HARVARD MEDICAL SCHOOL

CELEBRATING THE HEART AND IMPACT OF THE HMS COMMUNITY

PULSE

SPRING 22

FEATURED STORY

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Phill Gross expands his commitment to an HMS program that supports scientists' translational goals

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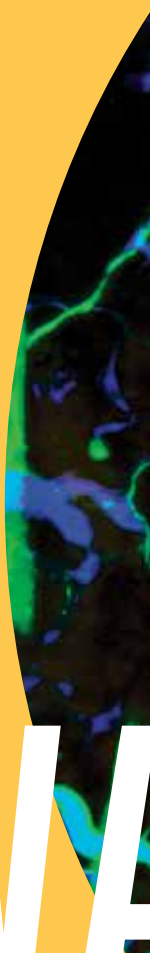

Before the coronavirus pandemic, Michael Springer, PhD, an associate professor of systems biology in the Blavatnik Institute at Harvard Medical School, was working to develop an inexpensive flu diagnostic test for at-home use. He would quickly shift his focus to COVID-19 testing, and this new project became the basis for a diagnostics company as well as a company that commercialized a creative swab design. It also led to the COVID-19 testing system that has been used across Harvard University.

Springer says that without the grant he received for his flu diagnostics work, he and his project partner would not have gained the confidence to move into the COVID-19 testing space, where they ultimately had such a significant impact. That grant was provided by the HMS Quadrangle Fund for Advancing and Seeding Translational Research, or Q-FASTR.

> "Q-FASTR HAS ENGAGED NEARLY HALF OF THE FACULTY IN THE HMS BLAVATNIK INSTITUTE IN THINKING ABOUT HOW THEY CAN ACTIVELY TRANSLATE THE FUNDAMENTAL DISCOVERY SCIENCE IN THEIR LABORATORIES TOWARD THE MEDICAL THERAPIES OF TOMORROW."
>
> DAVID GOLAN

"The concept for Q-FASTR was to form a committee of experts who would evaluate early-stage research projects, allocate donor funds to those with the greatest commercial potential, and then help expedite their translation into therapeutics," says Phill Gross, whose generous gift in 2014 established the program. "What has been a big surprise is just how involved the Q-FASTR team has been with each project—the give-and-take with researchers."

That's the "secret sauce," according to program co-chair David Golan, AB '75, MD, PhD. "The scientific and therapeutic advice and the project management expertise provided to the PIs and their teams by Q-FASTR staff are the chief factors underlying the remarkable impact of this program," says Golan, dean for research operations and global programs at HMS.

This robust scientific infrastructure has been catalyzed by the philanthropic dollars provided to support the projects financially, and Gross, a member of the HMS Board of Fellows and the HMS Discovery Council, has been instrumental in this area. He says the program's impact and success—48 projects have been funded with grants totaling $7.8 million, leading to $64 million in follow-on funding—have exceeded his expectations and motivated him, along with his wife, Elizabeth Cochary Gross, PhD, to make a new gift: $10.5 million spread over the next five years. That's inspiring to Golan, who calls Q-FASTR the "bedrock program" of HMS's sweeping Therapeutics Initiative.

"Q-FASTR has engaged nearly half of the faculty in the HMS Blavatnik Institute in thinking about how they can actively translate the fundamental discovery science in their laboratories toward the medical therapies of tomorrow, and it has supported those scientists programmatically, scientifically, and financially in pursuit of their translational goals," Golan says. "In the coming five years, we hope and expect that Q-FASTR will expand this culture of translation to even more laboratories in the Blavatnik Institute."

Ifat Rubin-Bejerano, PhD, senior director of translational research at HMS, is a key part of the Q-FASTR team responsible for nurturing, shaping, supporting, and advancing ideas for translation of fundamental discoveries. In addition to Springer's project, she points to several other recent projects that stand out as great examples of what Q-FASTR represents, including:

- A project by David Corey, PhD, the Bertarelli Professor of Translational Medical Science, on a **gene therapy approach for hereditary blindness**, which received $1 million in follow-on funding from the Blavatnik Therapeutics Challenge Awards (BTCA) and is in the process of negotiation with a leader in the field.

- A project by David Ginty, PhD, the Edward R. and Anne G. Lefler Professor of Neurobiology, on compounds for the **treatment of tactile hypersensitivity and anxiety in autism spectrum disorder**, which was selected for further research and development at the incubator Lab1636, a collaboration between Harvard's Office of Technology Development and Deerfield, an investment management firm that works to advance health through investment, information, and philanthropy.

- A project by Peter Park, AB '94, SM '94, SM '00, PhD, a professor of biomedical informatics, on **antisense oligonucleotides for neurodegenerative diseases**, which also received $1 million in follow-on funding from the BTCA and is close to being licensed to a new company.

THE LAB OF Q-FASTR RECIPIENT DAVID GINTY AIMS TO UNDERSTAND MAMMALIAN SOMATOSENSORY NEURONS AND CENTRAL NERVOUS SYSTEM CIRCUITS THAT UNDERLIE OUR SENSE OF TOUCH. HERE, THE BLUE-GREEN PROCESSES OF SENSORY NEURONS FORM A NETWORK OF NERVE ENDINGS IN MOUSE SKIN. SOME OF THESE ENDINGS ASSOCIATE WITH TOUCH-SENSITIVE SKIN CELLS (PINK). THE GREEN TENT-LIKE STRUCTURES REPRESENT HAIR SHAFTS.
IMAGE: MICHAEL RUTLIN

ARD

- A project by Junying Yuan, PhD '89, the Elizabeth D. Hay Professor of Cell Biology, on **compounds for the treatment of Alzheimer's disease**. Her intellectual property was licensed by a new company, Nido Biosciences.

Rubin-Bejerano says it's incredibly gratifying to work with accomplished faculty to help them identify translational applications for their basic science research. "They're the best in their fields, and they are trying just to explore the way things work, which is really important," she said. "They don't necessarily think about therapies. But if they take the time and we sit down together, we may come up with something they haven't considered."

Mark Namchuk, PhD, the executive director for therapeutics translation at HMS and another integral member of the Q-FASTR team, says that without Q-FASTR, many ideas with potential for therapeutic benefit might never be identified, and thus opportunities to alleviate human suffering might be missed. "This program is a key first step that moves discoveries toward medicines that impact people's lives," Namchuk says.

Q-FASTR SUCCESS, BY THE NUMBERS

- 45% of eligible Quad faculty have applied
- 113 grant proposals reviewed
- **48 projects funded with grants totaling $7.8 million**
- 150 faculty, graduate students, and postdoctoral researchers supported
- 2 new startup companies created
- 1 project moved into Lab1636
- **$64 million in follow-on funding**
- 37 patents secured
- 10 research papers published

DAVID COREY

DAVID GINTY

PETER PARK

MICHAEL SPRINGER

JUNYING YUAN

BUILDING AN ARMY OF SCIENTISTS TO FIGHT A RARE GENETIC DISORDER

In 2015, Lynn and Majid H. Jafar, MBA '04, issued a challenge to the global scientific community: Develop better treatments for CDKL5 Deficiency Disorder (CDD) within five years, and cures within 10. This seemed audacious, given that there was very little evidence at the time of therapeutic development activity for CDD, a rare disorder characterized by early-onset epileptic seizures and delayed neurological development.

> "THE ABILITY TO SPECIFICALLY CORRECT A SINGLE MISTAKE IN THE 3-BILLION-BASE-PAIR HUMAN GENOME IS TRULY BREATHTAKING."
>
> DANIEL J. LAVERY

Fast forward to today, and several clinical trials for CDD therapeutics have taken place, and several biotech and pharma companies have publicly announced gene therapy programs. "We are confident that despite the challenges of therapeutic development for a rare central nervous system disorder, we are on track to achieve the goals laid out in 2015," says Daniel J. Lavery, PhD, chief scientific officer of the Loulou Foundation. Established by the Jafars after their eldest daughter was born with CDD, the foundation funds CDD therapeutic research projects at universities and institutions worldwide, including at Harvard and its affiliate hospitals, where 14 faculty members have received 23 grants totaling almost $4 million since 2016.

CDD is caused by mutations in the CDKL5 gene, which provides instructions for making a protein that is essential for normal brain development and function. With support from the Loulou Foundation, David R. Liu, AB '94, PhD, the Thomas Dudley Cabot Professor of Natural Sciences in the Department of Chemistry and Chemical Biology at Harvard University, seeks to use two gene-editing agents—base editors and prime editors—to directly correct mutations in CDKL5 that cause CDD in patient cells and in mice. Lavery says that the prime editing technology that has been discovered and developed in Liu's lab has the potential to fulfill promises of molecular therapeutics that seemed like science fiction not long ago. "The ability to specifically correct a single mistake in the 3-billion-base-pair human genome is truly breathtaking, and we look forward to enabling this technology to advance to the clinic as soon as possible," he says.

Alan Brown, PhD, an assistant professor of biological chemistry and molecular pharmacology in the Blavatnik Institute at Harvard Medical School, has been focusing his Loulou Foundation-supported research on cilia, as there is increasing evidence that CDKL5 resides within these small hair-like projections found on the surface of many cells in the human body, including those in the brain. His lab recently identified proteins that cause primary ciliary dyskinesia (PCD). People with PCD have immotile or defective cilia, leading to recurrent respiratory disease, but they do not have the symptoms of CDD. "Understanding how different diseases that affect cilia have different clinical manifestations will be an important avenue of our future research," Brown says.

Several years ago, Steven A. McCarroll, PhD, the Dorothy and Milton Flier Professor of Biomedical Science and Genetics in the Blavatnik Institute at HMS, developed a technology in his lab for analyzing gene expression in brain tissue at single-cell resolution—for determining which genes each cell is expressing—in thousands of cells at once. Now, with Loulou Foundation support, "We are applying this technology to understand how the CDKL5 mutation causes each cell type in the human brain to change its pattern of gene expression," McCarroll says. "We hope that understanding the full set of biological changes wrought by this mutation will nominate many new potential strategies for therapeutic intervention."

Two other scientists within the Blavatnik Institute at HMS—Michael E. Greenberg, PhD, the Nathan Marsh Pusey Professor and chair of the Department of Neurobiology, and Sandeep Robert "Bob" Datta, MD '04, PhD '04, a professor of neurobiology—are among the more than 180 scientists whose research has been enabled by the Loulou Foundation.

"By assembling a global scientific community and working to encourage collaboration and communication within this community," Lavery says, "we continue to drive research forward to answer the key questions that will lead to better treatments and cures for CDKL5 deficiency disorder."

The Loulou Foundation organizes the annual CDKL5 Forum, the only scientific meeting in the world dedicated purely to CDKL5 deficiency disorder (CDD) research.

FINANCIAL AID AND EDUCATION

A FITTING, LOVING TRIBUTE

When Robert "Charlie" Adams contacted Harvard Medical School nearly a decade ago to learn more about estate planning, he said that he and his wife were looking to support medical education and felt they had a debt to pay. His wife, Patricia "Pat" Cronin Adams, MD '68, was a long-time pediatrician who completed her internship and residency within the HMS family of affiliated hospitals before they settled together in Dover, New Hampshire.

Ultimately, Charlie decided to name HMS as a beneficiary of his retirement account in memory of Pat, who died in 2015 and to whom he was married for 47 years. Now, with Charlie's death in 2020 and their estate settled, more than $260,000 will support scholarships for MD students.

"Foresight like this helps us stay true to our need-based financial aid philosophy," says Ryan Callahan, HMS's director of financial aid. "Legacy gifts help to change the landscape of who can afford to attend HMS."

On average, the HMS Financial Aid Office administers over $40 million in loans, employment, and scholarship funding from various federal, private, and school sources to more than 70% of the student body.

Pat enjoyed practicing medicine until an early-onset Alzheimer's diagnosis prompted her retirement in 1993. Before her illness, she regularly participated in her HMS Reunion Report, sharing personal and professional highlights with her classmates every five years. She would express gratitude for her patients, lament that there weren't enough hours in a day, and convey her love for her restored farmhouse and animals. When she could not contribute to her 40th Reunion Report in 2008, Charlie did so on her behalf, writing, "She was much loved and highly respected by her patients and their parents." He noted that she received the Franklin Rogers Award from the NH Pediatric Society for her contributions to pediatric causes. As his final tribute to Pat, Charlie's gift will provide other aspiring doctors with an opportunity to pursue a medical education.

MEMBERS OF THE HARVARD MEDICAL SCHOOL AND HARVARD SCHOOL OF DENTAL MEDICINE CLASS OF 2025 ENJOY WHITE COAT DAY IN AUGUST 2021.

ALBRIGHT SPEAKERS TOUT COLLABORATION

Why would a place like Harvard Medical School invest in having a Therapeutics Initiative?

"It's really about the impact that a medicine can have on human health and suffering," says Mark Namchuk, PhD (top), executive director of therapeutics translation at HMS. "An effective medication, broadly distributed, is one of the most effective vehicles of improving human health worldwide."

Namchuk was one of two keynote speakers at the annual Hollis L. Albright, MD '31 Symposium, whose theme was "Transformation Through Collaboration: Inclusive Science and the Convening Power of Harvard Medical School." He says that the Therapeutics Initiative's leaders are focused on promoting interdisciplinary collaboration. "I like to use the term 'borderless science.' Really great ideas typically involve different disciplines and different institutions," says Namchuk, who is also a professor of the practice of biological chemistry and molecular pharmacology at HMS.

The event's other keynote speaker, Robert Gentleman, PhD (bottom), is the executive director of the Center for Computational Biomedicine (CCB) at HMS, which aims to leverage data and computation to transform research and improve health. Gentleman said that the CCB must collaborate with IT professionals and scientists both inside and outside of Harvard to gather the resources needed to "do the science that we want to do."

HMS Dean George Q. Daley, AB '82, MD '91, PhD, updated symposium attendees on the expansive work of the Massachusetts Consortium on Pathogen Readiness (MassCPR), which has added two new research streams: tracking the viral variants causing COVID-19 and studying the effects of long COVID.

Opening remarks for the March 22 virtual event were delivered by Tenley E. Albright, MD '61, who, along with her brother, Nile L. Albright, AB '61, MD, established the endowed symposium at HMS in memory of their father, an alumnus who devoted his life to surgery, patient care, and student mentorship. Moustafa Abdalla, MD '22, an aspiring academic surgeon, was recognized as the 2022 Albright Scholar Award recipient.

FACES OF HMS


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The HMS Black Postdoctoral Association (HBPA), established in March 2020 to promote a sense of connectedness throughout the HMS Black research community, held its inaugural symposium Dec. 10 at HMS and via Zoom. After the symposium, members of the HBPA posed on the steps of Gordon Hall with one of the symposium's keynote speakers, Cassandra G. Extavour, PhD (center), the Timken Professor of Organismic and Evolutionary Biology and of Molecular and Cellular Biology at Harvard University.

02
Jean E. Schaffer, AB '82, MD '86, enjoys a celebration held Dec. 6 to recognize her appointment as the inaugural incumbent of the Ory Family Professorship at HMS. Schaffer is a senior investigator and associate research director at Joslin Diabetes Center.

03
At the 2021 Daniel D. Federman Teaching Awards Ceremony, held virtually Oct. 4, John Flanagan, PhD, a professor of cell biology in the Blavatnik Institute at HMS, is named as the recipient of the Fariborz Maseeh Award for Innovative Medical Education. The award was established in 2020 with a gift from the Massiah Foundation to recognize and support an HMS faculty member who develops and leads innovative courses in the MD curriculum. Flanagan helped to develop the advanced integrated science courses in the HMS Pathways curriculum.

04
In partnership with its sister center at the Massachusetts Institute of Technology, the Hock E. Tan and K. Lisa Yang Center for Autism Research at HMS held a virtual public outreach lecture Nov. 3 featuring Michela Fagiolini, PhD (top), an HMS associate professor of neurology at Boston Children's Hospital, and Marina Viola, author of "Storia del mio bambino Perfetto" ("The Story of My Perfect Child").

05
Ghislaine Firmin (left) and Simone de Oliveira are two of the community health workers who work on The Family Van, HMS's mobile health clinic, to educate residents of Boston's underserved neighborhoods and connect them to health resources.

06
Paula A. Johnson, AB '80, MD '85, MPH '85, the president of Wellesley College, delivers the 29th Fae Golden Kass Lecture on Feb. 11. The lecture celebrates outstanding women in the medical sciences and is sponsored jointly by HMS and the Radcliffe Institute for Advanced Study. Johnson's talk was titled "Meaningful Differences: Sex, Race and Health in the Era of COVID."

07
Harold J. "Hal" Burstein, AB '86, MD '94, PhD '94, AM '94, an HMS professor of medicine at Dana-Farber Cancer Institute, received a 2021 Harvard Alumni Association award for his outstanding service to Harvard University. At HMS, his leadership and engagement activities include serving as chair of an admissions subcommittee and formerly serving as co-chair of his class Reunion Committee. He also helped create the Distinguished Service Award for HMS Alumni when he was a member of the Alumni Council.

08
Scott H. Podolsky, AB '93, MD '97, director of the Center for the History of Medicine at the Francis A. Countway Library of Medicine, discusses how the HMS experience has changed over the past 60 years, focusing in particular on the role of medical student activism. Podolsky was the featured speaker for the Alumni Leadership Appreciation Event—held virtually Feb. 4—which is designed exclusively for alumni volunteers and leadership donors to recognize their commitment to the School.

09
Grigori Guitchounts, PhD '20, a Gordon Fellow conducting neuroscience research in the Datta Lab at HMS, discusses his work Jan. 28 at the seventh annual research day for the Ellen R. Gordon and Melvin J. Gordon Center for the Cure and Treatment of Paralysis at Spaulding Rehabilitation Hospital and HMS.

STRENGTHENING SCHOLARSHIP SUPPORT

The late Daniel D. Federman, AB ’49, MD ’53, a beloved member of the Harvard Medical School community, was a champion for students, saved lives, comforted families, transformed careers, and changed the School and the field of medicine for the better. It’s no wonder, then, that in 2007, the members of the Class of 1957 marked their 50th Reunion by establishing an endowed scholarship fund in Federman’s honor. Their class gift would provide financial assistance in perpetuity to those HMS students with the greatest need.

> “THE COST OF EDUCATION, PARTICULARLY FOR THE UNDERPRIVILEGED, IS OUTRAGEOUS, AND I WANT TO GIVE ANY HELP I CAN.”
>
> SIDNEY ALEXANDER

One class member who has been contributing to the fund since its creation is Sidney Alexander, MD ’57, a longtime cardiologist at Lahey Hospital & Medical Center, formerly the Lahey Clinic. While he has been a generous Harvard supporter for the past 40 years—as has his wife, Susan Alexander, EdM ’57—he saved his biggest gift for last, recently donating $100,000 to the Class of 1957 Endowed Scholarship Fund.

“Harvard Medical School is a great institution and deserves support,” says Alexander. “The cost of education, particularly for the underprivileged, is outrageous, and I want to give any help I can.”

The Chi-Li Pao Foundation USA shares Alexander’s concern that underprivileged students might not be able to afford to attend HMS. To address this concern, the foundation began supporting the REACH scholarship program. Administered through HMS’s need-based financial aid program, REACH decreases the loan burden for students who demonstrate qualities of Resilience, Excellence, Achievement, Compassion, and Helping the underserved. This funding makes it more feasible for students from disadvantaged backgrounds, including those historically underrepresented in medicine, to accept HMS admission offers.

“We believe the challenges and problems our society faces will best be addressed by individuals with diverse backgrounds and broad perspectives who will be inspired and transformed by the education that the Harvard experience will provide,” says Gloria S. Kim, MD, Chi-Li Pao Foundation USA trustee. Created in honor of Chi-Li Pao, a shipping magnate and generous philanthropist, the foundation recently gave another $200,000 to HMS in support of REACH. “The Foundation supports the REACH program for the benefit of mankind,” Kim says.

Trust-worthy investment

For Paul L. Weiden, AB ’63, MD ’67, philanthropic support of Harvard is a rewarding family tradition that began when his mother established a charitable remainder unitrust (CRUT) in 1997 to benefit herself and then her son—and, ultimately, both Harvard College and HMS. Following his mother’s lead, Weiden decided to set up CRUTs on a consistent basis for Reunions of both the College and the Medical School as part of his tax strategy and estate planning. Most recently, he made a generous gift to fund a CRUT to mark his 55th HMS Reunion.

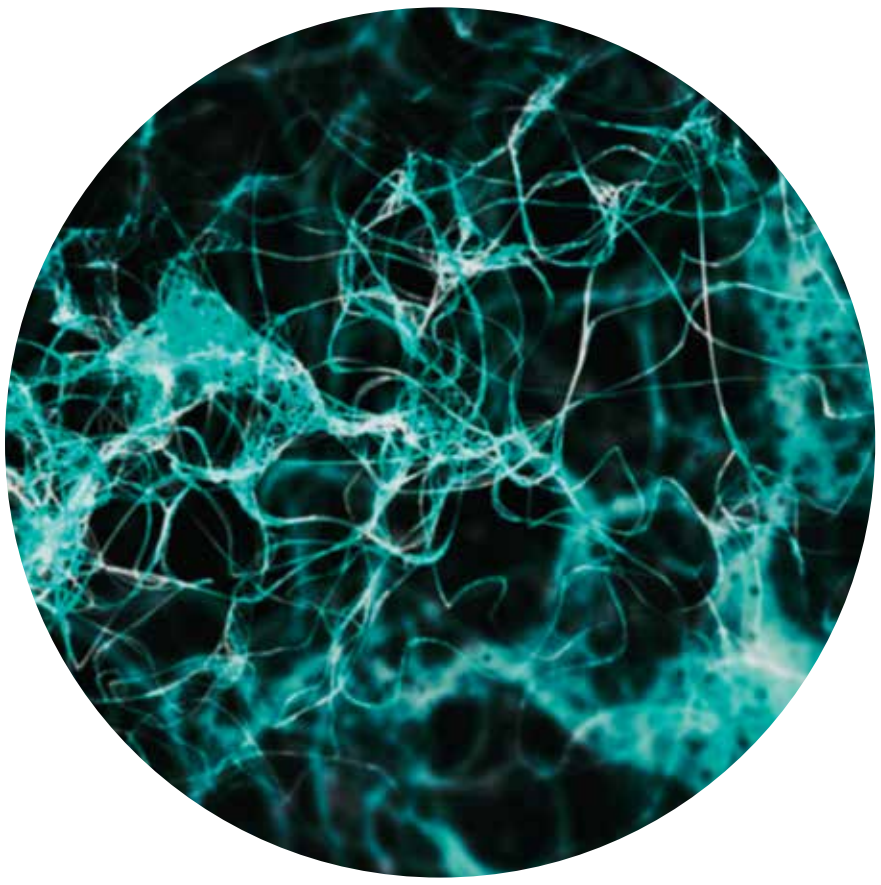
“This has provided meaningful tax savings and regular income, the latter intended primarily for the long-term support of my wife, Beverly Linkletter, who is younger, and of course, ultimately, for students who will receive support from the Weiden Family Scholarship Fund,” says Weiden, who is optimistic that his children, both Harvard College graduates, will choose to continue this tradition.

When establishing a CRUT at HMS, the donor transfers assets into a tax-exempt account and Harvard oversees investment of the trust assets, with no fee charged to the donor. The donor and his or her designated beneficiaries are paid a percentage of the trust’s value as income, typically between 5% and 7%. As the value of the trust changes, so too does the donor’s income. Upon the death of the last income beneficiary, the remainder of the trust is distributed to HMS.

A CRUT established by the late Donald F. Wallach, MD ’53, recently distributed funds to HMS that will establish a scholarship named after Wallach and his wife, Francesca, who died in 2020. Wallach, a former scholarship student himself, was an internationally accomplished biochemist and biophysicist who was the first scientist to recognize biological cellular membrane systems.

EXPLORING NEW AVENUES FOR ALZHEIMER'S RESEARCH

After an accomplished career as a board-certified neuropathologist and neurologist, Carol Ludwig, MD, transitioned to a philanthropic role that she says has been very rewarding. "I love identifying opportunities where our support can advance and de-risk cutting-edge emerging research. Ultimately, our goal is to make a positive impact."



The Carol and Gene Ludwig Family Foundation aims to develop a multidisciplinary group of highly creative and skilled researchers focused on accelerating the mechanistic understanding of neurodegeneration and Alzheimer's disease in order to further treatment development.

In 2002, Carol and her husband established the Carol and Gene Ludwig Family Foundation to support medical research, education, and communities. Since 2015, the foundation has generously supported projects related to brain health and aging led by Bruce A. Yankner, MD, PhD, a professor of genetics in the Blavatnik Institute at Harvard Medical School and an HMS professor of neurology at Boston Children's Hospital. Now, the foundation has expanded its support of HMS with a $2.58 million grant to establish the Ludwig Neurodegenerative Disease Seed Grants Program, which will help advance early-stage research toward treatment approaches.

"This new program taps into the neuroscience expertise at Harvard. We provide seed grant funding for talented researchers who are approaching neurodegeneration, particularly Alzheimer's disease (AD), from innovative perspectives," says Diana Shineman, PhD, the foundation's medical program director.

One of those researchers is Michael Greenberg, PhD, who received one of two inaugural grants through the program. He says that because aging is the primary risk factor for neurodegenerative diseases, including Alzheimer's, an understanding of the basic mechanisms of aging and their role in the onset of neurodegenerative disease progression has the potential to uncover important new strategies for therapeutic intervention.

"In this regard, accumulating genomic damage to neurons is a cardinal feature of neurodegenerative disorders and organismal aging," says Greenberg, the Nathan Marsh Pusey Professor and chair of the Department of Neurobiology in the Blavatnik Institute at HMS. "Our preliminary studies have identified a neuronal specific multi-subunit protein complex as a previously unrecognized mechanism of DNA damage repair in neurons that is critical for normal brain function, and whose disruption may contribute to mammalian aging and neurodegeneration."

With the Ludwig seed grant, Greenberg's lab will further probe the significance of the function of the protein in the aging process and the maintenance of neuronal genomic integrity. "We hope this work will provide the foundational basis for the future development of therapeutic interventions to prevent or combat various neurodegenerative conditions," he says.

"WE ARE EXCITED TO PROVIDE SEED FUNDING IN SUPPORT OF HIGH-RISK, HIGH-REWARD STUDIES THAT WILL HOPEFULLY ADVANCE TREATMENT DEVELOPMENT FOR THIS DEVASTATING DISEASE."

CAROL LUDWIG

Stirling Churchman, PhD, an associate professor of genetics in the Blavatnik Institute, also received a Ludwig seed grant. Her lab will test its hypothesis that mitochondria in Alzheimer's disease are experiencing mitonuclear imbalance through a decrease in mitochondrial gene expression, which can be restored by regulating mitochondrial DNA. "This project will result in new insights into the underpinnings of mitochondrial malfunction in AD and may lead to new therapeutic directions targeting mitonuclear imbalance," she says.

Dr. Ludwig says that despite recent high-profile clinical trial failures in Alzheimer's disease, the foundation is optimistic that technological advances in disease modeling, data science, genomics, and biomarker development have paved the way to investigate the underlying mechanisms of Alzheimer's disease as never before. "We are excited to provide seed funding in support of high-risk, high-reward studies that will hopefully advance treatment development for this devastating disease," she says.

BUILDING THE HEALTH CARE FRAMEWORK OF THE FUTURE

What does it mean to be a physician? The answer to that question will be radically different a few decades from now, says Jim Tananbaum, MD '89, MBA '91. He envisions a world in which the scientific progress that is currently enabling the creation of new drugs and diagnostics will become the cornerstone of medical practice for the individual.

"We will be able to combine a variety of measurements to enable a framework for care which learns and is continuously updated and improved—like other aspects of tech-enabled businesses that we are familiar with as consumers," says Tananbaum, the founder and chief executive officer of Foresite Capital, a U.S.-focused health care investment firm. He and his wife, Dana, recently gave Harvard Medical School $10 million to support its efforts toward creating such a framework, as well as to accelerate projects that will innovate how health care is delivered.

Robert Gentleman, PhD, executive director of the Center for Computational Biomedicine, says the Tananbaums' gift will support the building of critical computational and data infrastructure that is needed to support the broad application of machine learning (ML) and artificial intelligence (AI) methodology to health care and its delivery. He says that ML and AI algorithms need large amounts of data for training and to help identify potential problems with doctor-patient interactions, such as bias. "It will be advantageous for researchers and clinicians at HMS to have access to large, well-curated data resources—and that is what this gift will enable. We will be able to purchase data and hire top computational scientists to support active research."

THE TANANBAUM GIFT WILL CREATE:

- The Tananbaum Healthcare Transformation Fund, which will engage, enable, and build a community of innovative scientists, clinicians, and students across Harvard within the areas of health care policy, regulatory science, business, and entrepreneurship with the aim of improving health care and its delivery.
- The Tananbaum Catalyst Fund for the Center for Computational Biomedicine (CCB), which will be used to build and enhance the infrastructure of the CCB. The Center aims to leverage data and computation to transform research and improve health.

> "OUR HOPE WITH THIS GIFT IS THAT HMS AND HBS CONTINUE TO EVOLVE THEIR WORKING RELATIONSHIP AND PRODUCE THE NEXT GENERATION OF LEADERS WHO ARE AT THE CENTER OF TRANSFORMING OUR HEALTH CARE SYSTEM."
>
> JIM TANANBAUM

Gentleman says that, in addition, the gift will support activities to enable entrepreneurship, helping to create the technologies and companies of the future that will provide in-home and personalized care for everyone. Such activities will involve collaboration between HMS and Harvard Business School (HBS), underscoring Tananbaum's belief that being a physician leader over the next few decades will have more similarities to being a leader in other rapidly evolving industries than it has historically.

"As health care transforms to tech-enabled and distributed individualized care, it will need leadership that has been trained in medical science but also appreciates how to deliver high-quality health care products to the individual and how to continuously improve the way care is delivered," says Tananbaum, a member of the HMS Board of Fellows and HMS Discovery Council. "Our hope with this gift is that HMS and HBS continue to evolve their working relationship and produce the next generation of leaders who are at the center of transforming our health care system."

REMEMBERING PAUL FARMER

‘HEART AND SOUL’ OF HMS

On Feb. 21, the world lost pioneering global health physician and medical anthropologist Paul Farmer, MD ’88, PhD ’90. The Kolokotrones University Professor and chair of the Department of Global Health and Social Medicine in the Blavatnik Institute at Harvard Medical School, Farmer dedicated his life to improving and providing health care in some of the world’s most underserved countries and communities.

“Paul was, at his core, and to the very end, a doctor,” HMS Dean George Q. Daley, AB ’82, MD ’91, PhD, said in opening remarks of a March 4 candlelight vigil on the HMS Quad attended by hundreds of mourners from across the Harvard community. “His example will always be a reminder that a doctor’s truest calling is to care for the sick and ailing. This is the reason that, for me, Paul represented the heart and soul of Harvard Medical School.”

Farmer died in his sleep of an acute cardiac event at the age of 62 while in Rwanda, where he was chancellor of the University of Global Health Equity. He was also chief strategist of the international health organization Partners In Health (PIH), which he co-founded in 1987 when he was still an HMS student, and he served as chief of the Division of Global Health Equity at Brigham and Women’s Hospital (BWH).

TO HEAR AUDIO FROM THE CANDLELIGHT VIGIL HELD AT HMS, VISIT TINYURL.COM/PAUL-FARMER-VIGIL.

TO WATCH THE VIDEO OF THE MEMORIAL SERVICE HELD AT TRINITY CHURCH IN BOSTON, VISIT TINYURL.COM/PAUL-FARMER-SERVICE.

“Paul exuded joy and light, light that we all float upon,” said Joia Mukherjee, MD, MPH ’01, director of the Master of Medical Sciences in Global Health Delivery program and of the Program in Global Medical Education and Social Change at HMS, associate professor of medicine in the Division of Global Health Equity at BWH, and chief medical officer of PIH, in her closing remarks at the vigil. “Give light and people will find a way. I know his light will stay with us and we will find a way.”

Help carry on Dr. Farmer’s legacy by supporting the Paul Farmer, MD ’88, PhD ’90 Memorial Scholarship.
For details and to give, visit hms.harvard.edu/farmer-scholarship.

IMAGE: JOHN RA/ PARTNERS IN HEALTH

FINANCIAL AID AND EDUCATION

CARING FOR OUR FUTURE CAREGIVERS

Every student navigates twists and turns on the road to becoming a physician, eventually forging a unique path in pursuit of this dream. One common thread linking many of these students is the challenging, lengthy journey: four years of undergraduate studies, followed by four years of medical school education, and then several years as a resident before officially entering the workforce.

Christine Ament, AB ’97, MD ’02, knows firsthand from her days as an HMS student and in her current role of teaching residents and medical students at Boston Medical Center that “the length of training is daunting, and it can be really frustrating and demoralizing to have financial needs during training that you are not able to meet.”

“WE ARE SO LUCKY THAT THESE STUDENTS—ACCOMPLISHED ENOUGH TO DO ANYTHING IN THE WORLD—CHOOSE TO SPEND 10-PLUS YEARS TRAINING AS DOCTORS.”

CHRISTINE AMENT

Fortunately, HMS students are not alone on their journeys, thanks to support from donors like Christine and her husband, Dave Ament, AB ’96. The Aments recently gave $1 million to establish the Christine and Dave Ament HMS Student Experience Fund, which will support activities that have a positive impact on HMS students’ daily experiences, under the direction of HMS Dean for Students Fidencio Saldaña, MD ’01, MPH ’05. “This generous gift from Christine and Dave will allow us to address issues immediately and be enormously helpful to our students,” Saldaña says. “These funds will be used to continue to build the community and provide our students with the resources needed to do their most significant work.”

Christine Ament says that, through this fund, she and her husband are hoping to show HMS students their support and appreciation. “We are so lucky that these students—accomplished enough to do anything in the world—choose to spend 10-plus years training as doctors,” she says. “They work nights and weekends and holidays for years to acquire the advanced and intricate skills that we all expect to be able to call upon.”

For more than two years now, the world has had a front row seat to the heroism and dedication

Research has shown that 50 percent of medical students experience symptoms of burnout and that medical students are more susceptible to burnout than their non-medical peers.

of health care workers on the front lines fighting a global pandemic. “We all owe a massive debt of gratitude to health care professionals, now more than ever,” says Dave Ament. “Medicine is a wonderful career path, but one that comes with numerous daily challenges, stressors, and sacrifices that can really add up. Christine and I try to express our thanks and support by finding ways to alleviate those daily stressors and financial obstacles,” he says.

HEALTHY AND HAPPY AT AGE 120

The world of virtual reality (VR) has few limits. If, for instance, you've always wanted to visit Mount Everest—heck, even scale the summit—but the real-life confines of old age or declining health have dashed your hopes, simply put on a VR headset, and voila! You're transported to southern Asia, immersed in the beauty of the majestic mountain.

But what if you didn't need the magic of VR to climb mountains well into your 70s and 80s? What if you were fit enough to do it in *real life*?

Michael Antonov, a former technology executive who helped revive the virtual reality industry as chief software architect and co-founder of Oculus, envisions a future where people are healthy into their 120s. He launched The Michael Antonov Foundation to take on huge challenges that can make a difference in human lives—for example, how to extend life and make it more meaningful.

"I BELIEVE THAT AGING IS A TREATABLE DISEASE THAT CAN BE MITIGATED IN OUR LIFETIME. IN DOING SO, WE WILL IMPROVE SOCIAL AND ECONOMIC CONDITIONS FOR EVERYONE."

DAVID SINCLAIR

Toward that effort, Antonov recently gave $570,000 to support the research of David Sinclair, PhD, a professor of genetics in the Blavatnik Institute at Harvard Medical School and co-director of the Paul F. Glenn Center for Biology of Aging Research at HMS.

"I became interested in the aging space about five years ago," says Antonov. "David Sinclair is one of the most prominent researchers in the field, and I have been following his work. When I learned about the proposed experiments on epigenetic reprogramming, I knew I wanted to support this effort," he says.

Sinclair says that one of the main reasons we age is epigenetic drift, in which a cell "forgets" which genes to turn on and off to maintain optimal function. "Epigenetic reprogramming—the technical term for changing the identity of a cell—is a way to rewind the age of cells and revive the function of old or damaged organs and tissues by reversing epigenetic drift," he says. "Work in our lab is currently studying a variety of small molecules and genetic pathways that can be used to rewind aging."

Antonov, whose gift establishes the Epigenetic Reprogramming Research Fund, believes that reprogramming offers one of the most potent ways to rejuvenate tissues. Ultimately, Sinclair's goal is to discover cellular reprogramming therapies to treat age-related and rare diseases and eventually to slow and reverse aging itself, thereby extending healthy lifespan for billions of people. "I believe that aging is a treatable disease that can be mitigated in our lifetime," Sinclair says. "In doing so, we will improve social and economic conditions for everyone."

MINGLING AND MATCHING

FROM LEFT: NIYI ODEWADE, BEZAYE TESHOME, AND ASER ABRHA SHARE THEIR MATCH NEWS.

For the first time since the COVID-19 pandemic began, members of Harvard Medical School's graduating class were able to celebrate in person for Match Day. Scores of students and their family members and friends gathered in a crowded and noisy Tosteson Medical Education Center (TMEC) atrium on March 18 for the traditional bell-ringing that signaled the official release of match information from the National Resident Matching Program (NRMP). At noon, the students ripped open envelopes to learn where they matched for their residencies.

Each year, tens of thousands of medical students across the country submit applications and interview at hospitals across the U.S. in the hope of matching with a residency program in the specialty that interests them. They rank their preferences through the NRMP, which uses a computer algorithm to place students into residency spots.

This year, the 158 graduating HMS students matched to 145 clinical residencies, with 10 students embarking on nonclinical careers and three entering Massachusetts General Hospital's oral and maxillofacial surgery program. Although students will travel to all parts of the country for their residencies, 48% will remain in Massachusetts for their clinical training. The largest group, representing 30% of graduating HMS students, matched in internal medicine, with the next largest group, at 10%, matching in pediatrics.

WHERE IT IS NEEDED MOST

INVESTING IN LEADERSHIP TO IMPROVE MEDICAL EDUCATION

William E. Epifanio II, AB '82, a cancer survivor who has driven 172 miles from his Connecticut home to see his Harvard-affiliated doctors for decades, knows more than anyone the value of top-quality health care. He just wishes more people had access to it, and he puts the onus on medical schools to help make that happen by producing quality physicians.

"As a recognized global leader in medical education, HMS is especially obligated to live up to this task," Epifanio says. He believes that the School must remain committed to self-evaluation and improvement to stay on top. To support this effort, he has established a fund in his family's name with a $250,000 gift, to be used at the discretion of HMS Dean for Medical Education Edward M. Hundert, MD '84 (pictured), in order to address challenges and pursue opportunities within the Program in Medical Education.

Epifanio has a unique vantage point into the needs of the School. He has gotten to know Hundert well through his work on HMS's Advisory Council on Education and as part of a 12-member strategic task force focused on financing medical education at HMS. Additionally, he brings a wealth of experience in medicine and technology, which have been consistent threads throughout his life. While majoring in engineering and applied sciences at Harvard College, Epifanio completed the entire premedical curriculum. He also spent summers working on research projects at Sloan Kettering Cancer Center—securing a patent for an electronic system to measure the flow rate of electrolytic fluids—and in the medical products group at Arthur D. Little, an international management consulting firm. After completing a two-year analyst position at McKinsey & Company,

"WITH AN UNRESTRICTED GIFT, I'M BETTING ON THE IDEAS AND JUDGMENT OF A PERSON. ED HUNDERT IS BRILLIANT, CREATIVE, AND RELENTLESSLY CATALYZING IMPROVEMENTS IN HMS EDUCATION. I WOULD BET ON ED ANY DAY."

WILLIAM E. EPIFANIO II

Epifanio started a medical computer system company, which he ran for 14 years before becoming an equity analyst at JP Morgan Securities and Goldman Sachs focused on enterprise and PC software sectors. Epifanio now runs a registered investment advisory firm where he is an investment adviser and portfolio optimizer for high-net-worth investors.

"Bill's dedication, enthusiasm, and vision are huge assets both to HMS and to me personally," says Hundert. "His generous financial support and strategic insight will help us uphold our commitment to preparing tomorrow's leaders in clinical medicine, bioscience, health justice advocacy, and more."

The respect is mutual, and Epifanio has found a kindred spirit in Hundert. "With an unrestricted gift, I'm betting on the ideas and judgement of a person. Ed Hundert is brilliant, creative, and relentlessly catalyzing improvements in HMS education. I would bet on Ed any day," he says. "I'm confident that money specifically supporting him is money very well invested, most likely leading to impactful and positive outcomes."

GROUP STUDYING HUMAN BRAIN EVOLUTION GETS BIG BOOST

Allen Discovery Centers, which are often created in partnership with major research organizations and universities, embody The Paul G. Allen Frontiers Group's commitment to launching and fostering the development of entire new fields in biology.

In 2017, investigators at Harvard Medical School and Boston Children's Hospital began collaborating on a large-scale effort to answer an important question about human biology: How did our modern brains evolve?

To help answer this question, The Paul G. Allen Frontiers Group, a division of the Allen Institute, recommended $10 million in funding from the Paul G. Allen Family Foundation to these investigators for their first four years of work. This support enabled them to establish a huge database of ancient human DNA that has given rise to new insights about not only our biology and evolution, but also our cultural and social histories. Now this collaborative effort, known as the Allen Discovery Center for Human Brain Evolution, has received another $10 million award to fund the next four-year phase of its work.

"We developed the Allen Discovery Center funding mechanism with the goals of filling a gap left by traditional funding sources and giving visionary scientists the ability to attack a problem in new ways," says Kathy Richmond, PhD, executive vice president and director of the Frontiers Group and the Office of Science and Technology at the Allen Institute. "We've been thrilled with the success of the Center for Human Brain Evolution in its initial phase, especially the degree to which the investigators have engaged their communities and accelerated entire fields of research. We're so excited about what the next four years will hold."

The human brain evolution team is looking for pieces of the genome that are the same, or conserved, across all mammals except humans. Scientists dub this type of human-specific DNA change a "human accelerated region," or HAR. While many teams have studied HARs in modern humans, the center's researchers now plan to examine ancient human DNA to pin down how these regions of the human genome have changed during our evolution, matching genomic changes with key cultural and behavioral changes over the past 10,000 years of human history.

David Reich, AB '96, DPhil, a professor of genetics in the Blavatnik Institute at HMS, is leading the effort to collect this ancient DNA. The team receives samples from ancient burial grounds in Europe found by archeologists who collaborate with the genetics researchers. Reich and his colleagues have sequenced and analyzed DNA from several thousand ancient human genomes over the past decade. In the center's first four-year phase, they built these sequences and other publicly available ancient genome sequences into an open-access ancient human DNA database. In the center's next phase, the researchers will mine these ancient DNA databases for human accelerated regions likely to be involved in brain evolution and compare them with modern sequences.

They will also characterize how these DNA sequences work, using the genetic engineering technique known as CRISPR-Cas9 to edit human accelerated regions in neurons or brain organoids in the lab to understand the effects on neurons if these regions are deleted or mutated. Additionally, they are using ferret and monkey animal models to study how a few select genes, identified in the center's first phase, affect brain function. Together, these studies will shed light on which genomic changes likely drove our brains' evolution and which were just along for the ride.

> "WE DEVELOPED THE ALLEN DISCOVERY CENTER FUNDING MECHANISM WITH THE GOAL OF FILLING A GAP LEFT BY TRADITIONAL FUNDING SOURCES AND GIVING VISIONARY SCIENTISTS THE ABILITY TO ATTACK A PROBLEM IN NEW WAYS."
>
> KATHY RICHMOND

It's an extensive and coordinated effort to understand human evolution at a scale that's not typically funded by traditional sources, says Christopher A. Walsh, MD, PhD, the Bullard Professor of Pediatrics and Neurology at HMS and BCH. "These issues of human evolution that we want to understand, and their intersection with human culture and our cognitive features, are fascinating and broadly relevant—but very difficult to support with NIH funding," Walsh says.

Reich concurs with Walsh's assessment. "It's really transformative to have private funding," he says. "It fills an important gap that would not be supported by normal funding mechanisms."

Reich and Walsh lead the Allen Discovery Center for Human Brain Evolution along with Michael Greenberg, PhD, the Nathan Marsh Pusey Professor and chair of the Department of Neurobiology in the Blavatnik Institute at HMS. Greenberg's group will investigate how human-specific genomic features give rise to traits associated with human brain development and function. The goal will be to compare the landscape of sensory-responsive cis-regulatory regions in different brain cell types between humans and other primates. "This will begin to reveal how the complex human brain is able to develop slowly in a sensory-dependent manner during the first two decades of life, and in the process is able to acquire many special features that are uniquely human," says Greenberg.

The Allen Discovery Center for Human Brain Evolution has added three new investigators for the next phase of work: Eunjung "Alice" Lee, PhD, and Ryan Doan, PhD, both HMS assistant professors of pediatrics at BCH, as well as Vagheesh Narasimhan, SM '12, PhD, an assistant professor at the University of Texas at Austin and a former postdoctoral researcher at HMS.

BOLSTERING DEAN'S EFFORTS TO BUILD A DIVERSE COMMUNITY

Harvard Medical School can be a force for social change, says George Q. Daley, AB '82, MD '91, PhD. That's why, since early in his HMS deanship, he has prioritized building a culture of diversity, inclusion, and belonging.

"Essential to such a culture is that every person feels empowered, comfortable, and safe to express opinions and voice concerns and is treated with respect, tolerance, and dignity," says Daley, who has spearheaded a multipronged approach to address the scourge of racism in medicine and biomedical science. After becoming dean in 2017, he announced the creation of the HMS Task Force on Diversity and Inclusion. He charged Joan Reede, MD, MPH '90, SM '92, MBA, dean for diversity and community partnership, with assembling and leading it. From this task force sprung the Better Together plan, the goal of which is to establish HMS as the institution of preference for diverse candidates, including underrepresented minorities, women, those who identify as LGBTQ, and individuals with disabilities.

GEORGE Q. DALEY

JOAN REEDE

In pursuit of this goal, HMS has been acting on multiple fronts. Among those actions:

- The School is considering how to enhance the cluster hire model that it recently employed to hire six new junior faculty—four on the HMS Quad and two at Boston Children's Hospital. By prioritizing scientific excellence and a demonstrated commitment to HMS's institutional values of diversity and community, the cluster hire model enables HMS and its affiliated hospitals to build a cross-institutional, cross-disciplinary, self-reinforcing community of scientists, physicians, and leaders who are committed to inclusive excellence.

- The Program in Medical Education (PME) at HMS commissioned a Task Force Against Racism to investigate racism within the functions and programs across the PME and offer concrete recommendations and possible solutions. The task force—co-chaired by Andrea Reid, MD '88, MPH '01, associate dean for student and multicultural affairs and director of the HMS Office of Recruitment and Multicultural Affairs, and Fidencio Saldaña, MD '01, MPH '05, dean for students—examined the School's learning environment, the curriculum, faculty and staff development, the admissions process, assessment practices, and student affairs. Five subcommittees were formed, each of which developed bold and expansive recommendations that will ensure anti-racist strategies are embedded into the fabric of PME.

- The School is creating events and dialogues that promote diverse perspectives on and understanding of history and context, and that bring the HMS community together with members of its neighboring communities.

ANDREA REID

FIDENCIO SALDAÑA

"I don't think we can be an exemplary, world-class institution unless we are a diverse institution," Daley says. "I don't believe we can lead the world as researchers, educators, or clinicians without embracing, embodying, and truly entertaining a wide range of perspectives and experiences."

In support of Daley's efforts to build an inclusive and diverse health sciences community across HMS and its affiliated hospitals, Dana A. Weiss Smith, EdM '92, and Robert A. Smith, AB '81, MBA '85, recently established the Robert and Dana Smith Dean's Fund for Diversity, Equity, and Inclusion with a $1 million gift. The Smiths say they are thrilled to partner with Daley as he sets an example at HMS.

"I DON'T THINK WE CAN BE AN EXEMPLARY, WORLD-CLASS INSTITUTION UNLESS WE ARE A DIVERSE INSTITUTION."

GEORGE Q. DALEY

"From the work we do at both Boston Children's Hospital and in the community, we understand the value that his leadership and engagement at HMS—the pinnacle of its field—can bring to our local, national, and international communities," the Smiths say. "Over time, this effort will help diminish the health disparities that challenge our nation and the world by building a work force which, from bench to bedside, improves the quality and character of care that HMS alumni will deliver."

Daley, in turn, is thrilled to have the Smiths as partners. "I am so grateful to Dana and Rob for supporting my efforts to diversify the field of medicine," Daley says. He emphasized that by recruiting students from underrepresented backgrounds and supporting them holistically while at HMS, the School is more likely to retain them as residents, fellows, and the next generation of faculty physicians within HMS's affiliated hospitals. "While there is certainly much more work we can and must do on a local, regional, and national level, I believe that effecting change at HMS is the best way to create an enduring ripple effect.

The Better Together plan's overall vision for success includes increased representation of historically marginalized individuals at all levels, particularly senior faculty and department administrators and leaders.

VISIT TINYURL.COM/HMS-DIVERSITY TO LEARN MORE ABOUT DIVERSITY AND INCLUSION AT HMS.

BUILDING A BRIDGE BETWEEN MEDICAL AND BUSINESS STUDENTS

One of the greatest challenges that graduating Harvard students face is a fear of risk, says Samir Kaul, MBA '02. If these students were to learn more about risk and how to become effective risk-takers, perhaps they would feel more empowered to choose the career path they desire most. "My whole career has been at the intersection of business and the life sciences, and it has been incredibly satisfying. I want more students to have the same opportunities that I did," Kaul says.

To help create those opportunities, Kaul and his wife, Puja, recently gave $4 million to Harvard Medical School to establish a professorship that will solidify collaboration between HMS and Harvard Business School (HBS) and promote entrepreneurship, therapeutic translation, and academia-industry partnership.

"COLLABORATION ENSURES THAT KNOWLEDGE GAPS DO NOT BECOME THE BOTTLENECK TO INNOVATION."

SAMIR KAUL

"My hope is that the Puja and Samir Kaul Professorship of Biomedical Innovation and Translation stimulates the launch of many exciting startups, and at the very least encourages many more life sciences students to consider a career in entrepreneurship," says Samir Kaul, a founding partner and managing director at Khosla Ventures, where he focuses on health, sustainability, food, and advanced technology investments.

The highest honor Harvard Medical School can bestow on a faculty member is an appointment to an endowed professorship. Endowed professorships stand in perpetuity, generating invaluable support for incumbents and HMS while building a history of remarkable scholarship and leadership under one name.

The Kauls' gift is a tremendous investment in the Therapeutics Initiative launched by HMS Dean George Q. Daley, AB '82, MD '91, PhD, to help scientists develop better medicines that can improve human health. Daley, who has known Kaul for more than 20 years and was an informal mentor to him, says he couldn't be more grateful, both personally and on behalf of the School. "Endowed professorships are a major priority for me, and I am thrilled to have this fund to recognize and support a faculty member to drive collaboration between HMS and HBS, in perpetuity and in Puja's and Samir's names," he says.

On the HMS Quad, the recently completed Blavatnik Harvard Life Lab Longwood—the physical home of the Therapeutics Initiative—will be used by the Kaul Professor to build a bridge between the HMS and HBS communities and to promote life sciences entrepreneurship and company formation. The Life Lab will be a mixing pot for academic and industry scientists and will house a spectrum of projects, from early-stage lab research to startups being incubated toward maturity, all drawn from across the Harvard community.

"Harvard has some of the finest minds in the world in both business and the life sciences in the same zip code," Kaul says. "Collaboration ensures that knowledge gaps do not become the bottleneck to innovation. Together, the students of HMS and HBS are in a perfect position to bring groundbreaking research into the real world."

SAMIR AND PUJA KAUL

IN BRIEF

The following faculty-generated gifts and grants totaling $250,000 or more were awarded by organizations to support members of the Harvard Medical School community in their work to alleviate suffering and improve health and well-being for all.

The **Burroughs Wellcome Fund** has awarded grants to three researchers totaling $1.76 million. Charlotte Strandkvist, PhD (right), a research fellow in systems biology in the Blavatnik Institute at HMS, will work to develop new experimental methods to better understand how stem cells "decide" whether to divide to produce more stem cells or differentiate to a variety of cell types. Silvia Rouskin, PhD (left), an assistant professor of microbiology in the Blavatnik Institute at HMS, is working to understand RNA structure heterogeneity and its role in gene expression and disease. Emily Ferenczi, MD, PhD (below), an instructor in neurology at Massachusetts General Hospital, aims to use state-of-the-art techniques to identify and precisely manipulate connections between the basal ganglia and other areas of the brain to determine their influence over brain activity. Scientists and doctors think that disruption in these connections is responsible for many of the symptoms of Parkinson's disease.

Moderna Inc. is supporting the work of two researchers in the Blavatnik Institute at HMS with grants totaling $841,894. Arlene H. Sharpe, AB '75, AM '76, PhD '81, MD '82 (left), chair of the Department of Immunology and the George Fabyan Professor of Comparative Pathology, is aiming to demonstrate preclinical proof of concept for mRNA-encoded PDL1 in one or more disease models, combined with mechanistic measures of T cell modulation in vivo. Ulrich H. von Andrian-Werburg, MD, PhD (right), the Edward Mallinckrodt Jr. Professor of Immunopathology, is working to identify existing drugs that could be used to strengthen the immune response to the mRNA COVID-19 vaccine.

In addition to these grants, Moderna Inc. has awarded $105,000 to Russell Phillips, MD (right), director of the HMS Center for Primary Care and the William Applebaum Professor of Medicine at HMS and Beth Israel Deaconess Medical Center, to cover the costs for six months of development, design, implementation, and evaluation of the Sprint to Accelerate Vaccination Equitably (SAVE) Program. SAVE is an 11-week intensive improvement program that will help community and rural health teams increase COVID-19 vaccination rates for their target patient populations.

The Commonwealth Fund Fellowship in Minority Health Policy at Harvard University has prepared physicians, particularly physicians from groups underrepresented in medicine, for leadership roles in health policy and public health for 26 years, giving them the tools to transform health care delivery systems for minority, low-income, and other vulnerable populations across the country. The **Commonwealth Fund** has renewed its support of the fellowship with an $800,000 grant under the direction of Joan Y. Reede, MD, MPH '90, SM '92, MBA, dean for diversity and community partnership at HMS.

Mollie M. Williams, DrPH, MPH, executive director of The Family Van, has been awarded $800,000 from **Leon Lowenstein Foundation Inc**. for her efforts to build the capacity of the mobile health care sector through Mobile Health Map (MHM), a program of Harvard Medical School. MHM is a collaborative research network that helps mobile clinics measure, improve, and communicate their impact.

The **Multiple System Atrophy (MSA) Coalition** has awarded $475,494 to Dana Vuzman, PhD, director of genome platform development in the Department of Biomedical Informatics in the Blavatnik Institute at HMS and an instructor in medicine at Brigham and Women's Hospital, in support of her investigation into the underlying genetic causes of MSA using the Clinical Genome Analysis Platform.

Jonathan Abraham, AB '05, PhD '10, MD '12, an assistant professor of microbiology in the Blavatnik Institute at HMS, is studying how mosquito-vectored alphaviruses bind to cell surface receptors and jump between species and cause disease in humans. This project is being supported by a grant of $340,000 from the **Vallee Foundation.**

The HMS Program in Global Public Policy and Social Change, directed by Vanessa B. Kerry, MD '07, MSc, was awarded a grant of $325,000 from the **John D. and Catherine T. MacArthur Foundation** to create the COVID Academy, a series of seminars addressing COVID-19 policy implementation challenges for governors and state health officials.

NEW INSTITUTE USES HARVARD'S BREADTH TO TAKE DEEP DIVE INTO INTELLIGENCE

The new Kempner Institute for the Study of Natural and Artificial Intelligence at Harvard University was established on the premise that intelligence in natural and artificial systems is intimately interconnected: the next generation of artificial intelligence (AI) requires adopting principles that our brains use for fast, flexible, and natural reasoning, while understanding how our brains compute and reason requires theories developed for AI.

Guided by this premise, the institute is enlisting and training future generations of researchers to study intelligence from biological, cognitive, engineering, and computational perspectives. Its broad goal, which it will pursue within ethical frameworks and with a desire to improve the world, is to discover and increase scientific knowledge.

The institute will live in the recently completed Science & Engineering Complex in Allston, a 500,000-square-foot space that houses classrooms, cutting-edge teaching and research labs, and areas for innovation and collaboration. Bernardo Sabatini, SB '91, MD '99, PhD '99, the Alice and Rodman W. Moorhead III Professor of Neurobiology in the Blavatnik Institute at Harvard Medical School, will co-lead the Kempner Institute with Sham Kakade, PhD, the Gordon McKay Professor of Computer Science and of Statistics at the Harvard John A. Paulson School of Engineering and Applied Sciences.

Visit **tinyurl.com/Kempner-QA** to learn more about the new Kempner Institute from its co-leaders, Sham Kakade (top left) and Bernardo Sabatini (top right).

Established with a $500 million gift from Priscilla Chan, AB '07, MD, and Mark Zuckerberg (left)—co-founders and co-CEOs of the Chan Zuckerberg Initiative, which aims to build a more inclusive, just, and healthy future for everyone—the institute is committed to recruiting people from backgrounds traditionally underrepresented in science, technology, engineering, and math (STEM) fields. The gift will support 10 new faculty appointments, new computing infrastructure, and resources that will allow University students at all levels to study natural and artificial intelligence.

The institute's steering committee comprises faculty across Harvard schools and disciplines, including HMS faculty members Robert Gentleman, PhD, executive director of the Center for Computational Biomedicine at HMS, and Isaac Kohane, MD, PhD, the Marion V. Nelson Professor and chair of the Department of Biomedical Informatics in the Blavatnik Institute at HMS.

Q&A WITH BERNARDO SABATINI

We sat down with Bernardo Sabatini, SB ’91, MD ’99, PhD ’99, the Alice and Rodman W. Moorhead III Professor of Neurobiology in the Blavatnik Institute at Harvard Medical School, to discuss the new Kempner Institute for the Study of Natural and Artificial Intelligence and to talk more broadly about the role of AI in health care—a topic explored elsewhere in this issue.

01

The new Kempner Institute aims to build a population versed in both neuroscience and artificial intelligence (AI) systems. As the institute’s co-director, can you explain why this is such an important concept?

Neuroscience and AI are two of the most interesting scientific fields at the moment, and they need each other. In order to truly understand the brain and the nature of intelligence, we need both large amounts of data as to how biological brains work as well as solid tools, models, and theories as to how to make sense of this data. Thus, neuroscience already relies heavily on AI and machine learning (ML). Conversely, AI and ML often progress by people trying random new things, sometimes in an unprincipled manner (a “hack,” in the good sense). Studying the brain will give us insights into the “hacks” that evolution has created and selected and which we can add to AI systems to make them smarter.

02

You’ve noted that the institute is not only about advancing AI—it’s fundamentally about discovering and increasing scientific knowledge. But can you describe what impact larger AI systems might have on health care and how it’s delivered?

We hope that the discoveries that come from the institute will enable fundamentally new classes of AI systems. We can imagine that in the future, AI systems that help with diagnosis might actually interact with and observe the patient, as opposed to analyzing data provided to them by people. Current AI systems are not designed to do this and struggle with integrating data that comes from many different modalities. In addition, most AI systems don’t learn on the fly. Before the pandemic, no AI system could help treat individuals with COVID. However, in the future, an AI system might learn as a pandemic unfolds and help us treat sick individuals in real time.

We often hear about the problem of bias in data and how it can increase inequity. What can the institute do to help prevent this?

Bias is a problem. We need to understand how bias enters into data and how algorithms can detect and correct this bias. At the same time, we need to be frank about what AI systems can and cannot do. The institute will help us understand these problems, help us prove what AI systems can do, and help us develop “interpretable” AI in which we can see what factors are being used to make decisions. New theories and AI architectures will help us open the black box of AI to understand how bias creeps in and how to prevent it. Lastly, a wonderful feature of the Kempner is that it is embedded in a university community that includes scholars in ethics, law, government, cognitive sciences, and other fields that can collectively help us tackle the sources and effects of bias in AI algorithms.

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DEAN OF HARVARD MEDICAL SCHOOL
George Q. Daley, AB ’82, MD ’91, PhD

DEAN FOR ALUMNI AFFAIRS AND DEVELOPMENT
Lisa Boudreau

EXECUTIVE DIRECTOR OF DEVELOPMENT COMMUNICATIONS AND DONOR ENGAGEMENT
Emily Cahill

EDITOR
Randy Fox

CREATIVE DIRECTOR
Eliza Butts

CONTRIBUTERS
Victor DeRubeis
Kristine King

DESIGNER
Sametz Blackstone Associates

WRITERS
M.R.F. Buckley
Elizabeth Dill
Randy Fox
Jake Miller
Brandy Newlon
Alexis Stefano
Rachel Tompa

PHOTOGRAPHERS
Gretchen Ertl
Getty Images
Steve Gilbert
Channing Johnson
Steve Lipofsky
Sam Ogden
Donald Raymond
Maya Rucinski-Szwec
Bethany Versoy
Aaron Washington

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401 Park Drive, Suite 505
Boston, MA 02215

FOR INFORMATION
Contact Randy Fox, associate director of strategic communications, at 617-384-8629 or randall_fox@hms.harvard.edu

401 PARK DRIVE
SUITE 505
BOSTON, MA 02215

HARVARD MEDICAL SCHOOL

REMEMBERING THE INCOMPARABLE PAUL FARMER

10

CELEBRATING THE HEART AND IMPACT OF THE HMS COMMUNITY

IMAGE: REBECCA E. ROLLINS/ PARTNERS IN HEALTH

PULSE

SPRING 22

PAINTING WITH PURPOSE

Pamela Chen, AB ’16, MD ’20, poses with one of four portraits she painted of distinguished HMS alumnae for the “Women Before Me” exhibit installed in the Tosteson Medical Education Center. Chen, who noticed that the School’s artwork did not include many women or people of color, was inspired to recognize the accomplished female physicians at HMS who preceded her. The four women she selected are Eve Higginbotham, MD ’79 (seen in painting); Yeu-Tsu Margaret Lee, MD ’61; Gina Moreno-John, MD ’94, MPH ’94; and Raquel Cohen, MPH ’45, MD ’49, who died in 2020. **View the “Women Before Me” online exhibit at tinyurl.com/Women-Before-Me.**