

**Myopia: Focusing a Blurry World**  
Biomedical Breakthroughs and My Life

Alice Mar-Abe

February 27, 2009  
Mrs. S. Bass  
Washington Middle School  
2101 South Jackson St.  
Seattle, WA 98144  
Western Washington

What if everything beyond a few feet away from you looked like a hazy wall of color? This is what it's like to have myopia, without the help of eyeglasses, contact lenses, or eye surgery. I have myopia, and without my glasses, my life would be pretty frustrating. I wouldn't be able to play basketball, learn Chopin nocturnes, read good books, and even participate in school. More than 70 million Americans, a quarter of our population, share this problem. We depend on biomedical research to live normal lives.

People with myopia, or nearsightedness, can see objects close to their eyes clearly, but distant objects are blurry blobs. They can experience eye strain and fatigue. Symptoms often emerge during childhood. I needed eyeglasses by third grade. My mom, dad, grandparents, aunts, uncles, and many cousins also suffer from myopia, so it makes sense that myopia is thought to be hereditary!

Myopia occurs when the retina, cornea, and lens are out of sync. When the eye works normally, images first pass through the cornea, a transparent membrane that bends light rays near the front of the eye, and the lens, which focuses this image. The cornea and the lens interact with the retina, a light-receptive membrane on the back of the eyeball that transmits images to the brain, to create sight.

Axial myopia means that the eyeball is too long, causing the cornea to focus images too far in front of the retina. With refractive myopia, the lens and cornea are too powerful to create a distinct image for the retina. Either way, the result is fuzzy vision.

The simplest treatment is concave eyeglasses, a 16th century biomedical breakthrough! Glasses relocate the focal point of the eye to create a clear image.

Contact lenses do exactly the same thing, but placed directly on the eye instead of perched outside the face. They also naturally move with the eyes and provide a full

vision field. Hard lenses are long-lasting but less comfortable; soft lenses are more comfortable but require intensive cleaning.

However, neither glasses nor contacts cure myopia; they only temporarily improve sight. In fact, wearing eyeglasses worsens myopia by making the eye dependent on them, creating a need for increasingly strong prescriptions! Luckily for us, there are ways to actually restore vision. In recent years, many surgical procedures have been developed, such as Photorefractive Keratectomy, or PRK, Radial Keratotomy, or RK, and Laser In Situ Keratomileusis, or LASIK. All use lasers to flatten the cornea. PRK uses a laser to remove a slim layer of corneal tissue, RK utilizes small incisions around the edges of the cornea, and LASIK cuts a flap on the cornea's surface and removes some underlying tissue. These procedures don't work for everyone.

There are other options that don't involve parts of the eyeball being removed. Another option is phakic intraocular lenses, plastic or silicone eye implants placed in incisions near the iris. These correctly bend light as it enters the eye, in the place of the cornea.

There are also ways to correct vision without surgery. Orthokeratology uses special contact lenses that reshape the corneal surface overnight. The reshaped eye lasts long enough for one day of restored vision. This decades-old concept gained FDA permission in 2005. "Eye exercises" are another therapy. Both of these techniques are controversial, as not all scientists agree on their effectiveness.

New myopia treatments are developed with the help of human volunteers. Surprisingly, scientists have also been able to use animals in their research. A New Zealand team used chicks and tree shrews to study how eye growth influences myopic creep, or deteriorating myopic condition. Another team in China put Rhesus monkeys to

work at identifying the direction of a computerized "E." They hope to find the gene that creates myopia.

Biomedical breakthroughs such as eyeglasses, contact lenses, and laser surgeries have already focused millions of blurry worlds. I am grateful for all of the research that has improved the quality of life for me, my family and friends, and countless others across the globe. I hope that in the future scientists will discover ways to cure or even prevent myopia!

## Reflection

Through my work on this paper, I got to learn about a condition that about one in four Americans has, including me. When you think about it, this is a huge number! However, when I first started writing this paper, I didn't realize the full impact of myopia—it seemed to me just a condition that a lot of my family and friends were born with. Now that I have had the opportunity to explore this topic, I understand how lucky we are to have treatments such as glasses, contact lenses, and laser surgery available to us, and how it would affect my own life to go about with fuzzy vision, unable to function without a considerable amount of extra effort. I think it's truly wonderful how so many scientists have devoted their careers towards searching for biomedical breakthroughs!

## Bibliography

Crater, John. Sudden Vision: The RK Procedure for Nearsightedness And Other Wonders of Modern Ophthalmology. Thorofare, NJ: SLACK Inc., 1990.

Lochridge, Tanya. "Clear Vision Ahead." Current Health 2. 11/1/1999: 27.

"Monkeys watch eye chart to help locate human myopia genes." 1/19/2007. People's Daily Online. 19 Feb 2009.

<[http://english.peopledaily.com.cn/200701/19/eng20070119\\_342950.html](http://english.peopledaily.com.cn/200701/19/eng20070119_342950.html)>.

Orr, Tamra. "I Can See Clearly Now." Current Health 1. 3/1/2002:18.

"Phakic Intraocular Lenses." 4/22/2005. U.S. Food and Drug Administration. 17 Feb 2009.

<<http://www.fda.gov/CDRH/phakic/whatare.html>>.

Phillips, John R, Mohammad Khalaj, and Neville A. McBrien. "Induced Myopia Associated with Increased Scleral Creep in Chick and Tree Shrew Eyes." The Association for Research in Vision and Ophthalmology, Inc. 19 Feb 2009.

<<http://www.iovs.org/cgi/content/abstract/41/8/2028>>.

Schechter, Barry. "Vision Quest." Scholastic Choices. 2/1/2003:26.