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Keep an Eye on Your Eyes

Technologies For Protecting Vision

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The eyes are more than windows to the soul. With advances in eye health technology, they can also give a unique look into your health.

"The eye is a real window into what's happening in your body," says NIH eye health expert Dr. Houmam Araj. It's a convenient way for a doctor to get a clear view of your blood vessels, nerves, and connecting tissue without surgery.

Researchers are working on new technologies to help doctors get a better look into the eye and catch diseases earlier. They're also designing new tools to help people with vision loss get around in their daily lives.

What Doctors See Now

Getting regular eye exams is important, even if you think your vision is fine. Eye exams allow an eye care professional to monitor your eyes for common vision problems and signs of disease.

"There aren't early warning signs for the most common eye diseases," says NIH eye specialist Dr. Rachel Bishop. "By identifying diseases early, you have the best treatment options and the best chance of preserving good vision."

A comprehensive exam will often include eye dilation. After checking your vision sharpness, the doctor places drops in your eyes to dilate (widen) the dark center of your eyes, called the pupil. This allows more light into your eyes, just like opening a door lets light into a dark room. Then the doctor can examine the inside of the eye.

A special magnifying lens is needed to examine the tissues at the back of the eye. These tissues include the retina (light-sensitive tissue), the macula (central part of the retina for sharp vision), and the optic nerve (carries visual messages from the eye to the brain). Damage to these areas may be a sign of an eye disease.

"The eyes can also reflect illness that begins in another tissue far from the eyes themselves," Araj explains. Eye exams may reveal health problems like **diabetes**, high blood pressure, **autoimmune disorders**, sexually transmitted diseases, and cancers.

For example, eye doctors often detect diabetes by observing damage to the retina and blood vessels in the eye. The disease may show up in eye tissue before a blood glucose (sugar) test reveals it. Early detection can prevent not only vision loss but other serious complications.

Advances in Imaging

"Today's clinical technologies to image the eye are pretty amazing, but they are undergoing tremendous advances," says Dr. Donald Miller, an expert in eye imaging technology at Indiana University. "Future eye health practitioners will have incredibly more powerful imaging tools than anything we have now."

With new tools, eye health professionals may be able to catch disease even earlier. For example, Miller and his research team created a type of microscope to improve the diagnosis and treatment of glaucoma.

Glaucoma causes blindness by damaging nerve cells at the back of the eye. "The cells that get damaged by glaucoma are hard to see in the early stages of the disease," Miller says. "With current technology, thousands of cells must die before it's detected."

His team's new method would allow eye doctors to see the damage earlier. In glaucoma, early treatment can often protect you against serious vision loss.

Other eye imaging technologies are being developed to better detect age-related macular degeneration (AMD). AMD is the leading cause of vision loss and blindness nationwide among people age 50 and older. A current NIH-led study is tracking retinal degeneration in 500 people over five years to look for early signs of the condition.

The team is using a high-resolution imaging technique called spectral domain optical coherence tomography (SD-OCT) to visualize different sections of the retina. "It is sensitive enough to detect very small changes that other images of the eye cannot see," says Bishop.

Another new imaging technology allows scientists to track a specific protein in the eye. The approach may help doctors catch cataracts (a clouding of the eye's natural lens) and presbyopia (the inability to focus up close) earlier.

Other research groups are studying ways to treat cataracts. They've identified a chemical that could potentially be used in eye drops to reverse cataracts.

"Cataracts are the number one cause of blindness worldwide," Araj says. "If you live long enough, you will get them. New methods of detection and treatment can impact people everywhere."

Improving "Sight"

New technologies may also help people with low vision and blindness get around more easily in their day-to-day lives.

For example, an NIH-funded eye doctor recently improved a miniature telescope technology that can be mounted on regular eyeglasses. Called Ocutech bioptic telescopes, these devices help people with low vision see better while driving. This gives them the chance to stay behind the wheel.

Another scientist developed a partially robotic cane that can detect a person's surroundings. The cane has a camera to "see" what's nearby. The motorized roller tip then moves the cane toward a desired location, acting as a guide for the person to follow.

Sound can also act as a guide for those with low vision. A new smartphone app gives sound prompts to help visually impaired people identify the safest crossing location and stay within a crosswalk.

These and other new technologies are helping people with vision problems. But Bishop says, "While technologies can help keep your eyes healthy, there's a lot you can do, too."

Simple actions can go a long way to protect your eye health. These include not smoking, eating a healthy diet (especially dark leafy greens like spinach or kale), and maintaining a healthy weight. Also, know your family's eye health problems. Certain diseases can run in families. And make sure to wear sunglasses to block harmful sun rays and protective eyewear for activities like sports and home improvement projects.

Don't forget to get a regular eye exam to catch issues early. If your eye care professional finds a problem early, often there are things you can do to keep your good vision.

"An ounce of prevention is worth a pound of cure," Araj says.

Ask Your Doctor

- Am I at risk for an eye disease?
- What tests do I need?
- How often should I get eye exams?
- What are the benefits and risks of any medications or treatments?
- Are there new technologies that can help correct or manage my eye disease?
- Am I at risk for diabetes?
- How can you help me quit smoking?
- Would a clinical trial (research study) be right for me?

Links

- Keep Your Vision Healthy
- Eye Health Information
- Healthy Eyes Facts
- Eye Health Videos
- Aging and Your Eyes
- Eye Information for Kids
- Diabetic Eye Disease
- Glaucoma
- Age-Related Macular Degeneration (AMD)

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