



Research to Prevent Blindness

NEWS

FALL 2014

EYE RESEARCH MATTERS

Vision Loss by the Numbers

A recent survey of Americans' attitudes about vision loss (supported by funding from Research to Prevent Blindness; commissioned by Research!America and the Alliance for Eye and Vision Research) indicates that across all major ethnic groups, a majority of Americans are most concerned about loss of independence and reduced quality of life as a consequence of vision loss. Here are some facts that emphasize why finding ways to prevent vision loss and blindness is so important.

- **80% of the information we perceive is from our eyes.**
- **33% of the brain is devoted to visual processing.**
- **285 million people worldwide were visually impaired, with 39 million blind, as reported by the World Health Organization in 2010.**
- **4.2 million Americans over the age of 40 are blind or visually impaired (1.3 million blind / 2.9 million visually impaired).**
- **31% of men and 75% of women with visual impairment in the U.S. are not working.**
- **7.2 million Americans are projected to be blind or have vision loss by 2030.**

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Wear them. That's the bottom line takeaway from a new, RPB-supported study that confirms previous concerns about a combination of where you live, time spent in the sun and whether or not you wear UV-blocking sunglasses. In essence, the findings indicate that people of European descent who live far from the equator and work outdoors surrounded by highly reflective snow or water have nearly four times the risk of developing exfoliation syndrome (XFS), a leading cause of secondary open-angle glaucoma. The same blend of genetic and environmental factors also can lead to an increased risk of cataract and cataract surgery complications.

The study also found that just wearing a wide-brimmed hat didn't lower the chances of developing XFS. That info, combined with an association between XFS and work over snow or water, led researchers to conclude that light from reflective surfaces may be an important type of exposure in the development of the syndrome.

The condition occurs when a whitish extracellular material builds up on the lens of the eye and is rubbed off the lens by movement of the iris. At the same time, pigment is rubbed off the iris and both materials clog the eye's fluid drainage tissue known as the trabecular meshwork, leading to elevated intraocular pressure and glaucoma. While not all persons with exfoliation syndrome develop glaucoma, if you have XFS, your risk is six times greater. All the more reason to wear those sunglasses.



Research to Prevent Blindness

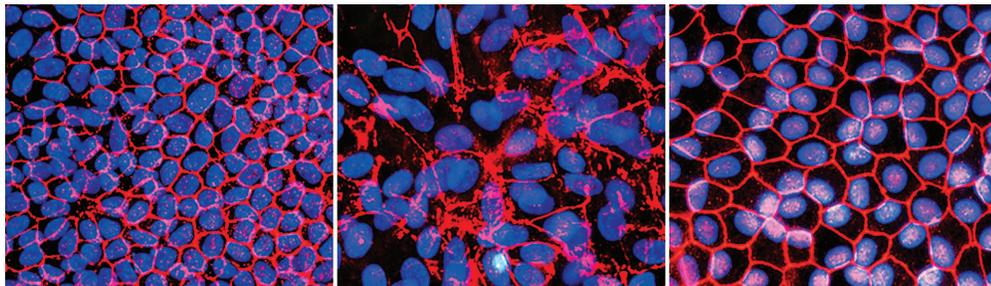
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- **The current, total annual economic burden of vision loss and blindness in the U.S. is \$145 billion (including medical costs, assistance programs, productivity losses, long-term and informal care, and costs of transfer and entitlement programs).**
- **The National Eye Institute's entire 2014 budget is less than one half of one percent of this annual cost of vision loss and blindness.**
- **The total U.S. vision loss and blindness economic burden is expected to reach \$717 billion by 2050 after adjusting for inflation—and the government is projected to pay more than 40% of that cost.**
- **The estimated cost of treating vision loss and blindness is \$6,680 per patient per year, at present.**
- **The federal government spends an average of only \$2.10 per person each year on eye and vision research.**
- **82% of Americans, across all major ethnic groups, say that it is important that the nation supports vision research.**
- **80% of blindness worldwide is preventable (with timely access to treatment and education about healthy practices to slow or prevent blinding conditions).**

Download the survey results at www.rpbusa.org.



Stephen H. Tsang, MD, PhD

Stem Cells Meet Gene Therapy

Scientists are steadily developing new ways to use stem cells derived from human skin cells for various purposes. As shown here, stem cells from a normal individual (left) and from a patient with a form of retinitis pigmentosa (middle) were induced to become retinal pigment epithelial cells. The cells derived from the patient show abnormal protein (red) surrounding the cells (blue). This defect was corrected by gene therapy treatment (right), showing it is possible to correct a genetic defect in induced mutant cells. This methodology provides a way to test patient-specific gene therapies in a dish.

Why Cold Air Causes Dry Eye Pain

Normally, between blinks, the temperature on the surface of the eye drops 2 degrees Celsius or less and most of us barely notice. It takes a fairly significant change in air temperature to register on the nerves in your cornea (the tough, clear surface of the front of the eye). But if you have dry eye – and 20% of the world's population does – then exposure to a little cold air or a slight drying wind can be painful. Scientists have recently found that, due to the chronically higher salt content in the tears of dry eye patients (hyperosmolarity), the sensitivity of certain corneal nerves is altered and they respond to even the slight cooling between blinks, carrying the painful information to the brain. Researchers are now trying to determine the cause of this hypersensitivity in order to develop a new therapy for dry-eye-induced discomfort. Current options for dealing with this condition include using osmolarity-correcting artificial tears and wearing goggles in winter to block cold air and minimize evaporation.

Please Pass the Fish

Researchers have shown for the first time that lipids derived from omega 3 fatty acids known as DHA and EPA—plentiful in cold water, fatty fish such as salmon and tuna—can inhibit leaky blood vessel growth (angiogenesis) that causes vision loss in the wet form of Age-Related Macular Degeneration (AMD). AMD is already the leading cause of blindness in the elderly of industrialized countries and its prevalence is projected to increase 50% by the year 2020.

“Current treatments for wet AMD involve intravitreal injections targeting growth factors. While effective, one-sixth of treated patients progress to legal blindness,” says Kip Connor, PhD, Harvard Medical School and recipient of an RPB Special Scholar Award. “Given the prevalence of neovascular eye disease, the potential impact of this study is highly significant, especially since nutritional interventions are safe, inexpensive, and readily put into practice. We hope to develop therapeutics that result in a greater visual outcome and quality of life for patients.”

A GIFT TO RPB CAN SAVE SIGHT

Research to Prevent Blindness, Inc. (RPB) is the only public foundation supporting research aimed at treating, preventing or curing all diseases that damage and destroy vision. Your support is critical to the success of our efforts. Contributions totaling up to one million dollars within a calendar year are matched, effectively doubling your gift. ALL GIFTS AND BEQUESTS ARE TAX DEDUCTIBLE.

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