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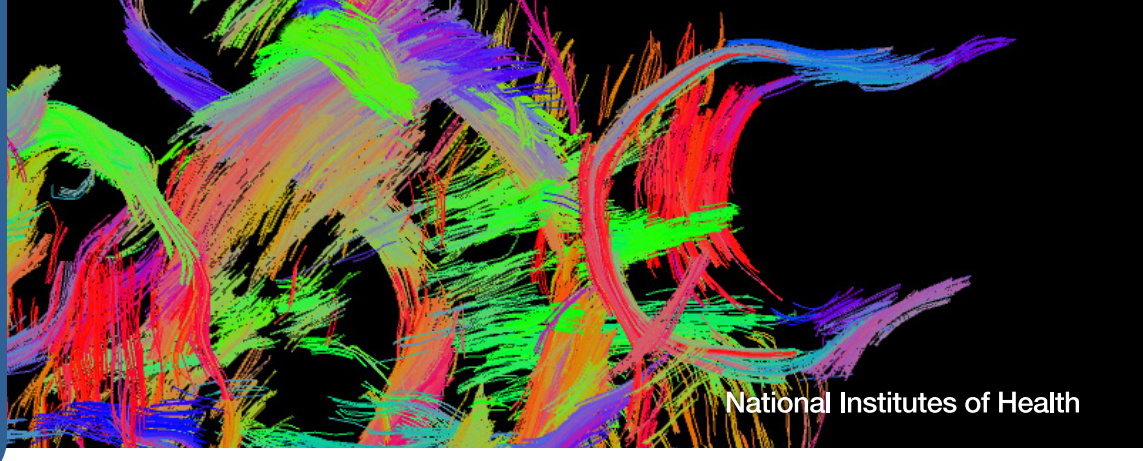


AHEAD IN THE CLOUD

CIO Thomson Guides NHLBI Into Off-Site Computing

BY CARLA GARNETT

Scientific data is not what it used to be. It used to come in megabytes and then gigabytes, but today terabytes and petabytes are becoming the norm and innovations in science seem to consume more bytes every day. That's one reason Alastair Thomson, NHLBI chief information officer, and his NIH colleagues began looking to the cloud for IT resources.

"I remember back around 1992 or so I was ordering 1-gig servers and I thought, 'How in the world will anyone ever use that much space?'" Thomson recalled. "Now we've got a new microscope going into Bldg. 14F that uses a massive amount of image data. We're talking way past gigabytes or even terabytes these days."

As advanced IT use grows, Alastair Thomson, CIO at NHLBI, is steering towards cloud computing.

As technology gets more sophisticated, it also begins to require more resources to keep up with it.

Cloud computing—paying a third party to handle IT infrastructure off-site—has been around awhile, nearly two decades according to some estimates. In recent years, however, those in charge of providing IT resources for large organizations have increasingly investigated remote use of hardware, storage capacity, energy for electricity and cooling, speed and power.

"You're only paying for what you actually need," Thomson explained. "There's a big advantage in that the cloud is elastic. You use only what you need when you need it. You don't have to keep paying for energy and resources you're not using. It helps drive down the costs so we can invest more in the really valuable resource—people's brains."

Site Unseen?

For its first forays into the cloud, NHLBI tested the waters with what Thomson called

SEE **CLOUD**, PAGE 8

Outdoor film festival draws crowds. See p. 12.

ALSO THIS ISSUE

'THE ELVIS OF PMI-CP'

Dishman Follows Instincts to Top PMI Cohort Post

BY RICH MCMANUS

If you're straight with the universe, maybe the universe will be straight with you.

How else to explain the arrival of Eric Dishman, director of the Precision Medicine Initiative Cohort Program (PMI-CP), who owes his life and health to precision medicine and now wants to make the "Hail Mary pass" that saved him from kidney cancer common medical practice?

Eric Dishman

SEE **DISHMAN**, PAGE 6

Poor Doctor-Patient Communication Often Breeds Poor Care

BY ERIC BOCK

A doctor's communication skills might be the difference between patients receiving high-quality care instead of sub-standard care. That's what NIMHD director Dr. Eliseo Pérez-Stable stressed at the recent CC Grand Rounds: Contemporary Issues in Graduate Medical Education in Lipsett Amphitheater.

Dr. Eliseo Pérez-Stable

"Effective patient-doctor communication leads to better patient satisfaction, better

SEE **COMMUNICATION**, PAGE 4

Animal Research Tribute, Sept. 16

An Animal Research Program Tribute & Dedication Ceremony is scheduled for Friday, Sept. 16 at 9:30 a.m. on the south side of Bldg. 10.

The animal research advisory committee and the IC animal program directors decided to commemorate the exceptional efforts and contributions made by the research animals and animal care and use community to the mission of NIH and the many health advances that have been supported.

The commemoration will be a bronze plaque affixed to a granite boulder to be placed on the south side of the Clinical Center. The boulder will be located in a quiet, reflective garden under a large tree with two benches along with discrete landscaping elements. The plaque will read:

"With recognition and gratitude to the research animals and the NIH animal care and use community that have contributed to exceptional biomedical research advances. Presented by the Animal Research Advisory Committee."

All are welcome to the dedication ceremony, which is being held in conjunction with the 2016 NIH Research Festival.

Car Free Day, Sept. 22

Mark your calendar to go "car free" or car "lite" on Thursday, Sept. 22. Car Free Day is a worldwide event that encourages greener methods of travel by mass transit, bicycling and walking to work. Carpooling and telework also count.

The Division of Amenities and Transportation Services challenges you to find alternative commuting options and pledge to go car free on Sept. 22. Talk to your coworkers about starting a carpool or vanpool. Try Metro. The Metro SafeTrack project will affect just a small area on the Orange Line in Virginia between Vienna and West Falls Church during September. The rest of the Metrorail system will be running at 100 percent with new and improved track work. This is a perfect time to explore your commuting options.

For more commuter information and options, visit www.ors.od.nih.gov/pes/dats/commuterinfo/Pages/default.aspx. For any questions or concerns, email nihparkingoffice@ors.od.nih.gov or call (301) 496-5050.

Protocol Navigation Lecture Set

The IRP Protocol Navigation Training Program Seminar Series returns on Monday, Sept. 19 from 11 a.m. to noon in Lipsett Amphitheater, Bldg. 10. The program provides training for intramural staff and contractors involved in protocol development, writing, coordination and management. Heather Bridge and Peg Sanders from the NIH Office of Human Subjects Research Protections will present "AAHRPP Re-Accreditation and New Updates to the NIH HRPP SOPs." For details contact Marcia Vital, (301) 451-9437, vitalm@mail.nih.gov.

This scene from Research Festival 2015 will be re-created Sept. 14-16, when the 30th showcase of the NIH intramural program takes place.

Annual NIH Research Festival Scheduled, Sept. 14–16

The 2016 NIH Research Festival: A Celebration of Intramural Science will be held Sept. 14–16 in and around the Clinical Center. Now in its 30th year, the annual showcase of NIH intramural research includes loads of talks, poster presentations and activities—both real and of the virtual type.

This year, NIH director Dr. Francis Collins will be a scientific speaker, presenting his work on diabetes during the opening plenary "Super enhancers in cell identity and disease" on Wednesday, Sept. 14. Come hear Collins speak about his own breakthrough research. Plenary sessions begin each day at 10 a.m. These also include "New insights through clinical imaging" on Sept. 15 and "Cell-based immune therapies" on Sept. 16.

Festival afternoons hold concurrent symposia, poster sessions and exhibits. Symposia are intended to draw a broad audience and include topics such as bench-to-bedside "home runs," microbiota, inflammation and chronic disease, precision medicine, computational biology and the long-term effects of early developmental exposure.

Poster sessions cover the diversity of NIH research and include the ever-popular IC director and scientific director poster presentations and cooking contest.

The NIH Library will host virtual reality and other technology demonstrations. Ever feel like you've been grabbing at nothing your entire life? Well, why not don a pair of virtual reality goggles so you can grab at nothing yet really feel like you are accomplishing something.

Also new this year to the festival, the National Library of Medicine will host morning tours of its collections. Come see rare, centuries-old medical books, a Nobel Prize medal and more.

Festival staples are back, too: the R&W "Taste of Bethesda" lunch, the vendor tent show, the NIH Green Labs Fair and exhibits on intramural resources.

Also featured for a second year is the NIH Future Research Leaders Conference sponsored by the chief officer for scientific workforce diversity. The conference provides early stage investigators from the extramural community and from diverse backgrounds with an opportunity to learn about the intramural research program and meet NIH PIs and scientific leadership.

Find the full festival agenda at http://researchfestival.nih.gov, easily navigable on mobile devices.

Register for the 33rd NIH Institute Relay

The 33rd NIH Institute Challenge Relay will be held on Thursday, Sept. 22 in front of Bldg. 1, beginning at 11:30 a.m. The relay consists of teams of five runners, each whom runs a half-mile loop around Bldg. 1. All institutes, centers, divisions and contractors are invited to enter as many teams as they wish. Each team must have men and women runners with at least two runners of the same sex.

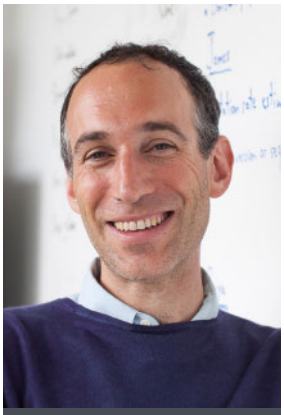
To register, visit https://www.fedesp.com/nih/events/the-nih-institute-relay-2016/. The fee is $15 per team. Each group leader is asked to provide the name and contact information for one volunteer; there need to be 26 volunteers for each of two heats. Be sure to visit food vendors and event exhibitors as well. To volunteer or for more information, call the R&W office at (301) 496-6061.

Director's Lectures Feature Ancient DNA, Immunotherapy

The 2016-2017 Wednesday Afternoon Lecture Series returns with 35 planned talks, scheduled for Wednesdays from 3 to 4 p.m., in Masur Auditorium, Bldg. 10.

The new WALS season gets off to a rousing start with geneticist Dr. David Reich, who will discuss how ancient DNA holds clues to the health of humans today. He will be followed by T-cell pioneer Dr. Carl June, who will talk about the evolution of immunotherapy treatments.

On Sept. 21, Reich, a professor of genetics at Harvard Medical School and an investigator at the Howard Hughes Medical Institute, will deliver the NIH Director's Lecture (first of four) on "Ancient DNA and the New Science of the Human Past." His research focuses on the impact of human evolutionary history on biology and disease and how complex genetic patterns may cause susceptibility to common diseases among different populations. Beginning in 2010, it became practical to sequence whole genomes from DNA extracted from ancient human bones and to analyze the data to understand changes in biology over time. Reich's talk will describe



Dr. David Reich

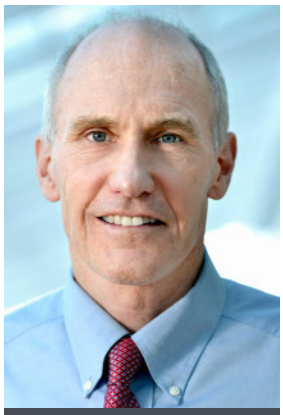
• • •

Thirty-five-talk season debuts Sept. 21

• • •

the avalanche of new discoveries that have resulted from the technology. The historical perspective that he brings to genetic data has led to a number of new insights about human biology and disease.

On Sept. 28, June, a professor in immunotherapy at the Perelman School of Medicine at the University of Pennsylvania, will deliver the NIH Director's Lecture (second of four) on "Engineering T Cells: Moving Beyond Leukemia." He is credited with developing the first successful immunotherapy treatment for leukemia using gene-transfer therapy. His laboratory is investigating mechanisms of lymphocyte activation, developing and testing novel forms of immunotherapy for cancer and chronic infections and studying the potential use of adoptive immunotherapy for cancer and HIV infection. Several clinical trials involving adoptive immunotherapy of autologous T cells, allogeneic T cells and genetically engineered T cells are in progress.



Dr. Carl June

For a complete WALS schedule, go to https://oir.nih.gov/wals. For more information and reasonable accommodation, contact Jacqueline Roberts, (301) 594-6747. R

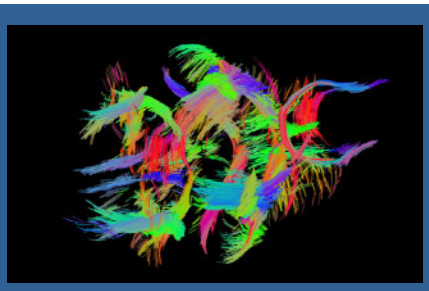
Drs. Ronald Hickman and Joan Austin appear in a new NINR video on grantsmanship.

NINR Launches Grantsmanship Videos

NINR has released a new series of videos titled "Building and Sustaining a Scholarly Career." The videos provide an overview of opportunities and dilemmas often encountered by midcareer scientists as they work to develop a sponsored project into a program of research (POR). Senior and midcareer scientists and NINR program officers discuss significant guideposts, useful strategies and lessons learned.

The videos delve into establishing and sustaining a successful POR, delineating useful strategies to develop a career trajectory and maintain a POR in a demanding academic environment and identifying approaches to challenges that deter POR success.

As part of the commemoration of NINR's 30th anniversary year, senior nurse scientists and NINR staff held a series of workshops for midcareer scientists at each of the regional Nursing Research Society annual conferences. The "Building and Sustaining a Scholarly Career" videos distill the main points of these sessions and are available at https://www.ninr.nih.gov/training/midcareervideos.



ON THE COVER: *Tracts of white matter in a mouse brain aqcuired with diffusion tensor imaging. The colors represent different fiber directions.*

IMAGE: SUSAN SCHWERIN, M. BUDDE, M. SHINDELL, J. MUNASINGHE, S. JULIANO & L.G. COHEN, ALL OF NINDS

The NIH Record

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NIH National Institutes of Health
Turning Discovery Into Health

Communication

CONTINUED FROM PAGE 1

adherence with medications and, ultimately, better health outcomes where adherence to treatment matters," Pérez-Stable said.

In the late 1990s, he said, then-Oregon Health Science University faculty member Dr. Wendy Levinson studied whether there was a link between the communication skills of doctors and malpractice claims. She discovered that doctors who never had a malpractice claim filed against them asked for patients' opinions, explained what was going to happen during the appointment, asked for feedback, used more humor and conducted longer visits.

He said the ability to communicate effectively is not a gift, but a skill that can be acquired and improved through hard work. Poor communication between patients and doctors is one factor driving health disparities in the United States.

When a patient first visits, the doctor should ask questions about racial and ethnic background, income level, formal years of education, occupation, parents' level of education and occupation, residence and preferred language (if not native English speaker). The answers to these questions will give the doctor an idea whether patients are from a population that has higher rates of disease and how best to communicate with them.

"Most of the time, we don't obtain anything close to reasonable information in our health care systems on these metrics," he said. "It's not just a matter of knowing for research purposes. It's a matter of knowing for quality of health care."

Twenty-two percent of Americans read at a 4th grade level, while the average American reads at 8th grade level, Pérez-Stable noted. Those who have difficulty reading have a harder time understanding what a doctor says. They might not be able, for example, to follow dosing instructions on medication labels.

Most patients who can't read go out of their way to hide that fact, he said. Some, for instance, will ask someone else to read a page because they "forgot their glasses."

To determine whether patients are functionally literate, Pérez-Stable recommends asking questions such as, "Do you have problems learning about your medical condition because of difficulty understanding written information?" or "How often do you have someone help you read hospital materials?"

★ ★ ★

"Most of the time, we don't obtain anything close to reasonable information in our health care systems on these metrics."

-DR. ELISEO PÉREZ-STABLE

★ ★ ★

When he worked at the University of California, San Francisco, School of Medicine as a general internist, Pérez-Stable asked patients to fill out a form with their medical history before their visit. Some wouldn't fill out the form completely or even at all.

"Right there is your first sign that there is an issue with literacy," he said.

When working with patients who have trouble reading, Pérez-Stable advises doctors to think about how they would explain a concept to someone without a medical degree. He also warns against interrupting when patients are talking and suggests avoiding jargon because "people will tune out if they do not understand the medical jargon."

Communication is more than talking to patients. Doctors should be aware of non-verbal communication such as making eye contact or placing a hand on a patient's shoulder.

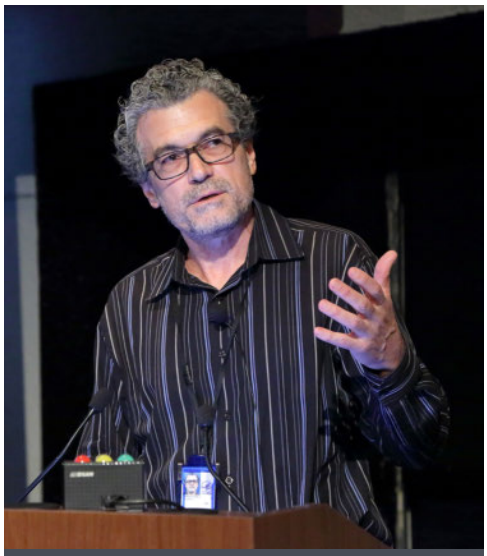
"There are a lot of other traditions, customs and issues around spirituality that matter a lot in dealing with patients from different cultures," Pérez-Stable said.

In Latin America, he said, a kiss on the cheek is an acceptable greeting in some cases. In other places, however, patients don't like the intrusion on their personal space and maintain a distance or do not look one in the eye.

In patient-centered care, the gold standard is shared decision-making. He cautioned, however, that it can "be taken to the extreme." As an example, he said, most people have difficulty interpreting the risk

Pérez-Stable (l) takes questions from the audience with Dr. Robert Lembo, executive director of graduate medical education for the Clinical Center.

PHOTOS: ERNIE BRANSON



Pérez-Stable urges physicians to let patients speak without interruption and to avoid technical jargon.

of getting a disease. Doctors cannot assume patients make the best decision.

If, for instance, a person has a 10 percent chance of having a heart attack in the next 10 years, clinical guidelines say patients should take statins to lower their cholesterol. However, some people will think they have a 90 percent chance of not having a heart attack, so they don't see the rationale for taking statins. In clinical situations like this, a strong clinician recommendation may be a better approach than a "shared-decision" model of care.

Speaking the same language as a patient is also important because doctors make fewer mistakes when they do. In the event it isn't possible for a doctor to speak the same language as a patient, professional interpreter services delivered in person, through video conferencing or telephone are strongly recommended alternatives.

Some hospitals, including where Pérez-Stable used to work in California, offer small financial compensation to physicians who know a second language well enough to use with patients. "That's not what motivates people, but at least it's some recognition," he noted.

Pérez-Stable concluded by reminding doctors to let patients speak without interruption and to be concrete and specific when making a recommendation to a patient and avoid technical language.

'GOVCON'

NIH Library Hosts Drupal Conference

The NIH Library recently organized and hosted the annual Drupal GovCon conference, one of the biggest Drupal conferences on the East Coast. Drupal is an open-source web content management system. NIH uses it as the back end of its home page.

Held at Natcher Conference Center July 20-22, the event drew nearly a thousand people from all over the world and at every level of government.

The conference featured more than 70 sessions. There were daily keynote speakers, including a presentation by NIH web developers Richard Barnes and Flora Qian about the NIH.gov web site's migration to Drupal. The 3 days also included free training, mentoring and networking opportunities, a coder lounge and an exhibit hall.

The NIH Library, located in Bldg. 10, champions new technologies that can improve how NIH operates. Drupal use and support is just one example of a technology that the library's Custom Information Solutions (CIS) Service encourages for adoption. Highly scalable and flexible, Drupal is available for anyone to download, use and share with others.

The CIS Service uses Drupal to build targeted web sites for the NIH community. These include tools to help grant managers assess research portfolios and virtual spaces that support scientific collaboration around specific diseases and conditions. Many institutes and centers also use Drupal for web site development.

The NIH Library hosts Drupal training classes and quarterly user group meetings, manages and hosts a Drupal community site and helps organize the annual GovCon event.

Drupal GovCon continues to grow, from 330 attendees in 2012 to almost a thousand in 2016. It illustrates the interest in and importance of open source platforms as low-cost solutions for digital government.

To view keynote talks from Drupal GovCon, visit http://videocast.nih.gov.—**Bridget Burns, MaShana Davis**

NIH Library Branch Chief James King (top) introduces the day 2 keynote presentation featuring Flora Qian (middle) and Richard Barnes (bottom). They talked about the NIH.gov web site migration to Drupal.

PHOTOS: SUSANNE COATES

Dishman

CONTINUED FROM PAGE 1

Five years ago, Dishman, now 48, was in full kidney failure and facing a life of dialysis with limited chemo options for his spreading cancer; a scar on his right wrist testifies to the arteriovenous fistula physicians had prepared for accessing his bloodstream. But thanks to a whole genome sequence, the donation of a kidney from a coworker at his former employer, Intel, and tailored treatments to eradicate his cancer, he is a kind of poster child for President Obama's vision of precision medicine.

Getting his face on that poster involved following his nose; Dishman can trace the last 25 years of his career to a single decision to buy a book, *Computers as Theatre*, by Brenda Laurel.

"A moment of curiosity about a book in the architecture section of a campus bookstore put me on the path to NIH," he said. "What a dream come true, to be swimming in a pool of health and medical excellence."

The intellectual stimulation of being on campus for his first few weeks was "almost overwhelming," he said. "I am certainly honored, and humbled and proud to be here. I feel like a kid in a candy factory."

Dishman was an undergraduate at the University of North Carolina when he was diagnosed, at age 19, with rare kidney cancer. While training for a marathon, he had experienced fainting spells, which led him to seek a doctor. He graduated in 1991 with a triple major—English, drama and speech communication.

"While starting out pre-med, I was going to be a Dickens scholar as I embraced my passion for the humanities," he said.

With his wife Ashley, whom he met in Chapel Hill, Dishman went from UNC to Southern Illinois University to pursue a master's in speech communication. Later, they both enrolled at the University of Texas to pursue doctorates.

While in Austin, a fateful event took place.

"By my nature, I like to learn from lots of other disciplines," Dishman says. He would browse the campus bookstore, looking for interesting titles. "It's fun, seeing other classes' books—I chose my classes that way."

While rooting around in the holdings of the architecture department, he found Laurel's book and bought it. "I probably stole some other kid's book," he chuckles.

"Laurel was the first female game designer at Atari," Dishman noted. "Computers and theater joined my two passions. I stayed up all night reading it."

The next day, while walking to class, he saw a poster advertising a talk on campus. The speaker? Brenda Laurel.

"I actually skipped my first class with my dissertation advisor to attend this talk, on virtual reality," he recalls. He approached Laurel after the talk and the two immediately hit it off.

That afternoon, he ran into the advisor, who asked why he had missed her class. She told him that a friend from Silicon Valley was interviewing social scientists for a summer internship at 4 p.m. in the student union and asked if he wanted to apply.

He did. And the interviewer was Brenda Laurel, who hired him on the spot for a 3-month internship in California. "That was how my career in Silicon Valley started," said Dishman.

"I was under intense chemo at the time," he recalls. "The Texas heat was too much for me, so I took the summer internship while also transferring to the University of Utah, in speech communication."

• • •

"A moment of curiosity about a book in the architecture section of a campus bookstore put me on the path to NIH."

-ERIC DISHMAN

• • •

"By my nature, I like to learn from lots of other disciplines," says Dishman.

PHOTOS: RICH MCMANUS

From Passionate Living to Precision Medicine

Even if he hadn't been cheating death for the past 29 years, it seems likely that Eric Dishman's appetite for life would have been oversize.

The Charlotte, N.C., native began life with an advantage: a photographic memory. It was in third grade that he realized "my memory was really different."

"But 23 years of lotsa, lotsa chemo" have left him with "chemobrain. Not only do I not have a photographic memory any more, but I am horrible with names now," he said. "My neurologist told me that the fact that my brain works at all is a miracle, in and of itself, and that I shouldn't be worried about anything."

But before that loss, Dishman's acute memory was a boon to his creative life. While a UNC undergrad, he indulged passions for singing, acting and playing the piano in numerous bands. He played the Shakespearean roles one minute and the role of a British pop star in a TV soap opera send-up called *General College* the next. In such productions, he knew not only his own lines, but also those of the entire cast.

When he sat for his Ph.D. orals at Utah, Dishman had nearly an unfair advantage—in composing his answers, he could literally see the reference pages in his mind and quote them verbatim.

At about the time he realized he had a different kind of memory, Dishman began the habit of daily journaling. It is a discipline he has maintained over the decades, through the cancer and transplant experiences, all the way to PMI.

"I've written many unpublished novels and short stories," he said. "I go where the creative juices go." He is currently writing two books on the topic of innovation in American health care, but insists,

For the next 3 years, Dishman commuted from Salt Lake City to Santa Clara, Calif., teaching and taking classes for half the week, and interning for Microsoft billionaire Paul Allen's think tank Interval for the other half.

"That was a crazy 3 years," Dishman says. "I was getting cancer treatment in both places. All the flight attendants knew me."

What began as a 3-month internship became an 8-year research and innovation adventure with Interval, developing new products and technology for health care and other areas. The company waited for him to complete his Ph.D. at Utah.

So Dishman never finished the degree—he is ABD (all but dissertation) because his job let him do more research than did his schooling.

He began taking advantage of how emerging technologies made it possible for more Americans to age in place and developed a nationwide reputation in the field. Prior to joining NIH this summer, Dishman had spent the past 17 years leading research labs and eventually running the global business as vice president of health & life sciences at Intel.

"I love hanging out with nurses and I love hanging out with geriatricians and people who focus on patient care," he said. "I already sneaked over to talk to [NIA director] Dr. [Richard] Hodes, who is the only institute director I really knew beforehand."

Dishman became the "aging-in-place guy," which is how program people at NIH first knew of him. "People used to call me 'the Elvis of Aging' in those days, an embarrassing but funny title—it has stuck with me. Now maybe I'm the Elvis of the PMI Cohort Program?"

And now that Elvis is in the building, PMI-CP is taking off toward its goal of enrolling more than 1 million participants over 3-4 years who will exhibit "quadruple diversity—of people, geography, health conditions and data types." Of the latter category, Dishman says, "New technologies and data types will emerge over time that we can't even imagine yet."

NIH recently awarded $70 million to establish the program infrastructure. In addition, NIH has enlisted communications firms with expertise in reaching diverse communities to support participant engagement efforts.

"All forms of media will be part of a targeted, national marketing campaign," Dishman said. This includes TV, newspapers, the web, doctors' and nurses' offices, the health provider organizations that have signed on to PMI so far, and even a mobile van that will reach distant outposts. "There will be multiple threads of engagement, both nationally and locally."

Dishman said his recent preview of a video unveiling PMI's "mark-itechture"—naming, branding and messaging—"made me weep and jump up and down, at the same time."

The cohort start-up team, hired earlier this summer, recently held a 3-day kickoff workshop, solidified its governance model and created 11 working groups, "from privacy and security to protocol development. There are lots of swim lanes of work, all happening at the same time...NIH had given us a good head start. It's not like we're starting from scratch."

Dishman was recruited to NIH by Dr. Kathy Hudson, NIH deputy director for science, outreach and policy. "I first really got to know and work with Eric on the ACD PMI working group and he really impressed me with his creativity, smarts and good humor," she said. "He brings a wealth of experience and expertise to his new post including his social science research background, his experience at Intel and his perspective as a patient. As an architect of this program, I am over the moon to have Eric firmly at the helm."

Much of the momentum for PMI starts with the President and HHS Secretary Burwell, Dishman noted. "The president basically told us, 'What do you need from me?' I'm not from government, but I understand that that's not always the case."

At Dishman's most recent checkup, his physician reported that he is still cancer-free, with perfect function in his one new kidney, "so go forth and conquer."

Perhaps more catalyzing than Obama's support has been Dishman's own experience.

"This Hail Mary pass, this miracle of the Human Genome Project completely changed everything about my treatment and life expectancy," he said. "The PMI Cohort Program is about making that kind of capability a normal part of care for people, not a Hail Mary pass or a miracle. I want to turn what was a lucky break for me into the normal course of health care for everybody else, and it will take accelerating science on top of the 1 million or more volunteers to get us there."

He continued, "We're building a data and science platform that ultimately thousands and thousands of studies can be built on top of and accelerate breakthroughs so that everyone has precision health. That's the goal. It's a big tent, and pretty soon there are going to be a whole lot more people under it. No one on the planet has done [something of this scale] before."

And no one on the planet may be better suited to the job.

"There is some future in which artist Eric will be back and those novels will see the light of day."

Dishman's other passions include snow sports and gardening. An avid snowboarder, back-country skier and sledder, he says he was born with a love of snow. "I want Francis [Collins, NIH director, who hired Dishman] to tell me if I have a gene for it," he jokes.

He enjoys nothing more than hiking 3,000 or 4,000 feet up, then sledding back down. "It's the most fun thing adults can possibly do."

For the past 8 years, before Dishman and his wife Ashley, a communications scholar and social scientist, came east, they lived on a 5-acre farm outside Portland, Ore. "We grew apples, pears, grapes, cherries and plums," he said. "We had a massive vegetable garden where we had recently reduced our inventory to 60 varieties of tomatoes and 35 varieties of peppers," most of which was donated to a local food bank.

"Both of us are really focused on reducing hunger," he said.

While waiting for Ashley to join him at their new home in Kensington, Dishman set out to learn guitar. "But I don't think I'm going to be good enough to join Francis's band," he said.

Nonetheless, rock guitar plays a part in his biography: Paul Allen, for whom Dishman worked as an intern, is the patron of the Jimi Hendrix Experience Museum in Seattle. He had Dishman's team consult on some aspects of the exhibit.

As Dishman brings his considerable energy to the burgeoning PMI cohort effort, there is only one topic that elicits a different sort of PMI—precision misery index. Do not mention the last-second Tar Heel national championship basketball loss last April. Some memories resist even chemobrain.

Cloud

CONTINUED FROM PAGE 1

"mundane uses, internal applications" like the institute's web site. Its move to the cloud was virtually seamless.

"When we relocated the web site, we called it the biggest change you didn't see," Thomson recalled. "It was completely transparent to outside users."

One use of the cloud seemed to give rise to the next and the next. Thomson immediately calls to mind two successes in scientific research. "Once developers of an image reconstruction software called the 'Gadgetron' began tapping the cloud's power [see sidebar below] it became clear that there was real potential for new science using the cloud," he pointed out.

Another application—involving big data—recently finished a pilot testing the cloud against traditional onsite computing [see sidebar p. 9].

Thanks to the success of the Gadgetron and other research, when approached with requests for more IT resources, Thomson now routinely steers investigators toward trying the cloud to meet scientific needs.

There When You Need It

Thomson and his colleagues also found the cloud to be a good alternative storage space for infrequently used data.

Once an investigator concludes a research study, he explained, and the data from the study is published, that PI most likely moves on to the next project and may not revisit the original data for months, years or ever. Still, the now-dormant data has to be properly stored for any potential reference, taking up valuable and expensive server capacity.

"We found that 80 percent of some of our data had not been accessed in 2 years," Thomson said. "So, we will put it on the cloud, at half the cost of storage space in-house. Savings like that, it's important to us."

Dr. Michael Hansen says cloud computing has benefitted his research.

PHOTOS: CARLA GARNETT

Software Forecast Bright with the Cloud

A few years ago, Dr. Michael Hansen and his NHLBI research group developed a new magnetic resonance imaging (MRI) framework called the Gadgetron. The MRI software takes an image's raw signal data and quickly reconstructs them so clinicians can review images and diagnose disease.

MRI is a relatively slow and motion-sensitive technique. Patients have to hold their breath, for example, and there's a lot of waiting involved, to see whether the clinician got the image clearly or has to repeat the procedure.

The Gadgetron software, however, can be used to shorten the wait time considerably and patients—oftentimes children—no longer have to hold their breath during the MRI scan.

Researchers at NIH, Children's National Medical Center in Washington, D.C., and around the world routinely use Hansen's software framework, which is available as open source software, capable of running on a wide variety of platforms.

Putting the Gadgetron to work, however, consumes a lot of IT resources, including up to 50 high-powered computers, Hansen said. The on-demand power offered through remote computing is what attracts the users of the framework.

"From a research perspective, where regular [usage rates] may change, the agility of the cloud is really valuable," said Hansen, chief of the institute's Laboratory of Imaging Technology and leader of a 5-person team of software engineers.

He recalled two "Aha!" moments in considering the cloud: One, when his team realized the extreme amounts of computational power they would need to run the Gadgetron, and two, when he figured the feasibility, cost and time of assembling his own data center on campus.

"The ability to change directions quickly has real scientific value," noted Hansen, who latched onto the cloud idea early.

"The strength of the cloud is not in our ability to transfer lots of data there," he explained, "it is the amount of computing power available. In the case of MRI, a typical clinical scan may be just a few gigabytes, but the processing time is long and that is where cloud computing is useful."

Applications like the Gadgetron could potentially be deployed in a more traditional cluster-computing facility, but users would have to reserve time and wait for their reconstruction jobs to complete. In a clinical environment, such a deployment strategy is not feasible.

"The bottom line is this," said Hansen, "when you have the patient on the scanner you cannot wait for a batch job to complete. You need dedicated resources to process the data as the scan is taking place. That is costly since you would need a large amount of computing power per scanner. A cloud deployment allows us to both scale flexibly when there is demand—pay for what we need—and share resources easily with multiple scanners/sites."

In the context of the total length of a patient study, he explained, the costs associated with clinical staff, nurses and anesthesiologists become an important part of the equation.

"Say a given scan sequence based on breath-holding takes 10 minutes," Hansen points out. "With free-breathing scanning and Gadgetron reconstruction, we might be able to turn that into a 5-minute sequence. The cloud computing cost is say $10 per hour while we do the scanning, but the cost of just 5 minutes of extra scan time is much more than that. So one can make an argument that cloud computing is also cost-effective."

Combining scientific innovation with IT cost efficiency is what NHLBI CIO Alastair Thomson and his fellow CIOs want to provide for all NIH researchers.

"That's very much how I see my role here," Thomson said. "I try to give the PIs the tools and environment they need and get out of their way."

Satisfied that Gadgetron users won't realize the work is being done on the cloud, Hansen's group now is fine-tuning the application and looking toward expanding availability.

"We hope to scale up and support the project to a stage where vendors pick it up," he said.

Soon some of NHLBI's in-house applications such as the Tracking system for Requests And Correspondence or TRAC, currently running in the institute's data center, will head to the cloud so they benefit from the high reliability and ability to support NHLBI's continuity of operations plan.

Safety First

That's not to say computing via off-site contractor happened for Thomson overnight without worry. Concern for security of IT data, for example, was a big consideration. "That's one reason I was hesitant to drive too fast too early," he said.

However, FedRAMP, the Federal Risk and Authorization Management Program, relieved much of the worry. The government-wide program run by GSA keeps a list of about two dozen cloud providers that have all been vetted and deemed safe-for-use by federal agencies. Big name IT companies such as Amazon, Google and Microsoft all have cloud vendor products on FedRAMP's list and therefore are well-equipped to tackle potential headaches—power outages or hack attempts, for example—that come with maintaining a large computing facility.

FedRAMP is not the whole story though and NHLBI's IT security team works to conduct its own assessment and authorization process to ensure that the cloud meets NIH requirements.

"What we learned is, with the phenomenal amount of money cloud providers spend," Thomson said, "there's no way NIH could afford the same level of security they already have in place."

Coming up next for Thomson and other agency CIOs is a presentation of their initial experiences with cloud computing that they will share during the NIH Research Festival.

Also on the horizon are more collaborations among ICs and additional pilots with other intramural researchers on such big data topics as genomics, connecting datasets from large populations and sharing such resources with scientists around the world.

"Everyone is moving this way at some speed," Thomson said. "Everyone is at least considering it."

Dr. Maria Mills says the cloud offers resources dedicated solely to her computationally expensive research.

Confessions of a Heavy User

Dr. Maria Mills, a postdoc in NHLBI's Laboratory of Single Molecule Biophysics, and her colleagues in senior investigator Dr. Keir Neuman's group, are looking at how a protein interacts with a small molecule.

"We wanted to see whether this molecule changes the structure and dynamics of the protein," she explained. "We do an atomistic complex simulation where every part of the protein and every part of the molecule—the physical equation of them—are all explicitly calculated...It's very computationally expensive. It's a massive amount of information that's being calculated very quickly over and over again."

Earlier this year, CIO Alastair Thomson, one of the folks who manages IT resources at NHLBI, approached Mills with an idea for a 2-month pilot project using Biowulf, a 20,000+ processor Linux cluster in NIH's high-performance computing facility.

"They asked me to conduct a head-to-head comparison of my computational work on Biowulf and on the cloud to see if there were any advantages in using the cloud," she said. "In terms of computational time, the performance was similar, but the cloud did save me time."

With the cloud, she said, "you design a computer system that you want at the time and it's immediately available to you. With Biowulf, we have a huge group of people sharing processors on a certain architecture and you have to wait until the processors that you need are free. Some days it's quick. Some days you might be waiting a day or 2 days before your job's run. You just have to wait it out. And since I tend to use a lot of processors for what I do—256 to 512 processors—sometimes I wait quite a while. And honestly, I sometimes feel like I'm hogging [the processors] a bit, because my jobs can take 60 hours."

The work Mills is doing is considered basic research without a direct translational application. However, the specific protein system she's analyzing is "involved in repairing problems that happen when DNA becomes too tangled, leading in humans to severe genetic defects, premature aging and susceptibility to cancer," she said. "We're not specifically looking for cures or treatment. We're just trying to understand the system and maybe down the line people can use the information to help people who have these disorders."

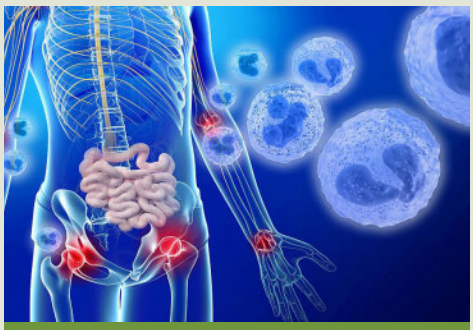
The lab uses what's called a "magnetic tweezers manipulation technique," Mills said. "We take a small piece of DNA, attach a magnetic bead to it and we can use the tweezers to manipulate the DNA. The proteins [we're studying] reorganize DNA, unfold it, cut it and wrap it around itself. We can use these tweezers to measure what's happening to DNA in the presence of these proteins. We can't really see what's actually happening to the proteins. That's where the simulation comes in. It gives us a way to visualize the protein molecules since we can't watch that directly.

"The magnetic tweezers experiments we've done indicate that the molecule we are looking at in the simulations stimulates the protein's activity," she said. "Hence our desire to understand how it affects the protein dynamics."

Mills' part of the process makes her a heavy processor user, which in turn made her an ideal candidate for testing a third-party IT provider. For the pilot, she worked closely with cloud provider technicians to design the best computer structure and write scripts to make things move faster.

"At first it took some optimizing, but that was just sort of the learning curve," she concluded. "The cloud was really nice, because it was resources temporarily dedicated to me, so I didn't have to worry about waiting for them and I didn't have to worry about other people not having access to resources they needed. It was a virtual computer cluster that I built and I'm using, and when I'm done with it I just shut it off."

Mills hopes to publish results from her pilot soon.



The just-discovered otulipenia is a rare and sometimes lethal inflammatory disease that causes fever, skin rashes, diarrhea and joint pain in young children.

IMAGE: NHGRI

Researchers Discover New Inflammatory Disease

NIH researchers have discovered a rare and sometimes lethal inflammatory disease—otulipenia—that primarily affects young children. Scientists have also identified anti-inflammatory treatments that ease some of the patients' symptoms: fever, skin rashes, diarrhea, joint pain and overall failure to grow or thrive.

Otulipenia is caused by the malfunction of OTULIN, a single gene on chromosome 5. When functioning properly, OTULIN regulates the development of new blood vessels and mobilization of cells and proteins to fight infection. Researchers published their findings Aug. 22 in the early edition of the *Proceedings of the National Academy of Sciences.*

Contributing to the work were researchers from NHGRI, NIAID, NIAMS, NHLBI and the Clinical Center, along with colleagues in Turkey and the United Kingdom.

"The results have been amazing and life-changing for these children and their families," said study co-author Dr. Daniel Kastner, NHGRI scientific director and head of NHGRI's inflammatory disease section. "We have achieved the important goal of helping these young patients and made progress in understanding the biological pathways and proteins that are important for the regulation of the immune system's responses."

Cells use biological pathways to send and receive chemical cues in reaction to injury, infection or stress.

Otulipenia is one of several inflammatory diseases that occur when the immune system attacks the host's own tissues. Inflammation is the body's natural response to invading bacteria or viruses. The body releases chemicals that cause blood vessels to leak and tissues to swell in order to isolate a foreign substance from further contact with the body's tissues. Inflammatory diseases affecting the whole body are caused by mutations in genes like OTULIN that are part of a person's innate immunity (the cells and proteins present at birth that fight infections).

Stem Cell Therapy Heals Injured Mouse Brain

Scientists and clinicians have long dreamed of helping the injured brain repair itself by creating new neurons; an innovative NIH-funded study published Aug. 22 in *Nature Medicine* may bring this goal much closer to reality. A team of researchers has developed a therapeutic technique that dramatically increases the production of nerve cells in mice with stroke-induced brain damage.

The therapy relies on the combination of two methods that show promise as treatments for stroke-induced neurological injury. The first consists of surgically grafting human neural stem cells into the damaged area, where they mature into neurons and other brain cells. The second involves administering a compound called 3K3A-APC, which the scientists have shown helps neural stem cells grown in a Petri dish develop into neurons. However, it was unclear what effect the molecule, derived from a human protein called activated protein-C (APC), would have in live animals.

A month after their strokes, mice that had received both the stem cells and 3K3A-APC performed significantly better on tests of motor and sensory functions compared to mice that received neither or only one of the treatments. In addition, many more of the stem cells survived and matured into neurons in the mice given 3K3A-APC.

"This animal study could pave the way for a potential breakthrough in how we treat people who have experienced a stroke," added Dr. Jim Koenig, a program director at NINDS, which funded the research. "If the therapy works in humans, it could markedly accelerate the recovery of these patients."

Oxygen Can Impair Cancer Immunotherapy in Mice

Researchers have identified a mechanism in mice by which anti-cancer immune responses are inhibited within the lungs, a common site of metastasis for many cancers. This mechanism involves oxygen inhibition of the anti-cancer activity of T cells. Inhibiting the oxygen-sensing capability of immune cells, either genetically or pharmacologically, prevented lung metastasis. This research was conducted by Dr. Nicholas Restifo of NCI and colleagues at both NCI and NIAID. The findings appeared Aug. 25 in the journal *Cell*.

Metastasis is the cause of most cancer deaths. It has long been hypothesized that the process of cancer metastasis requires cooperation between spreading cancer cells and the cellular environment to which they spread. A key component of that environment is the local immune system, which can act to fight off invading cancer cells.

The researchers discovered that T cells, a type of immune cell, contain a group of oxygen-sensing proteins that act to limit inflammation within the lungs. This new research shows, however, that oxygen also suppresses the anti-cancer activity of T cells, thereby permitting cancer cells that have spread to the lungs to escape immune attack and establish metastatic colonies.

Researchers have shown it's possible to diagnose a bacterial infection from a small sample of blood in infants 2 months of age or younger who have fevers.

New Strategy Holds Promise for Detecting Bacterial Infections in Newborns

Researchers supported in part by NICHD have shown that it's possible to diagnose a bacterial infection from a small sample of blood—based on the immune system's response to the bacteria—in infants 2 months of age or younger who have fevers. With additional research, the new technique could be an improvement over the standard method, which requires isolating live bacteria from blood, urine or spinal fluid and growing them in a laboratory culture. The study appeared Aug. 23 in the *Journal of the American Medical Association.*

Health care providers who evaluate young infants with fevers have limited means to quickly and accurately diagnose whether or not an illness results from a bacterial infection. Determining if the illness is caused by bacteria may involve complicated medical procedures, such as a lumbar puncture (spinal tap). While they wait for the test results, physicians also may need to admit the infant for a lengthy hospital stay or prescribe antibiotics, which may later turn out to be unnecessary.

"The development of a fast and noninvasive diagnostic tool holds promise for better outcomes and lower treatment costs for young infants with fevers of unknown cause," said Dr. Valerie Maholmes of NICHD.

CSR's McDonald Retires After 30 Years

BY PAULA T. WHITACRE

Scientific review officer Dr. Daniel McDonald retired in July.

It may seem that Dr. Daniel McDonald followed a linear path from graduate work to Johns Hopkins to serving in the Center for Scientific Review as a scientific review officer, a position from which he retired in July after 30 years.

In fact, he says, "Many times, it seems like an unseen and divine force led me on my path." He has appreciated every twist and turn.

McDonald was born in the Washington, D.C., area but moved frequently because of his father's job with the National Security Agency. He attended middle school in Ottawa, Canada. He originally wanted to enter West Point, but fate led him to St. Bonaventure University, where he majored in physics and met his wife Georgia.

Shortly before graduation in 1970, unsure of the next step, he spotted a flyer about fellowships in health physics sponsored by the Atomic Energy Commission. Accepted, he went to the University of Rochester.

"The department [of radiation biology and physics] was robust," he said, explaining that graduate students took an introductory course to learn about the faculty in order to choose their own areas of focus. "I ended up in bone biology in part because I connected with the strong group of folks in that field."

He earned his master's and Ph.D. with research on bone cell metabolism.

In 1975, McDonald moved to Maryland with his wife and then 1-year-old daughter for what he thought was a postdoc position in the Johns Hopkins Orthopaedics Research Laboratory.

"What I found out was I wasn't coming for a postdoc but to replace the person who interviewed me," he said. "It was a surprise to say the least."

McDonald remained at Hopkins for a decade. In addition to receiving several NIH grants, his lab undertook contract work for NIH.

The "unseen force" that charted his life led him to NIH in 1986. Ready for a change, McDonald was about to join the National Institute on Aging when a government freeze prohibited new hires. After the freeze, the Division of Research Grants, now CSR, hired him.

McDonald managed 5 study sections, served as chief of 2 integrated review groups and orchestrated peer review for approximately 7,500-8,000 applications by involving nearly 1,500 extramural scientists. He fondly recalled the guidance provided by staff and study section chairs. "The collegiality was, and is, wonderful," he said.

McDonald, in turn, fostered that collegiality with others.

"Dan was a pillar of CSR," said Dr. Rajiv Kumar, chief of the musculoskeletal, oral and skin sciences IRG. "He provided strong leadership in planning and implementation of peer review policies. While maintaining his commitment to NIH policies, he always nurtured a cooperative environment."

McDonald lives north of Baltimore. Despite a 114-mile round-trip commute, he was active in community life. A former baseball/softball and still-active tennis player, he coached youth sports for 20 years. He sings in several parish church groups. McDonald began birding 20 years ago, initially to share a hobby with his wife. They have birded in Central and South America and Australia. In October, they will visit South Africa.

Looking back at his career, he acknowledged that despite, or because of, the surprises along the way, he enjoyed the winding path.

"This was an opportunity I never could have envisioned when I was younger," McDonald said.

NIDA's Newman Honored with Lectureship

Dr. Amy Newman of the National Institute on Drug Abuse has been selected as the 2016 recipient of the seventh Philip S. Portoghese Medicinal Chemistry Lectureship from the American Chemical Society's division of medicinal chemistry and the *Journal of Medicinal Chemistry*.

Dr. Amy Newman receives the 2016 Philip S. Portoghese Medicinal Chemistry Lectureship from Dr. Phil Portoghese.

The award is named in honor of Dr. Phil Portoghese, the long-standing editor-in-chief of the journal, and honors the contributions of an individual who has had a major impact on medicinal chemistry research. The award was presented to Newman on Aug. 23 at the 252nd national American Chemical Society meeting in Philadelphia.

Newman joined the Intramural Research Program at NIDA in 1991 and is currently deputy scientific director as well as chief of the Molecular Targets and Medications Discovery Branch and the medicinal chemistry section. Her research focuses on the design and synthesis of small molecules to study mechanisms underlying drug abuse and to identify targets for medication discovery. She has coauthored more than 240 original articles and reviews on the topic. She is also an inventor on 12 U.S. patents or patent applications. She is the first woman to receive this award.

Outdoor Film Festival Celebrates 20 Years

PHOTOS: JENNY DEUTSCH

This year was the 20th anniversary of the NIH Comcast Film Festival, an end-of-summer ritual for many NIH employees and neighbors. The festival was able to return this year to the grounds of Strathmore Hall. Over the 3 nights, attendees were treated to showings of *Jurassic World*, with 1,800 moviegoers; *Minions*, which drew a hundred or so on a rainy evening; and for the finale, 1,400 came to see *The Wizard of Oz*.

"The purpose of the event is to bring awareness to the NIH charities and to provide an opportunity for employees and community members to meet," said Randy Schools, retired president of the NIH Recreation and Welfare Association, which helps coordinate the event each year. "The festival is one of the longest continuously running film festivals in the U.S. Seeing *The Wizard of Oz* on one of the largest screens in the country was a treat and a long-time memory for a lot of those in attendance."

Also stopping by the movies this year was Roger Berliner of the Montgomery County Council, who brought greetings on behalf of the council and thanked the many volunteers who keep the event going.

ABOVE: Moviegoers enjoy waffle cones at the film festival. LEFT: Enjoying movies one night are (from l) event founder Bob Deutsch, Erin Pinkney of Comcast, Roger Berliner of the Montgomery County Council and former R&W President Randy Schools. "The purpose of the event is to bring awareness to the NIH charities and to provide an opportunity for employees and community members to meet," said Schools, a longtime festival organizer.