

PENN Medicine

MILLENNIALS IN MEDICINE

Accelerating Shifts in the Culture
of Academic Work and Life
Creativity Makes a Comeback

Plus: A Quiet Inventor's Untold Stories



Photos by Daniel Burke

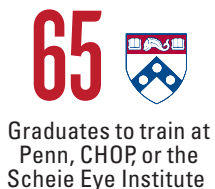


Reason to Cheer

Perelman School of Medicine students and their loved ones shared tears of joy, shouts of jubilation, hugs, and high fives underneath the coffered dome of the Penn Museum on March 17 as they discovered where they would be spending the next three or more years of their careers. During the annual Match Day ceremony, students' names are pulled from a basket as they are called up one by one to receive a letter telling them where they have matched. Some chose to tear open the envelope immediately, while others found a quiet corner to learn their fate before rushing back into the auditorium to celebrate. According to the National Resident Matching Program, Match Day 2017 was largest ever, with 31,757 residency positions up for grabs nationwide.



What's Next for the Class of 2017?



3
TOP
Specialties:





12

DEPARTMENTS

- Left THE PREP**
Reason to Cheer
- 2 VITAL SIGNS**
\$1.5 Billion Hospital Pavilion Announced
- 10 MEDICINE PLUS**
Funk Rock Doc-to-Be
- 38 DEVELOPMENT MATTERS**
Penn Medicine's "High Society"
- 40 ALUMNI NEWS**
Progress Notes and Obituaries
- 44 EDITOR'S NOTE**
A Generation Poised to Thrive in This Changing World
- 45 FUTURE PROGNOSIS**
Radiation Research Near and Far, Far Out

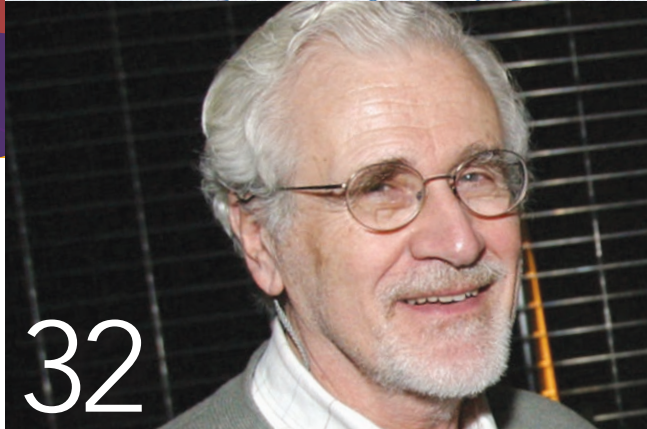
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SPRING/SUMMER 2017 / VOLUME XXVIII NUMBER 2

12 Medical Careers for the Millennial Generation

By Christina Hernandez Sherwood

A new generation's changing expectations of how to balance work and life, combined with new technologies, may be shifting the culture of work in academic medicine—for everyone.

24 Meet the Modern Medical Polymaths

By Rob Press

Medicine has been long intertwined with the arts. Today's younger physicians are embracing that connection, from anatomical drawing to podcasting.

32 A Quietly Instrumental Figure

By Rachel Ewing

An unassuming inventor in Interventional Radiology at Penn, Constantin Cope, MD, was the creative mind behind countless tools and techniques used by medical professionals worldwide.

About the cover: The smiling faces on the cover of this issue include Perelman School of Medicine students, residents, and early-career faculty who are featured in the pages within. In addition, the cover celebrates the happy moment as the class of 2017 celebrated at this year's Match Day. See more at left.

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A “Future-Proof” Hospital Breaks Ground in the Sky



Penn Medicine’s \$1.5 billion new inpatient facility will be Penn’s largest capital project ever, and a model of modern health-care building design.

Anyone who has spent much time at the Hospital of the University of Pennsylvania (HUP) has probably noticed a few things: One is that it’s a world-class health-care facility, providing advanced care and pioneering new treatments for patients with some of the most complex and severe illnesses seen anywhere. Equally apparent is that the hospital building itself is a maze. HUP is in fact a warren of multiple interconnected buildings that were added over changing eras. Though the original 1874 University Gothic-style building (similar to Penn’s College Hall) was demolished in the 1940s, today’s structure includes add-ons from the longstanding Gibson building (built 1883), through Maloney (1929), Gates (1954), Ravdin (1962), Founders (1987), and many

more. Modern, cutting-edge health care is delivered remarkably well in these retrofitted and multiply-modernized spaces.

For HUP’s next chapter, Penn Medicine’s leaders are planning ahead to meet the changing needs of the future of health care—by building an ambitious new facility designed to accommodate new technologies and models of care that haven’t been imagined yet.

The Pavilion, HUP’s new inpatient facility, was formally announced in May at a ceremony held in the Henry A. Jordan M’62 Medical Education Center overlooking the building site—an occasion described by Penn President Amy Gutmann as a “groundbreaking in the sky.” It will be Philadelphia’s most sophisticated and ambitious health-care building project. Located on the former site of

Penn Tower across the street from HUP and adjacent to the Perelman Center for Advanced Medicine, the 17-story building will house inpatient care for the Abramson Cancer Center, heart and vascular medicine and surgery, neurology and neurosurgery, and a new emergency department.

“Medicine and technology will continue to move at breakneck speed,” said J. Larry Jameson, MD, PhD, dean of the Perelman School of Medicine and executive vice president of the University of Pennsylvania for the Health System. “The Pavilion has been designed to adapt to advancements that have yet to be invented.”

“As the nation’s oldest teaching hospital, the Hospital of the University of Pennsylvania is rooted in a history of firsts going back nearly 150 years,” said Ralph W. Muller, CEO of the University of Pennsylvania Health System. “Now, with the Pavilion, we’re poised for the next hundred years of advances in patient care.”

Building Facts

\$1.5

BILLION PROJECT

largest in Penn's history

1.5

MILLION

square feet

2021

expected completion date

"Future-Proof" Features

500

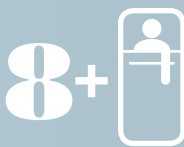
 private patient rooms

Flexible setup based on changing caregiving needs



Equipped with telemedicine and patient/family connectivity technology

Enough room for 8 people + patient for family/caregiver team communication



47

 operating rooms

Part of a seamless flow of operations from emergency through recovery and discharge



Hybrid rooms for multiple types of procedures

Read more about the design of the Pavilion and see a video online at PennMedicine.org/news/thepavilion

Milestones for Penn Medicine

PennChart Electronic Health Record Goes System-Wide

In March 2017, Penn Medicine became the first university-owned health system in the nation to have the same electronic medical record across all care settings, including inpatient, outpatient, and home care. The PennChart system ensures continuity of care, from the time a patient enters care at a Penn Medicine facility through discharge, according to William Hanson, MD '83, chief medical information officer at Penn Medicine. "And it increases efficiency—patients' data is captured once and then it follows them throughout their care."

Instead of recapitulating old workflows in a digital system, PennChart was designed with a lean, modular architecture that is prepared for future redesign. The system incorporates fewer and more standardized steps for clinicians, helping to reduce variation in care. For patients, it also replaces the multiple statements they might have received in the past from different doctors and hospitals with a single integrated bill. PennChart also opens up new possibilities for integrating research with clinical care, including better data integration, streamlined identification of potential study volunteers, and efficient billing of research costs to studies.

The system can also provide data to algorithmically predict preventable complications or readmissions. For example, based on a patient's lab results and vital signs, the system's algorithms could suggest she might be at high risk for sepsis. "We'd get the information in real time, analyze it, and then put signals out to the care providers to do the right thing earlier," Hanson said.

Putting Money on a Commitment to Preventing Readmissions

Penn Medicine and Independence Blue Cross, the largest private health insurer in the Philadelphia region, signed a new five-year contract this spring that extends beyond the terms of most insurance agreements to include a commitment to collaboratively improving care for patients while stemming the tide of rising costs. "It's more than a business agreement; it's a unified promise to the patients we serve across the region," wrote Ralph W. Muller, CEO of the University of Pennsylvania Health System, in a joint op-ed in the *Philadelphia Inquirer* with Daniel J. Hilferty, CEO of Independence Blue Cross, the largest private insurer in the Philadelphia region. The contract includes a plan to collaborate by forming joint care teams and exchanging real-time data to develop a more holistic view of patient data and help identify and address gaps in care. Penn Medicine is so committed to success that the agreement includes a 30-day readmission guarantee on inpatient services and surgeries.

The leaders described the collaboration as "an important 'first,' which we



Ralph W. Muller (center) with Independence's Daniel J. Hilferty and Anthony V. Coletta, MD

hope offers a model locally and nationwide—for how health systems and insurers can collaborate to provide better quality and coordination of care and combat rising health-care costs for patients and members. Five years from now, we hope that this first is a model that will have been implemented across our region and one that will be seen as critical to transforming health care for all Americans."

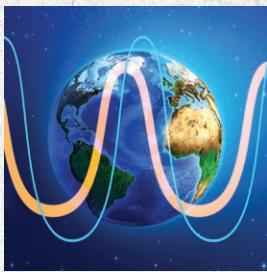
Buzzword Breakdown

Key words from recent Penn Medicine basic science and translational research

cTfh, or circulating T follicular helper cells, are critical to helping the body develop antibodies in response to vaccination or infection—but they are scarce. A Penn team reported in *Science Immunology* that it has found a way to identify and track these rare cells in the blood over time to monitor their contribution to antibody strength after an annual flu vaccine. This **real-time monitoring could help optimize vaccine development** for other hard-to-treat diseases including HIV.



CYCLOPS, an acronym for CYCLic Ordering by Periodic Structure, is an algorithm Penn Medicine researchers developed as a tool to detect and characterize molecular rhythms within cells, described in the *Proceedings of the National Academy of Sciences*. The tool could have many new medical applications, such as **more accurate dosing for existing medications**. Instead of requiring tissue samples taken from patients around the clock, CYCLOPS uses existing data on gene activity in different



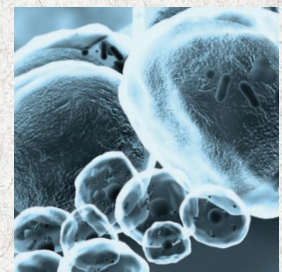
human tissues and cells. With an enormous sample size from cells obtained from people at biopsies and autopsies, in scientific as well as medical settings, CYCLOPS can detect any strong 24-hour pattern in activity even if the time of day each sample was taken is unknown.

Exosomes are tiny, capsule-like structures secreted from most types of cells. Like their mother cells, exosomes have protein markers on their surfaces that identify them to the immune system as part of the body. Penn researchers discovered that a dramatic drop in exosomes from transplanted cells could be a biomarker predicting transplant rejection. Their new method, detailed in the *Journal of Clinical Investigation*, could offer **earlier detection and better potential for reversal of organ transplant rejection**, and requires only a blood test.



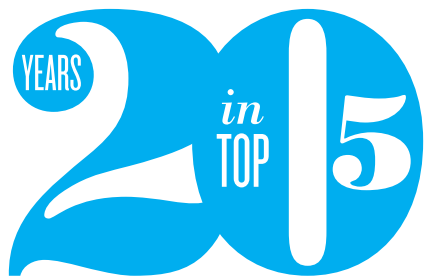
PD-1, or programmed cell death 1, is a receptor protein that has been targeted by drugs to unleash T cells to attack melanoma—successfully shrinking the tumors in about half of patients who receive this treatment. Among the half of patients who don't respond, most nevertheless have a T cell response to the drug. In *Nature*, in the first major publication to come out of the Parker Institute for Cancer Immunotherapy research collaborative, Penn Medicine and Memorial Sloan Kettering Cancer Center researchers reported that the size of patients' tumors determined how strong of a T cell response was needed to shrink that tumor. This clue could **help pinpoint which patients are not responding to cancer immunotherapy and tailor the drug regimen** quickly to boost the chances of successful treatment.

UCP1, or uncoupling protein 1, mediates the process of burning energy and generating heat in brown fat tissue. Penn Medicine researchers publishing in the *Journal of Clinical Investigation* found *Ucp1* gene expression was naturally high in fat tissue of obesity-resistant mice—but **they could use drugs to induce epigenetic changes to promote fat-burning**, or "browning" of white fat, in obesity-prone mice.



VRC01 is an unusual antibody against HIV in that it neutralizes 90 percent of viral strains. A pre-clinical study at Penn published in *Nature Communications* was the first proof-of-principle demonstration that injecting modified messenger RNA (mRNA) coding for VRC01 has **potential to make the body work as a factory to produce its own therapeutic antibodies** that fight HIV.

YAP and TAZ, signaling molecules in a cascade of protein-to-protein interactions known as the Hippo signaling pathway, are important in the heart's epicardium for a healthy repair process that protects people who have heart attacks from going on to develop heart failure. Publishing in the *Journal of Clinical Investigation*, Penn researchers found evidence of how these proteins trigger an immune-calming response in mice, offering **hope to harness the immune system to promote healthy recovery from many injuries**, heart attacks and beyond.



20 Years in the Top 5 Medical Schools

The Perelman School of Medicine at the University of Pennsylvania received a top-five ranking among the nation's "Best Graduate Schools" for 2017 by *U.S. News & World Report* —an honor bestowed for the 20th consecutive year. The school also ranked among the nation's top medical schools in several areas of specialty training.

PSOM's 2017 U.S. News Rankings

5th
Research/Overall

8th
Primary Care

Highly Ranked for Specialty Training



Pediatrics (# 1)



Women's Health



Internal Medicine



Drug/
Alcohol Abuse

The Perelman School of Medicine is an internationally recognized leader in the discoveries that advance science and pave the way for new therapies and procedures to improve human health. The school is consistently among the nation's top three recipients of federal funding from the National Institutes of Health.

Honors & Awards



Gil Binenbaum, MD'02, MSCE'09, GME'06

Associate Professor, Ophthalmology; Director of Research, Ophthalmology, Children's Hospital of Philadelphia

2017 American Association for Pediatric Ophthalmology and Strabismus Young Investigator Award

Binenbaum encourages clinicians to harness the power of data in patients' electronic medical records to efficiently answer clinically relevant questions in managing common eye diseases in children.



Paris Butler, MD, MPH, GME'16

Kevin Jenkins, PhD

Butler: Assistant Professor, Plastic Surgery; Jenkins: Vice Provost's Postdoctoral Fellow, Leonard Davis Institute of Health Economics

National Minority Quality Forum 40 Under 40 Leaders in Minority Health Award

Butler is nationally recognized for his dedication to reducing healthcare disparities along ethnic lines. Jenkins investigates the intersection of race, law, and health.



Anna Doubeni, MD, MPH

Associate Professor, Family Medicine and Community Health

Pennsylvania Academy of Family Physicians Family Physician of the Year

Doubeni dedicates much of her work to addressing needs of medically and socially disadvantaged patients, as well as tackling access to care and global health issues.



Chyke Doubeni, MD, MPH

Chair and Presidential Professor, Family Medicine and Community Health

U.S. Preventive Services Task Force Member

Doubeni brings an extensive research and clinical background in epidemiology, health disparities, primary care and community-focused medicine to the task force focused on evidence-based prevention recommendations.



Scott Halpern, MD'03, PhD'02, MSCE'01, MBE'02

Peter J. Snyder, MD

Halpern: Associate Professor, Pulmonary Medicine, Epidemiology, and Medical Ethics and Health Policy; Snyder: Professor, Endocrinology, Diabetes, and Metabolism

2017 Association for Clinical and Translational Science Distinguished Investigator Awards

Snyder and Halpern were recognized for translation from early clinical use to widespread clinical practice and from clinical use into public benefit and policy, respectively. Halpern also received the 2017 American Federation for Medical Research Outstanding Investigator Award.



Carl June, MD

Richard W. Vague Professor, Pathology and Laboratory Medicine; Director, Center for Cellular Immunotherapy, Abramson Cancer Center; Director, Parker Institute for Cancer Immunotherapy

2017 Fellow of the American Association for Cancer Research Academy

June was recognized for designing chimeric antigen receptor T cell immunotherapy for the treatment of refractory and relapsed leukemia.



Honors & Awards Continued



Frederick S. Kaplan, MD, GME'81

Isaac & Rose Nassau Professor and Chief, Molecular Orthopaedic Medicine

2017 Rare Impact Award from the National Organization of Rare Disorders

Kaplan has dedicated himself to understanding fibrodysplasia ossificans progressiva (FOP), in which the body's skeletal muscles turn into bone, forming an internal "second skeleton."



Daniel J. Rader, MD

Seymour Gray Professor of Molecular Medicine and Chair, Genetics

Award for Outstanding Work in Science as Related to Medicine from the American College of Physicians

Rader's internationally recognized research focuses on the genetics and physiology of lipoprotein metabolism and atherosclerosis.



Joseph Serletti, MD

Henry Royster-William Maul Measey Professor and Chief, Plastic Surgery

Robert Goldwyn American Council of Academic Plastic Surgeons Mentor of the Year from the American Association of Plastic Surgeons

Serletti, internationally recognized for his work in reconstructive microsurgery, was honored for the highly personalized attention he provides as a mentor to the next generation of surgeons.



David A. Spiegel, MD

Associate Professor, Orthopaedic Surgery; Pediatric Orthopaedic Surgeon, Children's Hospital of Philadelphia

2017 Humanitarian Award from the American Academy of Orthopaedic Surgeons

The award honors Spiegel's more than 20 years of humanitarian work in Nepal, Iraq and other underserved regions.



Douglas C. Wallace, PhD

Professor, Pathology and Laboratory Medicine; Director, Center for Mitochondrial and Epigenomic Medicine, Children's Hospital of Philadelphia

2017 Benjamin Franklin Medal in Life Science

Wallace was honored for his work as a pioneer of mitochondrial medicine, demonstrating the role of these organelles in multiple diseases and using mitochondrial DNA to trace human evolution and migration.



Kristy Weber, MD

Professor, Orthopaedic Surgery; Chief, Orthopaedic Oncology; Director, Sarcoma Program, Abramson Cancer Center

2019 President, American Academy of Orthopaedic Surgeons (AAOS)

Weber, who specializes in bone or soft tissue tumors and in complex limb salvage techniques, will be the first woman president of AAOS.



Linton Whitaker, MD

Professor and Chief Emeritus, Plastic Surgery

Clinician of the Year from the American Association of Plastic Surgeons

Whitaker is internationally recognized for his innovations and expertise in craniofacial reconstruction and cosmetic surgery of the face in adults and children.



\$21 Million Gift Propels Hereditary Cancer Research

Penn alumni Mindy and Jon Gray have pledged a new \$21 million gift to the Basser Center for BRCA at the Abramson Cancer Center, the world's first center devoted to the study of cancers related to BRCA gene mutations. The gift brings the couple's total commitment to \$55 million, including the initial \$25 million to establish the center in 2012 and subsequent gifts.

The new gift will support multidisciplinary research at Penn and beyond in areas such as biomarkers for early detection of ovarian cancer, cellular immune therapies and vaccines for BRCA-associated cancers, combination drug therapies, and extending the reach of preventive care and educational programs.

“I realized that if I didn't dedicate the rest of my life to trying to cure this disease, that no one else was going to do it. I didn't have many more shots.”

— David Fajgenbaum, MD'13, MBA'15, an assistant professor in Translational Medicine & Human Genetics and recipient of the Perelman School's 2017 Young Alumni Award, in a *Huffington Post* profile of his effort to coordinate global research on Castleman disease after his own near-death experience during medical school.



Penn Celebrates Innovators

The University of Pennsylvania and invention have a long history together—dating back to the kite-and-key inventor who began it all, Benjamin Franklin. Last year, Penn’s inventors were awarded 108 patents—the most in a single year ever before. And 68 of those patents had inventors from the Perelman School of Medicine. At the celebration of that milestone in May hosted by the Penn Center for Innovation, several Perelman School innovators received high honors.

Biomedical Device of the Year

Valve Prosthesis

Joseph Gorman III, MD (Surgery)
Robert Gorman, MD (Surgery)
Matthew Gillespie, MD (Pediatrics)

Deal of the Year

2016 Penn-Biogen R&D Alliance

Jean Bennett, MD, PhD (Ophthalmology)
James Wilson, MD, PhD (Medicine)

Inventor of the Year

John Lambris, PhD (Pathology
and Laboratory Medicine)

14 Penn Scientists Achieve High Academic Honors

10 *and* **4**

In February, 10 professors from the University of Pennsylvania were named Fellows of the American Association for the Advancement of Science (AAS), including six from the Perelman School of Medicine. They are among a class of 391 members honored for their scientifically or socially distinguished efforts to advance science or its applications. Penn Medicine’s new AAS fellows are:

Peter F. Davies, PhD, ScD, Pathology and Laboratory Medicine, for discoveries in the role of mechanical forces in atherogenesis and for contributions in vascular biology and vascular pathology.

Ruben C. Gur, PhD, Psychiatry, for contributions using neuroimaging as an experimental probe to document sex differences, aging effects, and abnormalities in brain function in a variety of disorders.

Jon Martin Lindstrom, PhD, Trustee Professor in Neuroscience, for contributions to the nicotinic acetylcholine

receptors field, discovering that receptor autoimmune response causes myasthenia gravis and elucidating pathology and possible therapies.

Michael S. Marks, PhD, Physiology and Pathology and Laboratory Medicine, Penn and Children’s Hospital of Philadelphia, for dissection of mechanisms by which lysosome-related organelles form within cells.

Mary C. Mullins, PhD, Cell and Developmental Biology, for cell and developmental biology contributions that include pioneering zebrafish as a model genetic system to study signaling and polarity in vertebrate development.

Amita Sehgal, PhD, John Herr Musser Professor in Neuroscience, for contributions to neuroscience and physiology, particularly in elucidating molecular mechanisms and cellular circuits underlying circadian rhythms and sleep.

In May, four members of the Penn faculty including three from the Perel-

man School were elected to the National Academy of Sciences, one of the highest honors a scientist can receive. The new Penn Medicine NAS members are:

Yale Goldman, MD’75, PhD’75, Physiology, for studies of molecular motors and protein synthesis.

Mitchell Lazar, MD, PhD, Willard and Rhoda Ware Professor in Diabetes and Metabolic Diseases, chief of Endocrinology, Diabetes, and Metabolism, and director of the Institute for Diabetes, Obesity, and Metabolism, for research on the epigenomic regulation of gene expression and metabolism.

Sarah Tishkoff, PhD, a Penn Integrates Knowledge Professor and David and Lyn Silfen University Professor in Genetics and Biology, for studies of genomic and phenotypic variation in ethnically diverse Africans that have shed new light on human differences in disease susceptibility and drug metabolism.

“This is something I do as a physician. I try to keep people from dying, and people are dying because of firearm injuries.”

— Shelby Resnick, MD, a fellow in Trauma and Surgical Critical Care, in a *Salon* article highlighting the re-emergence of trauma surgeons advocating for research on the interplay of gun violence and racism as a public health issue.

Immunotherapy Leader Robert Vonderheide to Direct Penn's Abramson Cancer Center



Robert H. Vonderheide, MD, DPhil, has been appointed director of the Abramson Cancer Center (ACC), effective

July 1, 2017. Vonderheide previously served as the ACC's associate director for Translational Research and executive director of its Translational Centers of Excellence program. Vonderheide is also the Hanna Wise Professor in Cancer Research, vice chair for re-

search in Hematology-Oncology, co-director of the Parker Institute for Cancer Immunotherapy at Penn, and co-leader of the Stand Up to Cancer-Lustgarten Foundation Pancreatic Cancer Convergence Dream Team.

Vonderheide succeeds Chi Van Dang, MD, PhD, who served as the ACC's director since 2011 and will become scientific director of the Ludwig Institute. Over the last five years under Dang's direction, the ACC has enhanced its stature as a world leader in modern cancer research and clinical care. It has the largest portfolio of cancer clinical

trials in the Philadelphia region and is home to the largest group in the world dedicated to cancer immunotherapy. Milestones include an "exceptional" rating (the highest possible) from the National Cancer Institute in 2015; the launch of a series of Translational Centers of Excellence to propel teams of scientists, nurses, and clinicians to improve collaboration in reaching for the cure for various cancers; and the establishment of the Center for Personalized Diagnostics with the department of Pathology and Laboratory Medicine, and the Basser Center for BRCA.

Cardiac Metabolism Expert Daniel Kelly to Lead Penn Cardiovascular Institute



Daniel P. Kelly, MD, has been named director of the Penn Cardiovascular Institute, a multi-disciplinary group of

researchers and physicians dedicated to scientific discoveries and medical breakthroughs in heart and vascular care.

"We are thrilled to recruit a leader of Dr. Kelly's caliber to Penn, and we are confident that under his leadership, Penn will become recognized as the nation's leading cardiovascular research center," said Michael S. Parmacek, MD, the Frank Wister Thomas Chair of Medicine.

As a physician-scientist, Kelly has spent the majority of his career focusing on the metabolic origins of heart muscle diseases. The Kelly laboratory has used genomic, proteomic, lipidomic, and metabolomic profiling to examine the pathways that regulate heart and skeletal muscle energy metabolism in search of new therapeutic targets.

Kelly joins Penn Medicine in August 2017 from Sanford Burnham Prebys Medical Discovery Institute at Lake Nona near Orlando, where he began as the Institute's founding scientific director in 2008.

UPHS Names Two New Top Leaders



Several Penn Medicine executives were appointed to new roles this spring to coincide with Garry Scheib stepping down as chief operating officer of the University of Pennsylvania Health System (UPHS) and chief executive officer of the



Hospital of the University of Pennsylvania (HUP) after more than 17 years with Penn Medicine.

As the new COO for the Philadelphia region of UPHS, Phil Okala is responsible for program integration across the system's three Philadelphia hospitals. He was previously senior vice president for business development, providing executive leadership for integration of other

regional health systems into Penn Medicine, among other strategic initiatives.

The new CEO of HUP is Regina Cunningham, PhD, RN, previously chief nursing executive for Penn Medicine. Cunningham has served Penn Medicine since 2011, initially as associate chief nursing officer in the Abramson Cancer Center, and has a deep understanding of hospital operations and ability to lead across many clinical and administrative areas.

Remaining in a part-time role with Penn Medicine, Scheib continues teaching and mentoring. Scheib is credited with transformative, collaborative leadership which has led the health system's hospitals to post industry-leading outcomes and record patient satisfaction scores. "I am most proud of how we work together to provide the best patient care," Scheib said a few weeks before making this transition. "HUP, like Philadelphia, is a city of neighborhoods, and its community members are what make HUP great."

“Given the origins of the opioid epidemic, the pharmaceutical industry has a societal obligation to contribute.”

– Tilo Grosser, MD, an associate professor of Pharmacology, on Vice.com. Grosser and Garret A. Fitzgerald, MD, director of the Institute for Translational Medicine and Therapeutics at Penn, were co-authors on a perspective article in *Science* calling for public/private partnership to support research on the basic biology of pain and find new, non-addictive treatments.

Ronald P. DeMatteo Appointed Chair of Surgery



of Medicine, leading a department

Ronald P. DeMatteo, MD, FACS, will take the helm of the department of Surgery in the Perelman School

which includes 130 faculty across 11 divisions who provide advanced patient care, conduct a robust portfolio of basic science and clinical research, and educate trainees. DeMatteo is a surgical oncologist who is nationally recognized for treating liver, gallbladder and bile duct and pancreatic dis-

eases, and abdominal sarcomas, as well as for research to help prevent tumors from returning after surgery. He joins Penn, where he completed his surgical residency and postdoctoral fellowship, after 20 years at Memorial Sloan Kettering Cancer Center. He joins Penn July 1, 2017.

Kristen Lynch Appointed Chair of Biochemistry and Biophysics



medicine, following eight years as a tenured faculty member in the department.

Kristen W. Lynch, PhD, has been appointed chair of Biochemistry and Biophysics in the Perelman School of Medicine,

Lynch has expertise in RNA biology and immunology and also holds a secondary appointment in Genetics. Her laboratory focuses on understanding the biochemical mechanisms and regulatory networks that control alternative gene splicing in response to antigens. Alternative splicing is a process in which a single gene codes for differ-

ent—but related—forms of a given protein, each of which has similar functions. Lynch and her team have identified more than 500 genes that undergo alternative splicing in response to T cell stimulation and have discovered some of the molecular mechanisms and signaling pathways that lead to this immune regulation.

LETTERS



A Lesson that Counts

I especially enjoyed your latest issue and the tribute to Peter Nowell. I would like to tell you a previously unknown story. I was a Penn medical student in 1957. My path lab assistant was Peter Nowell. We were very upset with him because he was never there. We were about to report him to the dean when we were called to a conference. The auditorium was packed. The speaker was Peter Nowell. He got up and said, “You were all taught that there are 48 chromosomes in the human body. There are 46 and I will show them to you.” Were we glad that we never went to the dean.

Benson Horowitz, MD’59

A Passionate Protestant

Your winter article about Peter Nowell brought back fond memories of my sophomore year summer in 1964 spent in his lab. There I was exposed not only to his scientific genius but also to his non-scientific side. We were both avid Phillies fans and had much to cheer about that summer before the Phillies’ legendary late September collapse. I also vividly remember Dr. Nowell relating the time the parish priest came to his house and was disappointed to learn that Dr. Nowell was not Catholic. He told Dr. Nowell that he assumed he was Catholic since he had such a large family and Dr. Nowell replied that he was just a passionate Protestant. It was a true self description of his non-scientific and his scientific life.

Steven Ominsky BA’62, MD’66

A Remarkable Thinker

It was Dr. Nowell’s lectures on tumor evolution that I heard as a Penn medical student in my first year of medical school in 1983 that stimulated me to devote my career to studying the biology of head and neck cancer, and his thought constructs continue to shape my own thoughts as I study and take care of patients with this disease. He was a remarkable thinker, wonderful teacher, and a kind and humble human being. I also clearly remember Dr. Nowell coming to a happy hour in the first week of medical school and coming to play softball with our class. He was a remarkable and inspiring person who truly led an impactful life.

Jeffrey N. Myers, BA’83, MD’91, PhD’91

A Philadelphia Chromosome Casualty

Certainly that was a wonderful tribute article which explained the astounding contribution of Peter Nowell, MD, a classmate I knew and respected in the alphabet-oriented segment of the class of 1952.

Sadly, another classmate, Sidney Gross (also Penn ’48), with whom I shared assignments in Bavaria (U.S. Army 1953-1956) saw his tour of duty cut short. He developed chronic myelogenous leukemia and he became one of the early patients evincing the Philadelphia chromosome—though he lived to complete a dermatology residency.

Donald Maloney, MD’52



Photos By Graham P. Perry

Funk Rock Doc-to-Be

Musical and medical passions are a natural match for Joseph Park, a second-year MD-PhD student at the Perelman School of Medicine at the University of Pennsylvania. Park is a Juilliard-trained classical violinist and Harvard University graduate who currently plays in a funk rock band called Trisomy Rescue with five medical school classmates and one Penn doctoral student in applied mathematics. Park plans to pursue graduate study in genomics and computational biology at Penn, aiming to become a physician-scientist combining biomedical research, clinical practice, and teaching—while still keeping music as an essential part of his life. Here, Park discusses his musical track in his own words.

On his inspiration to become a musician:

My mother, now a retired opera singer, had a dream as a young girl to become a world-renowned pianist. But due to her father's poor cardiovascular health, she made the decision to give up her dreams, which required a signifi-

cant financial investment to not only maintain piano lessons but also to pay off the cost of a grand piano. While she decided to become an opera singer instead, she encouraged me to pick up her dream and play the piano. However, being the rebellious child I was, at the age of three I chose the violin after jealously watching a girl play Vivaldi's Concerto in A minor on TV.

My family moved to New York City when I was 10 years old for a variety of reasons, including the opportunity for me to attend the Juilliard School. Ironically, my move to New York corrupted my classical music background once my friends introduced me to classic and alternative rock.

Throughout college, I kept up with violin as a member of the Harvard-Radcliffe Orchestra. Chamber music, which was also a favorite from my Juilliard days, continued to provide an avenue for me to temporarily forget all stressors. But I also started to take music arrangement and composition more seriously, using the skills I learned from music theory and ear training [at

Juilliard] to arrange old songs using modern sounds, perform K-pop songs in jazz and funk arrangements, and get into the habit of listening to any vocal part in 3-part harmonies.

On balancing music and medicine:

There were many students at Juilliard who were also interested in going into medicine, but there weren't any platforms that existed for us to perform at hospitals or other medical centers in New York City. So, a couple of classmates and I created a group at Juilliard called Apollo Ensembles, named after the god of both music and medicine. Through the few connections I had formed with the Beth Israel Medical Center through shadowing and research internships, we were able to start performing in the ICU at Beth Israel, before expanding our performances to other medical locations over time. At Harvard, I joined Music In Hospitals and Nursing homes Using Entertainment as Therapy (MIHNUET), an organization that performs at medical centers and senior homes throughout the Boston area. In addition to playing in the university orchestra, performing with MIHNUET helped me to continue tying together my interests in music and medicine. It really

wasn't an avidly active process on any of the members' parts, but somehow [forming a jazzy, pop-style funk rock band, Trisomy Rescue, in medical school] happened.

On writing medically inspired songs, including a love song about contraception:

Believe it or not, it was not our intent to become a medical school band; we weren't trying to write explicitly medical songs. As Trisomy Rescue, we do tend to write songs that incorporate some of the language we find ourselves immersed in during medical school, but we use such language to symbolize universal experiences such as love and heartbreak. For example, by symbolizing a heartbreaking situation as a schistocyte [a fragmented red blood cell] for our first song, we aimed to create a song about an emotional topic that our listeners could relate to while using a medical term to portray this emotion.

The language of family planning is not often used in pop music, so for "Meant to Be" we aimed to use that language to create a love song that is emotionally bare and explicit, for example, using lyrics such as "we're gonna use contraception tonight." The combination of a reggae and ballad-based musical atmosphere and lyrics that incorporate medical terms to talk about love and sex is what we think makes the song unique and catchy, while also capturing the band's identity and color.

On finding the band's unique sound while creating "Rescue Breaths," their first EP:

As clichéd as this may sound, each member of Trisomy Rescue brought in something special and unique. Our horn players, David [Kersen] and Jon [Peterson], were able to bring in jazzy components given their background and training in jazz performance. Peter [Schwab] and Dan [Gratch], the bassist and lead guitarist, used their experience in song-writing and band performance to create key catch-phrases, memorable lyrics and vocal lines, and the catchy guitar and bass lines that each of our songs heavily anchors on. Our drummers, Jacob [Seideman] and Mike [Randazzo], have changed the atmosphere of each song since their initial compositions through their own rhythmic interpretations. Finally, I've been organizing and incorporating each member's strengths to paint a general picture and lay down a framework for each song on which the band could build upon and add new ideas, while also writing horn lines, vocal melodies, and harmonies. Initially, the song-writing process was very random and disorganized, but it has now become a systematic process that everyone understands and can easily adhere to. Now that we have this system in place, we are still able to continue being productive as a band even during our busier clerkship years.

The process for putting together "Rescue Breaths" was also a process for us as a band to figure out our identity, the "Trisomy Rescue sound." For shows, we have performed a wide variety of genres, including jazz, funk, rock, pop, and even holiday music. But what ultimately went into our EP became a sound that traverses funk, jazz, and pop, and that sound is now an identity we are proud to live and play by. Interestingly, the new songs we are currently working on are consistent with this sound, and it makes us think that we have truly found an identity as a band through the process of creating our first EP.

On keeping music alive in a future medical career:

Music has always been an essential part of me and I cannot imagine a life without my serious investment in music. It has always been this way, and I hope that I will always be involved in music somehow. I also hope that Trisomy Rescue will have a long future, even if we will be encountering various obstacles in the clinic along the way. I also don't want to lose my roots in classical music, which is why I joined the recently founded Penn Med Orchestra in hopes of establishing a strong orchestral culture in the Philadelphia medical community, just as the Longwood Symphony has done throughout decades in Boston. While the orchestra is just in its beginning stages, I am hoping that the many years I have left in Philly as an MD-PhD student will allow me to invest significant energy and effort as the orchestra's concertmaster to see the community develop over the years. □

An earlier version of this article was originally published on DoctorsWhoCreate.com, a website focused on creativity in the medical profession, founded by second-year Perelman School of Medicine student Vidya Viswanathan. Stephanie Woo, the site's editor in chief and a medical student at Georgetown University, provided initial editing. Read more about Viswanathan and other creative medical students in "Meet the Modern Medical Polymaths" on p. 24.

To listen to music by Trisomy Rescue, view this article online at PennMedicine.org/magazine/funkrockdoc



MEDICAL CAREERS FOR THE MILLENNIAL GENERATION

By Christina Hernandez Sherwood

A new generation's changing expectations of how to balance work and life, combined with new technologies, may be shifting the culture of work in academic medicine—for everyone.

The performance required of an academic physician is a challenge worthy of a professional athlete or principal dancer at the ballet, if only the abstract difficulty of the act could be portrayed in a purely physical form. Sometimes described as a feat of juggling prowess and sometimes a matter of balance, the triple act of excelling simultaneously as a clinician, educator, and researcher, is itself a virtuoso achievement. And that's not even considering the time and resources required for complex life demands outside of medicine. From childcare to eldercare, and from hobbies to managing personal health and wellness, it's no easy feat to combine the needs of intensive academic medical work with all the other pieces that complete the rounded whole of a person's life.

The intensity of that challenge, combined with historical and structural biases, is a major contributor to the under-

representation of women and many minorities in academic medicine at the senior and leadership levels.

But as a new generation enters the stage, the choreography of the performance appears to be changing. To better build fulfilling and successful careers and lives, younger professionals in academic medicine are making conscious choices in their approach to the culture of overwork based on their observation of the struggles of the generations preceding them. At the same time, new technologies, new initiatives to counteract biases and structural features of the work environment that perpetuate unequal disadvantages, and other shifts in the terrain and in the culture are defining what academic medical careers mean now and in the future. The stories and perspectives on the pages that follow offer a series of snapshots of that ongoing change.



JUGGLING THE PIECES, NOT BALANCING THE SCALES

With changing technology and changing expectations of how to build fulfilling lives and careers, a new generation in academic medicine is helping to accelerate an ongoing shift toward “work/life integration” in place of the concept of “work/life balance.”

Ursina Teitelbaum, MD, keeps separate key chains for home and work, a symbol of her effort to strike a balance by largely segregating her two worlds. She sets her alarm for 4:30 a.m. to get two hours of uninterrupted work time so she can be fully present for her school-aged children when they wake up. An associate professor in Hematology/Oncology, and clinical director of the Pancreatic Cancer Research Center at Penn’s Abramson Cancer Center, Teitelbaum prefers her “secret” pager to her mandatory cell

phone because it gives her more control over when to respond. “There’s no safe space when you’re always accessible,” she said.

Her husband, on the other hand, is more comfortable allowing work and family time to mix. As vice chair for research and an associate professor of Emergency Medicine, Benjamin Abella, MD, MPhil, has been known to host research meetings at his backyard barbecues. He doesn’t mind squeezing in a few work calls during vacation or after his family has gone to bed. The flip side, Abella said, is that although he sometimes conducts work calls during his kids’ soccer games, he’s also usually able to attend their midday school programs. “I don’t think I could look at my life and say I have work hours and play hours,” Abella said. “It’s all intermingled.”

While some physicians, like Teitelbaum, are fighting against the integration of work and personal life, many



Ursina Teitelbaum, MD
Generation X

*Keeps Separation Between
Work and Personal Responsibilities*



Benjamin Abella, MD, MPhil
Generation X

Prefers Integrating the Two

Generations Decoded

The Pew Research Center uses these date ranges to delineate the birth years of recent generations, described as “a somewhat imprecise but useful cultural grouping of Americans by age.”

Millennials Born after 1980

Generation X 1965-1980

Baby Boomers 1946-1964

Silent Generation 1928-1945

Greatest Generation Born 1927 and earlier

Definitions can vary. For example, in a 2015 report, the U.S. Census Bureau defined millennials as those born between 1982 and 2000. Census data indicate that this generation is more racially and ethnically diverse than those that came before.

Perelman School's Class of 2017

Building their medical career paths

Top Matched Specialties for Residency of 170 Students Participating in the Match



24.1%

Internal Medicine



10.6%

Pediatrics



8.2%

Psychiatry



7.0%

General Surgery



5.9%

Anesthesiology



5.3%

Ophthalmology



5.3%

Orthopaedic Surgery



4.7%

Dermatology



4.7%

Neurology



3.5%

Emergency Medicine



3.5%

Family Medicine

All other specialties <3%

others report observing that the combination of changing technology and changing expectations of younger generations is increasingly blurring the lines between them. “At a place like Penn Medicine, you know you’re going to work hard and there are lots of issues of demand,” said Lisa Bellini, MD, GME’94, vice dean for academic affairs. “Balance is not really the right concept. It’s much more about integration.”

When Oana Tomescu, MD’04, PhD’04, GME’07, was going through medical school and residency at Penn, the coping strategy for work/life balance issues was that there was no strategy. “The mentality was, you don’t really talk about it, you just put your head down and keep working,” said Tomescu, who studies physician burnout and is an associate professor of Clinical Medicine and Pediatrics and associate program director of the internal medicine/pediatrics residency program. “The term ‘burnout’ I never heard once when I was in med school or a resident.”

But while budding physicians in the millennial generation, who make up the majority of medical students and residents today, have the strong sense of altruism common among more senior doctors, Tomescu said, they also have the expectation that their own health won’t be compromised in the care of others. And as digital natives, Bellini said, millennials intuit ways to optimize technology to achieve the work/life integration they crave. These two factors are leading millennials to accelerate a shift toward work/life integration that started years ago.

Working Beyond Boundaries

“To me, work/life integration means having the flexibility to address some aspects of my work whenever and wherever it best fits into my life,” said fourth-year anesthesiology resident Kristen Burton, MD. “We don’t have these finite boundaries and I think that’s a benefit to us ultimately for our balance.”

Burton said she can, for instance, make evening plans with friends because she can finish preparing for cases at home later via a secure connection. “In my former role as a chief resident,” she said, “I would often answer emails, calls, and texts from my co-residents on the go.”

Third-year medical student Jessica Dong, who plans to specialize in internal medicine, said she expects to value work/life integration over work/life balance throughout her career—and that’s something she perceives as an outgrowth of her dedication to patients. “A lot of my life is going to be spent working,” she said. “I want work to be something that fulfills me and is not just something I do as a means to an end of living my life separately.”



Kerri Vincenti, MD
Millennial

Values Work/Life Integration in Radiology



Having remote access to electronic medical records already allows for work/life integration. “If I want to leave the hospital early and go to the gym to make a workout class at a certain time and finish writing up my note afterwards,” Dong said, “that’s something I can do.”

Kerri Vincenti, MD, a third-year resident specializing in radiology, said millennials like her are part of a movement to encourage hospitals to embrace the ways technology can make work more flexible. Recent examples include Penn Medicine’s adoption of the mobile app Cureatr, which allows secure texting within the health system, and her department’s pilot program to provide radiologists with home work stations.

Major Life Choices

Some medical students consider specialty choice and alternate career pathways as ways to create the flexibility that will allow for work/life integration. Medical specialties designated with the acronym E-ROAD, thought to offer a “ROAD to success” highly compatible with the “life” part of work/life integration—emergency medicine, radiology, ophthalmology, anesthesiology and dermatology—are popular at Penn. This year’s specialty match data shows that while the top picks among Perelman School graduates are internal medicine (24.1 percent) and pediatrics (10.6 percent), anesthesiology (5.9 percent), ophthalmology (5.3 percent), and dermatology (4.7 percent) also rank high.

Vincenti, who originally planned to pursue pediatrics, ultimately chose radiology, in part, because of its flexible hours and the potential to work from home. “The choice of going into radiology was one of the ways that I integrated my life into my work,” said Vincenti, who has two young daughters. “Among the specialties that met my intellectual interests, radiology stood out as an option that offered the balance I was looking for.” She noted that some faculty in the department set aside days for academic pursuits. “There are a lot of different ways that you can still be a radiologist, but not necessarily have to be going to work 12 hours a day, five days a week,” Vincenti said. “That’s something that appeals to me.”

The build-your-own career mentality may also suffuse choices beyond medical specialties. At Penn, 68 percent of medical students spend a year or more before residency on a non-medical pursuit, often a dual degree, such as MBA, MPH, JD or PhD. Louisa Pyle, MD, PhD, a research fellow in cancer prevention at Penn and a clinical fellow in genetics and metabolism at Children’s Hospital of Philadelphia, said her dual degree allows her to spend about 80 percent of her time on research, and the rest on clinical work. “I enjoy being able to [take a personal call on a Friday afternoon] from wherever,” she said, “but also knowing that I have a meeting on Sunday afternoon with some collaborators to go over some data.”

Everyday Choices

There is a sticking point for work/life integrators: the feeling that you could—and should—always be working. It wasn’t long

ago that the only way to check in with the office while on vacation was to pick up the phone. Since the advent of email, however, it’s possible to largely continue work during your so-called getaway. Bellini said she tells junior faculty that while they might have to do some night and weekend work, it’s imperative to carve out time when they’re not worrying about work—or feeling guilty about not worrying about work. “You need to be able to disconnect,” she said. “If you can set some boundaries, then I think the concept of integration can work quite well.”

For Pyle, setting boundaries means sometimes turning off smartphone notifications. “At night, I don’t necessarily know if I’m getting a text, even if it’s work related, unless I’m formally on duty,” she said. “But I check as soon as I get up.”

On the whole, work/life integration isn’t a choice you make once. “The integration issues are all these little micro-decisions that you have to make,” Pyle said. In one instance, she was minutes away from a hard-won meeting with a senior person on campus when she received a call from a relative who



was helping care for a family member on hospice. “It was that micro-decision,” Pyle said. “Do I answer? Do I not answer? What do I do? So many things ran through my mind in that moment. How am I going to handle this? How are they going to interpret it?”

Pyle took the call, and was glad she did, because as the only medical specialist in her family, she was able to help her relative support their family member in a moment of pain. “I was late for my meeting and everything turned out okay,” she said, “but that’s just an example of how it’s all these little decisions and they can be so tiring.” □

PAIRED PERSPECTIVES: MEDICAL STUDENTS



Jessica Dong, MS3
Millennial

Pursuing MD and MBA Degrees



Emily Moin, MS2
Millennial

Pursuing MD and MBE Degrees

How does work/life balance or work/life integration weigh into your choice of medical specialty?



My thought process during the last couple years has gone from really wanting to like one of the ROAD specialties, but then, in the end, realizing that I wouldn't find them as personally or professionally gratifying as internal medicine. Ultimately, if I'm not as personally or professionally gratified by my profession, then even if I have extra free time or extra money, that that wouldn't necessarily make up for the day-to-day.

I do like the term work/life integration a little bit better than balance. Medicine is one of the professions that kind of calls for you to dedicate your life to your work. A lot of my life is going to be spent working. I want work to be something that fulfills me and is not just something I do as a means to an end of living my life separately.



I think that choosing medicine as a career, after working for several years in business for me meant that I was accepting that the line between work and life is going to be blurred, if it even really exists at all. I've heard some people describe that as seeing medicine as more of a calling than a career.

I think work/life integration is something that is happening across virtually every field, so I don't see that as something that's unique to medicine. And in some ways, I feel like, from speaking to faculty or with my friends' parents who are physicians, the integration of work and life and having work bleeding over into non-work hours is something that started in medicine long before it became the norm in other careers. I see that as part of the whole package of medicine not being a day job to me. It really is, to me, sort of like consciously picking what would be a really important part of my identity for the rest of my life: to be a physician. I certainly don't see that as being delineated by the hours that I'm on call or when I'm in the hospital or the clinic.

Have you considered flexibility as an impetus for different career pathways?



I'm actually getting my MBA at Wharton next year. I took a Wharton class my first year. At Penn, you have the option to take three classes outside of the med school for free included in our tuition. I took a Wharton class, and I decided to do the MBA.



I'm planning on pursuing a dual degree, a master's in bioethics, so it's not as divergent, I guess, as an MBA might appear. I think, for me, it's more that the bioethics lens or approach is one that I see as being important to whatever specialty I choose. I think I'm probably going to end up in academic medicine. I think that that would help me establish myself in my niche, whatever that may be in the future.



About half of med students at Penn will take time off during med school to pursue something that's not directly medical or clinically related. What I envision myself doing with the MBA is not 100 percent clear to me right now. But I know that I'm interested in systems of health and how there are structural challenges right now to improving health at a large scale in the U.S., and especially in preventative health, which is is what I'm most interested in.

This is something that is generational, especially in the last decade, for people to take time off prior to residency, and for the most part, people end up doing research, but then I think at Penn it's even more common. Medicine I think previously could be practiced in more of a siloed setting in private practice, but nowadays, it's becoming so tied up in policy and in larger health economics because of the way health care has changed in the U.S., and so I think people find it useful.

Perelman School of Medicine Class of 2017

Building their medical career paths

59% of Graduates Received Additional Degrees or Certificates

That's **7x** the National Average

38 Combined MD/Master's Degree Graduates

- 13 MD/MPH
- 9 MD/MBA
- 7 MD/MBE (bioethics)
- 7 MD/MTR (translational research)
- 2 Other

22 MD/PhD Graduates

59 MD Graduates Receiving Certificates

in areas such as Global Health, Women's Health Research, and Health Care Management, Entrepreneurship, and Technology



A DEPARTMENT CONFRONTS ITS GENERATIONAL CULTURE CLASH

OPEN
Communication



How Penn Anesthesiology discovered an intergenerational conflict and set out to change its own culture to support its physicians at all levels.

Education and work/life balance were the values prioritized over nearly 80 others in a survey conducted last year among both residents and faculty in the department of Anesthesiology and Critical Care at Penn. But the ways Baby Boomer and Generation X faculty and millennial residents hoped to achieve these values often looked different. And thus a generational cultural divide came to light.

A few examples of the generational disconnect: Residents deemed some teaching techniques too harsh, while attendings felt residents weren't receptive enough to feedback. Residents were afraid talking to faculty about their emotions would make them appear weak, while senior doctors said they wanted to support those feelings. Residents strug-

gled to complete their operating room tasks, while attendings tried to squeeze in teaching time.

In response, the department created a program to address the cultural changes happening in medicine—and within the department itself. Through this Culture of Change initiative, the subject of a forthcoming paper in the journal *Academic Medicine*, a group of residents and faculty began regularly discussing what they wanted the anesthesiology department to be while an anthropologist observed.

They told their stories—with names changed—via a newsletter. The effort led to formal and informal changes, all geared toward improving professional interactions within the department. Changes include initiatives that range from scheduling to mentorship.

“We’re developing a new culture,” said department chair Lee Fleisher, MD, “by having sufficient people who wanted to change and were willing to risk open discussions with their colleagues and the residents, many of whom are millennials.” That process, he acknowledged, could have been “chaotic, but instead became incredibly productive.”



Lee Fleisher, MD
Baby Boomer

*Leads Department in
Cultural Transformation*



As part of a cultural assessment exercise, department members in different professional roles affixed stickers alongside values that they most wanted Penn Anesthesiology to espouse in the future.

Scheduling

Thanks to the Culture of Change, the residency program worked to ensure the next day's schedule was sent to residents at least an hour earlier. Now residents can complete their next day's pre-operative tasks, such as researching their patients, earlier in the day. The change shaved up to an hour off their workday. "That's had a huge positive impact on work/life balance," said fourth-year and former chief resident Kristen Burton, MD.

Teaching

Millennials came of age experiencing frequent, intense assessment in education, said Justin Clapp, PhD, an anthropologist and research associate for the department. "They've been subjected to so much assessment that they constantly seem to be worried about how they're performing," he said. As a result, the department is changing how residents are assessed and given feedback among other changes in teaching.

Millennial residents, for instance, have less tolerance for "pimping," the practice of publicly quizzing medical trainees, Clapp said. Instead, they prefer more formal and individualized—and less public—assessments. But most faculty are accustomed to asking direct questions rather than waiting for volunteers to raise their hands, Fleisher said. "More residents and medical students are less comfortable showing a lack of knowledge in a group setting and they're willing to express that," he added. "We need to figure out how to [teach and assess learning in ways] where it's a win-win."

Mentorship

Responding to anesthesiology residents' dissatisfaction with the department's lack of a formalized mentorship process, the residency program established one, in which residents choose a faculty mentor within their first three months. "We know residency is tough," said Emily Gordon, MD, MSED, an assistant professor and associate program director for the anesthesiology residency. "Having that touchstone person for you that can serve on many levels is vitally important to your success."

The one catch: mentor and mentee can never review one another. "It's a low-stakes meeting," Burton said. "Because the two of you don't evaluate each other, it's a nice safe space."

The mentorship program will be evaluated annually, with the department expanding what works and fixing what doesn't. "That's the nice thing about our department," Gordon said. "It's this constant evolution. If we see a niche that needs to be filled, we'll work on filling it." □



Emily Gordon, MD, MSED
Gen X/Millennial Cusp

*Supports Mentoring for
Anesthesiology Residents*

INTERGENERATIONAL CONVERSATION: DERMATOLOGY



Emily Chu, MD, PhD
Generation X



Sarah Millar, PhD
Baby Boomer

Both Emily Chu, MD'06, PhD'05, an assistant professor of Dermatology at Penn, and Sarah Millar, PhD, the Albert M. Kligman Professor in Dermatology, were raised by mothers who worked in academia. Millar later mentored Chu as a student in her lab. The pair spoke together about their experiences and perspectives on generational change, work/life balance, and challenges for women in academic medicine.

Are you noticing benefits from increased flexibility in work in academic medicine?



For me, I'm not a physician. I'm a PhD, lab-based scientist. I have to say, I chose that career in part because of the innate flexibility that it offered in terms of when and where you do your work. That really doesn't change the amount of work or the level of competition. I think in clinical medicine there's a lot less flexibility in general. There's also perhaps not also the level of competition that one experiences as primarily a scientist.



I agree with that. I think in terms of flexibility for positions it really highly varies depending on the clinical workload. For those of us who spend a lot of time either seeing patients or engaged in other patient-related activities, you're very much tied to the workplace. So to the extent that you can write notes at home, that's only a small fraction of the amount of time that you really spend working. I grew up watching my mother, a now-retired PhD basic science investigator, spending a lot of time outside of work thinking about her projects, writing grants and papers. As my brother and I got older it was a little bit easier for her in some ways, but as Sarah has also experienced upon reaching a senior level, her administrative responsibilities just took on a larger and larger part of her work life.

How do you think the observation of the generations preceding yours has impacted your choices?



My mother grew up in a generation when women generally didn't work but she was very intent on having an academic career and did have a successful one. But she had far more obstacles to over-

come than I have had. I think watching her struggles and some of the choices that she made really clarified for me what I wanted and made me more determined. For instance, she worked in academia her whole life, but she never had a tenured position. I saw her professionally insecure and that made her personally unhappy as a result. For me, becoming a tenured professor was a huge goal and something that I was absolutely determined to achieve because I didn't want to have the kind of disappointments that I saw she had even though she was very successful in many ways.

My mother also worked part-time when I was a child. I saw the negative impact that had on her career. That was another thing that I didn't want for myself. I think there were a number of things I learned from watching my mother that caused me to be more determined and to not compromise as much as I might have if I hadn't seen how difficult it was for her.



My mom did work full-time. She had two kids. She was tenured at a relatively early age. In terms of this idea of trying to balance it all, one thing that was helpful for me was seeing that she was able to balance having a very full career with having a happy home life and that it can be done.

As a student I found, and continue to find, Sarah's mentorship to be immensely valuable. Since there are still relatively few women in leadership positions at Penn, it cannot be stated enough how helpful it is to have role models who understand what it means to navigate through an often high-intensity work environment and also to balance that with family life.

How would you assess progress toward equality and diversity in academic medicine?



More of the residents coming in to dermatology are female. I think that is progress, but I also think there's a lot of room left for additional progress. While the workforce is increasingly female, we aren't seeing a proportional shift in the leadership profile at this point. I am curious to see if that's going to change or not going forward because, while we could argue that just by virtue of us having greater numbers we would see a shift naturally, I think there are still some barriers.



I agree with Emily. There's definitely been a lot of progress since the 1960s in having women enter the workforce and in particular in medicine. We do still see a dearth of female leadership. The reasons for this are very complex and not always that easy to address. I think there is a large role for unconscious bias at every level that affects women's ability to succeed and that's something that we're trying to make people more aware of so that these biases can be addressed and the resulting problems rectified.

There have also been some studies coming out recently showing that even in terms of academic publication women are at a disadvantage. Their papers are less likely to be reviewed in the top journals. They're less likely to be asked to review papers and they're less frequently asked to write opinion articles and commentaries. All of these types of things impact women's ability to be promoted because, when people look at their track records, if they don't see the honors, the awards, the invited talks, the high-impact publications, then they consider that they're not as eligible as some equally talented men who have all of those things. It's rather subtle but a kind of cumulative effect that I think results in the outcome that we see.

TRANSFORMING CULTURE ACROSS THE MEDICAL SCHOOL LANDSCAPE

Funded by a \$1.3 million, first-of-its-kind grant from the National Institutes of Health, a randomized controlled trial recently completed at the Perelman School of Medicine sought to improve the workplace to help both men and women succeed. Getting there is complicated, but the study provided a roadmap.

Women and men begin medical careers on seemingly equal footing—the typical gender ratio of medical school classes in recent years is close to 50/50—but as they advance through the ranks in academic medicine, women lag behind. Less than a quarter of full professors in academic medicine are women, according to 2014 benchmarking data from the Association of American Medical Colleges. An even smaller fraction of women serve as department chairs and division chiefs.

“Making sure that we have the 50 percent of our talent who are women maximizing their ability to fully contribute to academic medicine here at Penn, and at all academic medical centers, is the goal,” said Stephanie Abbuhl, MD, GME’83, a professor of Emergency Medicine and executive director of FOCUS on Health & Leadership for Women, the program at the Perelman School of Medicine focused on fostering women’s advancement in academic medicine and promoting research on women’s health. “And if you do that, you improve the situation for everyone—women and men.”

A three-year, randomized controlled trial, conducted by FOCUS and led by Abbuhl and Jeane Ann Grisso, MD, MSc, as principal investigators with their multidisciplinary team, set a lofty goal: Find concrete ways to improve the culture of the academic medicine workplace to help women succeed. Thirteen departments and divisions in the Perelman School of Medicine were randomized to receive a multifaceted intervention targeting junior



Stephanie Abbuhl, MD
Baby Boomer

Led Study Focused on Women’s Advancement



women faculty, local departmental culture, and senior leaders, while 14 others acted as controls.

The trial, Transforming Academic Culture (TAC), was funded by a \$1.3 million, first-of-its-kind grant from the National Institutes of Health. “[The NIH] usually focuses on more traditional medical research—discovering the origins and new treatments of diseases. This grant was about biomedical careers,” Abbuhl said. “But guess what: You’re not going to get the best biomedical research unless you have all of our talented faculty—women and men—with successful and satisfying careers that are sustainable. That’s the real key.”

As the trial’s main focus, women assistant professors participated in specific interventions. More than 130 junior



women faculty took part in two programs during the trial: a manuscript-writing course focused on getting work published—a chief measure used for promotion—and a total leadership course geared toward work/life integration.

Fostering Productivity

As an assistant professor at the time of the trial, Hillary Bogner, MD'96, MSCE'01, now an associate professor in Family Medicine & Community Health and director of research programs for FOCUS, participated in the trial. Women assistant professors across different departments met about 10 times during the months-long manuscript course. “We were encouraged to write and to set deadlines for ourselves,” Bogner said. They were also given practical tips on topics such as choosing a paper title and selecting a



Hillary Bogner, MD, MSCE
Generation X

Participant in NIH-TAC Trial

journal for submission. “That was extremely helpful and definitely increased my productivity,” Bogner said. “We brought back what we learned to the department.”

Over the course of the trial, whose results were recently published in the *Journal of Women's Health*, both the intervention and control groups achieved significant improvements in academic productivity and work

self-efficacy. The PhD faculty in the intervention group published significantly more than those in the control group, but there was no between-group productivity difference among MD faculty or overall. Yet the average work time per week for faculty in the intervention group declined by two and a half hours compared to the control group. “They were able to be just as productive as the control group, while shaving off some valuable time,” Abbuhl said. “This was truly improving efficiency.”

Leadership through Work/Life Integration

The total leadership program, run by Stewart Friedman, PhD, director of the Wharton School's Work/Life Integration



Emily Conant, MD
Baby Boomer

Headed Trial's Task Force Initiative

Project, zeroed in on finding connections between work, home, community, and self. Participants conducted mini-experiments meant to integrate—and improve—the four domains of their life. Bogner, who runs for exercise, signed up for races with her co-workers. “It was a nice way of taking care of myself, and also creating a stronger bond between myself and the people I work

with,” she said. “When you think about work/life integration, it really is integration. You have to find ways where you can really satisfy both.”

Experimenting in Department-Level Change

At the local level, each of the 13 intervention departments and divisions created a task force, comprised of associate and full professor men and women, to head up its own change initiative to improve women's career success. “While we can try to make major changes at the institution, the best environment for change is looking locally first,” said Emily Conant, MD'80, GME'89, head of the trial's task force initiative and a professor and vice chair of faculty development in the department of Radiology. “The world moves so fast that this was really a unique opportunity to reflect on what we can do better in our departments.”

There were five main themes among the task force experiments, Conant said. One was mentorship, with several departments establishing mentoring committees for junior faculty members or promoting peer mentoring. Another was faculty cohesiveness—encouraging respect, support, and camaraderie by organizing social hours and other events. And administrative support was a hot topic, with departments adopting scribe programs to free physicians from EMR duties to better engage with patients.

Initiatives to encourage faculty development, advancement, and leadership opportunities were popular, Conant said. The creation by intervention groups of a new position devoted to this work—vice chair of faculty development—has since been adopted by departments across the medical school. Other intervention groups organized grant review panels and other writing supports for junior faculty.

Flexibility and work/life integration were addressed in specific ways unique to each intervention group. The pediatric division overhauled its on-call scheduling system to relieve some of the burden from junior faculty. The radiology department funded home reading work stations for doctors who preferred to take call away from the hospital. “Everyone was very pleased with it,” Conant said, “and happy they had more flexibility in when and from where they could read cases.”

Finally, trial investigators met regularly with chairs and chiefs of intervention departments and divisions to garner feedback and ensure continued participation. For their part, the chairs and chiefs were responsible for supporting the women assistant professors and task forces. These chairs and chiefs were brought together once a year with task force members and leaders in the medical school to share ideas and updates. “There was a wonderful cross-fertilization of creative ideas to support faculty” at these meetings, Abbuhl said.

“The exciting thing about the whole NIH-TAC trial is there was a commitment by the leaders at the institution,” Conant said. “Because of that commitment, at all levels, there was an accountability but also permission to make things happen and try to experiment.” □

INTERGENERATIONAL CONVERSATION: PATHOLOGY



Roseann Wu, MD, MPH
Millennial "with
some Gen X Leanings"



Gordon Yu, MD
Baby Boomer

Roseann Wu, MD, MPH, an assistant professor of Clinical Pathology and Laboratory Medicine at Penn, sees herself as a millennial physician with some Gen X leanings. She delivered a talk about working with millennial pathologists this year at a seminar hosted by the American Pathology Foundation. Wu discussed some of these generational differences in an interview together with her mentor, Gordon Yu, MD, an associate professor in the department.

What are the cultural interventions that your department has implemented to improve equitable advancement and work/life balance, and what were the results?



When I was starting on faculty here, there was a formal mentoring program, which is how I got assigned to Gordon as well as my other mentor, Leslie Litzky, MD. But in addition to the formal program, there are several other people who I go to in the department for various other questions and issues. Having good mentorship is crucial for knowing whether I'm on the right track for advancement. To help with that, we have a compensation grid and metrics for performance. That's reviewed annually. You know, as a millennial, I'd like feedback more often than once a year, but that's the system we have. Other than that, I think the culture of the department has been to focus on leadership skills and soft skills.

A lot of the defined performance metrics were not in place when I joined the department here 20 years ago. In those times it was assumed that the faculty who were destined to succeed would be intrinsically aware of their own performance level and what was expected of them in order to ensure success and promotion. I think we now realize that is not necessarily true and that clearly communicating expectations is of great benefit.



How do you think observation of the generations preceding yours has impacted culture change?



I think that earlier generations had that sense of loyalty to the institution and to the department. Somebody would come into a department and be there for their whole working career, 50 years, and I don't know if people still do that anymore. There may be a few, but a lot of younger physicians, I think, are a lot more open to moving if there are better opportunities for them and their families elsewhere.



For Rose's generation, I think that this is a critical time. Culture changes in the workplace are being demanded and as a result, the number of significant changes we've seen to the work culture in the last 10 years probably outnumber those of the last 50 years combined. This includes the level of transparency about how departments run, specifics on the budgets of the departments, salary structure, criteria for promotion, evaluations and feedback.



Now there's demand for more lactation rooms. And there's the childcare center that's going to be built here at Penn on the medical campus. All these things are being put in place because that's what people are expecting now.

How would you assess progress toward equality and diversity in academic medicine?



This is definitely evolving with the incoming generation of faculty. For me personally, I'm very happy to see increased diversity and equality for underrepresented groups but perhaps more pleasantly surprised when it happens rather than demanding it, which is different from what the generation of junior faculty is feeling. I think their approach is a healthy one, one which demands such equality and diversity in the workplace. That seems to be one of the major differences across generations. At the core of it, there's no real difference in what we're all hoping for; it's more the level of passion we are seeing in the younger generation.



I think everyone would like equality and diversity. It's just a matter of how we're going to get there and the expectations. I think my generation certainly feels disappointed or finds it kind of discouraging when we find out that, in leadership roles and upper levels, there may not be many people who look like us or think like us, or who are as diverse as the patient population we're treating. But in future generations, I believe in the next generation, it's not just going to be an expectation. It'll be a demand.

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STRENGTHENING THE CULTURE OF INCLUSION AND DIVERSITY

In July 2015, Donita Brady, PhD, a highly sought after cancer biology researcher, was recruited and hired at the University of Pennsylvania, choosing Penn over more than 14 other opportunities.

“After my first visit to Penn, I knew I found the collegial, collaborative, innovative, and ambitious scientific environment I was looking for at one of the world’s top medical schools to initiate my independent research program,” said Brady, a presidential assistant professor.

Penn presidential professorships, made possible through support from Penn President Amy Gutmann’s office and a \$2 million grant from the Pew Charitable Trusts in 2011, not only make it possible to recruit talented faculty like Brady (as well as Wendell Pritchett, JD, PhD, the law professor recently promoted to be Penn’s next provost). They are part and parcel of a larger effort to strengthen inclusion and diversity at Penn broadly and at the Perelman School of Medicine specifically. These values are mutually beneficial and enable everyone to fulfill their professional aspirations and innovate in a way that other environments would not make possible, according to Eve J. Higginbotham, SM, MD, vice dean of Inclusion and Diversity at the Perelman School of Medicine.

When the Office of Inclusion and Diversity (OID) was formally established in 2013 and Higginbotham hired to lead it, the Perelman School of Medicine’s standing faculty—that is, tenure track faculty and clinician-educator faculty—was 29 percent female, and five percent consisted of those from minority groups underrepresented in medicine. In 2016, the percentage of women had increased to 32 percent and those underrepresented in medicine stood at seven percent.

These modest gains have occurred against a backdrop of challenges in climate and cultural support of diversity that are widespread at all academic medical centers. As measured by a Diversity Engagement Survey developed by the Association of American Medical Colleges (AAMC) and the University of Massachusetts Medical School and DataStar, Penn Medicine compares relatively favorably to other institutions, but Higginbotham and other leaders are quick to point out that much more needs to be done both on campus and nationwide. Based on more than 3,000 respondents to the survey conducted in 2012, Penn saw mixed results, in the top third of AAMC institutions in access to opportunity, in the bottom third in cultural competence, and among the middle third in areas such as equitable reward and recognition with a common purpose, respect, trust, and a sense of belonging.

In June 2016, the OID announced a call for personal stories about inclusion across Penn Medicine. In a randomly selected subset of 33 narratives, the team identified stark differences along lines of the respondents’ gender, LGBT identification, and racial identification, in responses to the open-ended question, “Is Penn a very culturally competent place?” The OID plans to repeat the survey in 2018 and compare it to the baseline after taking steps to build a more inclusive culture strategically aimed at the identified issues. The office’s three-pronged mission includes recruiting talented and diverse faculty, retaining a diverse community of faculty, staff, and students, and reaffirming the value and benefits of inclusion and diversity throughout Penn Medicine.

Higginbotham and her team utilize Penn resources, external funding, and additional strategies to recruit outside the institution, while also fostering collaboration among diverse groups throughout Penn such as the Alliance of Minority Physicians, Penn Medicine Program for LGBT Health, FOCUS on Health and Leadership for Women, Penn PROMOTES Research on Sex and Gender in Health, and the Center of Excellence for Diversity in Health Education and Research—extending the impact of the efforts of these different groups by fostering synergy.

Collectively, all these programs, along with unconscious bias workshops, Health Equity Week, an annual Dr. Martin Luther King Jr. Symposium and other events all work to this common goal. Next steps for the OID include fundraising for endowments to sustain anchor programs like these, as well as developing opportunities for junior faculty who have an interest in health equity.

In addition to supporting retention of a diverse faculty, these efforts support the success of a diverse student body. In the 2016 Perelman School of Medicine entering class, twenty six percent of students identified as part of a group underrepresented in medicine and the class was 50 percent female.

“We have complex problems that require complex solutions, and you need a diverse workforce to solve those problems,” Higginbotham said. “We need a robust, inclusive educational environment to prepare the next generation of health professionals to meet the challenges ahead.”

—Greg Richter



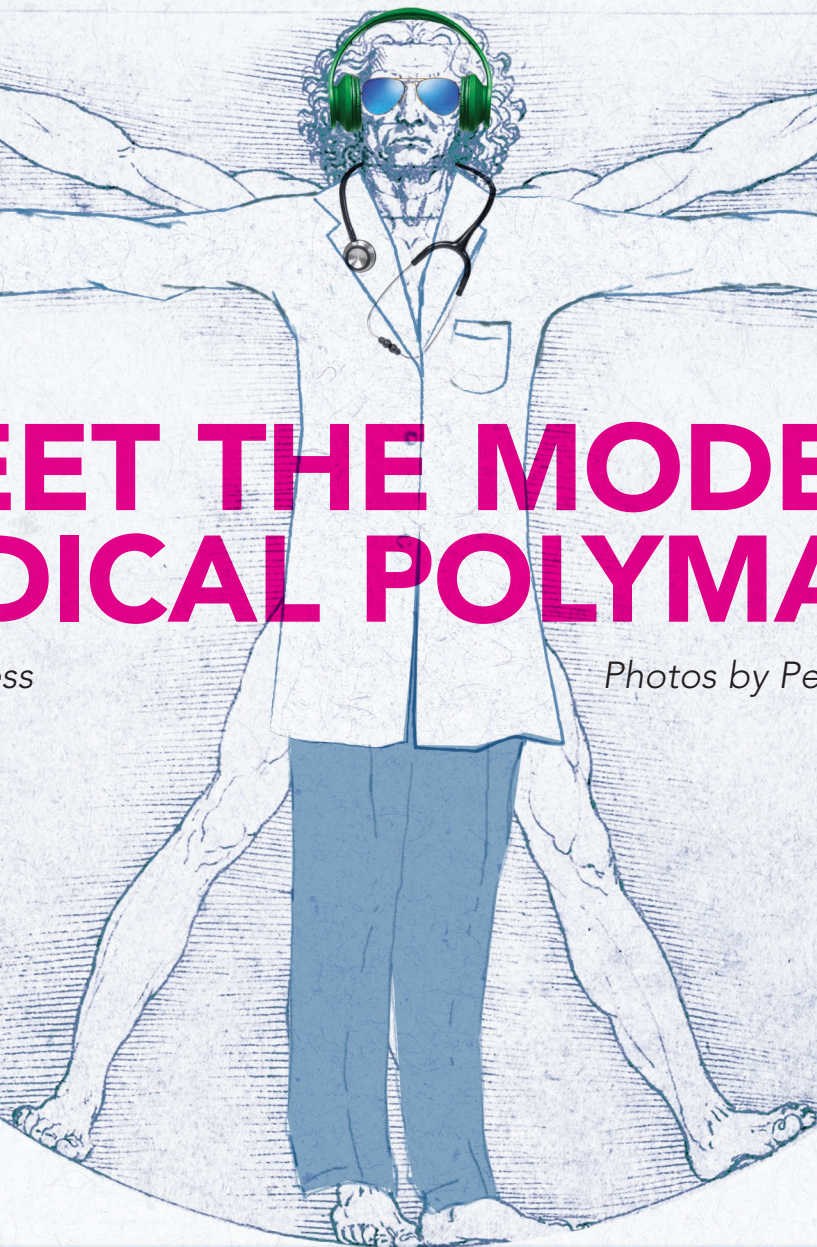
Eve Higginbotham, SM, MD
Vice Dean, Inclusion and Diversity



MEET THE MODERN MEDICAL POLYMATHS

By Rob Press

Photos by Peggy Peterson



Medicine has been long intertwined with the arts. Today's younger physicians are embracing that connection, from anatomical drawing to podcasting.

If you have the chance to listen to one of Vidya Viswanathan's talks on creativity in the medical field, you might get to hear one of her favorite historical anecdotes on the subject: how a bashful Frenchman used his hobby of playing the flute to help solve a medical dilemma.

In late 1816, French physician René-Théophile-Hyacinthe Laennec was at an impasse. The young woman in his office was experiencing heart trouble, and he needed to hear it—but he'd need to put his ear to her chest to do so, and that was too awkward to bear.

Drawing on previous observations of how sound could travel through a hollow tube, Laennec improvised. He tightly rolled a piece of paper, placed one of its open ends on the patient's chest, and placed the other end up to his ear.

He spent the next three years perfecting the design of what we now know as the first stethoscope.

Viswanathan, a second-year medical student at the Perelman School of Medicine at the University of Pennsylvania, tells Laennec's tale as part of the reason she built a website called *Doctors Who Create*. It's just one of the many examples she'll point toward of individuals who, as she put it, "stand at the intersection of art and science."

"Historically, physicians have been incredibly creative," Viswanathan said, adding that history is replete with well-known scientists who dabbled in the arts, or vice versa.

Some of her other examples: Anton Chekhov, one of history's most famous Russian authors, was a practicing physician his entire life and published studies on social medicine. Leonardo da Vinci's anatomical drawings—and some of the conclusions he came to about the body's function while producing those drawings—remain relevant despite being hundreds of years old. Closer to home, William Carlos Williams was, on top of being a renowned poet and painter, also a well-respected practitioner of pediatrics and general medicine.

Creativity and medicine are no strangers to one another—and have proven to be wonderful bedfellows.

As Viswanathan follows in the footsteps of Williams, who earned his own medical degree at Penn in 1906, she is forging a path forward for medical students and young physicians who are once again turning toward and embracing



Vidya Viswanathan

creativity in its various forms. Although humanities majors still make up a small percentage of medical school classes nationally, they are admitted at higher rates than science majors—46 percent of humanities majors who applied ultimately matriculated into medical school in 2016, compared to 39 percent of all other majors, according to data from the Association of American Medical Colleges. Viswanathan, who studied Chinese history as an undergraduate and worked as a freelance writer after graduation, is one of approximately a third of Penn medical students in recent years who completed post-baccalaureate studies before applying to medical school and a similar percentage whose backgrounds are considered "nontraditional" in medicine—at least according to the traditions of the most recent generation. Viswanathan seeks to speak for a generation of medical professionals like herself who see creativity as vital to their growth and education, and who are pushing for its inclusion within and outside the formal curriculum accordingly. To them, creativity is more than just something to indulge in outside of the medical space: It's something separate from but no less important than the constant influx of information provided by medical coursework, a tool to be utilized in myriad forms across all of medicine, and a means of infusing humanism into their lives as physicians.

Telling the Stories of Doctors Who Create

Viswanathan's website, *Doctors Who Create*, highlights physicians and medical students at the intersection of art and science. With it, Viswanathan is working not just to tell the stories of historical figures like Laennec and Williams

and of their modern counterparts, but to show that creativity's place in medicine deserves representation. If that sounds like a wide net to cast, it's because Viswanathan wanted it that way.

"I purposefully made it broad, because there are a lot of projects dealing with the humanities in medicine—which are wonderful—but sometimes there are people in medicine whose minds shut off when they hear 'humanities,' just like there are some people in the humanities whose minds shut off when they hear 'science,'" Viswanathan said. "People think 'I'm not good at that or I don't know enough about that, so I can't engage.' So I wanted to make it about creativity, which is something essential to both the humanities and science."

Viswanathan got Doctors Who Create off the ground in early 2015, right around when she was accepted to medical school. She started by contacting physician writers she'd known and appreciated, asking to interview them about their paths to medicine and what they might be working on—and the feedback was more enthusiastic than she expected. In the summer of 2016, Viswanathan received a grant from the student health-care innovation group Penn-HealthX to build a staff of about 25 volunteer writers, artists, and editors.

An Emerging Creative Culture in Medical School

Lauren Kelly entered the Perelman School of Medicine five years ago with a master's degree in narrative medicine from Columbia already under her belt—a background that she says led to her involvement with an effort in her first year to inject more creative expression into the Doctoring course in which students learn concepts of cultural competence and humanism in medicine. Kelly and seven other students worked with Horace DeLisser, MD, an associate professor of Medicine and associate dean of Diversity and Inclusion, to emphasize more small-group experiences in place of lectures in the class.

"We introduced reflective writing, paired discussions, and roleplays—creative opportunities to help us students process our experiences in medical school," said Kelly, who graduates from Penn in 2017 with MD and MPH degrees. The altered Doctoring course has been the norm for first-year medical students at Penn since 2013.

Even without a shift in the formal curriculum, though, shifts in the backgrounds of medical students made a difference in the learning environment, according to Yun Rose Li, MD'16, PhD'16. A self-described poet and artist who specializes in cancer genomics and computational biology, Li



noted there has been a growing interest from medical schools to admit students who didn't take the standard science-heavy pre-med route she had followed. Nearly a third of entering Penn medical students in the last few years have come from non-science undergraduate majors. In Li's experience, classmates who had diverse educational backgrounds brought something different to the table for group work and discussion.

"A lot of my classmates were extremely creative, and had interests and knowledge in areas I had never been exposed to," Li said. "I think when used appropriately, creative outlets give an opportunity to physicians and medical students to showcase a part of themselves and highlight their interests outside of medicine."



Elizabeth Card

Those different perspectives added diversity to the class, Li said, while enabling a dynamic in which students try to help one another. Referring to herself as "book smart," Li said some aspects of clinical education were especially challenging, and classmates who had majored in the humanities or had life experiences apart from medicine provided her much advice and support. She reciprocated in the form of basic science and biochemistry assistance.

Outside of the formal curriculum, Li's embrace of the humanities led to her co-founding *Stylus*, a literary magazine featuring written and visual work from individuals within the Penn Medicine community, in early 2012 along with two medical school classmates. Li found significant support—and a number of contributors—for the magazine from all walks within the medical school. Kelly, meanwhile, founded the Penn Med Writers group, a setting for medical students interested in writing to explore their creative sides

at a relaxed pace through readings and short exercises. Numerous other Penn medical students have followed suit in establishing their own creative ventures, including last year's debut of the Penn Med Symphony Orchestra led by second-year students Gina Chang and Dan Zhang (see *Penn Medicine*, Winter 2017).

Connecting with Medicine via the Creative Side

Elizabeth Card's wall is covered in pieces of paper with little anatomical drawings on them. "That's the most visual part of my medical education right now," said Card, a first-year medical student at the Perelman School of Medicine. "I have to set aside time if I'm going to draw a particular concept, but once I draw it out, it's there in my mind."

Card, whose online gallery labels her "A Painter Who Studies Medicine," focuses primarily on portraiture—but many of her works in addition to the anatomical drawings make readily apparent her fascination with medicine, from surgery to lab work. A self-described visual learner, Card believes her interests in the visual arts and solving visuospatial problems were fundamental to the development of her interests in biology and surgery.

Card said when she was looking at various medical schools, one of the things she focused on was what those schools were doing with the humanities and art.

"A lot of schools have embraced it," she said. Like Viswanathan, Card recognizes that emphasis on creativity in medicine seems, at times, to have fallen from its peak in history. It's a trend that's shifting, but cultural changes take time.

"A medical student's day-to-day job is learning lots and lots of information; the memorization of facts," said Daniel O'Connor, a fourth-year medical student graduating from

“I have to set aside time if I'm going to draw a particular concept, but once I draw it out, it's there in my mind.”

—Elizabeth Card, MS1

the Perelman School of Medicine in 2017, who plays the guitar in his free time and also exercises his creative mind through computer coding. Earlier this year, he worked with Dermatology faculty member Misha Rosenbach, MD, to create an iPhone app for rare-disease research. (See sidebar, "A Creative Solution for Rare-Disease Research Hurdles") "Computer programming is such a different, creative outlet. It's a relaxing, refreshing activity. It's nice to sit down on an evening and work on things, using a part of my mind that I haven't been able to use in a while."

O'Connor has that experience in common with Li, who said her chosen field of computational biology "is medicine,

but the work is basically computer programming.” That balance between the scientific side and the creative side—even when they may look similar—is less about *whether* you’re engaging with science and more about *how* you’re engaging with it, she said. Computational biology is medicine, but it isn’t a shift at the hospital.

“What I’ve learned is I couldn’t do both,” she said. “I couldn’t code something and see patients. So I switch things on and off. But when I’m able to take a day off and work on that, I’m still doing science, but I’m devoting myself to it.

That takes me away from being in the hospital and thinking about patients. That’s what I need, sometimes.”

Creativity and Care

The writers’ group Kelly founded is now in its fifth consecutive year of new first-year leadership—in fact, Viswanathan led it last year—while maintaining a core group of returning members.

“If anyone feels comfortable sharing, we listen to each other read aloud and allow the discussion to weave among

A Creative Solution for Rare-Disease Research Hurdles

When Daniel O’Connor overheard Misha Rosenbach, MD, an assistant professor of Dermatology and Medicine, discussing his frustration with a clinical challenge, he saw the opening of a creative path to a concrete, practical solution.

“[Rosenbach] was talking with a resident about how he’d just seen a patient with a rare disease, and how it was frustrating people were living in this age where everyone has a smartphone in their pocket—everybody’s connected through social networks—but we still couldn’t find a way to easily connect to patients and do research with that technology,” O’Connor said.

Shortly afterward, O’Connor approached Rosenbach and mentioned he might be able to work up a solution. It was the sort of idea-driven thinking that had initially gotten him into app development in college in the first place: See the problem, figure out the solution, then learn how to build that solution.

Originally, O’Connor and Rosenbach intended to build a simple application that could provide basic information to patients with sarcoidosis, an inflammatory condition that can affect the lungs, skin, eyes, heart, brain, and other organs, while also offering a survey they could fill out which would relay data back to researchers. The scope of the app quickly expanded, however, with the release of Apple’s ResearchKit—a set of tools designed to help researchers and developers build exactly the sort of thing O’Connor and Rosenbach were working on.

Developed in collaboration with Marc Judson, MD, at Albany Medical College and the Foundation for Sarcoidosis Research, the app, called “Sarcoidosis,” helps deliver informational resources to patients by supplying links to disease information and advocacy groups as well as directing them to specialists in their area (which is determined via the phone’s GPS).

Patients also have the ability to opt in to a research study, which will in turn help provide researchers with a trove of data. Optional, once-a-month surveys will query users about, for example, their symptoms and flare-ups, medications, and how sarcoidosis affects their lives. To help researchers spot trends, patients can also opt to provide further information, such as physical activity, through the iPhone’s sensors.

The information could help researchers answer questions about patient activity during flare-ups, seasonal variability of symptoms, and how quickly patients respond to treatment.

Due to the novel nature of the data’s collection, O’Connor cautions it should be approached with “a healthy scientific skepticism” until everything is more rigorously validated—but, he noted, that’s the case whenever a new technology is introduced.

“We’re excited about future opportunities to repurpose the app for other rare diseases, as well,” O’Connor said in a Penn Medicine news release when the app was launched. “With a strong app framework in place, ‘sarcoidosis’ could be swapped out for another disease, allowing wide networks of patients all over the country to participate in Penn studies without traveling to Philadelphia.”



our different ideas,” Kelly said. “At times, we find ourselves leaning on one another, acknowledging similar emotions and reactions to some of the most difficult aspects of our training.”

Li sees writing as a way to channel her passion for medicine and handle the emotional highs and lows inherent to the field. “Sometimes on days like today, when I experience something that is too difficult for me to process, I’ll write poems or a short piece the next day to reflect on my experience,” she said at 2:00 a.m. one night this spring after a hospital shift—the best time she had available for a phone interview conducted three time zones away. “It helps me let go,” she said. She had lost a patient that day and knew she wouldn’t be getting to bed anytime soon.

“It struck me a lot as an intern: We talk about patient care a lot in the medical sense: which tests to run or what medications to give. But I rarely ever have an occasion to talk to my attendings or my colleagues about the *care* of a patient emotionally,” she said. “I see my love for writing and doing creative writing in the medical community as an outlet for the lack of that in my day to day life.”

In talking to Li and Kelly, it becomes clear that the push to create a space for creative expression within the medical community is also rooted in a need to recharge a part of the mind that might otherwise not find relief. According to Kelly, allowing the creative mind to flourish—or at least see regular exercise—is a way to keep physicians and students more connected with the world around them, promoting empathy with their patients and themselves and allowing the more scientific, analytical side to rest for a bit.

“Mindful creativity is not unlike empathy. It involves recognizing the influence that other people have on us,” Kelly said. “I think this is the most important lesson that creativity has for medicine. I know this because I’ve lived in both a creative mind and in a tired, simple mind, and I see how it affects my engagement with the world and people around me. Within the span of a single day, I can shuttle between those ways of being multiple times.”

Carving Out Time to Create

Like others trying to explore their creative inclinations during or after medical school, Card has found that time is the most critical factor: However you plan on using your creativity, it won’t do anything for you if you can’t make the time. For some, that can be less about actually having the time and more about finding it difficult to justify creating art or exploring another pursuit when they could be dedicating more time to medicine.

“When you have so much to do and so many deadlines, it’s hard to prioritize art, to have that push to work on creative pursuits,” Card said. “When I was in college, art was always on the back burner. It was behind the oven, sometimes. When I got to medical school, I decided: This is the beginning of the rest of my life. If I don’t create the artistic habits I want to have in adulthood right now, when things are easier than they’ll be in the future, it’ll never happen.

When I got to medical school, I was doing the most art I’d done since high school. I’m glad I started it right then, and I’m keeping it up as much as I can right now—because once I get to residency, I don’t know what will happen.”

As a fifth-year MD/MPH student, Kelly has experienced that difficulty with balance firsthand.

She said the style of thinking—and sheer amount of information to memorize—didn’t leave much room at all for creative development or expression in her first two years of medical school. At that time, even just indulging in the creativity of others through reading, listening to podcasts, or going to exhibits had fallen by the wayside, to say nothing

“It seems to me that writing complements the doctor’s life so well. When you are tormented by people’s illnesses, it is a relief to be able to write your emotions down. Even surgery has its poetic side.”

—William Carlos Williams, MD 1906

of doing her own writing and painting. In her third and fourth years, Kelly decided to focus on reinvesting herself into the creative mindset.

“It’s much like endurance training,” she said. “Once you’ve been away from the gym for some time, the body feels languid and sluggish.”

It was during that reinvestment of time that Kelly realized the divide between her medical training and her desire to create wasn’t as impenetrable as it seemed.

“During my public health coursework, with dedicated time and support to explore creative avenues, I found I didn’t have to choose between the two callings: being a medical student and being a creator,” Kelly said. “I could, in fact, merge the two. That’s when I decided I wanted to use oral storytelling as a platform to advance my goals as a public health practitioner.”

Infusing Creativity within Medicine

In May 2017, Kelly released the premiere episode of a podcast focused on death and dying. “When I Die, Let Me Live” was inspired by Kelly’s numerous observations throughout medical school of physicians guiding patients through some of the most difficult decisions and emotional situations imaginable.

“As a medical professional, I have unique access to this world that’s full of story,” Kelly said. “I have also learned a great deal about the skill of applied storytelling—how the crafts of creative writing and oral history can be used to change conversations and initiate new dialogues in medicine.”



Lauren Kelly

The point, Kelly said, is to help make the conversations surrounding these immensely complicated, difficult topics easier on everybody involved. She described the response thus far as “overwhelmingly positive,” particularly among those in the fields of palliative care, narrative medicine, bioethics, and patient advocacy.

The podcast’s fusion of the creative format of storytelling with critical medical conversations, like Li and O’Connor’s

68 percent of Penn’s medical students spend a year or more before residency on a non-medical pursuit, often a dual degree, such as MBA, MPH, JD or PhD.

See more on p.12.

coding efforts for medical research and even Card’s anatomical drawings, may be an example of the many underappreciated ways in which creativity has lurked within medicine and medical education all along.

“The ways in which creativity manifests may not be explicit or come in the form of writing, art, or the humanities,” said Zachary Meisel, MD, MPH, MSHP’10. “It could

come through the development of a scientific protocol, or the advancement of a communication strategy. That’s kind of where I’ve gone, as someone who has these parallel interests of healthcare delivery and writing.”

Meisel, an assistant professor of Emergency Medicine at the Perelman School of Medicine who serves as one of the faculty advisors for *Stylus*, has given talks to medical students about narrative and writing from the perspective of a health care provider. A humanities major who attended medical school in the 1990s, Meisel observed little interest in supporting or emphasizing creativity at that time. But he sees the tide turning today, both in medical education and practice. His current research is geared toward tapping into practical applications of creativity within the medical community.

“Creativity can do a lot of things in healthcare and science, some of it largely about making care and people more humane—but there’s also a very concrete, practical side that hasn’t been fully utilized,” he said. “It’s becoming a more important tool to have in our quiver.”

Meisel recently received a \$2.1 million grant from the Patient Centered Outcomes Research Institute to further study whether or not healthcare providers should be using stories as a way of communicating the risk of opioid addiction to patients who come to the emergency room with acute painful conditions. His hypothesis is that stories may be useful in bringing context and ideas to patients who are trying to understand the complexity of pain relief and the risks sur-

rounding opioid use. Stories may frequently be used to improve one-on-one communication, but they often fall by the wayside when it comes time to garner support for a safety initiative, quality initiative, or guideline, in Meisel's view. Developing those narratives and communicating context, he said, is where creativity can come in handy.

Seeing Creativity as Central to Healing

Last spring, a letter arrived without much context at the University of Pennsylvania's central office. It was addressed, simply, to Vidya Viswanathan. The office contacted the puzzled medical student, who had no idea where the letter could have come from.

"It was this woman in her nineties who lives at a retirement home," Viswanathan explained. "She had lost her husband last year, and he had donated his body to medical education."

Viswanathan had recently spoken at a remembrance ceremony held annually by the Human Gifts Registry to honor such donors and their families. Her eulogy discussed what it means to die and what it means as medical students to learn something from those who have died. She spoke of the gratitude and the grief she and her peers shared.

The woman who wrote to Viswanathan had been unable to attend the ceremony, but she had read the speech. "She said the words helped her in her grieving," Viswanathan said. "I was touched by that."

Earlier this academic year, Viswanathan stepped down as editor in chief of *Doctors Who Create*, the website she founded in 2015. She transferred the role to another medical student while retaining the title of president to pursue

an ambitious agenda. Her goal for the next year is to secure more funding and collaborations with other organizations that support creativity in medicine, while her long-term plan includes conferences and scholarship funds for creative physicians. In these myriad ways, she wants to show that

“We tend to write songs that incorporate some of the language we find ourselves immersed in during medical school, but we use such language to symbolize universal experiences such as love and heartbreak.”

—Joseph Park, MS2, on writing music for the funk-rock band *Trisomy Rescue* with fellow medical students. See more on p.10.

creative endeavors do, in fact, have a place in medical practice: that the desire to spend time on writing, art, or app development when there's so much work to do as a medical student is borne not from selfishness but from a desire to connect with patients and peers in more meaningful, personal ways.

Ultimately, Viswanathan wants to build a medical education system that not only accepts creativity but rewards it as central to the work of healing.

"Creativity in medical education, creativity in writing or engineering: If all of these things could be incentivized in the way academic research is, I think we'd have a much more well-rounded hospital system," she said. She envisions that, as a trickle-down effect, patients and families would leave the hospital not only having received the best possible care for their physical ailments, but feeling they have been heard and understood—just like the widow who was moved by the written words of Viswanathan's eulogy.

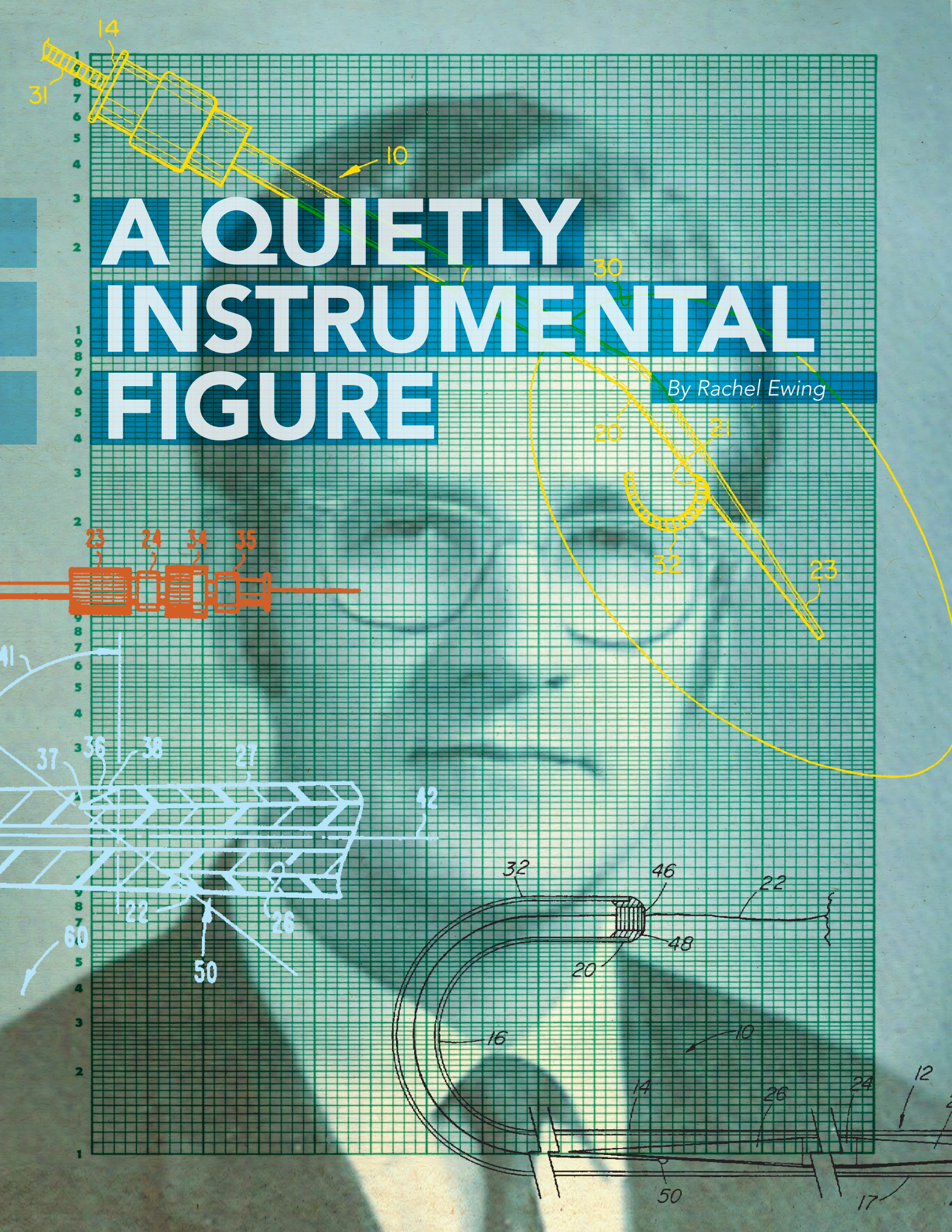
Like the inverse of Laennec's first stethoscope, an artful creation that helped maintain a respectful distance from a patient, the letter affirmed that creativity had immense power to bring young physicians closer to the human side of medical care. ▢

▶ Read this story online with related links and multimedia at PennMedicine.org/magazine/creatives



A QUIETLY INSTRUMENTAL FIGURE

By Rachel Ewing



An unassuming inventor in Interventional Radiology at Penn, Constantin Cope, MD, was the creative mind behind countless tools and techniques used by medical professionals worldwide.

According to family lore, Constantin “Stan” Cope, MD, began testing prototypes of new needles on oranges and grapefruits in the kitchen before anyone trusted him to try on a patient. Those modest citrus punctures back in the 1950s led to tools that are ubiquitous in medicine.

Cope died Nov. 6, 2016 after spending much of his prolific career in Interventional Radiology at the Hospital of the University of Pennsylvania (HUP). He led a quiet life as an immigrant physician and inventor, rarely telling his own story, even to those close to him. While virtually every clinician and medical trainee has used something that Cope invented, Cope himself is far less well known. These are the untold stories of Cope’s life and his legacy that is still unfolding.

Interventional Innovators

In May 1958, when Cope was a resident at the Veterans Administration hospital in Memphis, Tenn., he published a single-author paper in the *New England Journal of Medicine* describing an improved method of using a needle to insert large plastic catheters into a patient’s vein without a surgical incision. A month later, the *Journal of the American Medical Association* published his single-author paper about a new needle he invented to conduct minimally invasive pulmonary biopsies.

“We could put just a little anesthesia on the skin, put the needle between the ribs, and put this Cope needle in, and pull out a piece of tissue without any complication,” recalled Abass Alavi, MD, GME’70, a professor of Radiology at HUP who was a newly arrived Persian immigrant and medical in-

tern in 1966 when he met Cope at Albert Einstein Medical Center. “That is a genius approach. And he was the person who imagined it.”

An internist recruited to work in Radiology at Einstein on the merit of his inventions, Cope was a central figure among the radiologists who were revolutionizing their specialty in Philadelphia in the 1960s. These local innovators converged in a group called the Philadelphia Angio Club that helped to expand radiology beyond its origins using radiation to create images that visualize the body’s interior, into the earliest procedures of *interventional* radiology, combining imaging with minimally invasive procedures to address illness or dysfunction by inserting catheters, wires, and coils in imagery-guided techniques.

“He was the only nonradiologist in this group, as a matter of fact,” recalled Stanley Baum, MD, GME’61, an emeritus



The Cope family at home in the 1960s

professor of Radiology at HUP who chaired the department for more than two decades. “Everyone respected him for his unique ability to see a problem and go in his office and create a gadget to solve the problem.”

Catheters and other tools were not widely available at the time because the field was so new—so Cope made them using materials he purchased at hardware stores and the Army/Navy supply shop.

Curious about medical imaging and angiography, Alavi sometimes attended these Philadelphia Angio Club meetings. Cope brought an engineering mindset to bear on helping patients—ultimately an inspiration for Alavi’s own path branching out beyond on-on-one clinical care to innovations that affect millions. (See sidebar, “As an Innovator, You Deal with the Universe”)

The founding members of the Philadelphia Angio Club went on to form the Society of Cardiovascular and Interventional Radiology a decade later. Now called the Society

of Interventional Radiology, it is a premier professional organization in the field.

After their paths diverged for a time, Alavi, Baum, and Cope reunited at HUP in the early 1980s, where they would work together for the next three decades. Alavi and Cope rekindled what became a lifelong friendship. Yet the reticent Cope spoke of his own life so little that Alavi never knew that Cope, too, was an immigrant.

Personal History

Cope was the only surviving child of Polish Jewish émigrés in Paris, born in 1927. Aron Kope, formerly Kopelowicz, worked as an engineer and activist while seamstress

Esther Kope dressed fashion models in the family's apartment. (Cope changed his name's spelling when he entered the U.S. as a young adult.) Both Esther and Aron had lost most of their family to the pogroms—murdered or starved by the lack of work or migration opportunities. The few relatives who survived in Poland at the time of Cope's birth later died in the Holocaust.

Attuned to the shifting political winds, Aron Kope moved his young family to escape the mounting Nazi threat before the war reached them in France. It met them in London instead. Cope later recalled spending time in his abandoned city apartment building, throwing things out of the windows onto the quiet city for fun.

As an Innovator, You Deal with the Universe

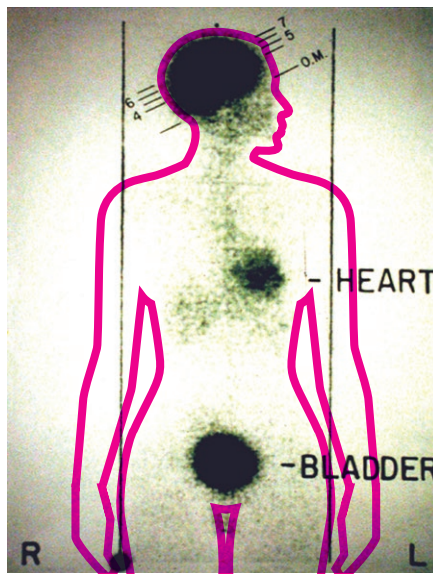
A young Persian physician from a humble background, Abass Alavi, MD, arrived in Philadelphia in 1966. Raised on 50 cents per day and studying by the light of a kerosene lamp, Alavi had toiled for years to become a doctor to ease the soul of his father, who died after suffering six months with untreated gangrene.

But when Alavi came to America, some of the other doctors were obnoxious to him. "I didn't speak well," he recalled. "My medicine was old-fashioned French medicine." Visiting the Radiology department at Einstein, Alavi found that Cope was kind to him, however—and more than just kind. "His creative mind and thoughtfulness were a source of inspiration for me," he said.

Cope helped Alavi see a way forward to fuse his mission as a healer with his lifelong passion for the physical sciences, overcoming the frustration he'd felt with the limitations of treating only one patient at a time. "As an innovator, you not only deal with that one person, but you're dealing with the universe," Alavi said. "This is why methodologies that Stan has introduced are being recorded in the history of medicine. It's not one person who comes to somebody's office and gets some medication or surgery in the operating room. It applies to thousands, millions of people."

Over the years of his friendship with Cope, Alavi took a parallel track, using molecular insights to pioneer new procedures in nuclear medicine. Today, Alavi serves as a professor of Radiology and Neurology at Penn's Perelman School of Medicine, as well as director of research education in Radiology.

In the 1970s at Penn, working with tomography pioneer David Kuhl, MD'55, GME'59, neurologist Martin Reivich,



The first whole-body tomographic scan, produced by Alavi in 1976, used fluorodeoxyglucose with fluorine-18 (FDG-18). "This is very much like the first picture that Roentgen took with x-ray of his wife's hand," Alavi said. An outline of the body is superimposed for clarity.

MD'58, GME'63, and investigators from the Brookhaven National Laboratory, Alavi was a member of the first group in the world to obtain tomographic images of the brain and scans of the whole body. Alavi went on to make numerous research findings in single photon emission computed tomography (SPECT), positron emission tomography (PET), computed tomography (CT), and magnetic resonance imaging (MRI).

PET makes it possible to see the earliest molecular changes that are the basis of disease, showing disease activity that CT or MRI alone cannot provide—enabling earlier diagnosis and rapid treatment monitoring for numerous diseases. These imaging techniques are already used in diagnosing millions of patients worldwide each year with dementia, brain trauma, schizophrenia, and other disorders. For example, PET can help diagnose Parkinson's disease 10 years before a patient shows symptoms. The technology also

sometimes helps prevent unnecessary surgery, evaluate a patient's response to cancer drugs, and influence treatment for brain disorders, inflammation, infection, and many other disorders. Alavi is currently working on using PET imaging to study atherosclerosis and heart disease.

"My colleagues and I are conducting research based on logic, bringing science to medicine," Alavi said. "This is really what has been my mode of operation over the past 50 years in the United States. Combining powerful imaging modalities, we will continue to change the way clinicians treat some of the most common problems of mankind and reduce human suffering for many years to come."

—Greg Richter and Rachel Ewing

“Just a Matter of Plumbing”

When Maxim Itkin, MD, began to learn from Cope, he asked a big question: How do you invent things?

“He said, ‘Oh, it’s easy. You just read old literature. All the ideas are already there,’” Itkin recalled—and he pointed to a pile of old books on his desk about the lymphatic system. “Everything I am doing right now has been not exactly known, but the ideas, the concepts, are out there.”

A vast quantity of knowledge about the lymphatic system from the past century has been largely forgotten because it was never translated from animal studies to humans, Itkin said. Useful methods of visualizing the lymphatic system in a living person didn’t exist. “When you image, you can understand, and then you can intervene. That’s why we became so successful.”

Itkin began by learning thoracic duct embolization from Cope. As Cope neared his 2004 retirement, Itkin began to take over performing this procedure. Only small handful of Cope’s trainees, including Richard Baum, MD, learned the technique.

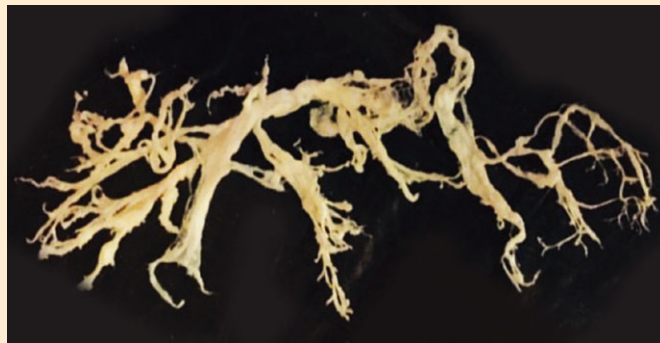
After learning about lymphatic intervention from Cope, Itkin has since made dramatic improvements in lymphatic imaging by joining forces with the Children’s Hospital of Philadelphia (CHOP) radiology and cardiology departments in developing magnetic resonance lymphangiography. What was once an invisible network of fluid vessels has become vivid in fine detail.

The body has many networks of tubes—the circulatory system and the bile duct to name a few—and, with advanced lymphatic imaging, “all of a sudden we have access to a set of tubes we had limited access to before,” said Baum, who is pursuing similar work at Brigham and Women’s Hospital. “Diagnosis, treatment, giving drugs—it’s a new horizon for us.”

The combined CHOP/HUP team has taken early steps toward that new horizon by treating patients with plastic bronchitis, a devastating complication that occurs in a small percentage of children who undergo surgery for right-side congenital heart failure and in other patients for unknown reasons.

“It was a big adventure and nothing was scary about it to him,” Cope’s daughter, Evelyn Stainthorpe, recalled. “He reminded me of Mr. Magoo, including his driving. He kind of just wandered through life with everything crashing all around him, yet unaffected by it all.”

Cope gained admission into a medical college in England and later transferred to a U.S. medical school to be near his parents; Aron had moved years earlier for his Jewish Revisionist political work in New York and Esther joined him after the war. As soon as he gained citizenship, Cope was sent off to the Korean War but was lucky to land in a lull in the fighting. He specialized in treating people injured by landmines and delivering babies.



Patients with plastic bronchitis cough up rubbery casts in the shape of the body’s bronchial tubes.

“It’s just a matter of plumbing,” said Itkin, who is now director of the CHOP/HUP Center for Lymphatic Imaging and Interventions. “It’s leaking. We need to find the way to fix it.”

Plastic bronchitis causes a person’s lungs to repeatedly fill with fluid that hardens into rubbery casts. When coughed up, those casts, which have molded to match the shape of the bronchial passages, look like tiny branching trees—beautiful if they weren’t so often deadly. Once only treatable only with a heart transplant, plastic bronchitis was usually a near-hopeless condition if it didn’t subside naturally, until Itkin and Yoav Dori, MD, PhD, a pediatric cardiologist at CHOP, pioneered these methods to intervene. Dori, Itkin, and their colleagues reported in the journal *Circulation* last year on the imaging of their first 18 pediatric patients with plastic bronchitis. Fifteen of the 17 patients who received an intervention to seal lymphatic leaks thus visualized had significant symptomatic improvements that were sustained months later. The team subsequently reported similar success in adult patients in the *Annals of the American Thoracic Society*.

Itkin and his colleagues are working to extend this impact to numerous other lymphatic conditions, both known and unknown. Itkin is confident that within five years, lymphatics will be widely seen as a new subspecialty in medicine. Indirectly, it would be the second specialty that owes its origins in large part to Cope.

Within a few years, Cope met and married Mary Grace Heller Cope, and the couple had five babies of their own. In 1963, Cope accepted his position at Einstein in Philadelphia, so the family settled in the suburban community of Elkins Park. They chose the neighborhood in part for proximity to some old friends of Aron Kope’s from his work in establishing Israel. Stan and Mary Cope befriended these neighbors, and their elder sons Yonatan and Benjamin (Bibi) babysat for the Cope children before they moved back to Israel. Today, Bibi’s name is well known there; he’s the Prime Minister.

Cope’s life story was not always easy for his children to extract. “He was not a storyteller,” said Connie Cope Franckle, his younger daughter. “Not, ‘Let me tell you this

or that. You had to by chance ask the right question, and then you would get the story." More than 20 years would pass between the night when Esther Cope, on her deathbed, confessed one last story to her son, and the day when someone happened to ask the right question to hear it. (See sidebar, "An Undiscovered Early Chapter")

Living his modest life, Cope was an avid tennis player, a violinist in the Chestnut Hill orchestra, and a family man who loved Peter Sellers and silly jokes. Each morning, he



Stan Cope with his wife, Mary Grace Heller Cope, in 2003

ate a soft-boiled egg. In the evening, he watched *Jeopardy!* with Mary. In between, when he wasn't working at the hospital, he tinkered with his prototypes.

"At home when I was growing up, I would hold a lighter under his catheters so he could stretch the catheter," Stainthorpe said. "I never knew what he was doing. There were always drills and all kinds of stuff lying around the dining room table."

Tools of the Trade

"I can't even begin to tell you how many things he basically invented," Baum said. "Catheters, guide wires, new approaches to difficult problems."

Cope was a prolific inventor even within a specialty that prides itself on creativity. "Our field is about innovation," said Richard Baum, MD, GME'93, chief of Angiography and Interventional Radiology at Brigham and Women's Hospital and son of Stanley Baum. Surgical specialties, Richard Baum continued, might encompass 10 procedures each. "In interventional radiology, there are well over 100 types of procedures we do." Many of the procedures that originate in interventional radiology ultimately become part of other specialties, he noted.

Indeed, many of Cope's inventions have become ubiquitous in medicine worldwide, thanks in large part to Cope's friendship with William Cook. When the two men first met at a medical conference and began discussing ideas about new equipment, Cook ran a small manufacturing company with his wife out of their spare bedroom in Indiana. Cook went on to manufacture tools based on Cope's ideas.

Today, Cook Medical is a major international medical device and supply company that manufactures thousands of products, dozens of which—including entire product lines used in fields from gastroenterology to neurology—owe their origins to Cope. Many of Cope's concepts have been copied or modified by other companies.

The locking Cope loop, for example, is so common that it is often sold generically. Before its invention, doctors who inserted a catheter to drain excess fluid from an organ ran into a common problem: The catheters tended to slip out.

"Stan came up with idea to have the tip of the catheter attached to a string," Stanley Baum said. "After the catheter was in you would pull the string so the tip of the catheter in the organ makes a curve on itself. That was a very simple thing, and in short order it became the standard of how everyone was doing this."

Such elegantly simple solutions were Cope's hallmark. "His genius was to work out a solution that others would look at and they'd go, 'Why didn't I think of that myself? Wow!'" said Joe Roberts, vice president of corporate development at Cook Medical.

Cope's relationship with Cook Medical allowed him to bring his ideas to the world while still keeping his hands-on work in the clinic. "He wasn't really interested in the royalty stream and starting companies," said Tom Osborne, senior vice president for intellectual property development at Cook Medical. "That rules the world now. But not for Stan. He had patients in mind only."

The Quiet Genius

Cope never stopped inventing, even up to his retirement. One of his later innovations made a strong impression on a young Russian-Israeli radiologist, Maxim Itkin, MD, GME'02. "Look at this, complete science fiction, they can intervene on the lymphatic system," Itkin, now an associate professor of Radiology and Pediatrics at Penn, recalled saying when he first read about thoracic duct embolization.

Itkin didn't know that the man who invented this minimally invasive procedure was on the faculty at HUP when he arrived for his fellowship shortly thereafter, but he quickly seized on his good luck. He asked Cope to teach him this new way to intervene on a system that had been an obscurity in medicine for generations. The lymphatic system is a low-pressure circuit flowing throughout most of the body, transporting cells and proteins from organs and tissues in a colorless fluid. Patients experience shortness of breath and fluid in the chest if the largest lymphatic vessel, the thoracic duct, is severed or damaged—a surgical complication that lacked any useful intervention before Cope's.

An Undiscovered Early Chapter

One evening, not long after Cope had had a stroke, his daughter-in-law asked him to tell her about his father, Aron. By chance, that was just the right question to elicit a new story. Connie Cope Franckle, Cope's younger daughter, recalled, "Through his restricted voice, he said, 'Aron's not my father.'"

After the heart attack that precipitated her death in 1982, Esther Cope had told her son that his real father and namesake was a Russian graduate student in Paris. "We always wondered why [our father's] name was Constantin. It's pretty weird for a Polish Jew," Franckle observed, adding that the story also explained why no one in the family inherited Aron Cope's big nose and ears.

With little information to go on beyond the pronunciation of the Russian surname that Cope repeated that night a decade ago, his elder daughter, Evelyn Stainthorpe, went online and found a promising lead in the name and photo of Konstantin Nikolaevich Tretiakoff. "No one in my family has my father's nose," Stainthorpe said. "This man has my father's nose."

Tretiakoff was a famous Russian doctor credited for discovering and naming the Lewy bodies in the brain that are a hallmark of Parkinson's disease, in his 1919 dissertation. According to a historical account published in the journal *Movement Disorders* in 2008, Tretiakoff left Russia because his family's democratic leanings placed them at risk of persecution from the Tsar, and his citizenship was revoked. After he completed his medical and scientific training in Paris, he worked in Brazil for several years in the 1920s before returning to western Europe for a time. According to this account, Tretiakoff returned to Russia once his citizenship was restored. He later became the founding chair of Neurology at the Saratov Medical University and had a distinguished career.

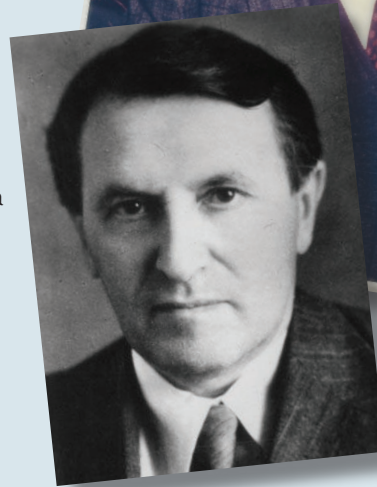
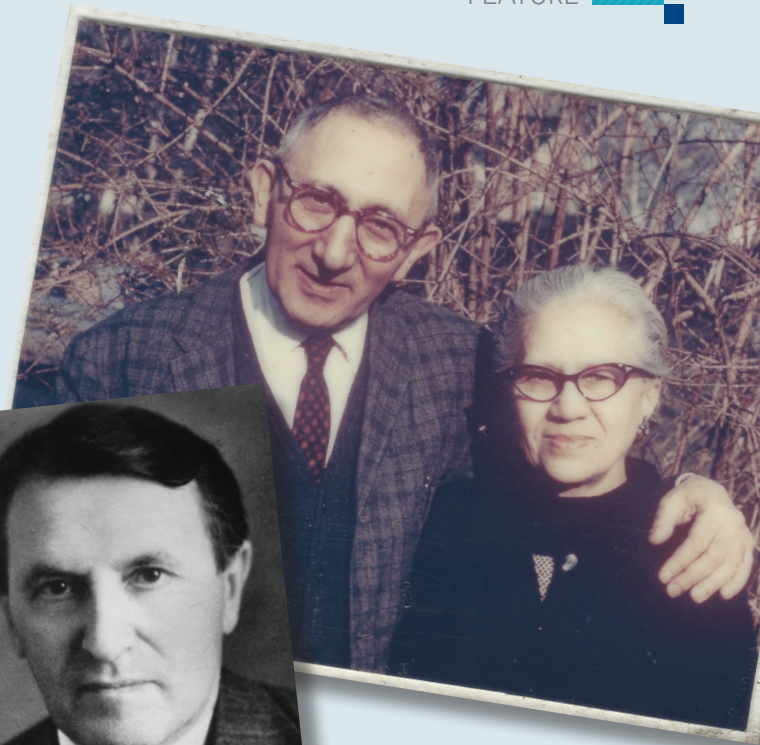
As part of her search, Stainthorpe enlisted her Penn Radiology colleague Maxim Itkin, MD, to use his Russian language skills to try to make contacts—initially to no avail.

Cope figured out how to see the thoracic duct well enough to know where it was leaking, and he determined a way to insert a tiny catheter to push still-tinier tools through that catheter to seal the leaks.

"Who would think of being able to catheterize a thoracic duct? The thoracic duct structure is like a thin piece of spaghetti," Stanley Baum said.

Watching in silence during lymphatic procedures that could last eight hours, Itkin assisted while the taciturn Cope offered few words of instruction or commentary—but even this silent modeling laid the groundwork for innovations that are still unfolding. (See sidebar, "Just a Matter of Plumbing")

Even though Cope rarely boasted—or even spoke—of his accomplishments, his genius for elegant and unexpected solutions continually impressed those around him. He



Left: Russian neurologist Konstantin Tretiakoff

Above: Aron and Esther Cope

But her hope of finding answers persists. In March 2017, Itkin received an email from the head of Neurology at Saratov Medical University requesting information about Tretiakoff for a symposium in honor of his 125th birthday this year. Itkin and Stainthorpe both wrote back and hope the connection will grow. Tretiakoff had a daughter in Saratov, Stainthorpe said, but they have not made contact to discuss DNA testing to learn if Tretiakoff was truly Cope's father.

If he was, they know this: If Tretiakoff left Paris for Russia as reported in September 1926, Esther Cope would have not yet known she was pregnant. Constantin Cope was born June 3, 1927.

opened new possibilities in new fields across the medical landscape, and he inspired younger physicians who learned alongside him—Alavi, Itkin, and Richard Baum, among others—to each innovate in surprising ways.

"I remember when I was a kid, I went to the circus. The most impressive thing I saw was a man who was able to stay balanced on a ball with his finger," Stanley Baum said. "The remarkable thing wasn't that he was able to do that. It was that he was able to think that he might be able to do that. That's what Stan Cope was like. He would do things nobody would ever think possible." ▢

► [Read this story online with related links at PennMedicine.org/magazine/cope](http://PennMedicine.org/magazine/cope)

Penn Medicine's "High Society"

The first months of 2017 saw engaging faculty discussions and fun evenings "on the town" in Florida and Philadelphia. In this issue, we offer a glimpse back at some of the highlights of those successful events.



Getting Your Passport to London: PPMC Gala Celebrates Hospital Hero Dr. Levin

More than 400 guests attended the 16th Annual Penn Presbyterian Medical Center (PPMC) Gala at top Philadelphia event venue VIE—enjoying a fun-filled evening "in" London with live music and a visit by man of mystery Austin Powers. This event is a significant fundraiser for PPMC, and each year a Hospital Hero is honored and their department is the beneficiary of the funds raised at the gala.

The 2017 Hospital Hero, L. Scott Levin, MD, FACS, leads the department of Orthopaedic Surgery, and is internationally known for his work in bilateral hand transplant. The evening raised more than \$257,000 for the creation of the Penn Orthoplastic Limb Salvage Center, dedicated to saving threatened limbs and enhancing the quality of life for patients.



Clare D'Agostino, Scott Levin, MD, FACS, Michele Volpe, and John BianRosa, MD, JD



Helga Levin



Roxanne DeStefano, Neil Sheth, MD, GME'09, Holly and Keith Wapner, MD, GME'85, and "Austin Powers"



Dean J. Larry Jameson, MD, PhD, Bert O'Malley, MD, Frances Jensen, MD, Kojo Elenitoba-Johnson, MD, and Jonathan Epstein, MD



The Palm Beach Story

Penn Medicine has been bringing its world-class faculty to Palm Beach, Fla. for more than a decade, with each visit more popular than the last. Outgrowing three different venues, this year's "Living Better — 2017" seminar attracted more than 220 guests to The Four Seasons Palm Beach.

The first session, "Stopping Cancer at the Starting Line," discussed how basic science is advancing early detection and innovative therapies for a variety of the most challenging cancers. It was moderated by Lynn Schuchter, MD, and the panel featured Kojo Elenitoba-Johnson, MD; Susan M. Domchek, MD; Erica Carpenter, PhD'09, MBA; and Ronny Drapkin, MD, PhD.

The second session on personalized medicine, "Getting Your Genes to Fit: A New Era in Medicine," was facilitated by moderator Daniel Rader, MD, and panelists included Kiran Musunuru, MD, PhD, MPH; Steven Joffe, MD, MPH; and Alice Chen-Plotkin, MD.

That evening, nearly 200 guests joined the Dean's Dinner at The Breakers—a stunning backdrop to learning all about Penn Medicine's new Pavilion at the Hospital of the University of Pennsylvania. Guests heard first-hand from faculty how this new building will revolutionize medicine and the health care landscape at large. Elegant and inspirational, the evening highlighted all of the ways that support for Penn Medicine is a powerful investment in the future of health care.

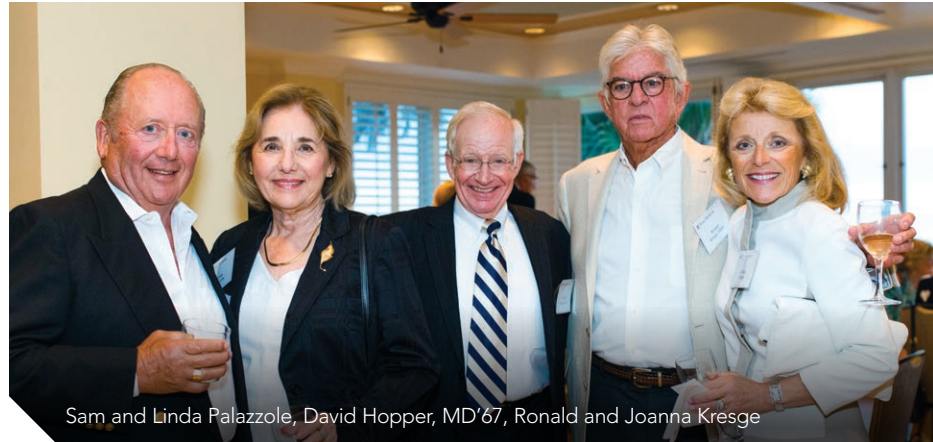


Alan Wein, MD'66, Noelle Wein, Joel and Linda Appel



Going from Coast to Coast: Penn Medicine in Naples

On the other side of the state, a lively group of Penn Medicine friends and alumni gathered at the gorgeous Beach House at The Ritz-Carlton to hear from "Researchers Pushing the Frontiers of Immunotherapy & Regenerative Medicine." Made possible by the generous efforts of a 19-strong host committee, more than 70 guests learned about the latest advances at Penn Medicine from E. John Wherry, PhD, and Kenneth S. Zaret, PhD, in a discussion moderated by Senior Vice Dean Gail Morrison, MD'71.



Sam and Linda Palazzole, David Hopper, MD'67, Ronald and Joanna Kresge

Thank You to Our Penn Medicine in Naples Host Committee!

- Jay & Patty Baker
- John G. Brehm, MD & Mary K. Brehm
- David & Dottie Brennan
- Jeffrey M. Hoffman, MD
- Jack & Graceann Hoopes
- G. David Hopper, MD'67
- Robert D. Klausner, MD & Kimberly A. Klausner
- Ronald R. Kresge, DMD & Joanna Kresge
- Shelly & Harriet Margolis
- Stephen G. Taub & Evelyn R. Burke
- Rhoda B. Temkin



John Wherry, PhD, Gail Morrison, MD'71, and Kenneth Zaret, PhD

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1960s

Stanley J. Dudrick, MD'61, GME'67, was recognized as a Pinnacle Life Member by Continental Who's Who for his contributions to medicine. Dudrick is a general surgeon and professor of Surgery at the Commonwealth Medical College, the founding medical director at Misericordia Hospital Medical Center, and a professor of Surgery at Yale University.

Stanley B. Prusiner, BA'64, MD'68, HON'98, was appointed chair of the scientific advisory board at Alzheon, Inc., a clinical-stage biopharmaceutical company focused on developing new medicines for patients suffering from Alzheimer's disease and other neurological and psychiatric disorders. Prusiner received the Nobel Prize in Physiology or Medicine in 1997 and the Albert Lasker Award for Basic Medical Research in 1994 for his pioneering work discovering prions.

1970s

Barry J. Gertz, BA'73, MD'79, PhD'79, GME'82, was promoted to partner at Clarus, a leading life science investment firm. He joined as a venture partner in 2014 from Merck, where he was senior vice president of global

clinical development, overseeing all aspects of Merck's clinical research. He has 28 years of experience in drug development, from exploratory clinical pharmacology to global Phase 3 trials.

1980s

Alan F. List, MD'80, was invested as civilian aide to the secretary of the Army, representing Florida, to promote good relations between the Army and the public and advising the secretary about regional issues. He most recently served as president and chief executive officer of Moffitt Cancer Center in Tampa, Fla.

Frederick S. Kaplan, MD, GME'81, is a 2017 recipient of the Perelman School of Medicine Distinguished Graduate award in recognition of his devotion to the disease *fibrodysplasia ossificans*

progressiva (FOP), a rare and disabling condition in which the body forms a second skeleton of heterotopic bone.

Sherman A. Williams, MD'81, joined Franciscan Physician Network Specialty Clinic's Lafayette, Ind. office as a gastroenterologist. He is a member of the American Gastroenterology Association, the American College of Physicians, and the American College of Gastroenterology.

Richard S. Levy, MD'83, GME'86, was appointed to the Board of Directors of Aquinox Pharmaceuticals, Inc., a clinical-stage pharmaceutical company discovering and developing targeted therapeutics in disease areas of inflammation and immuno-oncology. He was previously executive vice president, chief drug development and medical officer at Incyte Corporation.

Gregg Semenza, MD'84, PhD'84, was awarded the 2016 Albert Lasker Basic Medical Research Award for the "discovery of essential pathways by which human and animal cells sense and adapt to the presence of oxygen." Semenza is a professor of Medicine at the Johns Hopkins University School of Medicine.

Richard Eric Besser, MD'86, was named president and chief executive for the Robert Wood Johnson Foundation, of Princeton, N.J., which is the nation's largest charitable foundation devoted exclusively to health and health care. He was most recently the chief health and medical editor at ABC News.

James F.X. Kenealy, MD'86, is the 2017 recipient of the Massachusetts Medical Society's Special

Suspenseful Storytelling with a Scalpel

Talk to J. Kellogg "Kelly" Parsons, MD'97, MHS, long enough, and you'll find yourself asking a question he apparently hears quite often: With all of the time and dedication it takes to be a surgeon and professor, how can you find the time to write novels?

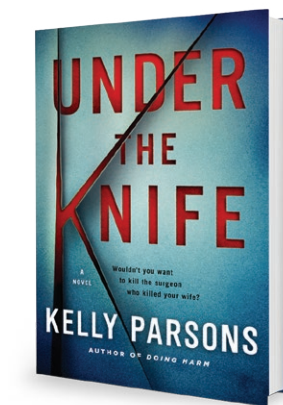
The answer, as he tells it, isn't very complicated: "If you have the love and determination for it, you just have to do it," he said. "I

Parsons remembers writing stories as early as grade school. He kept writing creatively all the way through high school, eventually putting it on the back burner in college—where he majored in history and made the decision to go into medicine.

His return to writing started with informal notes in a journal to help process the physical and emotional pressures of being a surgery intern at a large, inner-city teaching hospital. Through his residency and fellowship, it evolved into the beginnings of a book.

Parsons has now published two novels, both medical thrillers. The second, *Under the Knife*, was released in early February. (Read more about the first novel, *Doing Harm*, in *Penn Medicine*, Summer 2015.)

Parsons noted his experience as both a surgeon and a professor of Urology at the Moores UC San Diego Cancer Center lends itself to telling stories that are medically detailed but still relatable. Translating difficult topics into coherent, easy-to-follow narratives for patients or medical students is just part of his day-to-



day, so doing it for a wider audience through his novels is almost second nature.

Still, in part, the value he finds in writing is that it offers a break.

"After I've practiced medicine all day long, by the end of the day I'm exhausted and simply can't think about medicine at all," Parsons said. "But I've found that if I switch off the medical part of my brain for a while, and spend some time flexing and working the creative writing part of my brain, I can then return with new vigor to the medicine. The medical and writing components are complementary: Each helps the other stay refreshed."

—Rob Press



write whenever I can: vacations, early in the morning, late at night, weekends. I walk everywhere with my laptop, and if I have any kind of down time, I'm turning things over in my head and writing them down."



Award for Excellence in Medical Service, recognizing a physician who has made a distinguished demonstration of compassion and dedication to the medical needs of his or her patients and the general public.

1990s

Allison G. Blunt, MD'90, was appointed as vice president of medical at Advaxis, Inc., a clinical-stage biotechnology company developing cancer immunotherapies. He joins Advaxis from Covance where he was executive medical director for oncology.

James A. Comes, MD'90, has been appointed vice chairman of Emergency Medicine at the University of California at San Francisco (UCSF), chief of Emergency Medicine at UCSF Fresno, and the Gene W. Kallsen Endowed Chair in Emergency Medicine at UCSF Fresno. He will continue to serve as head of the Emergency Department at Community Regional Medical Center and holds an academic appointment as UCSF Clinical Professor of Emergency Medicine at UCSF Fresno.

David B. Agus, MD'91, joined Tempus, a technology company focused on helping doctors personalize cancer care, as chairman of the company's Scientific Advisory Board. He is currently a professor of Medicine and Engineering at the University of Southern California, where he leads USC's Lawrence J. Ellison Institute for Transformative Medicine.

Orville Dyce, MD'96, GME'02, opened a new location with Black Creek Medical Consultants in Hartsville, S.C. For more than 12 years, Dyce has been treating patients in Darlington, Chesterfield, and Kershaw counties with privileges at both Carolina Pines Hospital and McLeod Health Cheraw. He is board certified in otolaryngology and sleep medicine.

2000s

Oliver Mayorga, MD'02, has been named the chief medical officer for L+M Healthcare, which includes Lawrence + Memorial Hospital and Westerly Hospital. Mayorga is an Air Force veteran who served in Iraq, and in Biloxi, Miss., helping to restore medical services after Hurricane Katrina. He most recently served as chairman of Emergency Medicine at Lawrence + Memorial Hospital, Westerly Hospital, and Pequot Health Center.

Marcela V. Maus, PhD'03, MD'05, GME'08, has been appointed to the Clinical Advisory Board of Cellectis, a biopharmaceutical company focused on developing immunotherapies based on gene edited CAR T-cells. She serves as director of Cellular Immunotherapy at the Massachusetts General Hospital in Boston and an assistant professor at Harvard Medical School.

Joneigh N. Khaldun, MD'06, MPH, has been appointed as executive director and health officer of the Detroit Health Department. Khaldun is a board-certified



practicing emergency physician who served as the medical director of the Detroit Health Department since July of 2016. In her new role, Khaldun will lead the city's efforts to decrease the infant mortality rate and improve maternal health outcomes.

2010s

Jane I. Bernstein, MD'10, has joined the Florida Cancer Specialists & Research Institute, the leading community oncology/hematology practice in the state. Bernstein completed her anatomic pathology/clinical pathology residency at Yale-New Haven Hospital in New Haven, Conn, where she also served as chief resident in the program. Following her residency, Bernstein remained at Yale-New Haven Hospital for her fellowship in cytopathology.

David Fajgenbaum, MD'13, MBA'15, is the 2017 recipient of the Young Alumni Service Award in recognition of demonstrated leadership at the Perelman School of Medicine at the University of Pennsylvania. Fajgenbaum is a research assistant professor of Medicine in Translational Medicine and Human Genetics and the associate director of patient impact for the Penn Orphan Disease Center. He is the co-founder of the Castleman Disease Collaborative Network (CDCN), as well as a patient battling this rare and deadly disease. Despite life-threatening relapses, Fajgenbaum has built the CDCN into a model for international collaboration, and he has published research that has changed the way Castleman disease is studied and treated.

Loren K. Robinson, MD, MSHP'15, has joined the Board of Trustees of Spelman College, the school's youngest ever alumna trustee. Robinson works as deputy secretary of health promotion and disease prevention for the state of Pennsylvania. She is the recipient of more than 30 awards, including the National Minority Quality Forum's 40 under 40 Leaders in Minority Health and the National Medical Association's Rising Star Award.

OBITUARIES

1940s

Gerald H. Amsterdam, BA'39, MD'43, GME'49, Longwood, Fla., a retired surgeon; Sept. 1. Amsterdam maintained a practice in the Philadelphia area for over 40 years and retired in 2008. During World War II, he served in the U.S. Army Air Force.

Courtland "Corky" Van Deusen III, MD'43, Columbus, N.C., retired radiologist; Nov. 9. Born in China to missionary parents, during World War II, he served in the U.S. Army as the director of a POW hospital in France. He settled in western New York, where he had both a private radiology practice, as well as a partnership that ran the Radiology Department at the Niagara Falls Memorial Hospital until 1984. He was widely respected in his field and was honored with a Fellow Emeritus by the American College of Radiology and was a long time active member of the Niagara County and New York State Radiological Societies.

Charles T. "Chat" Lee Jr., BA'45, MD'47, Philadelphia, a retired internist; Feb. 7. He enrolled at the University of Pennsylvania and entered its six-year undergraduate medical school program established during World War II. From 1949 to 1951, Lee served as an Army captain in Japan and Korea, assigned to one of the army's first MASH units. He was awarded the Bronze Star for his service. During 36 years as a physician, Lee was affiliated with Chestnut Hill Hospital, serving as president of the hospital medical staff, and as a hospital trustee. In 1980, Lee was a founding member and board secretary of the Wissahickon Hospice, now part of Penn Medicine. A fellow in the College of Physicians of Philadelphia, he served as its president from 1998 to 2000. He also was president of the Aid Association of the Philadelphia County Medical Society. Lee retired in 1991.

1950s

John K. Erbaugh, MD, PsyD, GME'50, St. Helena, Calif., a retired physician; Jan. 16. From an early age, he knew that he wanted to be a doctor. He completed his medical studies and taught at the University of Pennsylvania. His career in medicine included practice in ophthalmology, neurology and psychiatry. During World War II, he served stateside in the Navy as a physician at the Philadelphia VA Hospital. Immediately after the war he toured the great cathedrals of Western Europe by bicycle. Erbaugh retired from medicine in 1993 and offered healing workshops in support of men's health.

Bernadine Ziegler Paulshock, BA'47 MD'51 GME'53, Skillman N.J., a retired physician; Oct. 16. Paulshock maintained a practice in Wilmington, Del., for many years. During her work in the Delaware Medical Center's Family Practice Department, she was responsible for Jefferson Medical School's medical student rotation in family practice. Paulshock's interest in the history of medicine led to the publication of numerous articles or letters to the editor published, including articles in the *Journal of the American Medical Association* and *The New England Journal*. She was an active member of the Medical Society of Delaware, serving one term as vice president and for fifteen years as editor of the Delaware Medical Journal. Several clinical journals appointed her to their editorial boards, including the *Annals of Internal Medicine* where she was a book editor. She was a fellow of the American College of Physicians and the recipient of the Delaware Chapter of ACP Laureate Award in 1997 for her commitment to excellence in medical care and services to the community. She also received the Delaware Trailblazer Award and was recognized and honored by the YWCA Delaware Academy of Women Leaders.

Nicholas C. Economidis, BA'48, MD'52, GME'56, Webster, Texas, a retired physician; Oct. 25. He maintained a geriatric practice in

Philadelphia and also served as staff physician for the old *Philadelphia Bulletin* newspaper in the 1960s. During World War II, he served in the U.S. Army Air Corps.

William C. Ackerly, MD'54, GME'58, Lyme, N.H., a retired psychiatrist; May 23, 2016. He lived directly off the Appalachian Trail and was known to offer ice cream, rest, conversation, and even the occasional game of croquet to weary hikers. He became known on the trail as "The Ice Cream Man."

Donald M. Kudrec, MD'56, Woodbury, N.J., a family practitioner; Feb. 1. He graduated magna cum laude from the University of Scranton, received his medical degree from the University of Pennsylvania, and completed his medical training at Pennsylvania Hospital. He served as a medical officer for the U.S. Coast Guard from 1957 to 1959. In 1962, he started a family practice in Woodbury, N.J. A former staff member and vice president at Underwood Memorial Hospital, he received the Medical Society of N.J. Golden Merit Award for 50 years of service.

Bernard Perry Ottenberg, MD, GME'56, Philadelphia, a retired professor of psychiatry at the University of Pennsylvania; March 7. Ottenberg was born in Philadelphia and attended Temple University for one year before he was drafted into the U.S. Army and served in South Asia. After being honorably discharged, he attended Harvard University, earning an AB in 1948 and an MD in 1952. Ottenberg's career at Penn began with a residency in psychiatry at HUP in 1952. He became a research fellow in 1956 and was appointed clinical professor in 1970. He retired in 2015. While teaching at Penn, he also maintained a private psychiatry practice which lasted for nearly 60 years. Ottenberg published more than 100 articles in psychiatric journals and general newspapers, many of which are included in the manuscript collection *Psychiatry and Social Issues*. Ottenberg was a member and leader of the Group for the Advancement of Psychiatry. He was also active on the

American Friends Service Committee, the Viola W. Bernard Foundation and the boards of Moore College of Art & Design and the Pennsylvania Academy of Fine Arts.

Paul C. Brucker, MD'57, Amble, Pa., a family practitioner; March 23. He graduated with honors from Muhlenberg College and earned his medical degree from the University of Pennsylvania. Brucker designed his own graduate training program, including a residency at Hunterdon, N.J., Medical Center and an internship at what is now Lankenau Medical Center. In 1973, Brucker became a professor and founding chair of the Department of Family Medicine. In 1990, he became president of Thomas Jefferson University and led the organization during its merger that formed the Jefferson Health System.

1960s

James E. O. Hughes, MD'62, Cresskill, NJ, a neurosurgeon; March 17. He received his BS from Yale University and his medical degree from the University of Pennsylvania. After beginning his training as a psychiatrist and serving as a staff psychiatrist in the Navy, Hughes switched his specialty to neurosurgery, completing his residency at Columbia-Presbyterian Medical Center in 1971. For the next 27 years, he was an attending neurosurgeon at St. Luke's-Roosevelt Medical Center and Harlem Hospital Center in New York City, serving as chief of neurosurgery at both hospitals. He also served as a clinical faculty at Columbia University.

Dragan V. Jezic, MD, GME'68, Silver Spring, Md., a retired radiologist; Feb. 19. Born in Zagreb, in what is now the Republic of Croatia, Jezic fled as an illegal refugee to Belgium after graduating in 1956 from the University of Zagreb School of Medicine, when his country was taken over by communists. He continued his medical studies in Antwerp for a year and then traveled to the Belgian Congo, where he

practiced family medicine with a cousin, a fellow refugee from Yugoslavia. Jezic returned to Europe in 1960 and worked at several U.S. Army hospitals in Germany before beginning internships in Boston and New York City. He completed a residency in Radiology at the University of Pennsylvania and began working as a radiologist at Greater Baltimore Medical Center (GMBC) in 1968. Jezic was named the head of radiology at the hospital in 1982 and served in this position for more than two decades until retiring from practice in 1993.

Richard B. "Hawk" Hawkins, MD'69, Fitchburg, Va., a retired orthopaedic physician; Dec. 29. He earned his undergraduate degree at Harvard University and medical degree at the University of Pennsylvania, followed by a surgical internship at the Hospital of the University of Pennsylvania. After training in orthopaedic surgery at several hospitals in Boston, he worked in general orthopaedics in private practice in Fitchburg, Va. He also served as a flight surgeon in the U.S. Air Force. In 1981, Hawkins received a certificate of appreciation from CARE-MED-ICO at the Dahka National Orthopaedic Hospital in Dahka, Bangladesh, where he volunteered. After his retirement from medicine, Hawkins worked for the Wachusett Brewing Company and enjoyed hobbies that included running, bicycling, and aviation.

2010s

Darryl Powell Jr., MD'13, Boston, chief resident in Internal Medicine-Pediatrics at the Har-





vard Brigham and Women's Hospital/Boston Children's Hospital combined program; April 15. Powell was known for a joyful spirit and devotion to improving care for underserved populations. According to a statement by Colleen Monaghan, MD, associate program director of his residency program in a Brigham and Women's Hospital memorial, "Anyone who had an encounter with Darryl left feeling better." Powell is remembered as a leader and mentor both at the Brigham and Boston Children's, and nationally through his involvement with the Student National Medical Association. Powell's medical interests included a focus on improving the transition from pediatric to adult care for children with chronic diseases and on addressing racial inequities in health care. Powell had plans to do a fellowship in pediatric hematology/oncology at Children's Hospital of Philadelphia after completing his residency.

FACULTY

Henry R. Drott, PhD, Swarthmore, Pa., retired scientific director of clinical chemistry at Children's Hospital of Philadelphia (CHOP); March 8. After earning his PhD in physical chemistry from the University of North Carolina at Chapel Hill in 1968, Drott was a National Institutes of Health postdoctoral fellow at the Johnson Research Foundation of the University of Pennsylvania under the direction of Takashi Yonetani, an internationally known professor of biochemistry and biophysics. Early in his career, he became affiliated with the University of Pennsylvania School of Medicine as an assistant professor of biophysics. In 1977, he joined the staff at CHOP as an assistant professor of chemistry in pediatrics, maintaining an academic title at Penn as clinical assistant professor of Pediatrics, and later was named scientific director of clinical chemistry. At CHOP, Drott introduced state-of-the-art automation, technology, and instrumen-

tation, allowing the lab to perform tests on tiny blood samples, in keeping with the relatively small amount of blood children have compared with adults. He also introduced bedside testing to enable more rapid clinical decisions. Drott retired in 2007 from CHOP after 30 years of service.

Bernard Perry Ottenberg, MD. See Class of 1956.



Robert L. Sadoff, MD, Huntington Valley, Pa., a forensic psychiatrist; April 17. Born in Minneapolis, Sadoff attended the University of Minnesota and graduated from its medical school in 1959. Sadoff joined the medical faculty at Penn in 1972, became a full professor six years later, and retired as clinical professor of psychiatry and director of the Center for Studies in Social-Legal Psychiatry in 2016. In addition to his work at Penn, he maintained a private practice. Sadoff used his forensic skills to examine high-profile defendants such as John E. du Pont and Jeffrey M. MacDonald. With seven other specialists, Sadoff created the American Academy of Psychiatry and the Law in 1969, helping to develop the standards of teaching and training for psychiatrists for assessing the mental states of defendants in court. He served as the academy's president from 1971 to 1973. Sadoff and his wife, Joan, endowed the Robert L. Sadoff Clinical Professorship in Forensic Psychiatry at the Perelman School of Medicine, which was recently awarded to Kenneth J. Weiss, MD.

LEGACY GIVING

Her Health and Leg "Born Again," Grateful Patient Gives Lasting Tribute

A catastrophic car accident more than five years ago propelled Nancy Donnelly on a medical odyssey that she could have never imagined. Her husband, Brian, sustained a lower leg injury, while Nancy suffered multiple broken bones, including ribs and her nose, and a collapsed lung. She was told she might lose her right leg. After initial treatment in western Pennsylvania, the couple was medevacked to the University of Pennsylvania. Nancy could not have been more thankful.



"The Penn Medicine trauma team was truly outstanding. From the surgeons, nurses, and all of the staff, I felt like I couldn't be in better hands," she said.

Led by Penn Medicine physicians L. Scott Levin, MD, and Samir Mehta, MD, Nancy's surgical team performed 25 operations and saved her leg above the knee. She spent six weeks at the Hospital of the University of Pennsylvania, which, coincidentally, was where she was born. "I feel like I've come full circle here, and experienced the 'rebirth' of my leg," she said.

When Nancy and Brian thought about giving back to the "superlative medical team" that they've come to know well at Penn, they first made a small donation to their health-care heroes, Levin and Mehta, along with their trauma team. As they contemplated a more lasting tribute, they found that they could make a gift through an unusual asset. "We had an extra paid-up life insurance policy that we no longer needed and determined that this would be the most affordable way to show our gratitude," Brian Donnelly said. The Brian and Nancy Donnelly Trauma Fund now supports research in orthopaedics and trauma care at Penn Medicine.

A gift of a fully paid-up life insurance policy can be a wonderful asset to donate to Penn Medicine because the gift results in a charitable income tax deduction for the donor while providing immediate support for Penn. □

Planned giving is often described as the final piece of a philanthropic puzzle. Figuring out how this important puzzle piece can work best for you, your family, and your philanthropic goals is what we do best. Speak with us to learn more about giving options. Contact Christine S. Ewan, JD, executive director of Planned Giving, at 215-898-9486 or cewan@upenn.edu.

► For more information, please visit the website at: www.plannedgiving.med.upenn.edu

A Generation Poised to Thrive in This Changing World

The overt theme of this issue of *Penn Medicine* is the millennial generation in medicine. But a magazine has enough space to show a view with some depth, so in fact there are two mirror themes propped up alongside the central one: digital transformation and creativity. In our cover story, technological change and generational change are inextricable as driving forces for advancements for equality and diversity. And creativity unites the other two features in this issue, as a quality celebrated among many Penn medical students and recent graduates, and as the cornerstone of the prolific inventiveness of the late Constantin Cope, MD.

These same three themes reflect back from the commencement address that Robert Wachter, MD'83, chair of the department of Medicine at UCSF, delivered to the Perelman School of Medicine's 2017 graduating class.

"When you entered college, medicine was an industry whose information backbones were the piece of paper, the three-ring binder, the post-it note, and the fax machine," Wachter observed. "Now it is the electronic medical record."

But this technology, he warned, is still in a time of transition prone to a problem called the "productivity paradox of I.T." Gains in productivity and quality from new tech are not immediate; the creative imagining required to achieve the technology's full potential comes later. One key lesson, Wachter told the graduates, is that "it's smart young people like you who are best positioned to do that." Younger doctors already ask why electronic notes are flat digital pages with tabs, only to learn it's because that's what was done in the old days of paper binders. "When we ditched the paper, we just digitized the same old note," Wachter said. "And young people say, 'That's absurd. Haven't you ever seen a Facebook wall? Or a Twitter feed? How about a collaboratively created note, a la Wikipedia? Why isn't there audio or video?'"

The creative minds of the millennial generation—as Wachter celebrated, and as the stories in the pages of

this issue illustrate—are ready to take on that reimagining of our digital future.

"We have the opportunity today to do more for our patients than ever before," he said. "And you have the knowledge, skills, values, and habits of mind to thrive in this changing world."

A transcript of Wachter's full speech is available online. Visit PennMedicine.org/magazine/ss17ed for the link.

RE

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More from *Penn Medicine* Online

The Path Through Penn Medicine

In Fall 2015, as the school celebrated its 250th anniversary year, *Penn Medicine* introduced the unique paths taken by several entering students at the Perelman School of Medicine. As they reached the halfway point of their medical school journey, this spring, several of these students shared their experiences in an online-exclusive article.



Amanda Labora co-founded a nonprofit online medical education platform focused on racial justice in medicine.



Katie McDermott discussed learning to "be comfortable being bad at things" as she builds skills.



Mariah Owusu-Agyei traveled to Ghana, the country of her birth, to do research in stroke prevention.

▶ See more of the Path through Penn Medicine at PennMedicine.org/magazine



In the Fall Issue:

The Opioid Crisis: Penn Medicine experts weigh in on the complex challenges of preventing the continued expansion of the epidemic.

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Radiation Research Near and Far, Far Out

By John Infanti

The new Albert Chadwick Research Room

looks nondescript from the outside, just like any other lab, but there's nothing else quite like it anywhere in the United States. From the inner workings of a tumor to outer space, this is a place with enormous potential.

What makes the room so unique is its radiation research platform—a miniaturized version of the equipment used in modern radiation oncology clinics like the one down the hall within Penn Medicine's Roberts Proton Therapy Center.

The platform is designed to precisely deliver photon radiation (the traditional kind used to treat cancer patients). However, it is also mounted on a rail system so it can be positioned directly in front of the research proton beam. Patients have been treated at the Roberts Proton Therapy Center since 2010, but until the opening of this research room in March 2017, researchers had time limitations on the use of the beam for experiments.

"Several facilities have one or the other modality, but only a few in the entire country have both, and none of those have integrated their capabilities into a single room," said Costas Koumenis, PhD, vice chair and director of Research in Radiation Oncology.

The facility makes it possible to do pre-clinical research steps away from the clinical spaces at the Abramson Cancer Center. This research may include advancements in radiation vaccine research and in groundbreaking immunotherapies like checkpoint inhibitors which attempt to free the body's immune system to fight cancer. Robert Vonderheide, MD, DPhil, the Hanna Wise Professor in Cancer Research and newly appointed director of the Abramson Cancer Center, pointed out that Penn re-

searchers will be able to design combination therapies, test them here, and translate them directly into the clinic in the next room over. "You can't narrow the gap from bench to bedside any further," he said.

And the ability to do photon and proton research side-by-side also has an impact much wider and further away. Next-Planet-From-The-Sun further.

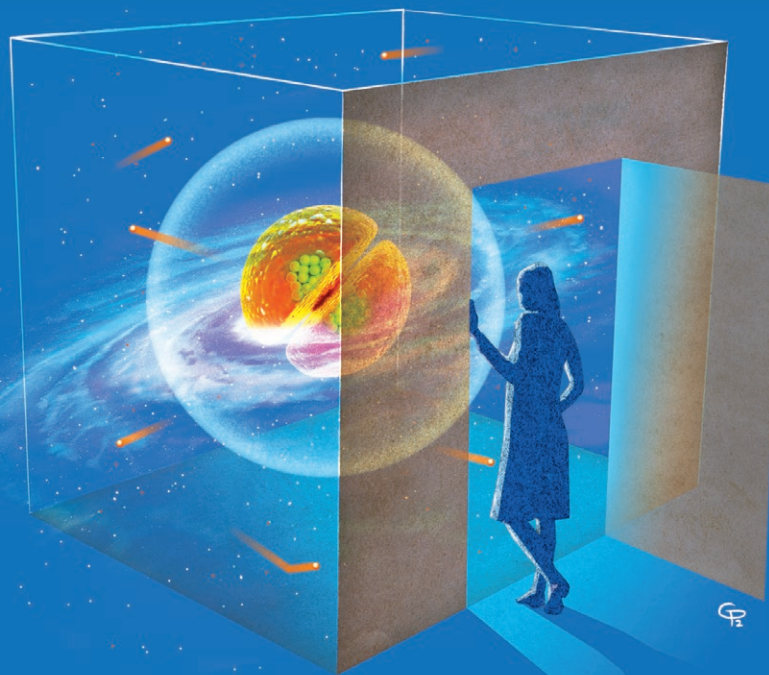
The radiation used for cancer therapies is a targeted version of what exists in outer space, and exposure to

that radiation presents a major health risk, and thus a serious challenge for exploration of the solar system. Since so few humans have ever spent extended time in space, it's important to be able to simulate space-like radiation conditions here on Earth, for both humans and the equipment they need to function in space.

"If your computer is affected and your software crashes in space, your mission is over," said Lei Dong, PhD, vice chair and director of Medical Physics. Dong

has worked with SpaceX and Boeing in the past to test the effect radiation has on electronics and the recovery software necessary to make sure those devices work when exposed to space-like levels. Now he'll continue that work at Penn in partnership with NASA and others in the aerospace industry.

"The research that happens here could take us places we haven't anticipated yet," said James Metz, MD, GME'00, chair of Radiation Oncology at Penn Medicine. "But from drug discovery to mechanical discovery, and of course the exciting work connected with sending astronauts into space, the truth is there's really no other facility quite like this." □



GP

Millennials are part of a movement to encourage hospitals to embrace the ways technology can make work more flexible. The combination of new tools, new demands, and programs to address longstanding inequities is driving shifts in the culture of academic medicine—for everyone.

See more on page 12.

