JUNE 21, 2013
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The Second Best Thing About Payday

nih record

ABOVE • *Ever see the Fan Dance? Attendees at the recent Ethnic Food Fair enjoyed a performance. See story on p. 12.*

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From New Vantage

Ex-Director Zerhouni Surveys Value of NIH Research

By Rich McManus

Nearly 5 years removed from his NIH directorship, Dr. Elias Zerhouni returned to campus June 4 to offer his views about how to value NIH research economically in an era of flat federal research budgets. His remarks at the end of a day-long meeting on that topic, conducted by the scientific review management board (SMRB), included vintage observations from the veteran of academia (Johns Hopkins), government (he was NIH director from 2002 to 2008) and industry (he is president of global research and development at French pharmaceutical firm Sanofi).

For example, his comment that "it's not very smart to go to the grocery store in an F-16 [fighter jet] when you can go on a bike," both brought the house down and illustrated the occasional mismatch between drug costs and human benefit; he was especially critical of expensive cancer drugs, stacked one on top of another, that might

SEE **ZERHOUNI**, PAGE 6

Former NIH director Dr. Elias Zerhouni gives remarks at June 4 SMRB meeting in Bldg. 1.

Soundtrack of the Mind

Does Music Fine-Tune the Brain?

By Carla Garnett

Music reaches into our deepest self, or so Plato declared some 2,300 years ago. We've been wondering about music's effect on us ever since. In the last decade in particular, a growing number of scientists have taken up the quest to chart music's course in the body, starting at the top—the brain. According to Dr. Aniruddh Patel, associate professor of psychology at Tufts University, there's no better time for music cognition research.

Dr. Aniruddh Patel

"What measurable impacts do musical listening and musical training have on brain function?" he asked May 13 in his talk for the National Center for

SEE **MUSIC**, PAGE 8

Technology Revolution

Data, Devices and Networks Promoting Smarter Health Care

By Dana Steinberg

Imagine a doctor appearing on a computer screen that sits atop a sensing robot; the robot locates a collapsed patient, takes her vital signs and instantly transmits test results to the doctor. The technology for this 21st century physician already exists and demonstrates what's possible in modern medicine when we combine computer and human innovation with communication networks.

Dr. Ram Sriram

Health care is a $2.7 trillion industry that continues to grow. "If you use information technology in the most efficient manner, you can [probably] save $100 billion,"

SEE **TECH REVOLUTION**, PAGE 4

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NIH...Turning Discovery Into Health

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briefs

Graduate & Professional School Fair, July 17

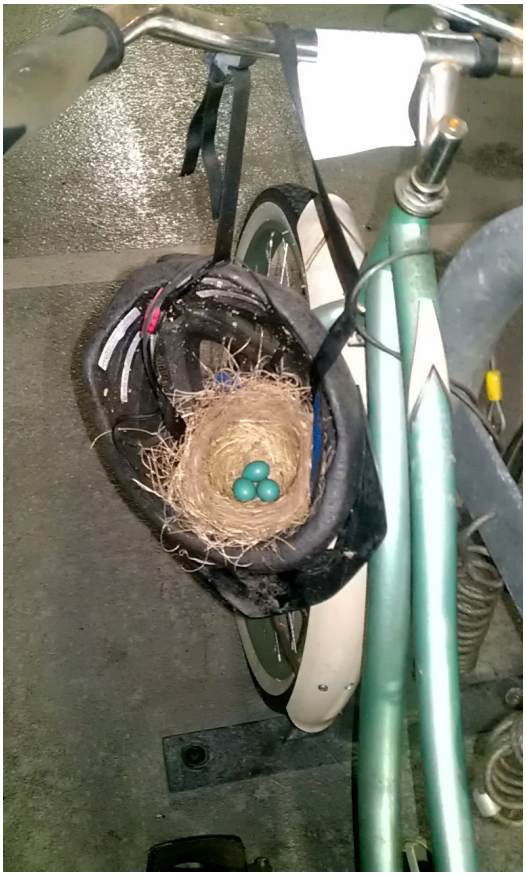
The NIH Graduate and Professional School Fair will be held on Wednesday, July 17 from 9 a.m. to 3 p.m. at Natcher Conference Center. The fair provides an opportunity for NIH summer interns (especially those in college) and postbacs, as well as other college students in the D.C. area, to prepare for the next step in their careers by exploring educational programs leading to the Ph.D., M.D., D.D.S., M.D./Ph.D., and other graduate and professional degrees. More than 100 colleges and universities from across the U.S. will be sending representatives in hopes of recruiting NIH trainees.

The day will also include workshops on getting into graduate and professional school, M.D./Ph.D. programs, interviewing and careers in public health, psychology and dentistry. Exhibits will be open from 10 a.m. to 1:45 pm.

A list of participating institutions and registration information can be found at https://www.training.nih.gov/gp_fair.

NIH Ski Club Honors Bingaman

In mid-May, the NIH R&W Ski Club presented Bob Bingaman (l) with an award, on his 70th birthday, in recognition of his 30 years of leading the club and providing members with a lifetime of memories in exotic locations all over the world. Bingaman, an NIH retiree, has coordinated trips to at least 56 ski areas in 14 countries including such world-renowned places as Chamonix (France) and St. Moritz (Austria) and the lesser known Tatranska Lomnica (Slovakia). The trips were perfect for skiers and non-skiers alike as time for tours was planned in London, Paris, Rome, Barcelona, Beijing, Budapest and Sydney, to name a few, and at sites such as Normandy, the Eiffel Tower and the Coliseum. Bingaman has been an integral part of R&W's programs over the years. Also on hand for the award were R&W President Randy Schools (c) and NLM retiree Richard Banvard. For more information about the Ski Club and how to join, call (301) 496-6061 or email nihrw@mail.nih.gov.



A robin laid eggs in a bike helmet at MLP-7. Above, the nest on May 28; the image below is from May 20. By the end of May, the eggs had hatched.

Bike Helmet Hosts Bird Nest in Campus Garage

Home is where the—helmet is? An opportunistic robin recently built a nest in a bike helmet in the Lister Hill Center garage, MLP-7.

"Hopefully, the nest can remain undisturbed for another 3-4 weeks for the chicks to fledge," noted ORS landscape architect Lynn Mueller, who forwarded these photos last month to the *NIH Record*.

"While I was on vacation last week, a colleague [Teresa Przytycka] noted this nest on the B1-level of the 38A garage," said Kimberly Tryka, staff scientist at NLM/NCBI. "The bike is on the north side of the garage. Her photo [from May 20] shows two eggs. Mine [from May 28] has three eggs. I didn't see a bird."

Followup on May 31: "The eggs in the bike helmet have hatched," reported Mary Herron, also of NLM. "Everyone on the elevator was talking about it."

FDA's Steven Rubin chooses an ambitious, but beautiful, route for his commutes to Bldg. 29A.

Rubin Makes a Habit of Biking to Work

(Story in an occasional series on NIH'ers who embrace alternative commuting modes)

While many NIH'ers cycled to work on May 17 for national Bike to Work Day, some make biking to work a regular routine.

Steven Rubin, a senior investigator with FDA's Center for Biologics Evaluation and Research, bikes 20 miles each way to the NIH campus several times a week, year round. From his home in Frederick County, Md., he drives about 25 minutes along back roads to Poolesville, then bikes the rest of the way, part of it along the scenic C&O Canal.

He picks up the canal by Seneca Aqueduct (mile marker 23) and rides to mile marker 17, Swain's Lock. "It's a beautiful ride along the narrow trail with the Potomac River on one side and the canal on the other, riding past rapids and spectacular scenery," he said. "There are blue herons, vultures, turtles, snakes, deer, the occasional red fox and [this time of year] hissing Canada geese and their chicks."

Rubin's commute takes him about 1½ hours, although, he admits, even if he drove the whole way or took the bus part of the way, it would take about as long, given traffic.

"When gas prices went up to more than $2 a gallon in 2004, a friend of mine said, 'Let's stick it to the gas companies and ride in.' We did it ever since. I love it!"

That friend was the late Dr. Phil Snoy, a well-known campus citizen who was director of FDA's Division of Veterinary Science. For years, up until Snoy's untimely passing in 2011, Rubin recounted driving to Snoy's house in Poolesville and riding their bikes together to work. They often were joined by FDA's Dano Murphy who enjoyed the ride so much that he drove from his house near the NIH campus to Poolesville to meet them, only to bike back to NIH. Rubin and Murphy still often ride together.

Rubin bikes in on average 2-3 times per week, but sometimes he'll bike in every day. On days when he doesn't pedal, he drives to a Park and Ride lot and takes the commuter bus from Germantown. But on those days, he still keeps a bike on campus to ride between his office and the bus stop.

Rubin's riding partner for many years was the late Dr. Phil Snoy, an FDA veterinarian who was well-known on campus for his athletic pursuits. This tree in front of Bldg. 29A was planted in his memory.

PHOTOS: DANA STEINBERG

His main motivation for biking to work? Exercise. "My metabolism is plummeting," he said. "I'd look a complete mess if I didn't [cycle]. It just feels good and it's a good way to start the day. When I don't bike in, I just don't feel right."

Rubin always enjoyed biking. In college, he and friends enjoyed competitive mountain biking. Later, he began riding road bikes. Since 2004, he has consistently biked to work. "The idea of combining biking with an actual way to get to work is appealing," he said.

It seems that NIH'ers increasingly are riding their bikes to work. "For years, Phil and I, and maybe one or two others, had the only bikes on the rack by my building," Rubin said. "Now, I can barely find a bike spot!"

In January 2014, he and his FDA colleagues will relocate to FDA headquarters in Silver Spring. He's still contemplating his new route.

If you have an alternative mode of commuting to and from NIH, especially in this era of BRAC-related congestion, let the *NIH Record* know and perhaps we can arrange a brief interview.—**Dana Steinberg**

NINR Holds Emergency Preparedness Training

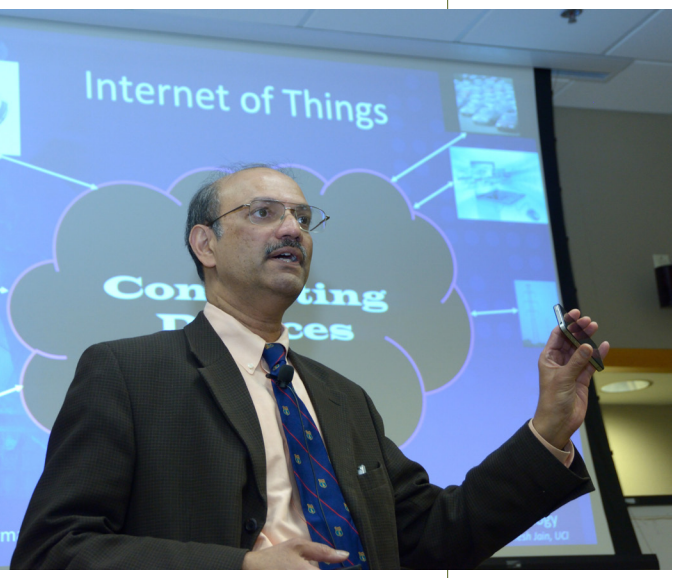
National Institute of Nursing Research staff recently participated in an institute-wide continuity of operations (COOP) emergency preparedness training session. Conducted by the NIH Division of Emergency Preparedness and Coordination in collaboration with the NINR COOP workgroup, it offered critical information and tools for emergency preparedness, response and recovery. "Although over the years NINR has provided emergency preparedness training, unusual weather events have recently reminded us that we need to ensure that all NINR employees are safe and prepared to continue operations when an emergency occurs," said NINR director Dr. Patricia Grady (shown, r).

PHOTO: ERNIE BRANSON

TECH REVOLUTION

CONTINUED FROM PAGE 1

estimated Dr. Ram Sriram, chief of the software & systems division at the National Institute of Standards and Technology. "It's not just biology, not just computer science, not management; it's a combination of all of these things that's going to play [a role] in the future health care regime."



Observes Sriram, "Think what the combined intelligence of the billions of people on the Internet can achieve." He is holding a smartphone, part of the "Internet of Things."

PHOTOS: BILL BRANSON

At his May 9 lecture at NIH, Sriram said smartphones and other smart devices are constantly sensing, monitoring and interpreting the environment. This, he points out, is called "The Internet of Things," an interconnected web of devices transforming our everyday lives. Meanwhile, social networks are connecting people, he said, "fostering a participatory culture and harnessing the collective knowledge of society."

Combining the Internet of Things and social networks, he said, forms SNSS—Smart Networked Systems and Societies. SNSS makes such advances as the 21st century doctor possible, by connecting cyber physical systems with medical devices while humans interact with them.

A growing number of Americans are looking online for health information and the health community is connecting to them via social media. Sriram said many hospitals are using YouTube, Facebook, Twitter and blogs for education, marketing, crisis communication and community outreach.

SNSS will help create smart health care, said Sriram, fusing advances in information technology with health care practices. There's technology available in which a small EKG device attaches to a smartphone and transfers data. Or, you might tweet about having a sore throat and instantly "visit clinic" advice pops up; then GPS gets you there. These are events in real time, transferring information and spurring immediate response.

While such advances offer opportunity, they also present privacy and security challenges. Is the data encrypted and who has access? Is the wireless network protected from data phishing and eavesdropping? Also, sensors and GPS can track our exact location. The person who posts about a sore throat can lead someone to conclude many people are sick in that area. This seems like innocuous information but certain facts could have consequences for bioterrorism, said Sriram.

Devices are talking to one another, generating huge volumes of data in and among systems. Sriram said we need to develop standards and protocols for information security that include identifying network vulnerabilities and having strategies and other fixes ready to go.

Devices and systems must operate and communicate properly. If networks fail, for example following a natural disaster, we must be able to reconfigure them to prevent loss of health records and other sensitive data. With the deluge of data, Sriram said, it's a challenge to categorize and process all of it, make it accessible and build a supportive and secure infrastructure.

By 2020, according to Intel, there will be 31 billion devices and 4 billion people (more than half the world's population) connected to the web. Observes Sriram, "Think what the combined intelligence of the billions of people on the Internet can achieve."

The event was hosted by the NIH biomedical computing interest group, an organization that promotes good biocomputing methodology and technology. The group meets for lectures, book club meetings, think-tank sessions and social gatherings. To learn more about BCIG and its upcoming events, contact Jim DeLeo at jdeleo@nih.gov.

Volkow Joins Former President on Drug Abuse Panel

NIDA director Dr. Nora Volkow (second from l) recently joined former President Bill Clinton (l), New York dignitaries and college students from New York University for a panel discussion on prescription drug abuse, particularly among 18-26 year olds, and how the Clinton Foundation's Clinton Health Matters Initiative can work with others to contribute to solutions in New York and nationwide. Featured speakers included Clinton, NYC Police Commissioner Ray Kelly (third from l), NYU president Dr. John Sexton (r) as well as Volkow. The event, held at Vanderbilt Hall, New York University School of Law in New York, was moderated by Melinda Beck, columnist for the Wall Street Journal.

PHOTO: NYU PHOTO BUREAU/HOLLENSHEAD

17-year-old golfer Michael Bruhn listens to NIH director Dr. Francis Collins address the post-tournament lunch at Argyle Country Club.

Teenage Cancer Patient Excels at Charity Golf Tourney

The fourth annual golf tournament to benefit the Friends of the Clinical Center had a surprising entrant on May 6 at Argyle Country Club in Silver Spring.

Michael Bruhn, a 17-year-old leukemia patient at the Clinical Center, earned a spot on a foursome, owing to his love of the game and his experience on his high school golf team. Caregivers not only permitted his participation, but also supplied him with a set of golf clubs.

"I contacted Michael's mom and let her know that we could provide a set of clubs for him to use and that our own board member, Diane Baker (wife of NIH director Dr. Francis Collins) would be able to pick the Bruhns up in the morning and give them a ride to the tournament," said Heidi Grolig, FOCC executive director.

"We were happy to sponsor a spot for Michael with one of the foursomes," Grolig continued. "We weren't sure until the day before the tournament if he would be well enough to play." The tournament included a group of FOCC supporters from the local business community, she said, and numbered some 60 golfers.

"We were very thankful that Michael was able to join us that day," Grolig said. "And little did we know what a wonderful golfer he is—and all around wonderful young man."

Although Bruhn made his high school golf team back home in Oregon, he has not been able to play much because of his illness and treatment. His mom, Kimberly, also attended the tournament, assisting volunteers at the day-long event.

"We teamed up Michael with Tom Bertke from IBM global business services and his son Chase Bertke," said Grolig. "The three had a great day and really bonded with Michael. Michael was the first person to win at the 'beat the coach' hole." Bruhn's team won the tournament with a score of 59.

Collins arrived at the course around 3 p.m. to greet the golfers at lunch and meet many of

Collins (l) and Heidi Grolig, FOCC executive director, pose with winning golf team members (from l) Bruhn, Chase Bertke and Tom Bertke.

FOCC's supporters. He also spoke with Bruhn and his mother and gave a talk about the work done at NIH.

Grolig said that donations and sponsorships at all FOCC events help patients by relieving them of financial stress, allowing them to continue in research and treatment at the Clinical Center.

Crowdsourcing Initiative Enables Exploration of New Therapeutic Uses for Industry Molecules

On June 18, NIH awarded $12.7 million to match 9 research groups with a selection of pharmaceutical industry compounds to explore new treatments for patients. The pilot initiative, called Discovering New Therapeutic Uses for Existing Molecules, is administered by the National Center for Advancing Translational Sciences. The NIH Common Fund is providing funding.

NCATS launched the New Therapeutic Uses program in 2012 to help re-engineer the research pipeline. By crowdsourcing compounds that already have cleared several key steps in the development process, including safety testing in humans, scientists nationwide are contributing their expertise to accelerate the pace of therapeutic development. Compounds were offered by AbbVie (formerly Abbott), AstraZeneca, Bristol-Myers Squibb Co., Eli Lilly and Co., GlaxoSmithKline, Janssen Research & Development, L.L.C., Pfizer and Sanofi for the pilot program.

The pilot phase tested newly created template agreements that proved to be extremely useful in facilitating negotiations, enabling the research to begin more quickly.

The award recipients each will test a selected compound for its effectiveness against a previously unexplored disease or condition. The 8 disease areas represented are alcoholism, Alzheimer's disease, calcific aortic valve stenosis, nicotine dependence, peripheral artery disease, schizophrenia and two rare diseases, DMD and the lung disease lymphangioleiomyomatosis.

Additional scientific expertise is being provided by NCI, NHLBI, NIA, NIAAA, NIDA, NIMH and NINDS.

More information about the awards, including video and audio clips from program awardees, is available at http://ncats.nih.gov/therapeutics.html.

ZERHOUNI

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***Above**:*
Before giving his remarks, Zerhouni is greeted by NIH principal deputy director Dr. Lawrence Tabak and by NIDCR director Dr. Martha Somerman and (obscured) NIGMS acting director Dr. Judith Greenberg.

PHOTOS: ERNIE BRANSON

buy a patient only a few months of time.

Admitting at the outset that measuring NIH's value is a very difficult topic, he added, "I am not here for an academic discussion of how medical research should be valued…[that] has been said today, I am sure, by the speakers you invited. I shared, for example, in Congress that the $4 per year invested per person in the United States since the 1970s on cardiovascular research now results in $2.5 trillion of economic value every year. The problem with these kinds of statements is that you can easily make them, but you can't easily prove them."

Zerhouni was asked to discuss "Value of Federally Funded Biomedical Research in the Development of Medical Interventions and Treatments." In a 20-minute address followed by questions, he argued that "the notion of value changes over time" and that narrowly defined metrics tend to be misleading. The most important criteria, he said, is whether dollars are assigned in a way that satisfies societal expectations.

"The product of NIH should be knowledge, not products," he said. "How do we achieve reduction in the burden of disease and reduction in the burden of health care costs? How do we transform knowledge into societal benefit?"

With the engineer's cast of mind that distinguished his NIH leadership, Zerhouni said, "I have a simple matrix in my mind," a series of pragmatic, measurable steps for "transforming ideas into knowledge." He enumerated four steps in translation, T1 through T4.

"T1 is when you are truly on the edge of understanding some process or disease biology," he explained. The criteria for valuing work at this stage "will be completely different" from how one values T4 research, which involves applying the fruits of basic research to the practice of public health. "This is getting mixed up in the public debate," he said.

Zerhouni plumbed NIH history for examples of the interdependency of various translational steps in achieving an acknowledged public health success. It was the long-term Framingham Heart Study that picked up cholesterol as an important signal in cardiovascular morbidity and mortality, he recounted. That work led to Drs. Michael Brown and Joseph Goldstein's Nobel Prize-winning studies that "changed the practice of medicine.

"How many times has NIH science done this?" Zerhouni asked, rhetorically. In stroke, there has been a 70 percent reduction (that's T3, change in the practice of medicine) in recent decades. But what has been the value of NIH research when only 30 percent of patients with diabetes comply with their medications and 70 percent don't, Zerhouni wondered? "And only 15 percent of patients with high blood pressure are compliant with their medication."

"The product of NIH should be knowledge, not products. How do we achieve reduction in the burden of disease and reduction in the burden of health care costs? How do we transform knowledge into societal benefit?"

He called implementation, or behavioral, research a worthy investment. "Look at a map of the United States," he said. "Why are there all these pockets of disparity [in health outcomes] when the knowledge is the same everywhere?"

Zerhouni's favorite example of NIH delivering on its promise to society is the Women's Health Initiative's finding, during his directorship, that hormone replacement therapy proved more harmful than helpful to women. "That's value," he declared, "and it's important to quantify that value…This kind of impact is very valuable, and measurable. You can point to lives saved, quality of lives, number of years."

In any discussion of value, Zerhouni emphasized the need to personalize results. The goal, he said, is outcomes that relate directly to societal expectations. In a country where chronic diseases account for 80 percent of health care costs, he said, "federal investment needs to be tied to the societal needs of the day. Otherwise you risk academic isolation, or living in some theoretical realm…Patients measure, better than anybody, the value of research."

Zerhouni said his personal view is that NIH should devote 60 percent of its budget to generate new knowledge. "I wouldn't go below that, no matter what."

Zerhouni also greets NIBIB director Dr. Roderic Pettigrew in Wilson Hall prior to his talk.

He concluded with three lessons:

- "Don't damage young investigators. Give 'em a chance, and give it early. Don't kill them with rigidity—4 years of this, then 6 years of that…They end up exhausted at the end of such combat."

- "We have moved away from studying human disease in humans," he lamented. "We all drank the Kool-Aid on that one, me included." With the ability to knock in or knock out any gene in a mouse—which "can't sue us," Zerhouni quipped—researchers have over-relied on animal data. "The problem is that it hasn't worked, and it's time we stopped dancing around the problem…We need to refocus and adapt new methodologies for use in humans to understand disease biology in humans."

- "Budget pressures are going to kill any inkling of innovation." Zerhouni warned that there are 5 diseases that, if not solved within the next 5 years, will certainly bankrupt some societies.

Zerhouni took half a dozen questions from SMRB members assembled in Wilson Hall and made a number of other observations:

- Game approaches to compliance fascinate him. "We've got to be able to engage the patient beyond a visit every 3 months, coupled with a series of 'thou shalt nots.'"

- The power of social networks, or so-called "influencers," has been underutilized in public health.

- Statins are phenomenally over-prescribed; only 10 percent of the patients who take them realize any benefit. "So 90 percent of what we do with statins is not helpful," Zerhouni said.

Any consideration of the value of research that does not take the customer into account is doomed, he warned. "You've lost the debate if you lose sight of the taxpayers and the patients."

Stratakis Honored by University of Liège

Honorary doctoral awardee Dr. Constantine Stratakis (c), with Prof. Albert Beckers (l), chief of the department of endocrinology, and Dr. Bernard Rentier, university rector, at the University of Liège

Dr. Constantine Stratakis, NICHD's director of intramural research, recently received an honorary doctorate from the University of Liège, Belgium, in recognition of his work on the genetic causes of endocrine tumors.

"Dr. Constantine Stratakis is a gifted investigator with an inspirational story from summer student to scientific leader," said the award citation. He merited the award because he is a "consummate clinical endocrinologist, translational investigator and beloved mentor." Stratakis received the degree in Liège.

The citation listed a number of his scientific accomplishments, including work with Dr. J. Aidan Carney that resulted in gene-based testing for three diseases—Carney complex, primary pigmented nodular adrenocortical disease and Carney-Stratakis syndrome. The ability to test for these diseases allows patients to begin treatment earlier. Prior to the test, more than a third of Carney complex patients died suddenly from complications of heart tumors and other tumors, the Liège citation said.

Stratakis received his M.D. and D.(Med)Sc. degrees in his native Greece. He came to NICHD as a postdoctoral fellow in 1988 and completed his residency in pediatrics at Georgetown University School of Medicine. He became acting scientific director at NICHD in 2009 and was named scientific director in 2011. He is board-certified in pediatrics, pediatric endocrinology and medical genetics.

Clinical Center Rounds Marks Hospital's 60th Year

In July 1953, NIH welcomed its first patient to the Clinical Center: 475,000 patients and many milestones later, the work goes on. All are welcome to join in celebrating 60 years of discovering tomorrow's cures at a special edition of Clinical Center Grand Rounds/Contemporary Clinical Medicine: Great Teachers on Wednesday, July 10 from noon to 1:30 p.m. in Masur Auditorium, Bldg. 10.

Speakers and their topics are:

Research Milestones: 60 Years of Clinical Research—Dr. John Gallin, director, Clinical Center

The Human Mammary Tumor Virus—Dr. James F. Holland, distinguished professor of neoplastic diseases, Icahn School of Medicine at Mount Sinai, New York

Location, Location, Location: The Mycobacterial Susceptibility Story—Dr. Steven M. Holland, chief, Laboratory of Clinical Infectious Diseases, NIAID, and deputy director for intramural clinical research, NIH.

MUSIC

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Complementary and Alternative Medicine's Integrative Medicine Research Lecture Series. "People have been speculating about music in the mind for millennia. Plato remarked that rhythm and harmony find their way into the inward places of the soul back in three or four hundred B.C."

Patel "is really a scholar of the science of music and the brain, with a particular interest in music and language," said NCCAM director Dr. Josephine Briggs, introducing the lecture. "That's of great interest to NCCAM, as we are interested in the therapeutic potential of music."

Advanced Tools, Better Insights

Development of neuroimaging tools—fMRI, PET, MEG and ERP, for example—that can examine the brain in multiple temporal and spatial scales give "us windows onto the brain that we never had before," said Patel.

Magnetoencephalography (MEG) maps brain activity via magnetic fields made by naturally occurring electrical currents. Event-related potentials (ERPs) are brain response measurements captured via electroencephalography.

"One of the things we've learned quickly with these techniques is that music processing is widely distributed in the brain," he said. "There is no single music center in the brain."

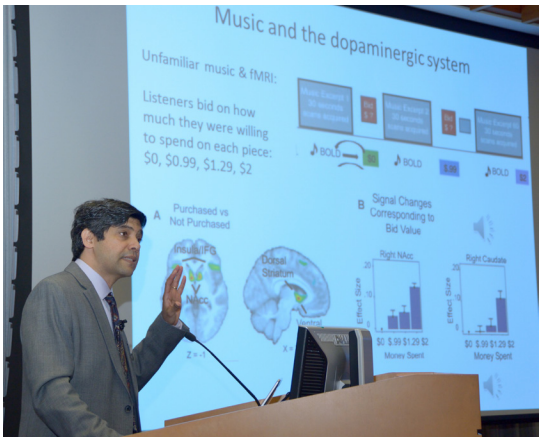
Patel showed an fMRI of a non-musician's brain listening to music sequences—harmonies. Brain areas activated by the music included not only the expected auditory regions, but also frontal, temporal and parietal locations.

"This is just one aspect of music—the harmonic," Patel said. "If I could overlay activations for rhythm, memory, emotion…we'd see wide swaths of the brain activated. This raises the idea that music has the potential to interact with many brain functions that are also distributed in different regions of the cortex such as language, memory and attention."

Patel discussed transient effects or "what happens when the music is on" as well as lasting effects, what happens in the weeks, months or even years afterwards. His talk targeted specifically musical training's effect on other cognitive domains.

Beyond Emotion

Why does the brain respond so strongly to music? Patel cited the "Multiple Mechanisms Theory," which suggests that music activates six different pathways to emotion in the brain.



Patel contrasted brain images of musicians and non-musicians.

Acknowledging music's remarkable influence over our emotions and the significant research already existing in that area, he said, "I'll be treating emotion as an enabler of other biological effects. It's a powerful internal reward that drives other brain systems."

To illustrate music's transient effects, Patel talked about a 2011 randomized, double-blind, placebo-controlled study of people undergoing total hip joint replacement under light sedation (spinal anesthesia).

One group listened to instrumental music, the other group heard sounds of ocean waves. Results? Music listeners consumed about 15 percent less anesthesia to reach target sedation levels and produced about 20 percent lower amounts of the stress hormone cortisol during the surgery.

What neural mechanisms might explain these effects? Study authors offered three possibilities, working alone or in combination:

- Activation of the mesolimbic dopaminergic system. Release of the natural chemical dopamine has been linked to pleasure/reward areas in the brain.
- Downregulation of the central nucleus of amygdala. The amygdala is associated with brain regions that respond to pain.
- Engagement of cognitive/attention resources.

Music, Language—Housemates in the Brain?

Patel also talked about music and neural plasticity. In slides of the brains of children, he pointed out evidence of faster brain development—"more gray matter in certain areas, including the corpus callosum"—in kids learning to play a musical instrument.

"We know now that musical training drives structural and functional changes in the brain," he said, citing 2012 research by Herholz & Zatorre in *Neuron*.

Patel said that what we already know about neighborhoods in the mind and how they function suggests it's possible that music training

Hear a 'SIMPHONY?'

Dr. Aniruddh Patel of Tufts University says the time is ripe for more music cognition research. One example he cited is SIMPHONY or Studying the Influence Music Practice Has On Neurodevelopment in Youth. He and colleagues began the study in July 2012 to look at how music training affects development of language, executive function and attention.

SIMPHONY involves three groups of children ages 5 to 8—those in music training, active control group taking martial arts and passive control taking no extracurricular activity. Youngsters will be tested once a year for 5 years; they'll have 6 hours of behavioral/cognitive testing, MRIs and EEGs.

Collaborating to get SIMPHONY started were Dr. Terry Jernigan and Dr. John Iversen at the University of California, San Diego, and Dalouge Smith of the San Diego Youth Symphony. The project is now being led by Iversen.

The study was based on PLING (Pediatric Longitudinal Imaging Neurocognition and Genetics), an NIH-funded study started in 2011 by scientists at UCSD to examine children's brain development using MRI. NICHD awarded the PLING grant; Jernigan is principal investigator.

NCCAM director Dr. Josephine Briggs introduced Patel as "a scholar of the science of music and the brain."

can change the way the brain handles language and speech.

Linguistic and non-linguistic auditory domains in the brain overlap, he pointed out. Language, like music, involves processing complex hierarchical sound sequences.

So looking at potential practical applications, might training in music prime pre-literate brains for reading?

"That may seem far-fetched," Patel said, "but there's a growing body of evidence that there are links between early rhythmic skills, musical training and phonological awareness, [which is] the ability to understand that words are made up of individual sounds that have to be segmented out and that can be manipulated. That's a key step in learning how to read."

Current research suggests that auditory processing is not a one-way street, he said. Scientists in recent years have moved away from the idea that hearing is a direct process—from cochlea to cortex; research now suggests a more complex auditory process that involves cognition. In other words, sound traffic flows in several lanes, in many directions across the brain.

"It's a very dynamic system that tunes itself," Patel said.

Patel recently proposed the OPERA hypothesis to explain why music training might enhance neural encoding for speech. OPERA stands for:

- **Overlap** in the brain networks shared by music and language
- higher **Precision** demands in music than in speech
- positive **Emotion**
- extensive **Repetition**
- focused **Attention**

"The key novel idea is that there is an asymmetry, that music is demanding more of the nervous system than speech does in terms of certain auditory processing," he explained. "Since speech and music share certain brain networks for auditory processing, speech benefits because of the plastic changes in those networks."

Patel said he's now expanding on the OPERA framework and developing studies (see 'SIMPHONY' sidebar) with colleagues to further document the links between music and language.

Following his lecture, Patel addressed questions about people who start and later quit music training and whether learning to play music might help you learn a foreign language.

The entire lecture is archived online at http://videocast.nih.gov/launch.asp?17947.

NIAMS Forum Explores Future Directions of Anabolic Therapies

NIH grantees and others with musculoskeletal disease interests recently met with NIAMS leadership and staff to discuss basic and translational research needs and opportunities related to bone-, cartilage- and muscle-building therapies. Part of the institute's scientific planning process, the full-day roundtable addressed topics including cell signaling molecules and pathways that could be targets for treatments that would increase bone, cartilage or muscle production; the extent to which multiple tissues share these processes and potential off-target effects of candidate therapies; and gaps in knowledge about musculoskeletal biology that are limiting the development of anabolic approaches to repair and rebuild musculoskeletal tissues. Participants included NIAMS director Dr. Stephen Katz (front, fourth from l), deputy director Dr. Robert Carter (back, second from r) and staff members Drs. Glen Nuckolls (front, l), Faye Chen (front, fourth from r), Joan McGowan (front, r), Gayle Lester (back, fifth from l), Jonelle Drugan (back, c) and Bill Sharrock (back, r).

NIMHD's Cooper Retires

Capt. Leslie Cooper
PHOTO: BILL BRANSON

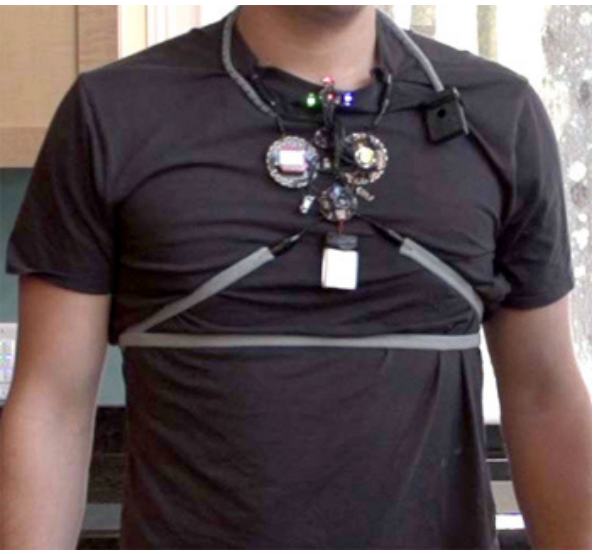
Dr. Leslie C. Cooper, an extramural program official and senior nurse advisor in the Division of Scientific Programs at the National Institute on Minority Health and Health Disparities, retires June 30, with 30 years of service as an active-duty member of the Public Health Service—29 years at NIH.

Over the course of her career, Cooper worked at 7 of NIH's 27 institutes—NIMHD, NCRR, NCI, NIDA, NHLBI, NINR and NICHD. She provided technical and scientific support and guidance to scientists, clinicians, students and emerging professionals as they prepared to advance the science and improve public health outcomes in this country and abroad. Her areas of expertise include community-based participatory research and translational research related to cancer prevention and other chronic diseases in minority and medically underserved populations. She engaged in cooperative activities within and across NIH and collaborated with other HHS agencies, federal partners, state and local entities and many communities to help the eventual elimination of cancer health disparities.

digest

Wearable Air Pollution Sensor Device Wins Design Challenge

New technology that creates a personal, portable and wearable air pollution sensor—developed under the My Air, My Health Challenge—was announced June 4 at the Health Datapalooza in Washington, D.C. The grand prize of $100,000 was awarded to Conscious Clothing. The challenge was held by NIH, the Office of the National Coordinator for Health Information Technology of the Department of Health and Human Services and the Environmental Protection Agency.



A portable and wearable air pollution sensor was the winning device at the recent "Health Datapalooza" held in Washington, D.C.

PHOTO: CONSCIOUS CLOTHING

Health Datapalooza is intended to encourage innovation and partnerships between technology specialists and health professionals to further biomedical research and solve health problems. Conscious Clothing's design was chosen from four finalists.

The winning team created the Conscious Clothing system, a wearable breathing analysis tool that calculates the amount of particulate matter that is inhaled. The system uses groove strips—stretchy, conductive strips of knitted silver material wrapped around the ribcage—to measure breath volume and collects and transmits data in real time, via Bluetooth, to any Bluetooth-capable device.

Anti-Smoking Medication Shows Promise for Treating Alcohol Dependence

A smoking-cessation medication may be a viable option for the treatment of alcohol dependence, according to a study by scientists at NIH. The study found that varenicline (marketed under the name Chantix), approved in 2006 to help people stop smoking, significantly reduced alcohol consumption and craving among people who are alcohol-dependent. The findings were published online in the *Journal of Addiction Medicine*.

"This is an encouraging development in our effort to expand and improve treatment options for people with alcohol dependence," says Dr. Kenneth Warren, acting director of the National Institute on Alcohol Abuse and Alcoholism. "Current medications for alcohol dependence are effective for some, but not all, patients. New medications are needed to provide effective therapy to a broader spectrum of alcohol dependent individuals."

Alcohol dependence is a chronic disease that includes symptoms such as craving, loss of control over drinking, withdrawal symptoms after stopping drinking, and tolerance, the need to drink greater amounts of alcohol to feel the same effect.

"Drinking and smoking often co-occur, and given their genetic and neurochemical similarities, it is perhaps unsurprising that a smoking cessation treatment might serve to treat alcohol problems," notes lead author Dr. Raye Z. Litten of the NIAAA Division of Treatment and Recovery Research. "Our study is the first multi-site clinical trial to test the effectiveness and safety of varenicline in a population of smokers and nonsmokers with alcohol dependence."

Early studies testing varenicline as a smoking cessation medication suggested it might also be effective for treating alcohol problems. Varenicline works by partially stimulating receptors for nicotinic acetylcholine, a promising molecular target implicated in both nicotine and alcohol disorders. This hypothesis was supported by early animal studies showing that varenicline decreases alcohol consumption.

Scientists Find Link Between Allergic, Autoimmune Diseases in Mouse Study

Scientists at NIH and their colleagues have discovered that a gene called BACH2 may play a central role in the development of diverse allergic and autoimmune diseases such as multiple sclerosis, asthma, Crohn's disease, celiac disease and type 1 diabetes. In autoimmune diseases, the immune system attacks normal cells and tissues in the body that are generally recognized as "self" and do not normally trigger immune responses. Autoimmunity can occur in infectious diseases and cancer.

The results of previous research had shown that people with minor variations in the BACH2 gene often develop allergic or autoimmune diseases and that a common factor in these diseases is a compromised immune system. In this study in mice, the BACH2 gene was found to be a critical regulator of the immune system's reactivity. The study, headed by researchers at the National Cancer Institute and the National Institute of Arthritis and Musculoskeletal and Skin Diseases and their colleagues, appeared online in *Nature*, June 2.—**compiled by Carla Garnett**

milestones

NIH employees honored as 2013 Service to America Medal finalists include (from l) Dr. Michael Gottesman, Dr. Julie Segre, Dr. David Henderson, Dr. Tara Palmore, Dr. Kevin Snitkin and Dr. Nora Volkow.

PHOTOS: SAM KITTNER/KITTNER.COM

NIH Employees Honored as 'Sammie' Finalists

Several NIH employees have been honored as 2013 Service to America Medal finalists, also known as the Sammie awards.

Each year, the Partnership for Public Service honors federal employees "whose important, behind-the-scenes work is advancing the health, safety and well-being of Americans" as part of Public Service Recognition Week.

The NIH'ers honored this year, and their award category, are:

Dr. Michael Gottesman, NIH deputy director for intramural research, nominated in the Career Achievement Medal category: "Throughout a four-decade career, led seminal studies in the treatment of drug-resistant cancer cells and played an instrumental role in improving the rigor of medical research."

Dr. Julie Segre, senior investigator in NHGRI's Genetics and Molecular Biology Branch, and Dr. Tara Palmore, deputy hospital epidemiologist at the Clinical Center (and their team, including Dr. David Henderson, deputy director for clinical care and associate director for quality assurance and hospital epidemiology at the Clinical Center, and Dr. Kevin Snitkin) in the Science and Environment Medal category: "Stopped the spread of a deadly hospital-acquired infection through the first-ever use of genome sequencing to identify the source and trace the transmission of antibiotic-resistant bacteria, creating a groundbreaking model for the health care industry."

NIDA director Dr. Nora Volkow was also nominated in the Science and Environment category: "Demonstrated that drug addiction is a disease that changes brain function and created new strategies for treating patients with substance abuse issues."

The finalists are contenders for eight Service to America Medals, including Federal Employee of the Year, set to be announced on Oct. 3 at a Washington, D.C., gala.

For more information on the awards, including profiles of nominees' careers, visit www.servicetoamericamedals.org.—**Jeff Kopp**

feedback

Have a question about some aspect of working at NIH? You can post anonymous queries at www.nih.gov/nihrecord/index.htm (click on the Feedback icon) and we'll try to provide answers.

Feedback: As times become fiscally challenging for the NIH and hard-hitting budget cuts are made to programs, services, contractors and grants, the practice of paying the NIH Police officers 10 percent retention pay, half an hour of overtime every day, take-home vehicles and free laundry service is fiscally irresponsible. These benefits, which no other NIH employee receives (nor get raises) have cost taxpayers millions of dollars over the years. The NIH police guard force has an average age in the 50s and has never had physical standards. Most young officers leaving the force…go to more professional agencies in spite of the outlandish perks offered to them here by the NIH. Has the NIH looked at bringing in a professional law enforcement agency like the Federal Protective Service [which] provides law enforcement services to most federal agencies? The NIH police guard force have several hard-working officers [who] are a credit to the NIH but the rest of the NIH population has worked equally hard and deserves the same perks and benefits.

Response from the Office of Research Services: The NIH police force operates to provide a safe and secure environment for the staff, patients and visitors to the NIH main campus in Bethesda and Rocky Mountain Laboratories in Montana. The officers are augmented by a contract security guard force. The NIH Police are a professional, federal police force and certain benefits are negotiated specifically with their bargaining unit.

Systems Biology Centers Mark 10th Year

NIGMS will host a meeting on July 11-12 focused on the activities and accomplishments of its National Centers for Systems Biology. The event, which is free and open to all, will take place in Kirschstein Auditorium, Natcher Conference Center. The agenda includes a panel discussion on the future of systems biology, presentations from each center and talks by young scientists whose careers have been affected by the program. Find more information and register at http://meetings.nigms.nih.gov/index.cfm?event=home&ID=16572.

Asian/Pacific Islander American Heritage Festival Includes Food, Culture

Where else on campus can you have delicious Asian food, watch traditional dance routines and try your hand at Chinese calligraphy other than at the NIH Asian and Pacific Islander American Organization's annual Ethnic Food Fair?

On May 22 on the Bldg. 31A patio, several hundred employees enjoyed the event, whose main attraction was a rich variety of ethnic foods and a celebration of Asian and Pacific Islander American heritage at NIH. Representatives from local restaurants such as Hollywood East Café, Shanghai Café, Tandoori Nights and Korean Korner sold their cuisine for NIH'ers to enjoy on a sunny afternoon.

Groups such as the Office of Equal Opportunity and Diversity Management and NIMHD set up tables to talk to attendees, while other groups such as the NIH APAO set up a table where you could try Japanese origami and Chinese calligraphy and learn about the health benefits of tea. There were also vendors selling jewelry and other items.

A highlight of the afternoon was a performance by the Korean Mae-Hwa Dancing Group, a group of women who were originally friends in high school in Korea who reunited in the D.C. area; they are led by teacher Sandra Oh. One of the dancers, Minkyung Song, is an NIH employee. The troupe came to the festival in pink and green dresses—the costume of the imperial court—along with hand fans and performed a graceful dance routine to popular Korean folk songs.

Also sharing information at the event were Public Health Service commissioned officers representing the Asian Pacific American officers committee and scientist professional advisory committee. The NIH Federal Credit Union, a regular supporter of the event, provided information about its financial services.

The theme of the observance, "I Want the Wide American Earth," was inspired by a poem by the late Filipino American poet Carlos Bulosan:

Before the brave, before the proud builders and workers,

I say I want the wide American Earth

For all the free.

***Above**:*
Fan Dance, performed by the Korean Mae-Hwa Dancing Group, led by Sandra Oh

***Below**:*
Representatives from local restaurants such as Hollywood East Café, Shanghai Café, Tandoori Nights and Korean Korner sold their cuisine for NIH'ers to enjoy on a sunny afternoon.

PHOTOS: JEFF KOPP

I want the wide American Earth for my people.

I want my beautiful land.

I want it with my rippling strength and tenderness

Of love and light and truth

For all the free.

The NIH APAO donates a portion of event proceeds to the Children's Inn at NIH. Membership in APAO is open to staff and members of the NIH community.

The event has been held since 1972, making this the 41st festival to date.—**Jeff Kopp and Laura Wong**