

A LOOK UNDER THE HEAD

What Can Brain Mechanics Tell Us About Decision-Making?

BY CARLA GARNETT

Researchers are closer than ever to understanding how you make up your mind. What's more, they may be able to quantify your thought process and perhaps even why you make the decisions you do. If that prospect freaks you out, don't worry. The research tells us about how the brain achieves these feats, not what any individual's brain is doing as you muse about this or that.

For much of the past two decades, Dr. Michael Shadlen, professor and HHMI



Columbia's Dr. Michael Shadlen speaks at NIH.

investigator in the department of neuroscience at Columbia University, and his colleagues have been studying decision-making from the inside out—examining mechanisms of the brain known to be involved in choice. Now his group is pushing the boundaries of that research.

“A decision is a commitment to a

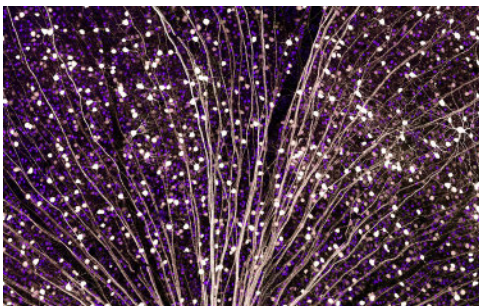
proposition among alternatives that arises through a process of deliberation,” Shadlen said at a recent NIH Neuroscience Seminar, “and I think the neuromechanisms of decision-making offer a window on higher brain function and cognition.”

Calling himself a “kind of a grandchild of the [NEI] Lab of Sensorimotor Research,” which sponsored his lecture, Shadlen described two studies, one on reasoning from symbols and the other that connects memory to decision-making.

NIH'ers, he pointed out, provided crucial building blocks for the studies and for a large share of research in the field. Former LSR scientists Dr. Mickey Goldberg and Dr. Carol Colby conducted work to characterize the parietal cortex—the region of the brain that Shadlen studies.

Shadlen himself worked as a postdoc with Stanford's Dr. Bill Newsome (of BRAIN

SEE SHADLEN, PAGE 8



Not Van Gogh's Starry Night, but close. See p. 12.

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Dr. Michael DeBakey (r) once treated Jerry Lewis.

THE TEXAS TORNADO

NLM Commemorates Heart Surgeon DeBakey

BY DANA TALESNIK

Anyone who has ever had heart surgery owes a debt of gratitude to the late Dr. Michael DeBakey. Today, coronary bypass is considered a routine operation but heart disease

SEE DEBAKEY, PAGE 6

PREVENTION POSSIBLE, HOWEVER

Liver Cancer on Rise, Aflatoxin Contributes, Says Gropman

BY RICH MCMANUS

There are few other chemical carcinogens as closely tied to causing cancer as aflatoxin, a product of mold, usually in corn, that is



Dr. John Gropman

ubiquitous on planet Earth. First discovered in the United Kingdom in 1960, aflatoxin was soon thereafter linked to disease when it was implicated in the deaths of turkeys who had consumed moldy peanut meal. Identified as a cause

of liver cancer from both experimental studies and epidemiology, aflatoxin remains

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Dr. Vernon Anderson, president of the NIH Bicycle Commuter Club, shows off the BTWD T-shirt at last year's event in front of Bldg. 1.

PHOTO: BILL BRANSON

"The Mathematics of Biomedical Data Science."

For all events, sign language interpreters can be provided. Individuals who need reasonable accommodation to participate should contact Jacqueline Roberts, Jacqueline.Roberts@nih.gov, (301) 594-6747, or the Federal Relay, (800) 877-8339.

For more information about the day's events, visit <http://nihpiday.nih.gov/>.



MIT's Dr. Bonnie Berger

'Safety by Design' Symposium Set, May 22-24

The Office of Research Services' Division of Occupational Health and Safety will hold its third symposium in a series promoting a culture of safe and responsible science in the conduct of biomedical research. "Safety by Design – Microbial Inactivation – Lessons Learned and a Path Forward" is scheduled for May 22-24 in Natcher Conference Center.

Presenters include researchers and other experts in inactivation who will discuss the science behind microbial inactivation, review past missteps, identify challenges affecting inactivation such as gaps in scientific knowledge and limited guidance and examine strategies for moving forward. The event offers formal presentations and opportunities to network, exchange ideas, work in small groups and learn. The August 2016 GAO Report to Congressional Committees *Improved Oversight of Dangerous Pathogens Needed to Mitigate Risk* will frame the symposium program.

Attendees should register by Wednesday, May 10, at www.safetybydesignsymposium.eventbrite.com.

Outdoor Event Returns

Asian American Heritage Month Activities at NIH

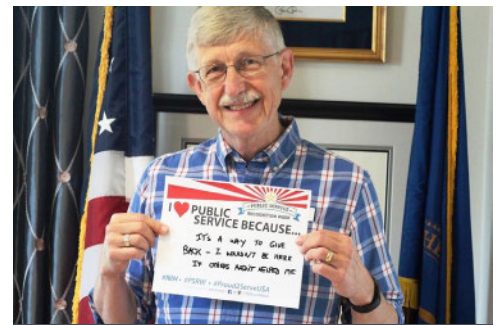
The annual outdoor event to celebrate Asian American Heritage is returning to the Bldg. 31 patio after a 2-year break. It will take place on Wednesday, May 24 from 11:30 a.m. to 1:30 p.m. and will feature Korean dance, Chinese music and a Tai Chi demonstration. The Bldg. 31 cafeteria will provide Asian cuisine for purchase.

The program will open with a colorful lion dance, accompanied by drums and gongs. NIH groups and community organizations will also be on hand to share health-related and other information. The event is sponsored by the NIH Asian and Pacific Islander American Organization.

For more information, contact Aaron Bell (bella@mail.nih.gov).

Two other commemorative events are planned. The 2017 KT Jeang Memorial Lecture will feature Dr. Xiang-Jin Meng speaking on "The ever-expanding host range and cross-species infection of Hepatitis E virus," on Tuesday, May 9, 3-4 p.m. in Masur Auditorium, Bldg. 10. The lecture is co-sponsored by the NIH Office of Equity, Diversity and Inclusion and the Office of Intramural Research. For more information contact Dr. Roland Owens (owensrol@mail.nih.gov). A reception follows the lecture.

Lastly, HHS and the Federal Asian Pacific American Council are presenting a full-day leadership training program on Monday, May 15, 8:30 a.m. to 4 p.m. at Kirschstein Auditorium, Bldg. 45. For more information, contact Dr. Eric Zhou (zhou@niaid.nih.gov). The latter two events can be accessed via <http://videocast.nih.gov>.



NIH director Dr. Francis Collins shows his support of Public Service Recognition Week.

NIH Marks Public Service Recognition Week, May 7-13

Public Service Recognition Week honors federal, state and local government employees. Events in honor of your contributions as a federal employee are being held May 7-13. Here is how NIH employees can participate:

- Take a photo of yourself with the completed "I Heart Public Service" template (<https://hr.od.nih.gov/about/iheartpublicservice.pdf>). Be sure to take high-resolution photos.
- Spread the word the week of May 7-13—Upload your photo to Facebook and/or Twitter using these hashtags: #NIH #PSRW #Proud2ServeUSA. The #NIH hashtag allows NIH to find our employees.
- Send your photo to NIHforJobs@od.nih.gov. Images will be posted on NIH social media outlets.
- Add the Public Service Recognition Week logo to your email signature.
- Attend one of the events being held in your honor at <http://publicservicerecognitionweek.org/events>.

If you have questions or would like more information, email ShaRhaina Brown, sharhaina.brown@nih.gov.

Bike to Work Day, May 19

The annual Bike to Work Day will be held Friday, May 19. Once again, the pit stop in front of Bldg. 1 will be the focus of NIH's observation of BTWD. It opens at 7 and goes until 9 a.m. Participants who arrive by bike and who have pre-registered at www.biketoworkmetrodc.org/ by May 12 will receive a free 2017 BTWD T-shirt. Registrants should identify the National Institutes of Health (spelled out) as their employer and may select the pit stop closest to their worksite.

The NIH Bicycle Commuter Club, along with the NIH R&W and the ORS Division of Amenities and Transportation Services, coordinates the activities in front of Bldg. 1. In addition to T-shirt distribution, a light breakfast is provided, campus bicycle registration is offered by the NIH Police and a local mechanic provides minor adjustments and assessments of recommended maintenance.

Information will be available from the NIH BCC about cycling facilities and from the Washington Area Bicycle Association on bicycling in the D.C. area and other cycling organizations.

Around 8 a.m., the Carl Henn Award for promoting bicycle commuting and safety will be presented. Henn was a longtime NIH employee and Rockville resident who was an early advocate for bicycle commuting.

Pictures of the event from past years can be found at www.nihbike.com/.

Pi Day Reset to May 18

NIH will hold its third annual Pi Day Celebration on Pi Day 2.0, Thursday, May 18. As you may recall, the original Pi Day festivities, on 3.14, were postponed due to inclement weather. The goal of the event is to increase awareness across the biomedical science community of the role that the quantitative sciences play in biomedical science.

NIH Pi Day will feature tours, talks, posters and a keynote address by MIT's Dr. Bonnie Berger at 1 p.m. in Masur Auditorium, Bldg. 10. She will discuss

Aiken Presents Nursing's Impact on Patient Outcomes

Dr. Linda Aiken recently presented the first NINR Director's Lecture of 2017. In her talk, "Nursing's Impact on Patient Outcomes," Aiken described her program of research that has shown that nurses with higher levels of qualifications, fewer patients to care for and improved working environments have better patient outcomes.

Aiken is the Claire Fagin leadership professor of nursing, professor of sociology and director of the Center for Health Outcomes and Policy Research at the University of Pennsylvania.

"With NINR's support, we have created the field of nursing outcomes research," said Aiken of the work she and her team have conducted over the past quarter century.

She seeks to determine "to what extent modifiable organizational features of nursing determine patient outcomes in different settings/patients" by surveying nurses across hospitals—thus collecting data on an entire population of organizations instead of on a single institution.

This approach has led to Aiken's discovery that each one-patient increase in nurses' workload is associated with a 7 percent increase in mortality following general surgery. Additionally, Aiken showed that every 10 percent increase in the proportion of nurses with a bachelor's degree is associated with a 5 percent decline in patient mortality.

These and other findings from Aiken's team have influenced policy makers. For instance, regulators in California and Massachusetts have cited Aiken's work in their recommendations regarding nurse/patient ratios.

In introductory remarks, NINR director Dr. Patricia Grady highlighted the "astounding" global reach of Aiken's work, which has included more than 30 countries. Indeed, citing studies conducted in Europe, Aiken demonstrated that her research has influence around the world, not just in the U.S.

For instance, she replicated her work on nurse/patient ratios at National Health



Dr. Linda Aiken (l) and NINR director Dr. Patricia Grady

Service hospitals in England. Subsequently, Wales and Ireland adopted legislation for nurse/patient ratios; similar legislation is under consideration in Scotland and England. Additionally, nurse/patient ratios have also been legislated in Queensland, Australia.

Noting that nursing is associated with "every performance measure that anybody cares about" in hospital outcomes, Aiken's team now is developing methods to prove causality—not simply association—between nursing and outcomes.

The video of Aiken's lecture is now available on NINR's YouTube channel at <https://www.youtube.com/user/NINRnews>. **R**

Lorig To Give NINR Director's Lecture

Dr. Kate Lorig will present the second 2017 NINR Director's Lecture on Tuesday, May 23 from 10 to 11 a.m. in Lipsett Amphitheater, Bldg. 10.

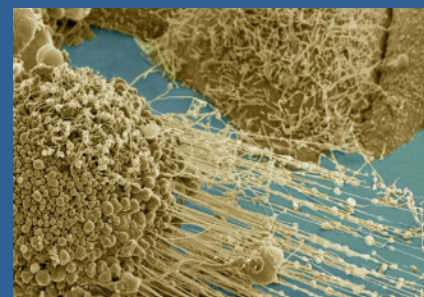
In her talk, "Chronic Disease Self-Management—Evidence, Instruments, Translation and Beyond," she will discuss the effectiveness of low-cost self-management interventions for reducing symptoms and improving quality of life. She will also explore the role of self-efficacy as a predictor and moderator of outcomes.

Lorig is a professor emerita at Stanford School of Medicine. Her research has

focused on the development and evaluation of self-management programs in English and Spanish for people with chronic diseases. This work has been supported by NINR as well as other NIH institutes, government agencies and foundations. Her programs are delivered in small groups, via mail and the Internet. The interventions are used in more than 30 countries and have been attended by more than one million people.

Lorig holds a B.S. in nursing from Boston University, an M.S. from the University of California, San Francisco, and a doctorate in public health from the University of California, Berkeley. She served as a Peace Corps volunteer in Chile.

The event is free and open to the public. For more information and to register, visit www.ninr.nih.gov/directorslecture. **R**



ON THE COVER: Scanning electron micrograph of an apoptotic HeLa cell

IMAGE: TOM DEERINCK

The NIH Record

Since 1949, the *NIH Record* has been published biweekly by the Editorial Operations Branch, Office of Communications and Public Liaison, National Institutes of Health, Department of Health and Human Services. For editorial policies, email editor or phone (301) 496-2125.

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NIH National Institutes of Health
Turning Discovery Into Health

Groopman

CONTINUED FROM PAGE 1

a significant contributor to liver cancer in humans, which is now the second leading cause of global cancer deaths.

“Liver cancer is one of the most profoundly important cancers on our planet,” said Dr. John Groopman, the Anna M. Baetjer professor of environmental health sciences at Johns Hopkins University’s Bloomberg School of Public Health and professor of oncology and associate director for cancer prevention and control at Johns Hopkins School of Medicine and the Sidney Kimmel Comprehensive Cancer Center. He gave the biannual NCI Stars in Nutrition and Cancer lecture Mar. 21 in Lipsett Amphitheater.

Especially hard hit from liver cancer are China, Southeast Asia, sub-Saharan Africa and, recently, Central America, especially Guatemala, which has the highest rates of liver cancer in the western hemisphere. Some 750,000 people die of liver cancer each year, most before age 50, according to 2012 data, “and that’s clearly an underestimate,” said Groopman. “That number exceeds the population of Baltimore.” More than 80 percent of those deaths occurred in the economically developing world.

While aflatoxin plays a role in worldwide liver cancer morbidity and mortality, it is exacerbated by other causes of disease including infection (or co-infection) with hepatitis B and C viruses, which dramatically accelerate the chances of acquiring the disease. Obesity, type 2 diabetes, non-alcoholic fatty liver disease and non-alcoholic steatohepatitis also contribute to the rise.

“There are about 500 million HBV carriers worldwide,” said Groopman. “One hundred million people are expected to die in this century from [liver cancer].”

In the U.S., liver cancer is the most rapidly rising solid tumor in both men and women, said Groopman, likely due to an “astounding” resurgence of fatty liver disease caused by alcohol abuse.

“I wish we understood the mechanism [causing fatty liver disease], which affects about 30 percent of the population, but is rising,” he continued. “There had been a very dramatic decline in chronic alcoholism in the U.S. in the 1960s and 1970s, but it’s on the rise again, along with opiates. It’s a huge

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“The challenge was finding foods with enough compounds to modify protective enzymatic pathways. Our colleagues found that broccoli turned out to be most useful.”

-DR. JOHN GROOPMAN

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problem in rural America.”

The border counties of south Texas have the highest rates of liver cancer in the U.S., but over the next 15-20 years, liver cancer rates are projected to rise in Hispanic and African-American communities, Groopman said.

How to counter this global threat? Groopman and his colleagues have been studying liver cancer hotspots, especially in coastal China, since the early 1980s and have discovered both urinary biomarkers and natural products that can arrest progress of the disease.

For 30 years, they have focused on Qidong, in Jiangsu province, where the median age of liver cancer death is the late 40s. Here, a “diabolical parallelism” of

exposure to both aflatoxin and hepatitis B virus, often before age 1, is a major public health problem.

“Aflatoxin exposure can occur *in utero* if the mother eats exposed food,” noted Groopman. “We can detect [carcinogenic] mutations in plasma up to 20 years before diagnosis of disease.”

He and colleagues are documenting a two-pronged approach—reducing consumption and chemical detoxification—in high-risk human populations.

An MIT-trained toxicologist, Groopman, who also trained at NCI’s Division of Cancer Cause and Prevention years ago, and his team focused on natural products as interrupters of the metabolic path by which aflatoxin produces dangerous DNA adducts



Mengxi Du, a nutrition grad student at Tufts University, greets Groopman after his talk. She was a participant in the week-long John Milner Nutrition and Cancer Prevention Research Practicum.

PHOTOS: BILL BRANSON

that promote cancer.

“The challenge was finding foods with enough compounds to modify protective enzymatic pathways,” he said. “Our colleagues found that broccoli turned out to be most useful.”

If you bite into a raw stalk of broccoli, it tastes bitter. The chemical cause of that bitterness is glucoraphanin, a beneficial chemical. No part of broccoli contains more glucoraphanin than the seed.

In research supported by NIH, in particular NCI, this international team of scientists has been working to systematically deploy their basic science discoveries to intervention trials in high-risk populations. “These proof-of-principle trials represent the type of team science needed to develop cancer prevention that is both economically and culturally appropriate for these communities,” said Groopman.

While these trials have been under way, “we are going to listen to the cancer registry data,” he assured.

Already, liver cancer incidence in Qidong is dropping among the younger population, Groopman reported, but it’s unlikely due to HBV vaccination because this was introduced there in 2002.


“Deng Xioping [who led the People’s Republic of China from 1978 to 1989] allowed farmers to make a profit, so the local agriculture switched from corn to rice as a staple commodity.” The reduction in aflatoxin exposure has been about 4,000 percent.

“It’s like quitting smoking to reduce lung cancer,” said Groopman. “We should never forget that primary prevention can have profound benefits.”

Besides China, aflatoxin exposure has been linked to acute toxicities in communities suffering from drought and poor crops, impairment of child growth and development and cancer in many countries across the globe.

Aflatoxin also plays a putative role in rising rates of gall bladder cancer on the west coast of South America; this has been documented in studies led by NCI intramural investigators.

Concluding with an endorsement of global studies as a worthwhile investment for the U.S., he noted, “All humans respond to aflatoxin in the same way.”

The full talk can be seen at <https://videocast.nih.gov/summary.asp?Live=21944&bhcp=1>. 

OUT OF SILOS

IMAG Consortium Celebrates 10th Anniversary

Scientists use computational modeling—a mix of mathematics, statistics, physics and computer science—to understand complex systems, from the weather to the mechanics of blood vessels. The interagency modeling and analysis group (IMAG) consists of representatives from multiple federal agencies that fund research in multiscale modeling of biomedical, biological and behavioral systems.

IMAG convened for a 3-day meeting recently at Natcher Conference Center. This year’s meeting celebrated the 10th anniversary for the Multiscale Modeling Consortium, the group of researchers from across the country and around the world whose research has been promoted by the IMAG agencies. The consortium represents more than 100 projects relevant to multiscale modeling.

“Over the past 10 years, we’ve been building this momentum, energy and excitement for developing computational models that cross scales in time and space,” said Dr. Grace Peng, chair of IMAG and director of the NIBIB program in computational modeling, simulation and analysis. “Over the last decade, we have brought people out of their silos studying one particular scale of how this cell or that organ behaves. The conversations in this consortium and at this meeting motivate modelers to go outside those bounds to think above and below their focused scales of interest, which could benefit the entire biomedical research community.”



Visiting researchers assembled at NIH for the 10th anniversary meeting of the IMAG Multiscale Modeling Consortium.

PHOTO: ERNIE BRANSON

March of Dimes Honors Bianchi

NICHD director Dr. Diana Bianchi accepts the March of Dimes Colonel Harland Sanders Lifetime Achievement Award at the annual American College of Medical Genetics and Genomics clinical genomics meeting. Presenting the award is Dr. Joe Leigh Simpson, senior vice president at the March of Dimes. A pioneer in the field of prenatal genomics, Bianchi also directs a laboratory at NHGRI.





Above, on a panel discussing the legacy of world-renowned surgeon Michael DeBakey are (from l) Dr. George Noon, Dr. Shelley McKellar and NLM's Dr. Jeffrey Reznick. Below, from NLM's Profiles in Science online collection, an image of DeBakey and surgical team at work, circa the 1960s

LECTURE PHOTOS: ERNIE BRANSON

DeBakey

CONTINUED FROM PAGE 1

wasn't even treatable back when DeBakey graduated from medical school. His work made cardiovascular surgery possible; his inventions and revolutionary procedures continue to save countless lives.

A world-renowned surgeon, innovator, educator and medical research advocate,

• • •

“Dr. DeBakey was truly a force...who produced much positive change, all wrapped up in American values, ingenuity, hard work and commitment.”

-DR. SHELLEY MCKELLAR

• • •

DeBakey performed more than 60,000 operations and published more than 1,000 medical reports in his lifetime. He continued working as a surgeon in Houston until he was almost 90. In 2008, months after receiving the Congressional Gold Medal, he died of natural causes at the age of 99. His boundless energy and grueling schedule had earned him the nickname the Texas Tornado.

“Dr. DeBakey was truly a force...who produced much positive change, all wrapped up in American values, ingenuity, hard work and commitment,” said Dr. Shelley McKellar, who is the Hannah chair in the history of medicine at Western University in London, Canada. “And he instilled a hope for many good things to come.”

Speaking at the first annual NLM Michael

DeBakey Lecture in the History of Medicine on Mar. 21 in Lister Hill Auditorium, McKellar told of the prominent surgeon who garnered great media attention for his medical achievements and for the roster of notables he treated. DeBakey operated on many celebrities, including the Duke of Windsor, Marlene Dietrich and Jerry Lewis. He served as a heart disease authority on

many government health initiatives at the invitation of Presidents Kennedy, Johnson and Nixon. He also treated such world leaders as the Shah of Iran and Russian President Boris Yeltsin.

DeBakey was featured widely in the press in the 1960s, including colorful spreads in *Time* and *Life* magazines. Yet there's a younger generation that likely has never heard of him. To help carry on his rich legacy, NLM now houses an archival collection of DeBakey's papers—articles, surgical notes, interviews,

correspondence, travel diaries and photos—also available digitally on its Profiles in Science web site. And, thanks to a contribution from the DeBakey Medical Foundation, NLM launched the DeBakey Fellowship program. The inaugural class of five fellows includes a doctoral student, professor and biographer.

“DeBakey was intentionally impactful when it came to education, medical research and patient care,” said McKellar. “The man was never idle.”

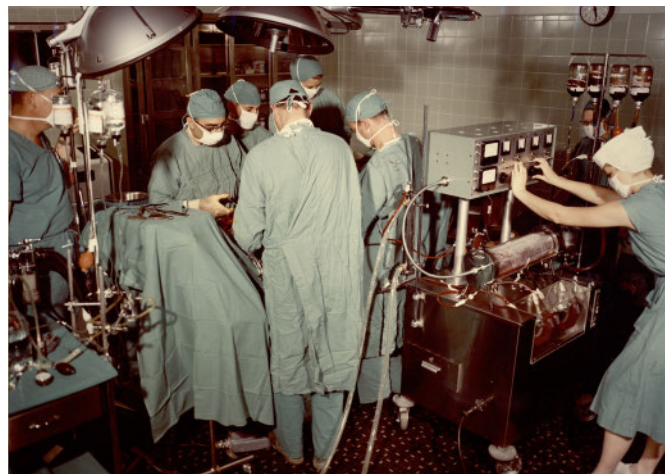
Often working 18-hour days between the operating room and lab, going on rounds, teaching and mentoring, DeBakey would in a heartbeat rush off to lobby for research funding and was back in his lab before anyone knew he'd left, recalled panelist Dr. George Noon, the Meyer-DeBakey chair in investigative surgery at Baylor College of Medicine, who served on DeBakey's surgical team.

Medical Pioneer

The son of Lebanese immigrants, DeBakey learned sewing from his mother and stitched the first prototypes of his Dacron grafts on his wife's sewing machine. He performed the first patch graft angioplasty in 1958. These grafts are still used today to repair obstructed arteries.

“It wasn't long before DeBakey's surgical techniques and prosthetic arteries emerged as the standard approach to treating diseased blood vessels,” said McKellar.

DeBakey's ingenuity was apparent right out of medical school in the 1930s, when he invented a roller pump that became the pulse of heart-lung machines, making open heart surgery possible. In 1964, he performed the first successful coronary bypass and, in the





Noon and McKellar offer perspectives on DeBakey's place in medical history.

late 1960s, performed some of the first heart transplants.

DeBakey developed, and later improved upon, ventricular assist devices—mechanical pumps that support heart function in people with weakened hearts. He also designed dozens of surgical instruments, from clamps to forceps, still used by surgeons today.

Medical Statesman

DeBakey's reach extended well beyond the OR. His arrival at Baylor College of Medicine in 1948 to chair its department of surgery began a 50-year affiliation with the medical school. He put Baylor on the map as a leading cardiovascular disease center, where he trained surgeons from around the globe. He also established a high school in Houston for minorities interested in medicine. The DeBakey High School for Health Professions today is a top public school in the city.

Tirelessly lobbying for federal research funding, DeBakey convinced Congress to back the National Heart Institute's artificial heart program in 1964 in response to the problem of heart failure in America. The \$1 million annual program budget burgeoned into \$8 million within a few years. Through this program, DeBakey and his colleagues received significant NIH funding for mechanical circulatory support system research.


"It intrigued me," said McKellar, "how he translated his expertise in the OR into political and policy capital on local, national and international levels to affect medical research funding, medical education and

broader disease awareness."

Another feat was DeBakey's efforts in chartering the NLM. "In the process, he made friends and allies with some of the most powerful men in the U.S. government," said Noon.

DeBakey's love of libraries began as a child in small-town Louisiana, said Noon, where he'd sit outside on hot days reading books he'd checked out from his local library. Later, as a surgical consultant in the surgeon general's office in the Army during World War II, DeBakey conducted research for the surgeon general. Appalled at the decrepit condition of the Army Medical Library in downtown D.C., DeBakey worked with Sens. John F. Kennedy and Lister Hill to establish NLM, which would absorb the Armed Forces Medical Library collection.

DeBakey argued to keep the NLM near Washington, as an independent agency operating in conjunction with NIH, said Noon. When President Dwight Eisenhower signed the NLM act into law, DeBakey became a member of, and would later chair, its board of regents. He also helped establish the National Network of Libraries of Medicine, extending NLM's reach nationwide.

The DeBakey Papers collection at NLM, archived online at <https://profiles.nlm.nih.gov/>, and his namesake fellowship program are two ways NIH is working to keep DeBakey's legacy alive. Said NLM director Dr. Patricia Brennan, "The past has many lessons to offer us as we face current and future challenges in medicine, science and public health." 

Have a question about some aspect of working at NIH? You can post anonymous queries at <https://nihrecord.nih.gov/> (click on the Feedback tab) and we'll try to provide answers.

Feedback: Loved the story about Brandon Hartz (https://nihrecord.gov/newsletters/2017/04_07_2017/story3.htm). I'm wondering if Mr. Hartz would be willing to give a talk on creating pollinator gardens for employees?

Response from Brandon Hartz, Office of Research Facilities: I am always more than willing to share my landscape-related knowledge and experiences to anyone with an interested ear. Please feel free to reach out to me at brandon.hartz@nih.gov or (240) 479-0214 to discuss this speaking opportunity.



NIH's new landscape architect has been on the job for less than a year, but is already willing to join the campus's rich lecture circuit.

PHOTO: ERIC BOCK

For other NIH staff members who have landscape-related questions or requests, there are a number of ways I can be of assistance. I commonly field individual email requests from NIH staff regarding identifying plant species on campus. Every now and then a request will necessitate a longer explanation of things like: the environmental benefits of the no-mow naturalized areas, the assembly and function of campus stormwater features like pervious paving/green roofs or the purpose of the tree snags left to decay in place for wildlife forage and shelter.

Feel free to reach out to me directly with requests for information regarding both the macro and micro issues affecting the campus landscape. I will do my best to answer any question in a reasonable amount of time. For topics where there is lots of staff interest, I would be happy to give talks in a larger forum; I thrive on outreach and sharing of information. In the past I've lectured at universities and presented at industry conventions and can do this for staff benefit as well.



Describing himself as a grandson of NEI's Laboratory of Sensorimotor Research, Columbia's Shadlen gives a lecture in the NIH Neuroscience Seminar Series.

PHOTOS: BILL BRANSON

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“Many of us believe that it’s this persistent activity—which is a notable property for the association cortex—that holds the key to cognition because it confers a kind of freedom from immediacy.”

-DR. MICHAEL SHADLEN

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from vision and construe it as evidence leading to what the monkey is going to do with his eyes,” Shadlen explained.

The scientists measure the electrical activity of neurons during deliberation. The researchers can trace, for example, the choices the monkey makes as well as how long he takes to make them and why. They can also predict the choices using a mathematical formula based on reaction time.

The amount of time used to decide, Shadlen explained, is controlled by the same mechanism that controls which choice is made. He demonstrated this by predicting the monkey’s accuracy simply by measuring the reaction times.

“What we learned is that the neurons don’t just tell us which eye movement the monkey is going to make, but also why he made it,” Shadlen said. “Noisy information from the environment comes in through the eyes—the visual cortex—where it’s converted into ‘momentary evidence’ in favor of right versus left.” The information keeps piling up until the brain has enough to make a decision.

“Many of us believe that it’s this persistent activity—which is a notable property for the association cortex—that holds the key to cognition because it confers a kind of freedom from immediacy,” Shadlen continued. “It’s not like sensory neurons that keep up with the changing world or motor neurons that have to control the body in real time. It’s the stuff in between that is the stuff of thought and the site at which many diseases—whether caused by genes or toxins—infiltrate or negatively affect our cognitive capacity.”

Shadlen shared several movies from his experiments—decisions, accompanied by neural recordings.

“You’re witnessing the brain doing

additions and subtractions—actually the running sums of positive and negative numbers approximating an integral,” he explained.

He said such videos refute “the idea that information in the brain will need billions of neurons recording in order [for scientists] to see things. We have to reconcile that intuition with the fact that it’s so easy to see computations arising at the level of a single neuron in a single trial.”

Shadlen concluded his lecture with a slide showing a size progression of three brains from mouse to monkey to human. Findings from decision-making research have already broadened the field’s notions about the mechanics of more complex thought.

“As we evolved cognition and got bigger and bigger cortical mantle, what was growing essentially was the association cortex,” he said. “I think the basic principles of decision-making that can be studied in these very simple direct paths could be telescoped out to decisions about decisions about decisions—that’s sort of what abstraction is—and that the principles understood at the level of the monkey brain will have some relevance to the kind of complicated things we do with the human brain.

“And I think ultimately to treat diseases one day,” he concluded, “and restore these kinds of operations, integrations and bounds-setting—and lots of things we don’t yet understand obviously—will require manipulating brains at the levels of molecules and circuits. I know in my lab, and for many of you, there’s already at least a dialogue with [scientists] working in all of these levels, interaction with people who do human [brain] imaging and circuit dissection.” **R**

Shadlen

CONTINUED FROM PAGE 1

Initiative renown), who spent 4 years as a postdoc with NEI’s Dr. Bob Wurtz, cofounder in 1973 of the LSR and its chief until 1997.

At Columbia, Shadlen’s lab uses rhesus monkeys to study the neural mechanisms of perceptual decisions. They train the monkey to view information on a computer monitor and use that information to make a decision. Scientists track the monkey’s eye movements because that’s the way the monkey communicates its decision—an eye movement to one of two targets.

“As neurologists,” he said, “we study decision-making in the lab because we think the basic principles that arise by studying these highly contrived, non-naturalistic tasks will help us understand what goes awry in disorders that affect higher brain functions.”

Researchers record action potentials of neurons in the brain’s parietal cortex, specifically the lateral intra-parietal cortex or LIP.

“The region is suited to take information



Globally, the World Health Organization estimates that 500 million people are infected with HSV-2 while two-thirds of the population are infected with HSV-1.

NIH Scientists Advance Understanding of Herpesvirus Infection

Herpes simplex virus (HSV) infections last a lifetime. Once a person has been infected, the virus can remain dormant (latent) for years before periodically reactivating to cause disease. This poorly understood cycle has frustrated scientists for years. Now, NIH scientists have identified a set of protein complexes that are recruited to viral genes and stimulate both initial infection and reactivation from latency. Environmental stresses known to regulate these proteins also induce reactivation.

Globally, the World Health Organization estimates that 500 million people are infected with HSV-2 while two-thirds of the population are infected with HSV-1. These viruses cause human diseases ranging from oral cold sores to genital lesions to serious eye conditions that can lead to blindness. In infants, HSV can cause neurological and developmental problems.

People infected with HSV also have an enhanced risk of acquiring or transmitting human immunodeficiency virus (HIV).

Scientists at NIAID previously made progress toward understanding the role of cellular protein HCF-1 in initiating HSV infection and reactivation. HCF-1 and associated proteins are recruited to the viral genome to enable the virus to replicate and spread. This previous work identified targets for the development of therapeutics to suppress infection and reactivation.

Their latest work, with collaborators from Princeton University, identifies new HCF-1 protein complexes that play additional roles in initiating viral infection and reactivation. Reporting in *Cell Host & Microbe*, the scientists found they could reactivate latent HSV in a mouse model using compounds that turn on components of these HCF-1 protein complexes. Interestingly, some of these HCF-1-associated proteins also are involved in HIV reactivation from latency.

The researchers are continuing to investigate the protein complexes involved in promoting HSV gene expression, infection and reactivation from latency. Identifying these complexes and understanding the mechanisms by which they function can potentially reveal additional targets for the development of new therapeutics.

Researchers Discover Mitochondrial ‘Circuit Breaker’ That Protects Heart from Damage

A team of scientists from NIH has discovered biological mechanisms that appear to prevent damage to the heart muscle’s “power grid,” the network of mitochondrial circuits that provide energy to cells. One of those mechanisms, the researchers found, acts much like a circuit breaker, allowing energy to continue moving throughout the heart muscle cells even when individual components of those cells—the mitochondria—have been damaged.

Such protective mechanisms could one day help better understand how heart and skeletal muscle function under both healthy and unhealthy conditions, such as with heart disease, mitochondrial diseases and muscular dystrophy, the researchers say.

Their study appears in *Cell Reports*. The lead author of the study is Dr. Brian Glancy, an investigator with the Muscle Energetics Laboratory, NHLBI.

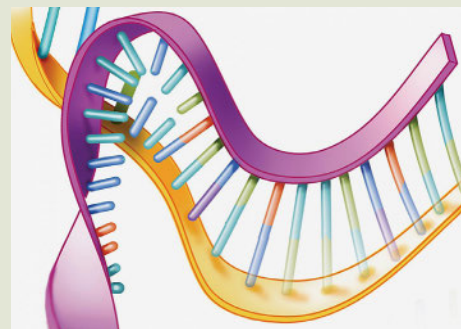
In 2015, members of this same NIH research team announced the discovery of the so-called mitochondrial power grid in the skeletal muscle. Since that pivotal discovery, some scientists have raised questions about how such a grid would protect itself from damage to the muscle cells. This new finding offers some key insights.

Using high-resolution 3-D images and special light-activated probes, the scientists revealed a two-part system protecting the heart muscle’s power grid from disease-related damage. Instead of being organized as one large, grid-like network such as in skeletal muscle, the mitochondrial circuits in the heart are arranged in parallel rows that form several smaller subnetworks, the researchers found.

This subnetwork acts as a mechanism to prevent damage by limiting the spread of electrical dysfunction to smaller regions.

The researchers compared the newly discovered circuit breaker mechanism to lightning striking a city power grid: Lights may flicker over the whole city, but once the circuit breaker activates, only part of the city loses power.

In addition to primary support by NHLBI, this study is also supported by NCI.



In studies of mice, scientists discovered a drug, designed to silence a gene called ataxin 2, that may be effective at treating ALS and SCA2.

IMAGE: NINDS

Gene Silencing Shows Promise For Treating Two Fatal Neurological Disorders

In two studies of mice, researchers showed that a drug, engineered to combat the gene that causes spinocerebellar ataxia type 2 (SCA2), might also be used to treat amyotrophic lateral sclerosis (ALS). Both studies were published in the journal *Nature* with funding from NINDS.

“Our results provide hope that we may one day be able to treat these devastating disorders,” said Dr. Stefan Pulst, professor and chair of neurology at the University of Utah and a senior author of one of the studies. In 1996, Pulst and other researchers discovered that mutations in the ataxin 2 gene cause SCA2, a fatal inherited disorder that primarily damages a part of the brain called the cerebellum, causing patients to have problems with balance, coordination, walking and eye movements.

For this study, his team found that they could reduce problems associated with SCA2 by injecting mouse brains with a drug programmed to silence the ataxin 2 gene. In the accompanying study, researchers showed that injections of the same type of drug into the brains of mice prevented early death and neurological problems associated with ALS, a paralyzing and often fatal disorder.

“Surprisingly, the ataxin 2 gene may act as a master key to unlocking treatments for ALS and other neurological disorders,” said Dr. Aaron Gitler of Stanford University, senior author of the second study. In 2010, Gitler and colleagues discovered a link between ataxin 2 mutations and ALS.

“Many years of research on yeast and flies laid the groundwork for these exciting results,” said Dr. Daniel Miller, a program director at NINDS. “They demonstrate that rigorous studies on simple disease models can lead to powerful insights that help us understand and potentially treat seemingly untreatable disorders.”



At left, Maj. Gen. Charles Bolden, former NASA administrator, addresses the ExLP audience. At right, NIAID deputy director for science management Dr. John J. McGowan and ExLP 2017 graduate Julie Berko, acting director of the NIH Office of Human Resources, are also on hand for the commencement.

Executive Leadership Program Graduates 2017 Class

BY KEISHA BERKLEY

Leaders are valued at NIH and NIH has supported leadership development by offering programs such as the NIH Executive Leadership Program (ExLP). Recently, 20 leaders representing 15 institutes and centers graduated from the 7-month program.

Tabak encouraged the group with the “3 Cs of leadership,” telling the grads to “contribute, connect and communicate” well beyond the formal end of the ExLP.



“The world takes no pity on those who get lazy about learning.”

-DR. JOHN J. MCGOWAN



A large number of “top 5” leaders currently are eligible to retire; in order for NIH to continue to accomplish its mission, it is critical that initiatives such as ExLP are designed to develop a cadre of new leaders.

ExLP’s graduation ceremony featured remarks by former NASA administrator Maj. Gen. Charles Bolden as well as Dr. Lawrence Tabak, NIH principal deputy director; Dr. John J. McGowan, NIAID deputy director for science management; and Dr. Alfred Johnson, NIH acting deputy director for management.

McGowan had strong words about his passion for continuous learning, noting “the world takes no pity on those who get lazy about learning.” He also summed up, “Leadership is not a position, it’s something you do.”

Bolden, describing a great leader’s unbridled curiosity, said, “As a leader, it’s okay to ask questions and not be the smartest in the room. Be the one who’s brave enough to ask a question.”

Bolden also shared his 5 pillars of leadership: Know your strengths, know yourself, do the hard things, ask questions and ask to be challenged.

For details about the program visit <https://training-center.nih.gov/exlp/index.html>. Recruitment for the 2018-2019 ExLP will begin in January.



At a ceremony held in Lister Hill Center Auditorium, Dr. Lawrence Tabak (l) shares his “3 Cs” of leadership. Dr. Alfred Johnson, NIH acting deputy director for management, also addresses ExLP graduates.

PHOTOS: PARTNERSHIP FOR PUBLIC SERVICE

NINDS Acting Deputy Director Willard Retires

BY SHANNON E. GARNETT

During a vacation on North Carolina’s Outer Banks in 1997, Dr. Alan Willard, NINDS acting deputy director, spotted a vacancy announcement in *Science* magazine that said “Come to NINDS and make a difference.” Since joining the institute in 1998, he has taken that message to heart—making a difference, not only at NINDS and NIH, but also within the neuroscience community at large.

On Mar. 31, having well accomplished that charge after 20 years of federal service—almost all with NINDS—Willard officially retired.

“There are very few careers in which one gets to work every day with large numbers of smart, interested, committed people and I know that I am truly fortunate to have had such a career,” said Willard.

“NINDS and indeed many across NIH will sorely miss Dr. Willard’s wisdom, collegiality and good humor,” said Dr. Walter Koroshetz, NINDS director.

Before joining NINDS, Willard was a tenured faculty member at the University of North Carolina at Chapel Hill in the department of cell and molecular physiology and the curriculum in neurobiology, where he pursued research in developmental neurobiology and synaptic physiology. He also served as a director of graduate studies and as a member of the administrative board of the Graduate School at UNC.

Growing up on a dairy farm in Vermont, Willard was always interested in animal physiology and anatomy. However it was not until he entered Yale University that he developed a real fascination for science.

“I had an extraordinarily exciting instructor—Dr. Richard Goldsby—who showed us the joys of biology as an experimental field and from that point on I was hooked,” said Willard.

He earned his undergraduate degree in molecular biophysics and biochemistry from Yale in 1972, and his Ph.D. in biology from the University of California, San Diego, in 1978. Willard did postdoctoral research in the UCSD biology department from 1979 to 1980, and from 1980 to 1983 at Harvard Medical School in the department of neurobiology, where he later became an instructor.

In 1984, Willard left Harvard for UNC, and from there he joined NINDS as scientific review administrator of the NSD-C study section, which reviewed basic, clinical and translational research grant applications in the areas of epilepsy, pain and basic neuroscience.

“I had recently completed a term as the chair of a CSR study section and really enjoyed being involved in the scientific review process, so the idea of becoming an SRA seemed like a natural next step in my career,” Willard explained.

In January 2002, he was asked to serve as acting



Dr. Alan Willard bids farewell to NIH after nearly 20 years with NINDS.

deputy director of the Division of Extramural Research (in addition to continuing his work as an SRA). This would be the first of 7 times during his NINDS career when he took on a second position while a vacancy was being filled.

In September 2002, he became chief of the Scientific Review Branch, a position he held until January 2011, when he became deputy director of the Division of Extramural Research. He was named acting deputy director of NINDS in 2014.

Throughout his time at NIH, Willard received numerous awards and accolades, including many

translational human stem cell research (prior to the development of induced pluripotent stem cell technology), a huge volume of American Recovery and Reinvestment Act of 2009 initiatives, the first Exceptional Unconventional Research Enabling Knowledge Acceleration (EUREKA) in neuroscience grant reviews and the first rounds of NIH Pathway to Independence Award (K99/ROO) reviews.

During 2008 and 2009, Willard served as the “integrator” of a set of three large teams of NIH staff who implemented significant changes to the NIH peer review process.

Known for his wit and for always having a joke at the ready, Willard acknowledged that he will miss his colleagues, coworkers and the researchers NINDS supports. However, the more administrative aspects of his job, like performance reviews and travel justifications, he will not miss as much.

“I very seriously doubt that I will ever wake up one morning and say, ‘Gee, I really have a burning desire to write lengthy justifications for our scientists to attend professional meetings,’” Willard quipped.

In retirement, he plans to travel and spend time pursuing his passion for hiking and backpacking in remote locations. He is most looking forward to an extended trip to New Zealand and Australia with his 90-year-old mother, who shares his love of exploring the outdoors.

“One of the things I have enjoyed most during my career, both as a faculty member at UNC and

★ ★ ★


“NINDS and indeed many across NIH will sorely miss Dr. Willard’s wisdom, collegiality and good humor.”

-DR. WALTER KOROSHETZ

★ ★ ★

NIH Director’s Awards, NINDS Merit and Special Act or Service Recognition Awards and several NINDS Merit Awards for Mentoring. He served on countless NIH, trans-NIH and NINDS committees and working groups as well as some outside of NIH.

Among Willard’s most satisfying accomplishments were his collaborations with teams of scientific review officers to identify reviewers from diverse scientific backgrounds and then helping them work together to evaluate large numbers of new and complex types of applications. Especially memorable examples included a trans-NIH request for applications for centers of excellence on

as an NIH employee, is sharing the excitement of scientific discovery with members of the public,” Willard concluded. “During my time at NIH, I have had the opportunity to learn about enormous numbers of exciting discoveries. I believe strongly that it is important to help members of the public appreciate how many amazing and important projects their tax dollars support, so whenever I am traveling, I always make a point of telling the people I meet about the remarkable range of projects that NIH supports. I intend to continue to be an enthusiastic champion for science in general and for NIH in particular.” 

Volunteers with Eczema Needed

NIAID seeks volunteers with eczema to participate in a research study. New research into the causes of eczema suggests that differences in skin bacteria may play a role in the disease. Researchers will collect live bacteria from the skin of healthy volunteers to treat adults and children suffering with eczema. For more information, call 1-800-411-1222 (TTY 1-866-411-1010) or visit <https://go.usa.gov/xXcd4>. Refer to study 17-I-0033.

Energy Study Seeks Healthy Females

NIDDK seeks healthy Caucasian females ages 18-35 to participate in a research study. Doctors want to learn how the body burns energy at different temperatures. You will have an 8-11 day inpatient stay at the Clinical Center. Compensation is provided. For more information, call the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Read about the study at clinicaltrials.gov, 12-DK-0097.

Diagnosed with Stomach Cancer?

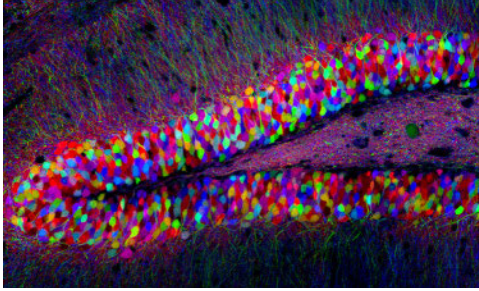
Have you been diagnosed with stomach cancer? NCI researchers at the Clinical Center need volunteers 18 or older with stomach cancer that has spread to the abdomen for a study at the Clinical Center combining surgery with heated chemotherapy as a potential new treatment for stomach cancer. For more information, call the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Learn more online at <https://go.usa.gov/xXnqK>. Refer to study 17-C-0070.

NIAID Seeks Healthy Volunteers

NIAID researchers seek healthy volunteers, 18-50 years old, for an investigational vaccine study targeting RSV. Compensation is provided. For more information, call 1-866-833-5433 (TTY 1-866-411-1010). Email vaccines@nih.gov or visit <http://bit.ly/2nOkOvY>.

Energy Study Wants Healthy Males

NIDDK seeks healthy Caucasian men ages 55-75 to participate in a research study. Doctors want to learn how the body burns energy at different temperatures. You will have an 11-day inpatient stay at the Clinical Center. Compensation is provided. For more information, call the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Read about the study at clinicaltrials.gov, 12-DK-0097.



Random mixing of fluorescent dyes created this psychedelic slice of a mouse brain. Known as “rainbow,” the technique allows scientists to distinguish nearby cells by color and has helped advance the NIH Human Connectome Project.

IMAGE: JEAN LIVET, TAMILY A. WEISSMAN, JEFF W. LICHTMAN, HARVARD UNIVERSITY

NOW SHOWING AT STRATHMORE ‘Microscopy as Masterpiece’ Exhibits NIH-Funded Images

BY ALISA ZAPP MACHALEK

Colorful scientific images and videos from NIH researchers and grantees greet attendees at Strathmore Mansion’s “Arts & the Brain” lecture series. The digital presentation, displayed on a large flatscreen monitor, features nerve cells in jelly bean colors, star-shaped glial cells, a flyover of boutons bursting with synaptic vesicles and much more.

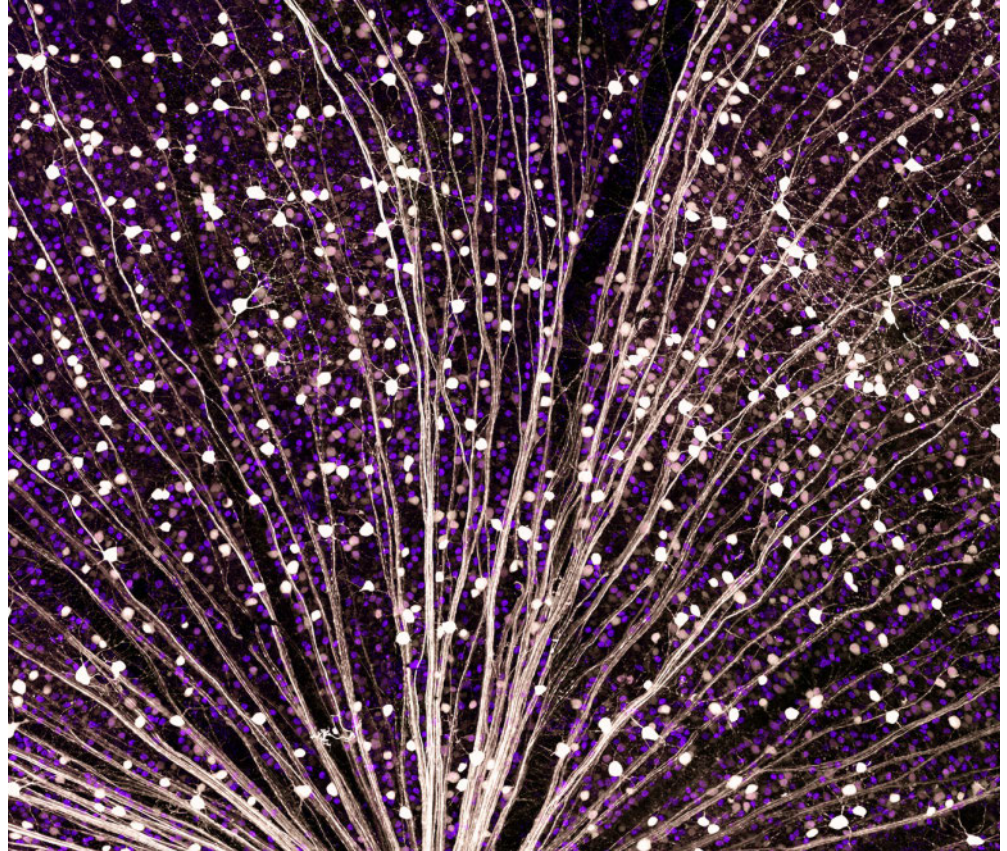
“Attendees have been taken with the beauty of these images,” said Lauren Campbell, director of education at Strathmore and mastermind of the Arts & the Brain program. “The Microscopy as Masterpiece exhibit adds a surprising and delightful visual and concrete element to the lectures.”

Campbell created the lecture series to appeal to the community’s interest in blending art and science. “Many people in Strathmore’s orbit are both science-focused and arts-focused, and have lots of talent in both areas,” she said.

With NIH and Strathmore just one Metro stop apart, a collaboration seemed natural. The digital exhibit grew out of a conversation Campbell had with a musician who performed at the mansion—and also happened to be an NIH employee.

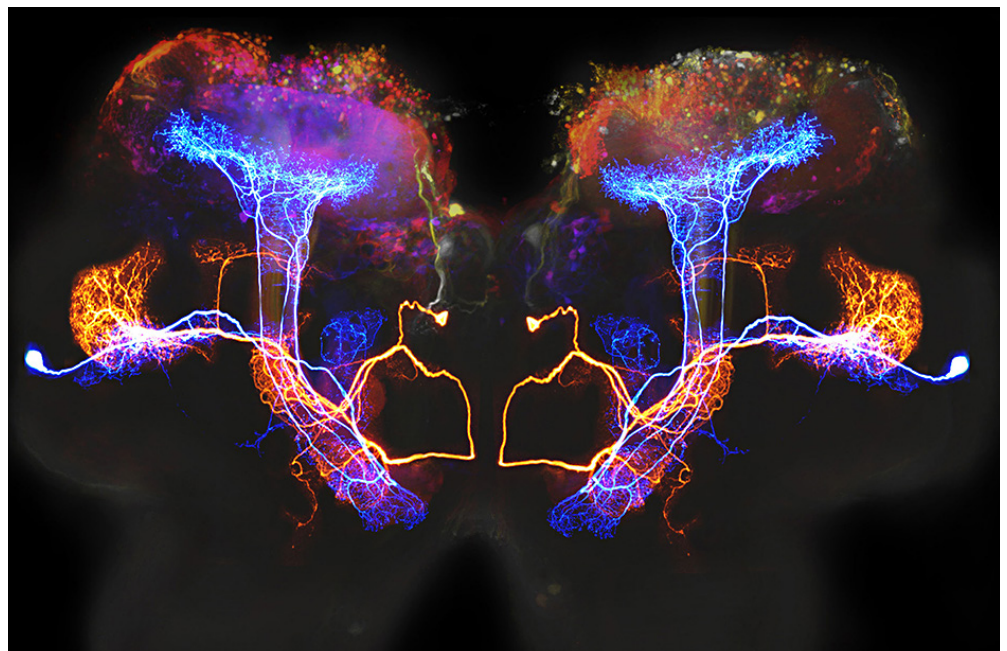
The final lecture in the 2017 Arts & the Brain series, titled “Medical Avatar,” will be on Thursday, June 1. For information, see <https://www.strathmore.org/education/programs-for-adults/arts-the-brain-package>.

Tickets to the lecture cost \$25. Viewing the Microscopy as Masterpiece exhibit before or after each lecture is free.



The pinpricks of light in this starry night sky are actually green fluorescent protein, marking specific cells in a mouse retina. This detailed image was made using large-scale mosaic confocal microscopy, a technique that, like Google Earth, computationally stitches together many small, high-resolution images.

IMAGE: KEUNYOUNG KIM, WONKYU JU AND MARK ELLISMAN, NATIONAL CENTER FOR MICROSCOPY AND IMAGING RESEARCH, DEPARTMENT OF OPHTHALMOLOGY, UNIVERSITY OF CALIFORNIA, SAN DIEGO



This composite image shows two neurons in the locust brain (one colored orange, one colored blue) that process information about odors.

IMAGE: MARK STOPFER, NICHD