

Students focus on eye diseases during summer research program

For the past three months, a select group of six undergraduate students have worked with faculty in Oakland University's **Eye Research Institute (ERI)** on projects investigating causes and potential cures for eye diseases such as glaucoma, cataracts and retinopathy.

The students – Maya Sammane, Adam Seidel, Maria Donovan, Anthony Premceski, Reham Karana and Regan Miller – took part in OU's Summer Undergraduate Program in Eye Research (SUPER), helping carry out experiments that could lead to breakthroughs in treatments for vision loss. Utilizing the latest scientific methodologies and equipment, students worked under guidance from ERI faculty mentors on research sponsored by the National Institutes of Health.

"I originally wanted to go into crime scene investigation, but after this experience I've changed my career goals," said Miller, a junior biology major. "I love the idea of being able to work on treatments for people with diseases."

Under the mentorship of Dr. Ken Mitton, Miller monitored the growth of cells found in vessels of the retina, comparing two versions of the growth factor VEGF. Abnormal growth of these cells is associated with various retinal diseases, Miller explained.

"While the body needs VEGF to form vessels to deliver nutrients and oxygen, an excess amount will cause abnormal growth and could eventually cause retinal detachment or other complications," she said.

Premceski, mentored by Drs. Frank Giblin and Vidhi Mishra, worked on a project examining the interaction between alpha crystallin protein and an alpha crystallin peptide using fluorescence polarization. The goal was to find out whether the peptide was binding to the protein, increasing the risk of cataracts.

"As humans age, the crystallin protein in the lens breaks down to form peptide," said Premceski, a sophomore biomedical sciences major and member of the OU Honors College. "We hypothesized that the peptide was binding to the protein and speeding along the formation of the aggregates. These aggregates are what cause cataracts."

Working with Dr. Giblin, junior biology major Maria Donovan researched the development of cortical cataracts.

"A possible cause of cortical cataracts is solar UVB light, so my project was to investigate the process of DNA damage and repair in cultured human lens epithelial cells, in the presence of UVB-induced radiation," said Donovan, who plans to attend medical school.

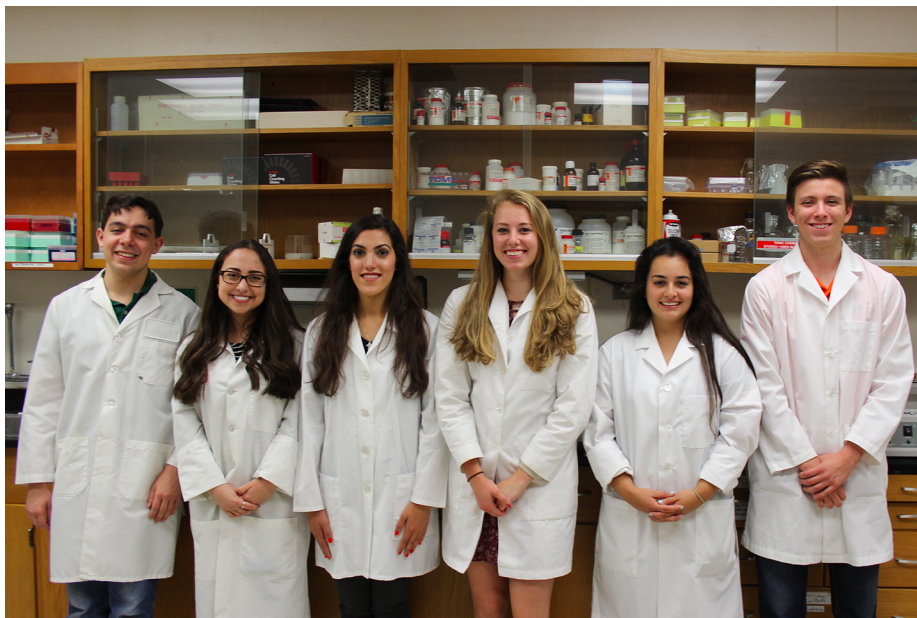
"I came into the Eye Research Institute with little knowledge about research and came out knowing that I will be involved in research throughout my lifetime, as a doctor."

Sammane, a sophomore biomedical sciences major, said that the SUPER program has taught her that, in addition to technical know-how, the research process requires a healthy blend of pragmatism and patience.

"It's easy to want to plan every single step in order to complete a goal, but you have to remember that based on your results, your next step may take you into a different direction," said Sammane. "Research is not something you can necessarily speed up or even anticipate exact results for. You have to be willing to put in the time, work and patience required."

Sammane's research focused on light adaptation in the eye, exploring how photoreceptor cells – rods, cones, and intrinsically photosensitive retinal ganglion cells – contribute to dopamine synthesis in the retina.

"We determine dopamine synthesis levels in retina samples (collected from mice) by using a research method called Western



OU undergraduate students (from left) Adam Seidel, Maya Sammane, Reham Karana, Regan Miller, Maria Donovan and Anthony Premceski – took part in OU's Summer Undergraduate Program in Eye Research (SUPER), helping carry out experiments that could lead to breakthroughs in treatments for vision loss.

"If there is a deficiency of dopamine in the visual system, there can be a risk for reduced vision or even a condition called myopia, which is nearsightedness."

Using a mouse model, Seidel measured the thickness of the retina to determine whether the Peripherin 2p/rds mutation Y-285 STOP CODON causes retinal degeneration in mice. The findings from this experiment will help researchers understand the potential effect of this mutation in the human eye, he explained.

"Peripherin is a photoreceptor protein in the retina, which affects the regeneration of photoreceptor disks necessary for normal vision. If the photoreceptor disks are unable to regenerate, the result is retinal degeneration, which causes vision loss," said Seidel.

Seidel, a junior liberal studies major and OU Honors College member, said the SUPER program helped him to appreciate the broad skill set and knowledge base that research requires.

"While I learned a great deal, I have a better perspective of how much more I need to learn about the research process," he said. "With this in mind, I have planned additional coursework in statistics and biochemistry."

Mentored by Dr. Shravan Chintala, Karana examined the role of the Rtca enzyme in causing glaucoma in mice.

"The back of the eye has cells called ganglion cells which take visual information up to the brain. Damage to ganglion cells results in a loss of vision," said Karana, a junior and OU Honors College member majoring in biology. "An article came out stating that an enzyme called Rtca caused the loss of these cells in fruit flies. We were interested to see if this was true with other animals."

The students worked in the lab roughly 30 hours per week for 12 weeks, learning research fundamentals, including keeping a research notebook, evaluating research literature and following laboratory protocols. Acceptance into the SUPER program is selective, according to ERI Director Frank Giblin.

"We look for high-achieving students in science and math, especially organic chemistry and calculus," said Dr. Giblin. "Most of our students have an interest in medical school or graduate school. About 75 to 80 percent go on to pursue graduate education."

Dr. Giblin said the program is geared toward underclassmen and that most of the participants continue to work with their faculty mentors after their SUPER experience has ended. Some have gone on to publish scholarly articles with their mentors.

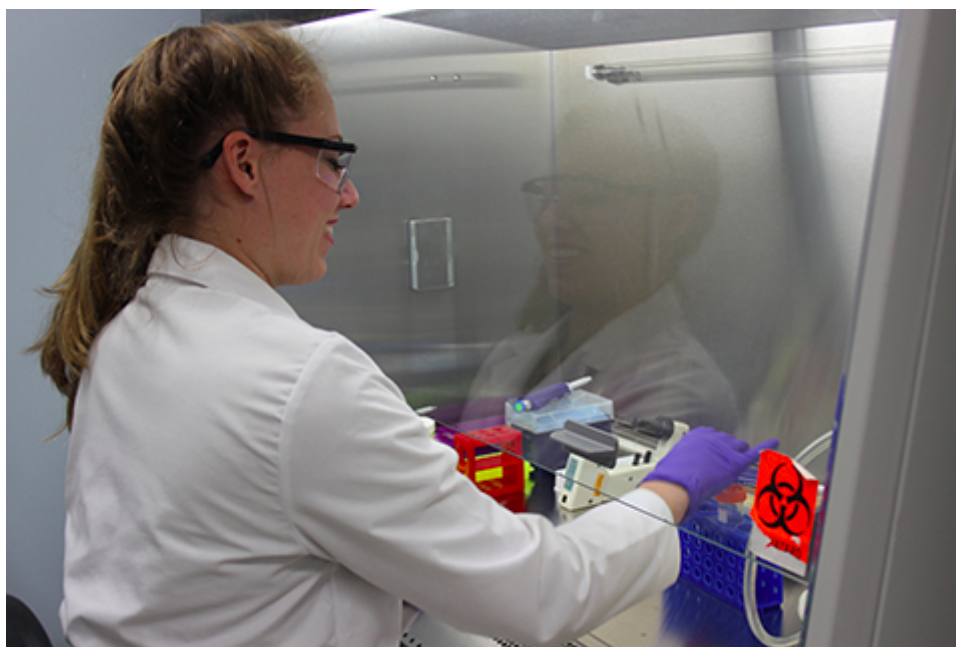
"Most of the students come in knowing very little about research," Dr. Giblin said. "They learn from the ground up about how research is conducted, the scientific method, how to formulate a hypothesis, how frustrating research can be and the failures that happen along the way. Research is difficult, but you can achieve a satisfying result."

To apply for the program, students submit a personal narrative outlining career goals and interests, a letter of reference, academic transcripts and a resume. They are also interviewed by ERI faculty members.

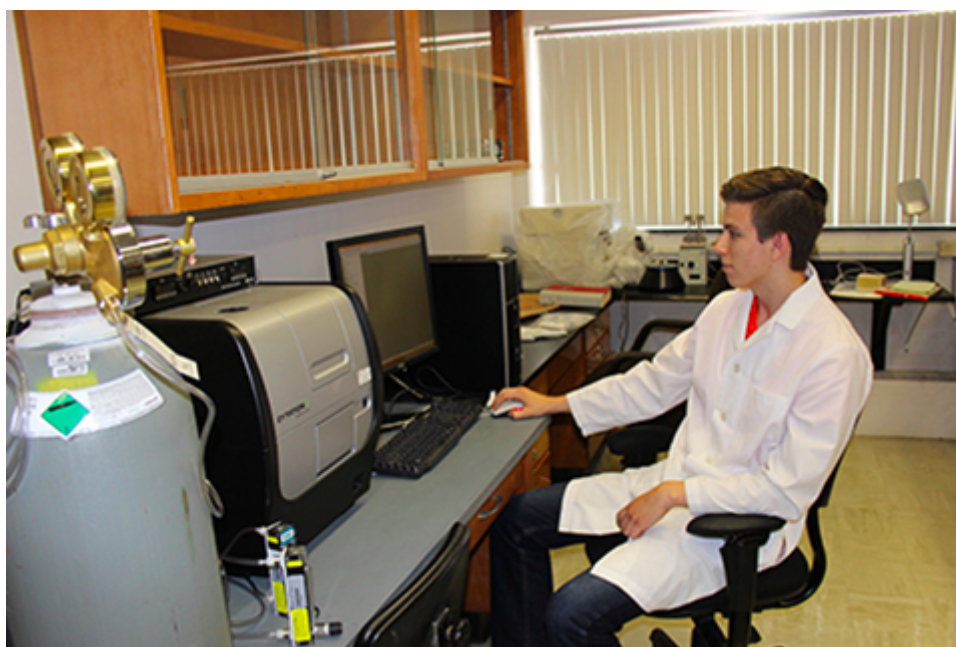
Those admitted to the program receive a research fellowship of \$3,750. Students also attend a weekly Vision Science seminar given by ERI and Beaumont Ophthalmology faculty and receive training in professional speaking and presentation.

The SUPER program concludes with a symposium on **Friday, July 29** during which students will deliver 15-minute PowerPoint presentations on their projects. Open to the public, the event runs from 9:30 a.m. – noon, in room 254 of the Engineering Center on OU's campus.

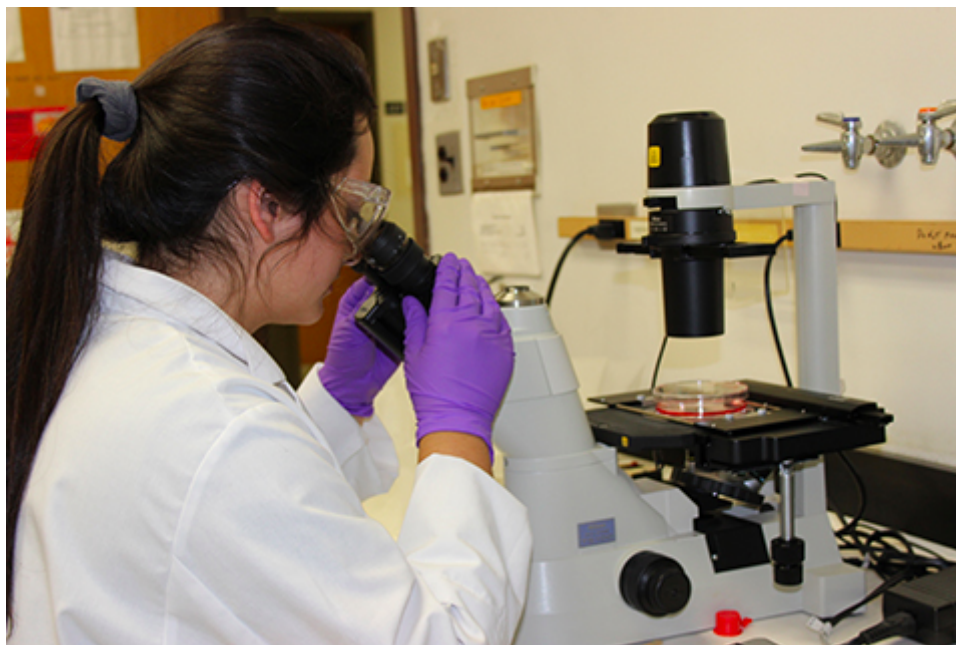
To learn more about the Eye Research Institute at Oakland University, visit oakland.edu/eri.



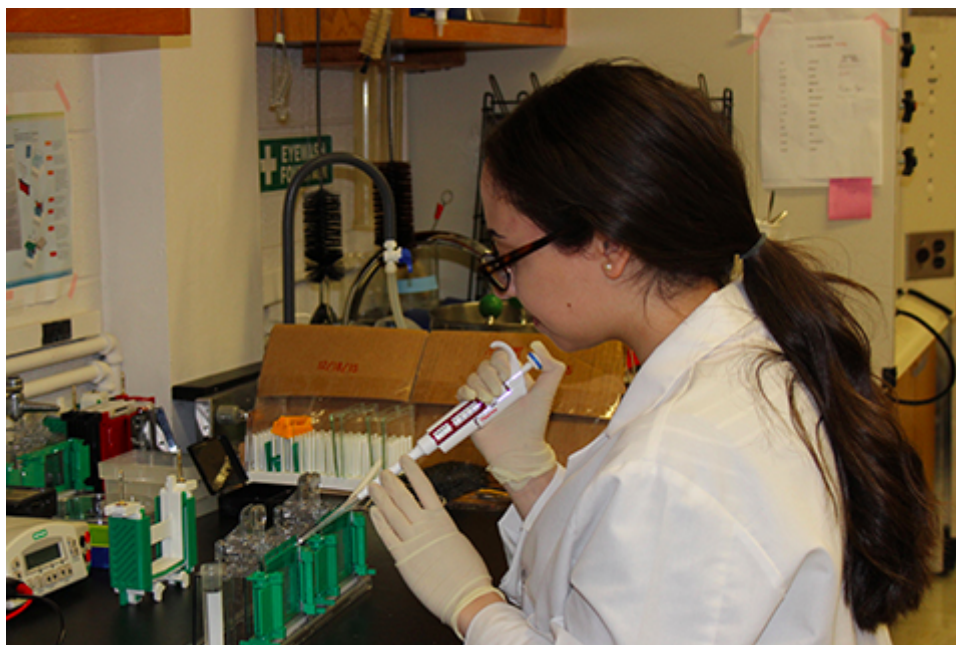
Regan Miller



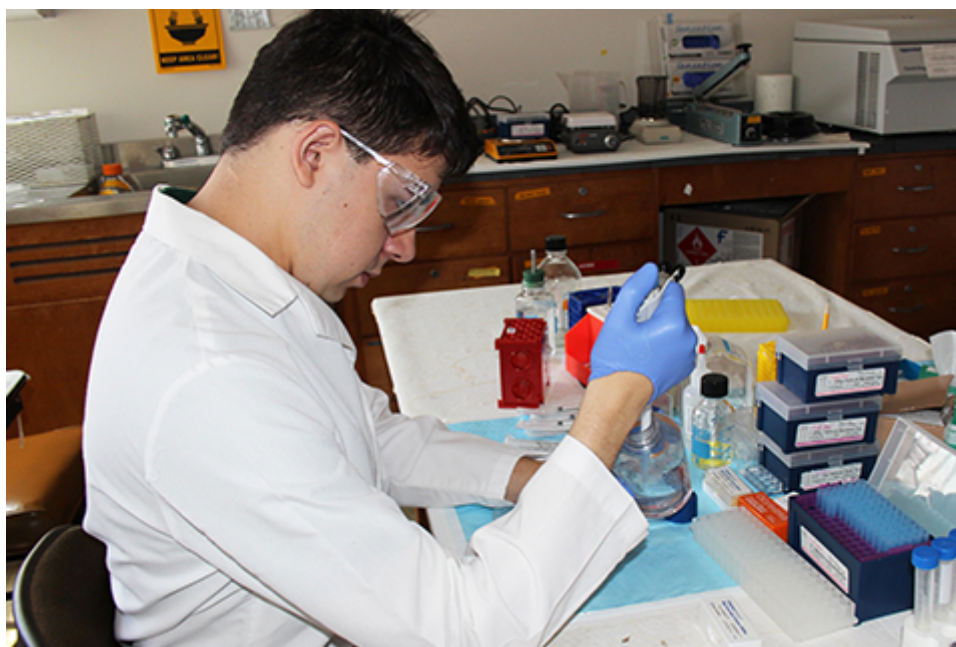
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