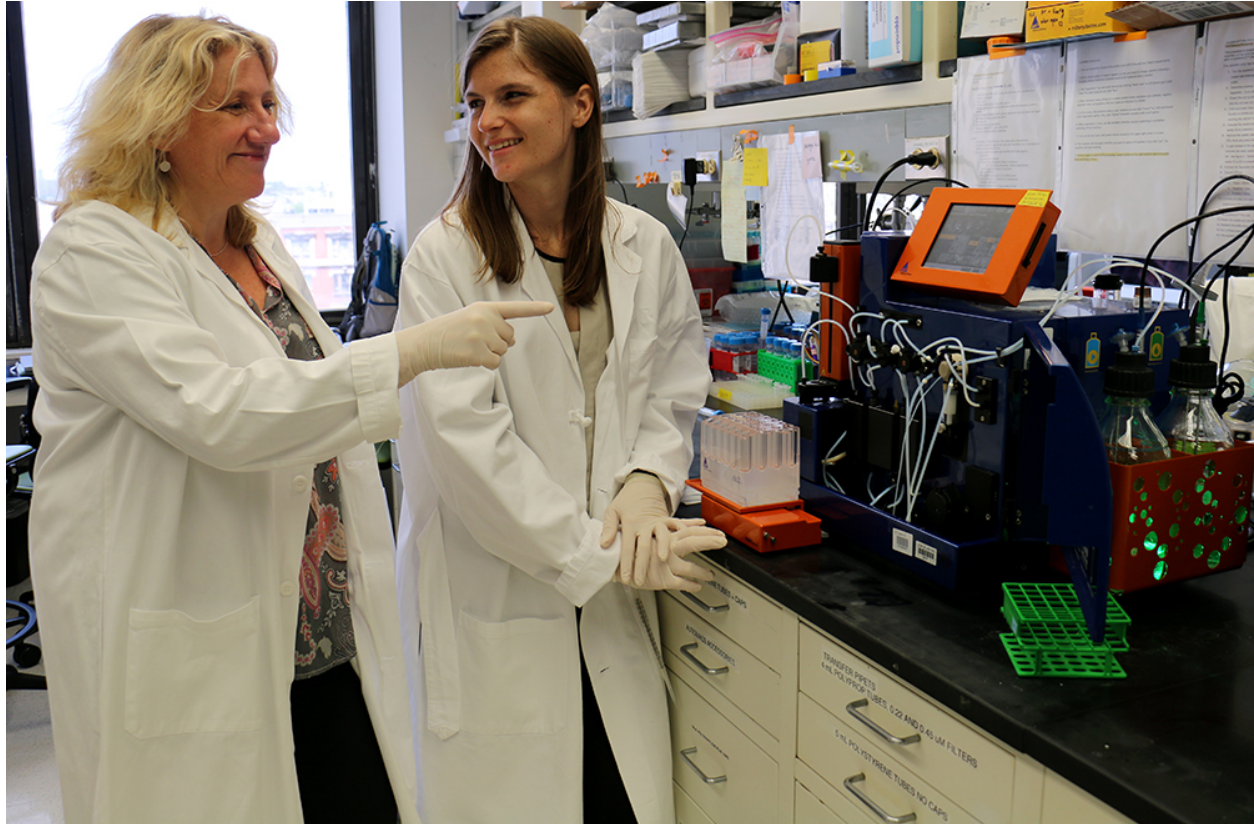


Secondary School Teachers Trade Vacation for Stem Cell Research at Columbia

August 28, 2018

Posted in: [Campus News](#), [Community News](#) / [Medicine](#)



Emmanuelle Passequé, PhD, discusses the equipment in her lab with high school science teacher Kimberly Dempsey, who is doing research this summer with faculty members in the Columbia Stem Cell Initiative.

The best part of Kimberly Dempsey's summer research in the [Columbia Stem Cell Initiative](#) is her daily discussion with her mentor, Amélie Collins, MD, PhD, a postdoc in Professor Emmanuelle Passequé's lab at [Columbia University Irving Medical Center](#) (CUIMC). Dempsey, a 10th grade chemistry teacher at East Side Community High School in Manhattan, is helping to develop a protocol for comparing hematopoietic stem cells in neonatal and adult mice.

"The most exciting part of the experience has been talking with Dr. Collins about her experimental design, listening to her think through her choices for controls, and her responses when unexpected data come back," says Dempsey. "It is wonderful to witness the creativity and logic inherent in good scientific research."

Dempsey is one of 15 high school teachers conducting research this summer in [Columbia University's Summer Research Program for Science Teachers](#), now in its 29th year. The program provides paid

fellowships for two consecutive summers to New York metropolitan area secondary science teachers to do hands-on research with faculty members in Columbia University and New York Stem Cell Foundation laboratories. Through a grant from [NYSTEM](#), New York state's stem cell initiative, the program currently focuses on educating teachers about stem cell biology.

CUIMC physician/scientist [Samuel Silverstein](#), MD, the program's founder and director, saw a need for the program while giving lectures to high school science students and their teachers in the 1980s. "My interactions with teachers suggested they were unfamiliar with contemporary techniques in cell biology," he recalls. He founded the program in 1990 to fill this gap and give teachers access to the thrill of scientific discovery.

"We are making available the priceless resources of Columbia University's faculty, laboratories, and libraries," Silverstein says. "This is not just a medical school program. It encompasses every science discipline represented at the University. It is both an ongoing experiment in secondary science education and a unique Columbia contribution to the STEM education of children in New York metropolitan area schools."

Silverstein was recognized for his work on the program with a [2017 VP&S Award for Excellence](#) in the category of community service. Each year, the medical school honors a small group of employees—selected by a committee from a pool of nominees—for their outstanding contributions.



Two high school teachers toured the embryology lab at Columbia University Fertility Center. Robert Prosser, senior staff associate in the Department of Obstetrics & Gynecology, left, explains the equipment.

The program was the first professional development program for science teachers to require two full summers of participation. To date, 320 teachers have completed it and 211 Columbia faculty members have mentored at least one teacher for two summers; 49 percent have mentored two or more. Professor [Greg Freyer](#), PhD, holds the record. He has mentored 10 teachers, the most of any faculty member.

This summer, teachers hail from schools in the Bronx, Manhattan, Brooklyn, and Westchester County. What they learn in the lab and during professional development sessions will eventually find its way into their classrooms.

“I have been developing a list of important basic skills that I see done around me,” says Dempsey. “A big one that I have not focused enough on in my practice is having students prepare dilutions from solutions and explain how these dilutions are made. This fairly simple mathematical procedure has been a small part of my curriculum that I will focus more time on.”

Besides developing new skills, teachers have a chance to network. Building relationships is important to Ronnie Almonte, a teacher with the New York City Department of Education. He is in his first year of the program and working on embryonic stem cells in the lab of [Dieter Egli](#), PhD. “Columbia’s program bridges the gap between my local public school and all the city has to offer,” says Almonte. “I’m already starting to make connections. A postdoc in the lab came up to me and said he would love to talk to kids in my classroom. When students meet real scientists, they get a better sense of what science is and, perhaps, their potential place in it.”

For many teachers, the program also brings professional recognition and advancement. Arlene Ramos, who teaches at the High School for Health Professions & Human Services in Manhattan, says the program gave her confidence to flourish in her career.

“Through the program I’ve learned about other opportunities to enhance my teaching,” says Ramos, who conducted research on Alzheimer’s disease in the lab of [Ottavio Arancio](#), MD, PhD. “I got accepted into and attended the Math for America Program and Columbia University Zuckerman Institute Brain Insight Teacher Scholar Program.”

The program’s benefits are more than anecdotal. A study—[published in *Science* by Silverstein and his Columbia colleagues](#)—reported that 10 percent more students of teachers who completed Columbia’s program passed New York State Regents exams in biology, chemistry and earth sciences than classmates studying the same subjects in classes taught by other teachers in the same school. The study also reported that program graduates are 3-4-fold less likely to leave teaching than non-participants. Silverstein calculates that each program graduate saves the NYC Department of Education \$39,680 (\$1.80 for every \$1 in program costs) in the first four years following entry into the program for courses students do not have to repeat, and teachers who do not have to be replaced.

Impressed by the program’s results, other organizations have adopted its model, including Stanford University’s science outreach program, New York State’s [Questar III BOCES](#), and the New York State NYSYSTEM-sponsored initiatives at Cornell University and Rensselaer Polytechnic Institute. Questar III BOCES has found that 7 percent more students taught by graduates of its program achieve honors Regents science exam grades than students taught by non-participating teachers in the same schools. “This is the first evidence that the program can be replicated successfully by a state educational agency in collaboration with state university and Department of Health scientists,” Silverstein says, “and that it affects students at all levels of accomplishment, high and low achievers alike.”



Arlene Ramos, right, collaborated with Hong Zhang, staff associate in the Taub Institute, left, and pathologist Ottavio Arancio, MD, PhD, center, on Alzheimer's disease research.

The program is poised to do more in the future.

“There are only about 5,000 high school science teachers in New York City’s public high schools,” says Silverstein. “We could provide similar experiences for about 15 percent of them in 10 years if all medical schools in the city joined together to implement programs like ours.”

In collaboration with the Associated Medical Schools of New York, Silverstein is proposing such an initiative to New York City’s Department of Education. “The more we collaborate to support teachers and their schools,” he says, “the more likely their students will be prepared and interested in pursuing careers in medicine and other humanly rewarding STEM disciplines.”

##

Ottavio Arancio, MD, PhD, is professor of pathology & cell biology and of medicine (in the Taub Institute for Research on Alzheimer's Disease and the Aging Brain).

Amélie Collins, MD, PhD, is assistant professor of pediatrics at Columbia University Medical Center.

Dieter Egli, PhD, is assistant professor of developmental cell biology (in pediatrics and obstetrics & gynecology).

Greg Freyer, PhD, is professor of environmental health sciences at Columbia University Medical Center.

Emmanuelle Passegué, PhD, is director of the Columbia Stem Cell Initiative and Alumni Professor of Genetics & Development (in Rehabilitation & Regenerative Medicine) at Columbia University Vagelos College of Physicians and Surgeons.

Samuel Silverstein, MD, is the John C. Dalton Professor of Physiology & Cellular Biophysics.