

## Preventing blindness focus of ORNL technology, AMDx

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Automated Medical Diagnostics, a startup company based in Memphis, envisions its product helping to preserve the sight of millions of people at risk of vision loss from diabetic retinopathy.

Using Telemedical Retinal Image Analysis and Diagnosis, a technology recently licensed by AMDx from the Department of Energy's Oak Ridge National Laboratory and the University of Tennessee Health Science Center, patients can quickly be screened for the disease in their primary care doctor's office and other remote sites, permitting early detection and referral for [diabetic retinopathy](#) and other retinal diseases.

"If diabetic retinopathy is detected early, treatments can preserve vision and significantly reduce the incidence of debilitating blindness," said Edward Chaum, an ophthalmologist and Plough Foundation professor of retinal diseases at the UT Health Science Center Hamilton Eye Institute in Memphis. Chaum and ORNL's Ken Tobin, partners in AMDx, led the team that developed a method for teaching computers to aid in the diagnosis of diabetic retinopathy and other blinding eye diseases.

The Web-based technology uses a digital camera that takes pictures of the retina at a primary care physician's office or other remote clinical site. The patient's medical data and retinal images are sent to a server and processed through the patented system that quickly sorts through large databases and finds visually similar images representing equivalent states of diabetic [eye disease](#). This allows diagnoses to be made in seconds so patients will know before they leave the office if they have

no eye disease or if they need to follow up with a retinal specialist. Conventional techniques require a patient to wait several days to receive results.

"With the TRIAD network, all of the computed diagnoses are sent to an ophthalmologist for review and sign-off of the computer-generated report, much like what is done for an EKG," Tobin said. "Over time, our hope is that the number of reports requiring physician review will be reduced as the performance of the TRIAD network is proven through clinical testing."

For more than a decade, manufacturers of semiconductors have used this technology to rapidly scan hundreds of thousands of tiny semiconductors for defects and to learn quickly about problems in the manufacturing process. Since 2005, Chaum, Tobin and colleagues have been supported by grants from the National Institutes of Health and other federal agencies to test and demonstrate that retinal pathology can be identified and quantified by adapting the content-based image retrieval technology.

"What separates this from other methods is that we have automated the process of diagnosing [retinal disease](#) by capturing the expert knowledge of an ophthalmologist in a digital patient archive," Tobin said.

This allows far more people to undergo screening, especially the indigent and those in areas that are medically underserved.

"Today, less than half of Americans known to be diabetic receive the recommended yearly examination because they either cannot afford eye exams, lack access to eye care providers or are unable to comply with physicians' recommendations," Chaum said. "In the next 15 years we will need to be able to screen more than 1 million patients every day worldwide in order to detect and manage vision loss and blindness due to diabetes."

"By using automated computer-assisted diagnostic methods like TRIAD and the connectivity of the Web throughout the world, this is an achievable goal."

Tobin and Chaum see AMDx and TRIAD as a game changer, providing diabetic patients with easy access to screening cameras in primary care medical practices and a variety of other settings.

Provided by Oak Ridge National Laboratory

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