Eye on patients, mind on innovation

New Global Head of Ophthalmology Research sees the eye as a frontier of biomedical research.

By Elizabeth Dougherty | Oct 19, 2017

It wasn't always the eye that captivated ophthalmologist Cynthia Grosskreutz. At first, she'd set her sights on space. As a physics student, she worked in a group that studied lunar samples collected during the moon landings of the US Apollo space program. She also analyzed data sent from the Pioneer 11 spacecraft. But when the US government canceled its interplanetary space program, Grosskreutz decided to look elsewhere.

When she did, she found medicine – and the eye. "The eye is beautiful. I was just fascinated by it," says Grosskreutz, who recently became Global Head of Ophthalmology at the Novartis Institutes for BioMedical Research (NIBR). "And vision is really important."

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It doesn't take a space mission to get a close look at the eye, yet in many ways it remains as mysterious as distant planets and stars. "There are a lot of diseases that have been recognized for hundreds of years, even a thousand in the case of glaucoma. Yet we still don't understand what causes some of these diseases," says Grosskreutz. "The reason research is important is because that cause and effect are not yet fully understood."

Research to understand the underlying biology of eye disease has been at the core of Grosskreutz's career, most of which was spent at the Massachusetts Eye and Ear Infirmary in Boston in the US, where she took care of glaucoma patients and ran a laboratory. She studied rodent models of glaucoma and discovered molecular pathways involved in the disease.

But connecting those findings back to the people who actually suffer from glaucoma proved challenging. So Grosskreutz became committed not only to basic research, but also to learning more from patients. "We don't understand enough about eye disease as a whole in people," she says. "I'd like to really bring the patient into research, using imaging data, patient samples, genetics – bringing all that together to really strengthen how we go about looking for targets and drugs to treat eye diseases."

Grosskreutz shares more about her career in ophthalmology below.

When it comes to drug discovery and development, are there advantages to working on the eye?

We're able to give eye drops or inject medicine directly into the eye, where we hope it will work locally without affecting the rest of the body. Local administration is one of the really neat things about ophthalmology. It gives us a chance to try innovative things.

Do you have an example of an innovative approach that uses local administration?

We have one that we just started testing in the clinic that we hope will be effective in treating diabetic retinopathy, which occurs when high blood sugar levels damage blood vessels in the retina. The disease is the most common cause of vision loss among people with diabetes.

We know from studying samples of fluid from the eyes of patients with diabetic retinopathy that levels of a certain biochemical are elevated. Our compound acts on a pathway that influences the levels of that biochemical. The interesting thing is that that biochemical is essential elsewhere in the body. If our compound were given systemically, it would be a no-go. But we're injecting it into the eye, where we hope it will work locally without affecting the rest of the body.

Are there other projects that illustrate how exciting it can be to work on the eye?

We'd like to deliver gene therapy into the eye for patients with a specific kind of retinitis pigmentosa, a form of retinal degeneration that slowly causes blindness. We are not the only company pursuing gene therapy for the disease, but we are making our first foray into this space and it's incredibly exciting. The first gene therapy was recently approved in the US, and the excitement around that is through the ceiling. We have been at work on our gene therapy technology for a number of years, and we're moving toward clinical testing. It's exciting because our approach aims to deliver genes directly to the cells that need them, inside the eye.

In parallel, we have also been collaborating with investigators in Sweden and Canada to better understand the disease by following a group of patients over time. We've learned an enormous amount about how retinitis pigmentosa evolves and how quickly it progresses. We've also learned about what to use as measurements to determine if an experimental drug is working or not. All of this research will help guide us as we think about clinical trials.

You still maintain a faculty appointment at Harvard Medical School in the US and see patients at the Massachusetts Eye and Ear Infirmary. How does that influence your work at Novartis?

About two afternoons a month I see glaucoma patients, many of whom I've followed for years. I really like patient care. It helps keep me focused on what our goal is here at Novartis, which is to develop medicines. We always talk about putting the patient first, but I have the privilege and honor of having patients tell me what they want directly. It may be less frequent drops or the hope to see better. It's a practical approach, and it's

very motivating.

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