologist to investigate the muscle weakness that required her to use a wheelchair. When she learned that her patient’s wheelchair had broken and that she was sharing one with her mother, Torabi pressed the primary care doctor for a prescription for a new one.

“This experience has sustained me and reminded me of why you enter med school in the first place,” Torabi says, “to help people.” [/yale medicine](#)

John Curtis is the editor of Yale Medicine.



Last year two medical students, at left, Tara Torabi, and Paul Bourdillon, were part of a patient navigator program to help newly arrived refugees find their way through a complex health care system. The two physicians at right, Amir Mohareb, a resident in internal medicine, and Aniyizhai Annamalai, an assistant professor of medicine and psychiatry, run the refugee clinic.



Like dissection, but without the mess

In 2016 the Historical Library acquired an 1891 deluxe German edition of *White's Physiological Manikin*, a lift-the-flap anatomy first published in 1886. In its day, it was the state of the art for instruction in anatomy.

A life-size “lift-the-flap” model of the human form joins the medical library’s collection.

By Ashley P. Taylor

One of the newest acquisitions in the Medical Historical Library is in an elegant wooden case, about 3 feet on each side, that opens to reveal a paper model of a 5-foot-9-inch naked man with brown hair, blue eyes, and rosy cheeks. The case is a “deluxe” German edition of *White's Physiological Manikin*, a flap anatomy designed by author and publisher James T. White in 1886.

Melissa Grafe, Ph.D., the John R. Bumstead

Librarian for Medical History and head of the Medical Historical Library, spotted the manikin, titled *Dr. Franke's Phantom*, among the online offerings from a British dealer last October and knew that it belonged in Yale's collection. The Cushing/Whitney Medical Library already had a strong collection of anatomical books, Grafe said, thanks in large part to library namesake and neurosurgeon Harvey Cushing, M.D., who collected them. But *Dr. Franke's Phantom* is not your typical anatomical volume. It's a flap, or lift-the-flap anatomy, in which each layer of

tissue or paper flap can be lifted to reveal the layer underneath. The manikin's multiple layers of flaps represent muscle, bone, and organs all the way down to the spinal cord. Prior to the new purchase, which arrived at Yale in November 2016, the library had several flap anatomies already, but the new addition is the largest among them. “There's nothing like this in the collection itself; there's just nothing to compare,” Grafe said.

According to Grafe, flap anatomies, which date back to the 16th century, gave medical students and interested laypeople a simulation of dissecting a three-dimensional body—without the mess of a cadaver. *Dr. Franke's Phantom*, which can hang on the wall, was likely used in its day for traveling lectures, in doctors' offices, and in anatomy classrooms, Grafe said. “You can just imagine people looking at this—and it's life-size—walking up to it and being amazed at the complexity of the human body,” Grafe said.

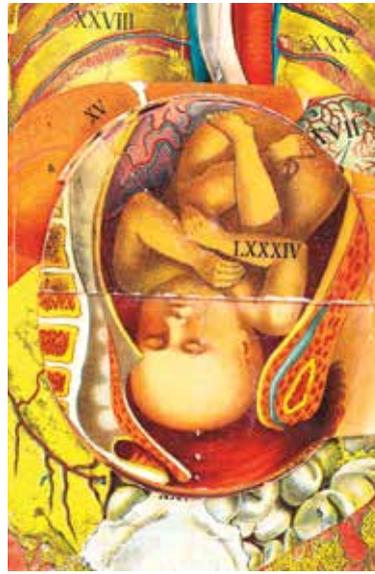


White's manikin bears a stamp of medical approval from Frank H. Hamilton, M.D., one of four physicians who attended to President James A. Garfield after he was shot in 1881; the name *Dr. Franke's Phantom* likely refers to Hamilton, Grafe said. The German edition is considered deluxe, Grafe said, because underneath its male exterior, it contains flaps for both male and female genitalia, plus a womb and a fetus inside. Additional flaps illustrate the positions of hands and forceps during delivery.

Anyone at Yale, as well as outside researchers, can request to use the manikin at the Medical Historical Library. By the end of its first month at Yale, a

student had already used the manikin to research a paper about flap anatomies, and Grafe had displayed it for the Society of Clinical Surgery's 2016 annual meeting at the School of Medicine. "We can envision all kinds of uses for this," Grafe said.

The manikin is unlikely to appear, however, in the anatomy classroom: Outside the anatomy lab, Yale medical students use a computer resource available at the medical library called VH Dissector Pro, which Grafe describes as "the modern equivalent of lift-the-flap," which allows students to rotate structures in space. But alongside contemporary tools, flap anatomies retain their places in libraries due to their historical value. They even have an Instagram presence: Look for #flapbookfriday.



FAR LEFT The manikin's flaps can be lifted like pages in a book to reveal muscle, bone, and organs beneath the skin. This image depicts a surgeon's scalpel cutting through skin on the leg.

LEFT Although ostensibly a 5-foot-9-inch male, the manikin includes, underneath several flaps, a womb and fetus. It also includes both male and female genitalia.

BELOW The flaps lift up to reveal successive layers of the human body, right down to the brain, skeleton, and central nervous system.





Starting from scratch

LONG BEFORE “PATIENT-CENTERED CARE” was common parlance in the medical profession, Bonita Stanton, M.D. ’76, was practicing it in the slums of Dhaka, Bangladesh. A staff scientist and director of the urban volunteer program at the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) in the 1980s, Stanton organized poor, mostly illiterate village women as research assistants in a case-control study that led to significant reductions in diarrhea among village children.

“It didn’t take much to realize that I couldn’t design the study,” said Stanton. “The women *had* to help me because I didn’t know anything about their culture and their circumstances.” So Stanton put them on her team.

Throughout her career, Stanton has relied on teamwork to face challenges outside her comfort zone. When she returned from Bangladesh in

the late 1980s at the height of the rise of the HIV epidemic, she harnessed the expertise of inner-city Baltimore youth and recreation center directors to devise a program for preventing risky sexual behaviors. She brings that collaborative spirit to her latest endeavor as founding dean of Seton Hall University-Hackensack Meridian School of Medicine, the first private medical school in New Jersey, which is set to open in the summer of 2018.

“It really matters to be able to collect the right people in your

cabinet,” Stanton said of starting a medical school from scratch. The pediatrician and infectious disease specialist has hired most of her cabinet, and department chairs have also been appointed. Leadership of the fledgling medical school is now hiring faculty members to add to the many who will come from within Seton Hall University and Hackensack Meridian Health, an integrated health care system in New Jersey.

The 55 students of the new school’s inaugural class will study in the research facility that once housed Swiss pharmaceutical company Hoffmann-La Roche. The six-story building that straddles the New Jersey town of Nutley and the city of Clifton is already steeped in medical history—Valium and interferon were discovered there.

The curriculum, which will prepare future doctors to pursue any medical specialty, is currently a work in progress. Stanton’s cabinet and about 150 Seton Hall faculty members, including basic scientists, physician and non-physician health care professionals, lawyers, social workers, and communications experts, are developing a course of study that reflects the school’s vision: “Each person in New Jersey, and in the U.S., regardless of race or socioeconomic status, will enjoy the highest levels of wellness in an economically and behaviorally sustainable fashion.”

The vision embodies the values of Stanton’s career, which



Since graduating from the School of Medicine in 1976, Bonita Stanton has fought diarrhea in Bangladesh and devised programs to prevent risky sex in Baltimore. Now she's the founding dean of the Seton Hall University-Hackensack Meridian School of Medicine, the first private medical school in New Jersey.

she has spent combating health disparities and caring for the disenfranchised. Stanton has taken adaptations of the HIV prevention program she created in Baltimore to China, Namibia, and Vietnam, among other countries in Africa and Asia. Concurrent with her position at icddr,b, she was a maternal and child health specialist at the World Bank.

“It’s all about servant leadership: serving people and working together to find the best way to serve,” she said. “That belief is at Seton Hall University’s core,

and it really aligns with how I see medicine as well.”

To realize the school’s vision of equal access to care for all at a reasonable cost, Stanton again points to the importance of teams. The new medical school’s curriculum will emphasize collaborative learning and collaborative care—the College of Nursing and School of Health and Medical Sciences at Seton Hall will move

there from their current location in South Orange. “Part of the reason for the high cost of care is that we have not been skilled in working as a team with our professional counterparts across disciplines,” said Stanton, referring to nursing, occupational and physical therapy, and related fields. “We must learn very early on to deliver care in a team, and the best way to do that is to be trained that way.”

The curriculum will also stress appropriate use of care settings, from doctors’ offices to hospitals—another means



ONLINE EXCLUSIVE

Vivek Murthy, M.D. '03, M.B.A. '03, out as Surgeon General

Just over two years into his four-year term, Murthy was removed from his post as Surgeon General. He was asked to resign after assisting with the transition to the administration of President Donald Trump.

For full story, visit medicine.yale.edu/murthy.

of making care more efficient and affordable.

Establishing the mission and vision for the school, said Stanton, is a critical challenge in starting a medical school. “The mission and vision define the entire fabric and constitution of the school. But this critical challenge is also what makes the opportunity to start a school so wonderful: You start with a blank slate.”

Stanton relishes the opportunity to start from scratch, she said, because it gives her the opportunity to make her own mistakes rather than be restricted by the past mistakes of others. She gives the School of Medicine much of the credit for her comfort with uncharted territory.

“Yale Med’s educational format made it so much more likely that its graduates could step into a situation (such as starting a new medical school) with few guide rails or established paths and design the best routes for our purposes,” Stanton said. “At Yale we weren’t studying for grades because there were no grades. We were studying to learn.”

—Sonya Collins



A polymath’s perpetual adventures

Michael Singer, Ph.D. '00, M.D. '02, is a self-described “serial entrepreneur” who has co-founded not one but several health- and medicine-related companies. Accordingly, his claim to fame is not a single accomplishment, but rather the

diversity of his skills and interests. At both Yale College and the School of Medicine, he excelled in neuroscience, medicine, and art history; developed a love for travel; and studied multiple languages. Former professors laud his intellect and accomplishments. But on top of all that, they mention something else. “He’s also such a nice guy,” said Singer’s mentor, Gordon M. Shepherd, M.D., D.Phil., professor of neuroscience, “When you combine that with his unbounded curiosity and abilities, I think it made for a wonderful basis for doing what he’s done.”

Singer grew up in DuBois, a resource-poor town in western Pennsylvania. Childhood asthma motivated him to pursue medicine, and he applied to Yale College because it was ranked first in *U.S. News & World Report*, a decision he describes as being “right for the wrong reasons.”

At Yale College, Singer needed a work-study job, and during his sophomore year spotted two postings related to biology on the post office bulletin board: one to wash glassware and do cell-culture work, one to work in Shepherd’s lab doing computer modeling of how odor molecules interact with neuronal receptors. He jotted down the first number and went back to his room to call, only to find the post had been filled. “So there I was: It was pouring rain outside, and I decided that I should go back to the post office.” He called Shepherd’s lab, got the job, worked there

as an undergraduate, then did his Ph.D. there, writing a thesis whose title was “almost exactly the job description that I had found in the post office.”

Shepherd became more than a scientific mentor. He also “got me exposed to the rest of the world,” Singer said, facilitating trips to work with collaborators in Germany, Brazil, and Israel.

Though his studies focused on science and medicine, science was by no means all Singer did. During his senior year, he studied Mayan art with Mary Miller, M.A. '78, Ph.D. '81, Sterling Professor of History of Art, and senior director of the Institute for the Preservation of Cultural Heritage. “The course involved Mary taking us around and looking at these pots in the museum,” Singer recalls. “What a great way to spend your time in a course at Yale.” Miller encouraged Singer to pursue art history, Shepherd remembered. “It was fun to think that I was competing with the art world for Mike’s abilities,” he said.

During Singer’s M.D./Ph.D. program—which he completed in just seven years—he continued to branch out, studying Hindi, Spanish, Portuguese, archeology, and parasitology. He went to Pakistan on a Downs Fellowship, where he studied the epidemiology of childhood injuries. In preparation for that trip, he studied yet another language, Urdu.

During his medicine internship at Brigham and Women’s



Hospital in Boston, a patient with severe asthma attacks told Singer that his inhaler, which he had been overusing, was empty. If physicians knew when a patient's inhaler was being heavily used and when that patient was having breathing problems, Singer theorized, perhaps they could predict and avert asthma attacks. Singer's first invention was a "smart" inhaler that uses cellular technology to tell a physician how much the inhaler is being used. During Singer's residency in the Harvard ophthalmology

program he met his wife, Baharak Asefzadeh, O.D., M.S.

He went on to launch HealthHonors Corporation, which creates behavioral economics software to encourage people to make healthful choices. He sold that company to Healthways in 2009. Later, he founded Topokine Therapeutics, which developed topical treatments to reduce fat in undereye bags. Topokine was sold to Allergan in 2016.

His next endeavor is Cartesian Therapeutics, which develops cancer therapies.

His Yale education, Singer said, encouraged the interests that have led to business success (not to mention personal enjoyment). "The faculty don't want you to focus too much on any one thing," he said. "I think that attitude is what puts you in a position to explore new opportunities as an adult. I haven't had a career to speak of, really; I just keep on moving from one interesting adventure to the next."

—Ashley P. Taylor

As a Yale undergrad, Michael Singer was torn between art history and medicine. He entered the M.D./Ph.D. program and since his graduation in 2002 has launched several companies that make therapeutic devices and software.

Linda Mayes' journey to leading the Child Study Center



watch an interview
with Linda Mayes at
yalemedicine.yale.edu/mayes

WHILE TRAINING AS A NEONATOLOGIST at Vanderbilt University Medical Center in Nashville, Linda C. Mayes, M.D., FW '85, cared for preterm infants born to rural families in her home state of Tennessee. Some babies weighed barely two pounds. "Seeing families come to grips with having to send their 800-gram baby many miles away taught me a lot about the complex systems of health care for seriously ill children and their families," said Mayes, director of Yale's Child Study Center.

Determined to better understand infant and child development, Mayes arrived at Yale in 1982 for a second fellowship in pediatric clinical research. She planned to return to Tennessee to care for preterm children and their families. Instead, she stayed in New Haven, where she was mentored by renowned psychologists and behavioral and developmental pediatricians.

Mayes, now the Arnold Gesell Professor of Child Psychiatry, Pediatrics, and Psychology, runs a behavioral neuroscience laboratory that has followed children and their families over 20 years. She has also developed interventions for at-risk families.

With colleagues across the pond, Mayes helped establish the Yale–University College London master's program in developmental neuroscience and psychopathology. Since 2007, she's served as special advisor to Dean Robert J. Alpern, M.D.,

Ensign Professor of Medicine. She continues to serve as principal or co-investigator on multiple clinical trials, including one on the neural circuitry of mothers who have abused cocaine. In 2016, she was named director of the 106-year-old Child Study Center.

Since her appointment, Mayes has met with researchers and physicians across the school to build interdepartmental collaborations among the center's 25 disciplines with a focus on improved mental health care for children and families. "The most rewarding part of my job now is bringing people together and capturing their excitement around what we could do, where we could go—to try and imagine the Child Study Center 10 and 20 years from now."

How has our understanding of child development and child mental health evolved?

We now have a far better understanding of how life experience can affect genetic regulation. We know that early trauma and adversity shape the emerging brain and have lifelong implications not just for physical health but also for well-being, mental health, and overall life success. The old metaphors of nature versus nurture are completely outdated. We take a lifespan perspective and attempt to understand how childhood events carry into adulthood and potentially into the next generations as children become adults and raise their own children.

What are some of the center's major achievements in research? The center began under founding director Arnold Gesell, Ph.D., M.D. 1915, whose innovative idea was that a child's cognitive, social, and motor abilities unfold in a predictable and ordered way, as do physical growth and physiological capacities. The Child Study

Center was at the forefront of these early developmental ideas and helped shape prominent ideas around children's mental health in the 1960s and 1970s. By the 1980s, the center was leading the way in defining characteristics of childhood psychiatric disorders, including autism. In the 1990s, center researchers were conducting clinical trials on new pharmacological agents to treat childhood psychiatric disorders and beginning to investigate the genetic basis of these disorders. Today, we are at the forefront of understanding, for example, the neural basis of social development or how early childhood trauma can have a lifelong impact on key neural and immune systems.

How far along has the center's clinical restructuring progressed? We have begun to change our infrastructure so our clinicians work in what we are calling a group practice. We will be able to have more collaboration across

our specialty services and better cross-training for our fellows and our faculty. We are looking for one unified space to bring all of our services together, but even before we have that, we are designing our practice together and beginning to change the ways families are able to access our services.

The center has been a pioneer in developing community programs. How do these differ from other public programs? We distinguish ourselves by our range of our services—from providing specialty expertise around very specific childhood disorders such as autism, anxiety, Tourette's syndrome, and post-traumatic stress disorder in children, to providing in-home services and serving parents and moms in the community. In our portfolio of services, we address concerns across generations. For example, we are opening a parenting center called the Parent and Early Family Development Program. When an adult becomes a parent, there's an enormous amount of

development going on at the psychological level and at the brain level. We're interested in offering specific services to adults in their role as parents as these will positively impact their children.

These days it seems that kids are always staring into their mobile devices.

Do we know whether these habits will affect development? At this point, we don't really know. Never has the world of information been more accessible in such a rapid way to children. They will naturally gravitate toward and use technology. We do know that relationships are important for healthy brain development in children. Relationships open up and translate the world for children; for example, using the iPad to FaceTime with grandparents or uncle or aunt. Contextualizing the technology puts it inside relationships, which we know are absolutely essential for healthy development.

**{ To nominate a subject for Q&A, contact
Yale Medicine, 1 Church Street, Suite 300, New Haven, CT 06510 or email ymm@yale.edu**

Why sleep matters

By Cathy Shufro

Meir H. Kryger, M.D., was giving a morning lecture on sleep disorders when he spotted the physician who'd invited him to speak slouched in the front row, deep in slumber.

Kryger approached his host, woke him, and began to interview him. "I wanted my audience to learn how to ask questions about sleepiness," recalled Kryger, a professor of medicine (pulmonology) at the medical school. When Kryger asked, "Do you ever fall asleep while driving?" his host replied, "Doesn't everybody?"

"A lot of people don't appreciate that they have a symptom that can be really significant—and dangerous," said Kryger in an interview. (Sleepy drivers cause one in five car crashes.) To help readers recognize sleep disorders in themselves and in people around them, Kryger has written *The Mystery of Sleep: Why a Good Night's Rest Is Vital to a Better, Healthier Life*. The book discusses sleep-related phenomena, including sleep apnea, nightmares, sudden infant death, and restless legs syndrome. The book explains how to minimize

the harms of shift work, lists "the thirteen commandments for fighting insomnia," and outlines a plan for minimizing jet lag. Kryger also considers "secondhand sleep problems," addressing the travails of bedmates whose partners snore, grind their teeth, or fidget nonstop.

Like the doctor who snoozed during that lecture, Kryger said that many people don't recognize that drowsiness could signal a serious sleep disorder or even a disease such as cancer. And sometimes the signs aren't obvious: Falling asleep in a movie theater can suggest a sleep problem, but so can moodiness, memory lapses, or dreaming while half awake. Readers can rate the probability that they suffer from a disorder by using the book's modified Epworth Sleepiness Scale. For those who go on to seek medical advice, Kryger warns against speaking in generalities: Rather than saying, "I'm tired," patients

should specify changes in mood and behavior.

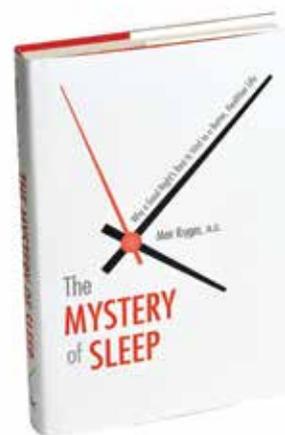
Women report more sleep problems than men do. In a National Sleep Foundation poll, 60 percent of the thousand women questioned said they slept well only a few nights per week. Kryger says women are often misdiagnosed, however; doctors conclude that they are depressed when their symptoms actually suggest a sleep disorder.

Women constitute about a third of the roughly 7.4 million Americans believed to have obstructive sleep apnea, in which blocked airways cause snoring and pauses in breathing during sleep. The condition can lead to heart disease and other serious illnesses. Although sleep apnea affects not only women but babies and children and even snub-nosed dogs such as Boston terriers, the stereotypical sleep apnea sufferer is an overweight older man. As a result, Kryger said, women with apnea are often misdiagnosed as suffering from depression. He called that "a failing of the medical-education system. Doctors do not know enough about sleep."

Undergraduates show a keen interest in the topic, however. When Kryger offered a class on sleep at Yale College last fall, more than 100 students vied for 18 spots. Similarly, undergraduates flock to Stanford's "Sleep and Dreams" course, where Kryger recently guest-lectured; the class has been taught since 1970, and former students include psychologist and Yale President Peter Salovey.

The Mystery of Sleep notes that President Barack Obama rarely got the seven to nine hours of sleep recommended for adults. Kryger quotes then-President Obama as saying that when his term ended, "I'm going to take three, four months where I just sleep." Kryger said that insufficient sleep can be risky in presidents, because it may cause irritability and impulsivity.

As for Kryger himself, he usually manages to get at least seven hours of sleep. He recommends heeding a colleague's caveat: "If you don't sleep, you don't dream."



{ Send notices of new books to
Yale Medicine, 1 Church Street, Suite 300, New Haven, CT 06510 or email yym@yale.edu

Fighting for Obamacare

SINCE THE ELECTION OF PRESIDENT DONALD TRUMP in November, medical students at Yale have joined with others around the country to support the Affordable Care Act (ACA). The Yale Healthcare Coalition held rallies, organized phone banks to contact politicians, wrote opinion pieces for their hometown newspapers, and met with Connecticut senators and representatives. Their elation when the Republican Congress failed to repeal the ACA in March turned to disappointment in May, when a replacement bill, the American Health Care Act, narrowly passed. The students vowed to continue fighting for health care for all. “It is important to remember,” said student Karrin Weisenthal, “that this isn’t an intellectual debate. There are real people and real lives that are going to be paying the price of this vote.”

On Jan. 9 medical students gathered on the steps of the Sterling Hall of Medicine to take part in a national moment of silence in support of the ACA.

—John Curtis

