



Franklyn Boothe is one of hundreds of young people who spent the summer working with School of Medicine researchers.

SUMMER TO REMEMBER

CURIOSITY PIQUED AT PITT

BY JENELLE PIFER

PHOTOGRAPHY BY MARTHA RIAL

If during high school or early in your undergraduate years you decide you want to become a doctor, the first thing an advisor will likely tell you is: *You're going to need to do a lot of research.* That's what happened to Franklyn Boothe, an undergraduate and senior at Pitt. *Research*, he thought back in 10th grade, *it sounds interesting. But what is it?*

"It's this mysterious thing you're supposed to do," says Boothe, "but they don't tell you exactly what it entails."

Having spent this summer (his second in a row) studying how antipsychotic drugs work in schizophrenia, Boothe knows this: "You just have to start small and ask a lot of questions."

He got his start in the lab with David Lewis, an MD, director of Pitt's National Institute of Mental Health-funded Conte Center for the Neuroscience of Mental Disorders, chair of Pitt's Department of Psychiatry, and UPMC Endowed Professor of Translational Neuroscience. Boothe is one of 15 undergraduates participating in the Conte Center's summer research fellowship. Lewis says he hopes the program will engage students both "intellectually and affectively" by showing them the path discoveries take to become treatments, as well as "the importance of developing new treatments from a human perspective." Fellows attend weekly lectures on faculty research, as well as clinical sessions where they interact with patients face to face.

The latter was eye-opening for Boothe. He met high-functioning schizophrenia patients and patients so overwhelmed by delusions they couldn't maintain relationships or hold down jobs. "It really puts things in perspective and gives a face to what you're working for," he says. "It's easy to lose track of why we're sitting in a lab and pipetting for several hours. It's to try and improve people's lives."

Boothe's first days in the lab were among his toughest. "It's kind of like being thrown into a quantum physics class when you've never taken physics before," he says. He had to acquire the lingo, memorize the protocol, and master new techniques.

This summer, however, he's working almost independently. He's designed an experiment to help determine how mitochondria change in schizophrenia. The Lewis lab had already defined an abnormality that may cause less

energy to be produced, fewer neurons to fire, and problems to occur in systems like working memory. Still, Boothe says, there could be confounding factors. Not enough research has been done into how antipsychotic drugs affect mitochondria, and researchers can't say, with certainty, that it's the disease causing the change, not the drug. Boothe's preliminary data indicate the drug is not responsible.

It's the first major study he's conducted from start to finish. "It's been really gratifying to not only be able to do this on my own but to get good results," Boothe says.

The big picture, Lewis says, is that mental illnesses and addictive disorders account for 40 percent of all the years lost to premature death from disability in the United States. "The problem is big," he says, "and we need the best and the brightest now and in the future to consider it."

For a career path as demanding as research, students have to take some initiative, says Pitt's Guy Salama, a PhD. In other words, they need to knock on some doors.

And the busy scientists on the other side? They need to be willing to answer.

"People who have decided to dedicate their lives to research are few and far between, so you have to cater to them a bit and encourage them. Otherwise, it's not going to happen," says Salama, who is a professor of cell biology and mentor in the Pittsburgh Research and Investigation Summer Experience (PRISE) program, a summer cardiology fellowship for

undergrads.

Zane Kalik, a rising senior at Youngstown State University (YSU) and current PRISE fellow, came knocking early on. "It doesn't matter where you start, just get a good research foundation as early as possible," says Kalik, who started in an environmental biology lab as a freshman.

When he was a junior at YSU he caught Salama's attention. Kalik's mentor Carl Sims, a former Pitt postdoc with Salama who later joined the faculty at YSU, had recently died. Kalik had been so well trained he was able to pick up where Sims left off. Kalik was using equipment that allowed him to study electric currents in the heart, and how they sync to create irregular heartbeats called arrhythmias. Salama was impressed and invited the budding researcher to speak at Pitt's Cardiovascular Institute.

When Kalik heard about the PRISE fellowship—funded in part by the American Heart Association—he applied, was accepted, and spent the summer at Pitt researching a new drug to prevent atrial fibrrosis.

"The cardiac action potential is a symphony of ion currents," says Kalik, now in his second year with PRISE and one of six fellows. "All those currents work together to generate our heartbeat, and it's a very beautiful process." But this electric chorus can get thrown out of whack when deposits of collagen develop in the atria because of injury or aging. (This is called fibrosis.) The heart can then become highly susceptible to atrial fibrillation, the most common arrhythmia. A hormone called relaxin, however, seems to prevent this; Kalik is trying to figure out how.

"Zane is really unusual. He's just totally devoted. He spends an enormous [number] of hours to try to crack a difficult nut," says Salama. Kalik's typically in the lab between 12 and 15 hours per day, a habit he attributes to his former mentor Sims. Kalik says the more cells he can study, the better his data.

"A summer—a lot of people say—*it's not enough time*. I think it is," he says. "You just have to use the time, and you have to really work at it."

The Chang-Moore lab at Pitt—a tumor virology lab run by National Academy of Sciences members Patrick Moore and Yuan Chang—took in a high school student this summer. It was the first time it had done so. The researchers had decided to participate in the Doris Duke Foundation





Zane Kalik

to be done [in cancer research],” says Assefa, who attended lectures and worked alongside 37 other scholars in this program and the University of Pittsburgh Cancer Institute Academy. Assefa, who’s originally from Ethiopia, came to America at age 10 and now attends high school in Arlington, Va.

“She had the personality to be inquisitive,” says Chang, “She just came in with that and leaves the lab with that.” Chang remembers one early interaction when Assefa was learning to manipulate DNA: “She said, *You know what they show in CSI [the TV show]? Does it really happen that way?*”

What’s great about the Doris Duke program, Chang says, is it harnesses students’ enthusiasm and teaches them what science is really about.

Assefa now speaks fluently about the project and her plan to go to med school one day.

Lotze spearheaded the Doris Duke program at Pitt many years after spending two pivotal summers in high school programs himself: “One at Northwestern University, where I ended up going to college and medical school,” he says, “and the other at Strong Memorial Hospital in Rochester, N.Y. My first summer after high school I worked in an operating room, and I ended up becoming a surgeon.”

Beginnings, he says, are really important. ■

Academy for Clinical Research, an eight-week program for young people from underrepresented and disadvantaged groups. Program director Michael Lotze, Pitt professor of surgery and assistant vice chancellor, health sciences, remembers when he first sidled up to the research pair with the idea: “They said, ‘Make sure you give us a good one.’”

Birdy Assefa, an enthusiastic 16-year-old, did not disappoint.

She found out about the program through the Jack Kent Cooke Foundation, which connects highly motivated students with new

opportunities as early as the seventh grade. Assefa met with her advisor there. “I told her, ‘I’m interested in research, and I want to know what that is.’” Her advisor directed her to Pitt.

This summer Assefa immersed herself. Working alongside Chang at the bench every day, Assefa studied a virus called the Merkel cell polyomavirus (MCV). The Chang-Moore lab had recently discovered that MCV causes an aggressive type of skin cancer called Merkel cell carcinoma, but the team is still working to unwrap the biochemical pathways responsible.

“It’s really interesting, and there’s so much

NOT SO LAZY DAYS

The School of Medicine and partners offer summer research and enrichment opportunities for students 16 and older.

UNDERGRADUATE

- Center for Neuroscience at the University of Pittsburgh Summer Undergraduate Research Program
- Conte Center for the Neuroscience of Mental Disorders Undergraduate Research Fellowship
- Models of Infectious Disease Agent Study (MIDAS) Summer Research Program, *MIDAS National Center of Excellence*
- Pittsburgh Center for Kidney Research
- Pittsburgh Research and Investigation Summer Experience (PRISE) for Undergraduate Students, *Cardiovascular Institute*
- Pittsburgh Tissue Engineering Institute Summer Internship Program
- Pittsburgh Tuskegee Prostate Training Program, *Department of Pathology*
- Summer Premedical Academic Enrichment Program, *Student Affairs/Diversity Programs*
- Summer Undergraduate Research Program, *Departments and Divisions of Cell Biology and Molecular*

Physiology, Cellular and Molecular Pathology, Immunology, Molecular Genetics and Developmental Biology, Molecular Virology and Microbiology, Molecular Pharmacology, and Molecular Biophysics and Structural Biology

- TECBio, *Department of Computational and Systems Biology*

HIGH SCHOOL

- Doris Duke Foundation Academy for Clinical Research
- Medical Explorers, *Student Affairs/Diversity Programs*
- Pittsburgh Tissue Engineering Institute High School Summer Research Internships
- Summer Premedical Academic Enrichment Program, *Student Affairs/Diversity Programs*
- University of Pittsburgh Cancer Institute Academy, *Departments of Biomedical Informatics and Computational and Systems Biology, Hillman Cancer Center, Women’s Cancer Research Center*
- University of Pittsburgh Health Career Scholars Academy

For more information: www.howscienceworks.pitt.edu or Office of Science Education Outreach, M525A Sciafe Hall, 412-648-9572.