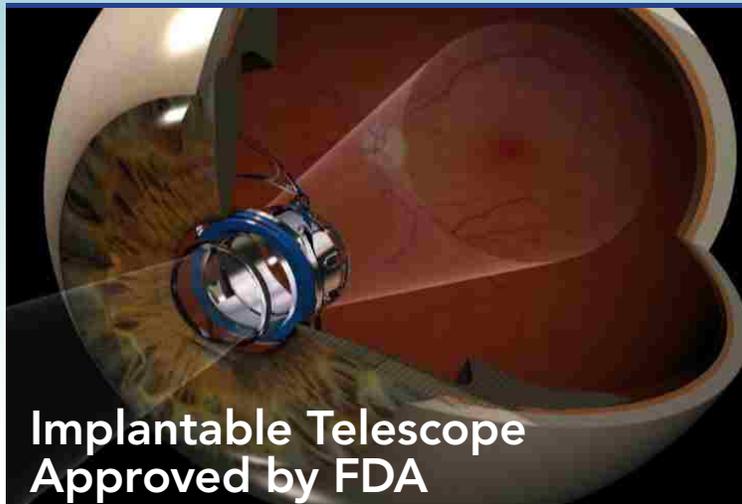


# Eye Research *News*

50th Anniversary



## Implantable Telescope Approved by FDA

A tiny, implantable telescope (IMT) has been approved by the U.S. Food and Drug Administration for people who have lost central vision to end-stage age-related macular degeneration (AMD) and for whom all other treatments no longer improve sight. After years in design and the approval process, the IMT's benefits were deemed to outweigh any post-operative risks (a low percentage of complications, usually involving the cornea). The IMT may allow people with severe vision impairment to once again see faces and possibly read large print by magnifying images beyond damaged areas of the macula and onto usable regions of the retina. After receiving the IMT in one eye by an ocular surgeon specially trained in the procedure, patients must undergo training from a low-vision specialist in how to use the device while continuing to use their better eye for peripheral sight.

## Gene Therapy Goes Non-viral

Researchers recently announced that they are closer to a non-viral gene therapy treatment for degenerative eye disorders. The new approach uses nanoparticles small enough to penetrate cells to deliver sight-preserving genes to the retina. Nanoparticles offer a safer alternative to most current gene therapy, which uses a virus to deliver DNA to cells, a method that is efficient but may cause immune responses that lead to inflammation and other complications.

## Guide to Eye Health

### RESEARCH UPDATES

Last year, RPB distributed a "Guide to Eye Health" containing the latest research on modifiable risk factors that contribute to eye diseases. Since that time, more research has been published that may help you make eye-healthy lifestyle choices to reduce the severity or rate of progression of a vision disorder. The "Guide" is available online ([www.rpbusa.org/publications](http://www.rpbusa.org/publications)), or by request.

### Healthy Diet Reduces Cataracts in Women

Women who eat foods rich in a variety of vitamins and minerals appear to have a lower risk of developing cataracts, according to a large population study which also found that higher prevalence of cataracts in women was associated with modifiable factors smoking and obesity.

### Modifiable Risk Factors for Macular Degeneration Found Earlier in Life

Smoking and low levels of "good" cholesterol (HDL) are associated with increased early stages of age-related macular degeneration (AMD) in middle age, while having higher levels of HDL reduces risk. Improving vitamin D levels in the blood may lower the risk.

### Resveratrol May Prevent Some Blinding Diseases

Resveratrol—found in red wine, grapes, blueberries, peanuts and other plants—stops out-of-control blood vessel growth in the eye, according to researchers, making it a potential treatment for AMD, diabetic retinopathy and retinopathy of prematurity. A separate study found that resveratrol may reduce intraocular pressure, suggesting it may be useful as a treatment for glaucoma.



## Quitting Smoking Anytime Reduces AMD Risk

Research has already shown that smoking and heavy drinking may accelerate the risk of developing AMD. A new study indicates that, even after 80, continued smoking increases the risk of developing AMD.



## Do Earliest Signs of Glaucoma Appear In the Brain?

Many glaucoma patients experience vision loss despite efforts to manage ocular pressure. Now, scientists are a step closer to understanding why... and treating it. The finding represents a paradigm shift in understanding glaucoma and opens the door to “an entirely new domain of nerve-derived therapeutics,” according to an RPB researcher. Current glaucoma therapies focus on measuring, lowering and monitoring ocular pressure within the eye to slow damage to the optic nerve. But the recent discovery indicates that the degeneration works in reverse order, starting in the brain and working its way to the retina in the late stages of the disease. Researchers are now working on finding drugs that can improve or restore the connectivity between the optic nerve and the mid-brain.

## Antiviral Meds Reduce Return of Eye Problems From Herpes

The herpes simplex virus (HSV-1) is the leading infectious cause of corneal blindness among developed nations. It can remain dormant in nerve structures for years after the initial infection has healed—until it is reactivated by fever, sun exposure, a menstrual period, trauma (including surgery), or nothing at all. It can emerge in one or both eyes, causing inflammation or infection of the cornea, the eyelid, the membrane inside the eye (conjunctivitis, or pink eye) or middle layer of the eye (uveitis).

Earlier RPB-supported research indicated that 98% of all people in the U.S. may carry HSV-1, even though they may not exhibit symptoms. The

virus can be transmitted by kissing, sharing eating utensils, or by sharing towels. HSV-1 lesions can be spread by touching an unaffected part of the body, including the eyes, immediately after touching a herpes lesion. Transmission can be reduced by washing hands with warm, soapy water and avoiding kissing if a lesion is apparent or developing.

While there is no way to eliminate the virus in the body, researchers have recently determined that taking oral antiviral medications after HSV infection may reduce the risk of these recurring eye-related manifestations of the disease. They suggest that preventive oral antiviral treatment should be considered for patients with frequent recurrences of corneal diseases such as epithelial keratitis (infection of the top layer of the cornea), stromal keratitis (infection of deeper layers of the cornea), blepharitis (eyelid infection) or conjunctivitis.

## New Treatments for Eye Diseases Right In Front of Our Eyes

Recently, RPB researchers reported that existing compounds may have use as treatments for eye conditions. Drugs used in psychiatry and neurology as mood stabilizers and anti-epileptics may provide a novel treatment for preserving vision in individuals with ischemic injury (shortage of the blood supply) to the retina. Some non-steroidal anti-inflammatory drugs (NSAIDs) may inhibit the damaging, excessive blood vessel growth (called neovascularization) that is a defining feature of wet age-related macular degeneration, retinopathy of prematurity and proliferative diabetic retinopathy. Compounds called polyphenols (found in plants, including berries and tea) may also assist in delaying, slowing or treating certain types of retinal degenerations, including retinitis pigmentosa.



# Researchers Repair Scarred Corneas with Stem Cells

Every year, thousands of people around the world accidentally burn their eyes with cleansers or other chemicals, damaging the tissue that keeps the cornea clear. Many more people develop corneal blindness from viral or bacterial infections.

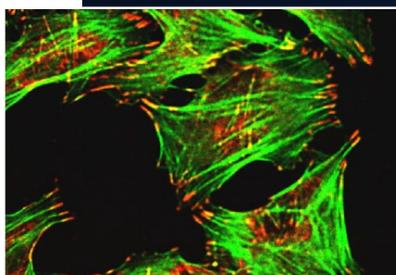
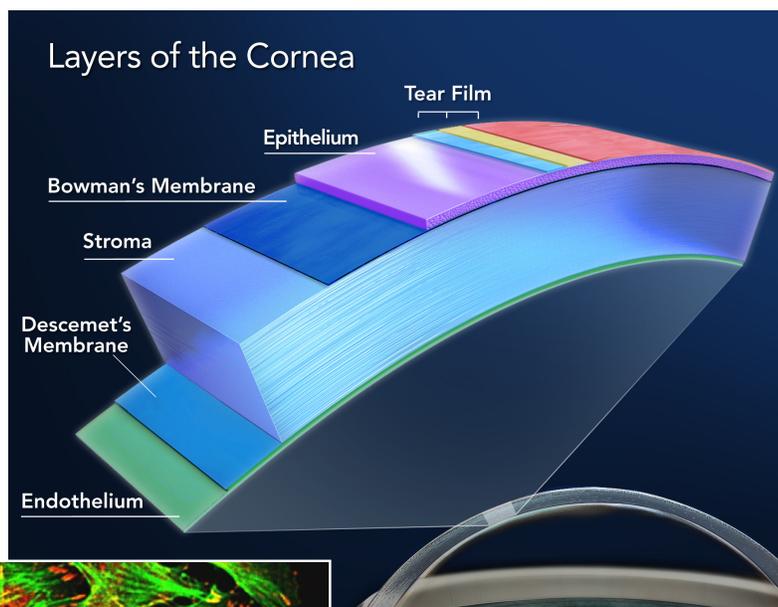
Current treatments for these injuries require transplantation of donated human or artificial corneas. These transplants permanently weaken the cornea, often require ongoing doctor visits, and sometimes undergo rejection. Due to a shortage of tissue in eye banks, transplantation is not available to most of the people in the world with corneal scarring. Making it all worse is that when people have LASIK surgery to correct vision, the cornea can no longer be used in transplantation, which means even less tissue to go around.

Recently, researchers have shown high rates of success using a patient's own stem cells to restore sight lost to damage of the outer layer of cells. The treatment involves taking stem cells from a patient's healthy eye, multiplying them in a lab and placing them into the burned eye where they replace the damaged tissue.

"There are a number of labs around the world using this approach," says James Funderburgh, Ph.D., an RPB Jules and Doris Stein Professor at University of Pittsburgh School of Medicine. "It's important work and great news for people with that type of injury."

However, outer layer burns represent a small percentage of cases of corneal blindness, according to Funderburgh, whose lab is working to develop a treatment for the more prevalent causes of corneal blindness.

"The cornea is made up of several tissue layers," he explains. "Each of these is necessary for vision. The outermost layer of cells is called the corneal epithelium. It is a very thin layer, vulnerable to



*Fibroblasts, shown here, are cells that repair wounds by creating non-transparent tissue. A new treatment introduces stem cells into scarred eyes where they replace fibroblasts, produce transparent corneal tissue and do not trigger a rejection response.*

trauma and chemical burns, but it almost always heals quite quickly without scarring. The major tissue in the cornea is called stroma, and most corneal blindness is due to stromal damage. Stromal scars can result from viral or bacterial infections, genetic diseases, chemical or thermal burns or trauma. Stromal scarring is permanent and affects eight million people world-wide."

The good news is that Funderburgh's lab is developing a stem-cell therapy for this major cause of corneal blindness.

"Our lab has discovered and expanded human stromal stem cells, obtained from donors" says Funderburgh. "We have shown that when these cells are injected directly into the cornea they repair stromal scarring. We are working to develop an off-the-shelf product that could treat people anywhere in the world, without surgery, in a simple medical setting such as a walk-in clinic."

# RPB: Investing in Vision for 50 Years

**Yesterday** RPB, founded by ophthalmologist Dr. Jules Stein, led the drive to create the National Eye Institute, sponsored the creation of eye research centers across the U.S., launched a program to upgrade ophthalmology to departmental status at medical schools and supported studies leading to nearly every advance in eye science in the last 50 years including the adaptation of the laser for eye surgery, the development of vitrectomy and the use of anti-angiogenesis drugs for eye diseases.

**Today** RPB is recognized as the catalyst behind a Golden Age of Eye Research. Cutting edge treatments for nearly every blinding disorder are being explored at RPB-supported labs. Fifty-six U.S. medical schools and 157 scientists are supported by RPB grants for basic, clinical and translational research and 1,000 studies are published in peer-reviewed journals every year citing RPB support.

**Tomorrow** Your support, coupled with RPB's broad-based program covering the entire spectrum of eye diseases, will produce new treatments, screening devices and the ability to prevent blindness before it occurs.

Contributors to RPB, both large and small, are critical to the success of our efforts. You, too, can help pass the gift of sight to others. You might:

- Simply mail your gift by check or contribute online at [www.rpbusa.org/rpb/invest/contribute](http://www.rpbusa.org/rpb/invest/contribute).



*Dr. David K. Wallace, Duke University School of Medicine, received the RPB Walt and Lily Disney Award for Amblyopia Research to develop tests that improve doctors' ability to diagnose amblyopia (lazy eye). He is shown here performing a fixation preference test on a young patient. It is estimated that three percent of children under six have some form of amblyopia which, if left untreated, can result in legal blindness in the affected eye.*

- Donate real estate, life insurance or contribute stock.
- Establish a Charitable Remainder Trust (CRT) that enables you to provide for yourself and/or your family—and to support eye research as well.
- Include RPB in a bequest.

**FIND OUT HOW:** Call RPB at 1-800-621-0026 to learn more about bequests or any of the other above options. Consult with a financial advisor and talk to your attorney regarding the final form of any lifetime or testamentary transfer.

**ALL GIFTS AND BEQUESTS ARE TAX DEDUCTIBLE.** Research to Prevent Blindness, Inc. (RPB) is recognized by the U.S. Internal Revenue Service as a publicly supported tax exempt organization under section 501(c)(3) of the Internal Revenue Code.

## WHY IS RPB DIFFERENT from other charitable non-profit foundations?

- It is the only public foundation supporting research seeking preventatives and cures for *all* diseases of the visual system that damage and destroy sight.
- It supports scientists at every stage in their career, from medical school fellowships to senior scientific investigator awards.
- With no more than a handful of employees at any time during its 50 years of service, it has the smallest professional staff among all major non-profit foundations in the country.
- Since it conducts no expensive special events or mass public mailings, its fund raising cost ratio has always been held to less than 2%.
- Through a special fund created by RPB's founder, contributions totaling up to one million dollars are matched, thus doubling the value of gifts received during any calendar year.
- The names and addresses of contributors to Research to Prevent Blindness (RPB) and prospective donors are never shared with any third party.



**Research to Prevent Blindness**  
645 Madison Avenue • New York, NY 10022-1010 • 212-752-4333 or 1-800-621-0026  
FAX: 212-688-6231 • Web site: [www.rpbusa.org](http://www.rpbusa.org) • e-mail: [inforequest@rpbusa.org](mailto:inforequest@rpbusa.org)