VOICES FROM FRONTIERS

“Patient input is the blockbuster drug going forward.”
—Margaret Anderson,
Executive Director, FasterCures

“Some of the most important things we’re doing are derived from the difficult questions that patients have asked me about their own health.”
—David Okonkwo,
Pitt Professor of Neurological Surgery

“Anybody who said we couldn’t do it wasn’t invited back.”
—Elizabeth Tyler-Kabara,
Pitt Associate Professor of Neurological Surgery
(re: the effort to restore touch with brain interfaces; see photos and story to right)

WHITE HOUSE AT OUR HOUSE

On the chilly October morning of the White House Frontiers Conference, innovators from across the country gathered at the University of Pittsburgh and Carnegie Mellon University to discuss frontiers in science and technology—from driverless cars to precision medicine to missions to Mars. For presenter Michael Boninger, the ultimate frontier is very close to home.

“The next moonshot is the brain,” he said. Boninger, professor of physical medicine and rehabilitation and a UPMC vice president, spoke on the promise of pairing artificial intelligence with assistive technology to help people with disabilities. He showed videos of the few patient volunteers who’d undergone a surgical procedure to connect to a Pitt-developed technology that uses a brain-computer interface, or BCI. (The technology is based on studies by Pitt’s Andrew Schwartz, Distinguished Professor of Neurobiology.) One video showed a young father, paralyzed from the neck down, grasping his girlfriend’s hand for the first time in years.

“This person could reach out and touch a person’s hand. But he couldn’t feel it.” That, Boninger said, became the Pitt team’s next frontier.

Recently, Pitt and University of Chicago researchers collaborated to implant BCI electrodes not only in the motor cortex, but also in the sensory cortex. Nathan Copeland, a 28-year-old with tetraplegia, became the first person ever to experience the sensation of touch using a brain-controlled prosthetic limb. The afternoon of the Frontiers Conference, in Pitt’s Alumni Hall, President Barack Obama met Copeland. The president would later recall their meeting in his plenary remarks: “We shook hands. He had a strong grip, but he had kind of toned it down. Then we gave each other a fist bump.

“That’s what science does. That’s what American innovation can do ... that’s what this Frontiers Conference is all about—pushing the bounds of what is possible.” —Elaine Vitone

Obama fist-bumps Copeland as Pitt’s Jennifer Collinger stands by.
In summer 2005, I was a 16-year-old intern for Congresswoman Barbara Lee, trying to find my way around the Capitol. In my rush to get on an elevator, I almost knocked over the person inside. I looked up to apologize and recognized then-Senator Barack Obama, whose iconic speech at the Democratic National Convention had made him my ultimate role model,” said Alexis Chidi, Pitt-Carnegie Mellon MD/PhD student, as she introduced the president of the United States to White House Frontiers Conference attendees in Pittsburgh this October. Since that first encounter with Obama, Chidi has finished her PhD as part of the Pitt Medical Scientist Training Program. She will graduate with her MD in 2017.

Obama noted that Chidi neglected to mention that “she started on her premed degree when she was 16.” He then added, for the faculty members present, “I hope you already have tenure, because Alexis is coming!”

The president joked that his conference hosts are both with the “Obama alumni mafia”: Carnegie Mellon’s President Subra Suresh served as director of the National Science Foundation under Obama, and Pitt’s Chancellor Patrick Gallagher directed the National Institute of Standards and Technology (and now serves on a commission exploring issues of cybersecurity for Obama’s administration). What follows are select remarks from the president during a Pittsburgh panel on brain science and medical information, which was moderated by Atul Gawande, a Harvard public health researcher, Brigham and Women’s Hospital surgeon, and New Yorker staff writer.

On his precision medicine initiative
Part of our goal here is to shift from what is really a disease care system to an actual health care system.

“We're being very intentional about making sure that we are reaching out to communities that sometimes are forgotten, whether it's African American communities or women, so that we can really pinpoint what works for whom.

On making innovation possible in the health care system
Even as we're doing all this cool stuff to come up with greater cures, what we're also having to do is try to figure out what are the incentives, the perverse incentives, that are set up in the health care system that prevent [information] from reaching a patient earlier.

On privacy and cybersecurity
The opportunities to hack your information will be just as great or greater in a poorly integrated,
Lasting Effects

Studies have linked alcohol, cannabis, and other drugs to changes in the maturing mind’s structure and function. But to draw concrete conclusions about how and whether such substances change the adolescent brain, researchers need to take a before-and-after look at a very large population. No one has undertaken such a study with this purpose in mind—that is, until now.

This year, Pitt received a $5 million grant from the National Institutes of Health to participate in a multicenter effort called the Adolescent Brain Cognitive Development (ABCD) Study, wherein 9- and 10-year-olds will be assessed to capture a baseline view of the brain before any drug use occurs. Then, over the next 10 years, investigators will observe whether lifestyle choices disrupt brain development. The study will include more than 10,000 kids nationwide, 500 of whom will come from the Pittsburgh area.

“The goal is to determine which types of substances, at what levels, during which age periods have lasting effects on brain development,” says Duncan Clark, an MD/PhD, “and to understand those effects in the context of individual vulnerabilities and resilience.”

Clark, a professor of psychiatry, is heading the Pitt team, which includes Rolf Loeber, a PhD and Distinguished Emeritus Professor of Psychiatry; Beatriz Luna, a PhD and the Staunton Professor of Psychiatry and Pediatrics; Claudiu Schirda, a PhD assistant professor of radiology; and David Lewis, an MD who holds the Thomas Detre Chair in Academic Psychiatry.

—Kristin Bundy

FLASHBACK

Around 1770, former military surgeon Nathaniel Bedford established what is believed to be the first private practice in Pittsburgh. He prospered and laid out the town of Birmingham—now the South Side (still undeveloped on the map, left)—naming the streets after his wife and her siblings: Jane, Sarah, Mary, and Sidney. In 1787, Bedford became a trustee of the Pittsburgh Academy, the original incarnation of the University of Pittsburgh. His homestead (in what is now downtown) is circled in green.
Every year, 60,000 women in the United States are diagnosed with ductal carcinoma in situ (DCIS), a type of premalignant tumor that grows in the breast ductal system—and rarely progresses to other organs. Yet, because of improved screening technologies and lengthening life spans, more women are being diagnosed with DCIS and undergoing potentially unnecessary preventive treatments.

Adrian Lee, PhD director of the Women’s Cancer Research Center, coleader of the Breast and Ovarian Cancer Program at the University of Pittsburgh Cancer Institute, and new director of the Institute for Precision Medicine (among other positions), has teamed up with Adam Feinberg, associate professor of materials science and biomedical engineering at Carnegie Mellon University; Priscilla McAuliffe, an MD/PhD assistant professor of surgery and member of Magee-Womens Research Institute; and Darryl Hadsell at Baylor College of Medicine. The team has an $800,000 Department of Defense grant to create a new model for diagnosing DCIS.

“To understand [disease progression], you need models—what we call tractable models—where you can change genes, turn genes on, turn genes off, and try to understand the biology,” Lee says.

With this 3-D model, Lee will be looking for genetic biomarkers that provide insight into how and why some cases of DCIS are harmless and some cases spread from the duct. —Ali Greenholt

Appointments

Gwendolyn Sowa, MD/PhD associate dean for medical student research and professor of physical medicine and rehabilitation, became the new chair of that department in July. Sowa also holds appointments in orthopaedic surgery and bioengineering and is the medical director of UPMC Total Care—Musculoskeletal Health.

At the Ferguson Laboratory for Orthopaedic and Spine Research, where Sowa is codirector, investigators are digging into the mechanobiology of the spine, studying stressors on intervertebral discs and the cartilage where vertebrae meet to find novel and personalized treatments for what she calls the “clinical conundrum” that is low back pain. In her new position, Sowa hopes to emphasize collaboration in order to harvest and showcase the educational, research, and clinical talent in the department.

Donald P. Taylor, a PhD (who also has an MS and an MBA), has been named assistant vice chancellor for commercial translation in the health sciences. Taylor’s additional appointments include codirector of the Center for Commercial Applications of Healthcare Data and codirector of the Clinical and Translational Science Institute’s Innovation program. He is an associate professor of both biomedical informatics and bioengineering.

In his new position, Taylor is responsible for cultivating the “enormous market potential” of Pitt's basic and clinical research to fill unmet market needs, such as technologies surrounding personalized medicine. To do this, Taylor emphasizes the importance of collaborative relationships across scientific and business disciplines, institutions, and mindsets. “You’ve probably heard of team science,” says Taylor. “We are now activating team translation.”

At its grand opening and researcher retreat this June, the Center for Medicine and the Microbiome (CMM) welcomed its codirectors, Barbara Methé, a PhD professor of medicine, and Alison Morris, an MS and MD professor of medicine, immunology, and clinical and translational science (see p. 34). Methé comes to Pitt from the J. Craig Venter Institute in Maryland, where she studied microbial and environmental genomics. “She was a member of the original human microbiome project,” notes Morris.

Professor of pediatrics Patrick McKiernan, an MD, is now director of the Pediatric Hepatology Program at Children’s Hospital of Pittsburgh of UPMC. McKiernan will also join Children’s Center for Rare Disease Therapy. While a consultant pediatrician in the liver unit at the Birmingham Children’s Hospital in England, McKiernan led a study that injected adult stem cells into children with metabolic liver disease as an alternative to liver transplantation. Although these phase 1 and 2 trials proved safe, the stem cells didn’t permanently correct the defect. “That’s work that I would like to continue here in Pittsburgh,” says McKiernan. —AG
MATCHES MADE IN PITTSBURGH

Match Day rightfully commands the med school’s attention each spring, but what about all the envelopes being opened at other schools? Who are the brand-new docs coming here?

Some impressive stats on the newest house staff:
This year, 312 new residents said “Yes!” to Pitt and UPMC, and a total of 650 trainees (residencies and fellowships) came here. Nationwide, more than 30,000 graduate medical positions were offered this year. At Pitt, 98 percent of spots offered were filled—two points higher than the national average. —Robyn K. Coggins

Illustration: Michael Lotenero, based on a photo by Mervin Stewart (MD ’53)