



# DISCOVERY

THE DISCOVERY EYE FOUNDATION

The Discovery Eye Foundation supports cutting-edge research related to sight-threatening eye diseases and their treatments.

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Spring 2019

## Crosslinking Breakthrough for KC

*DEF-funded research leads to new device for corneal stiffening*

**T**remendous advances in corneal crosslinking (CXL) for those with keratoconus (KC) are being made by DEF-funded researcher James Jester, PhD, the Jack H. Skirball Endowed Research Chair and professor in the Department of Ophthalmology and Gavin Herbert Eye Institute at UC Irvine.

Crosslinking increases the stiffness or rigidity of weak corneas to treat thinning corneas and KC. CXL currently involves treating the thin cornea with the vitamin riboflavin and single-photon ultraviolet (UV) light. This generates oxygen-free radicals and chemical crosslinking that leads to the stiffening of the cornea.

**Having two photons instead of one allows a much more precise focus of the laser to direct crosslinking in specific places.**

There are several problems with the current method, Jester says. First, it requires removal of the epithelium; second, it is a long, 30-minute procedure; and third, there is delayed visual recovery due to the healing response of the epithelium.

Beginning around 2011, Jester's team realized the procedure would be more precise and faster with a two-photon laser approach. This short, pulsed laser could more specifically focus the excitation of riboflavin using a low-energy infrared light.

According to Jester, we now have a two-photon device that can produce the crosslinking in just four minutes. Additionally, it can get through the epithelium without removing it, so healing should be faster and safer.

Using two photons instead of one allows a much more precise focus of the laser to direct crosslinking in specific places. "Since we can

*(continued inside)*

# "At the Forefront of Research"

*DEF donor Ken Ruby gives more than money*

**K**en Ruby made his way from Cleveland, where he grew up, to the University of Pennsylvania, then to the Army, before a friend asked if he wanted to go to California. His answer was, "Sure, why not."

That was 60 years ago, and he's been here ever since, currently living in West Los Angeles with his wife, Wendy, near his three daughters and one grandchild. They are very involved in various medical and Jewish philanthropies.

Ruby has been a real estate developer for more than half a century, and the 85-year-old has no plans to slow down any time soon.

But he has had to give up skiing, which he had enjoyed for more than 50 years. "I like skiing and biking, but now I can't ski, so I do a lot of biking," he says.

Seven or eight years ago, Ruby noticed he was having trouble seeing when going from light to dark or dark to light. He went to a retina specialist and, "sure enough, I had retinal cell loss that was progressing," he says.

Diagnosed with dry age-related macular degeneration (AMD), he soon met Discovery Eye Foundation Medical Director Dr. Anthony Nesburn, and learned about the work he and DEF Research Director Dr. Cristina Kenney are doing around AMD and mitochondria.



Now a very generous financial donor to DEF, Ruby saw that DEF needed more resources. "I like to be at the forefront of research," he says, adding that he supports cancer and orthopedic research, as well. He is particularly interested in DEF-funded research on new drugs and nutritional supplements that help reduce mitochondria loss. So interested, in fact,

that he is also a test subject, having given blood for the research projects.

"Hopefully, they will find a cure or something that will stop the progression of macular degeneration in the next few years," Ruby says. "I would like my own sight reduction to stop, so I have a vested interest in their work."



## DEF in the Community

A packed house joined DEF Research Director Dr. Cristina Kenney and Vision Ambassador Tom Sullivan on March 19 at Florence Sylvester Memorial Senior Center in Laguna Hills for "Aging Diseases of the Eyes." A new presentation, "AMD & Alzheimer's: Learn How They Relate," will be held at the same center Sept. 10, 2019. Visit [www.discoveryeye.com](http://www.discoveryeye.com) for more details.



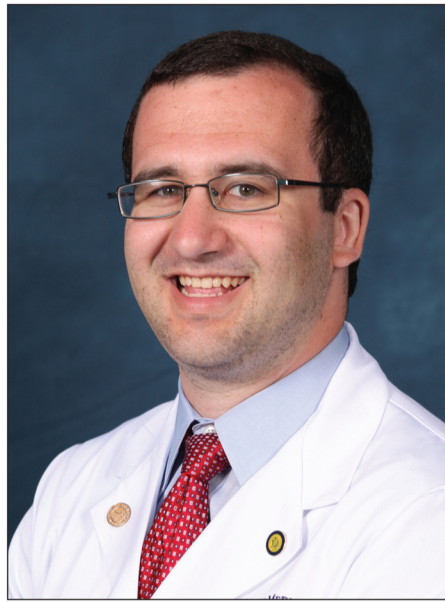
# Meet the Researcher: Andrew Dolinko, MS3

**L**ong interested in research, California native Andrew Dolinko found a connection to the “clinical realm” while working in a biology lab in high school. Following his undergraduate career at Johns Hopkins University, he began UC Irvine’s Medical Scientist MD/PHD Training Program and learned about the lab of Discovery Eye Foundation Research Director Dr. Cristina Kenney, where he has been working now for nearly three years.

“The lab in which I work is very closely connected to the medical school,” Dolinko says. “We are part of the Gavin Herbert Eye Institute, a center that brings physicians and researchers in the field of ophthalmology together. Being able to interact with and discuss the clinical side with my colleagues, and learn about both the research and clinical aspects of ophthalmology has increased my interest in the field.”

“DEF, which funds part of my research, lets investigators, such as me, bridge the clinical and the research. In doing so, we are able to learn what are the gaps in clinical knowledge and understand how we can address those unanswered questions with our research,” he says.

Specifically, Dolinko is working on a diabetic retinopathy project to understand how mitochondria affect the way retinal cells respond to the stresses associated



**“DEF lets investigators, such as me, bridge the clinical and the research.”**

with diabetes. “We know there are certain populations that are more likely to develop diabetes and complications, such as diabetic retinopathy,” he says. “We want to investigate whether a person’s mitochondrial DNA, which reflects ancestry, has any impact on the responses to diabetic stresses that can lead to cell damage.”

“We have found that mitochondria have ‘metabolic memory’ based on ancestry and whether the person has diabetes,” he says. “Surprisingly, it appears that, in some cases, the cells from certain diabetic patients seem to be more resistant to cell death in response to certain stresses from diabetes, compared with other diabetic subjects. This may help us understand why some diabetics get very bad eye disease, but others do not. However, these

differences need to be investigated further.

“Our findings show that mitochondria have a metabolic memory that is transferable and, in some cases, actually protects the retinal cells from diabetic stressors, such as high glucose and low oxygen levels.

“As we learn more about how mitochondria work in our cell lines, we can determine more about the mechanisms that underlie these contributions, which may lead us to understanding what other molecular pathways we should target clinically in order to benefit diabetic patients.”

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## Crosslinking

*(continued from front)*

control the volume, we can generate a specific pattern of crosslinking

to actually match the curvature of an individual patient’s cornea,” Jester says.

The device has been built in the lab, and clinical data on animal

subjects show corneal flattening, as well as increased stiffness, which would be desirable in KC patients. The next step, Jester says, is to build the device for use on humans in the clinic.



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## Donor Appreciation Lunch

Generous donors who supported DEF in 2018 came together in February at Shutters on the Beach in Santa Monica for our annual Donor Appreciation Lunch. DEF-funded researchers Drs. Henry Klassen and Jing Yang presented a special update called "Progress Using Retinal Progenitor Cells in Humans for Retinitis Pigmentosa and Other Retinal Diseases."



Seated L to R: David and Lenny Kelton, Darlene and Mario Antonini, and Tom Sullivan  
 Standing: Dr. Jing Yang, Dr. Cristina Kenney and Patty Sullivan



L to R: Dr. Kristin Nesburn, Dr. Anthony Nesburn, Linda and Marty Blank, and Marlene and Jim Henerson



Seated L to R: Matthew Nesburn, and Jack and Katy Schoellerman  
 Standing: Drs. Henry Klassen and Jing Yang