

New device finds early signs of eye disease in preemies

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Tell-tale signs of a condition that can blind premature babies are being seen for the first time using a new handheld device in a study at Duke University Medical Center.

The technology, developed in part by Duke biomedical engineers, uses spectral domain [optical coherence](#) tomography (SD OCT) to create a 3-D picture of the back of the eye. "This new tool is changing the way we identify eye conditions in infants," says Cynthia Toth, MD, an ophthalmologist at the Duke Eye Center, who is leading the study that appears online this month in the journal *Ophthalmology*.

Retinopathy of prematurity (ROP) is one of the most common causes of vision loss in children, affecting about 16,000 babies each year, according to the National Eye Institute. It occurs when babies are born prematurely and their retinal blood vessels don't develop fully. Instead, the vessels grow abnormally and are prone to leaking and contracting. That can pull the retina out of position, causing retinal detachments that can lead to visual loss and blindness.

Current screening for ROP is based on two-dimensional images taken either with an ophthalmoscope or a camera placed directly on the infant's cornea. "Examining the retina with these methods is like looking at the surface of the ocean and only seeing dimly into the shallow water," says Toth, a professor of ophthalmology and biomedical engineering. "You cannot see what lies below."

SD OCT, on the other hand, uses a narrow beam of light to create a 3-D high-resolution map of the intricate detail in the retina's layers. "This is like looking into an aquarium from the side, where all the fish at every depth are visible," Toth says.

Ophthalmologists at Duke Eye Center pioneered and have been using OCT to accurately diagnose adult eyes for more than a decade, and in the past two years, Toth has been studying the application of this technology for retinal diseases in children.

"SD OCT reveals the retina in greater detail than was ever before realized, allowing us to observe disease at almost the cellular level" she says.

New advances in OCT led Joseph Izatt, a professor of biomedical engineering and ophthalmology at Duke, to create the handheld probe which can snap pictures over 40 times faster than previous versions of OCT. That means multiple scans of the eye now take only seconds. It also means the portable handheld SD OCT system can be taken directly to premature infants in the incubator.

The device is manufactured by Bioptigen, Inc., a Duke spinout company in Research Triangle Park. Izatt is the chairman and chief technology officer of the firm.

"Now, for the first time, we can take the SD OCT system into the neonatal intensive care unit and hold it over the infant's eye without touching the [eye](#) and image the retina while the infant is lying in the bed," she says. "We don't have to transport the infants out of the intensive care unit, which makes the whole process much more comfortable for them and their parents."

Toth's next step is to determine what role the system could play in

treatment decisions.

"Right now we're analyzing data on more than 20 infants to identify how the SC OCT images of RoP relate to the usual examination and to decisions we make about treatment. What we hope to learn is whether what we see in the infant's eyes today will help us to predict how their disease and vision will be in the future."

Toth says this imaging technology could also have practical applications for improving the diagnosis and treatment of babies suspected of having a wide range of retinal diseases including albinism and retinal injury.

Source: Duke University Medical Center ([news](#) : [web](#))

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