CARPE DIEM!
Andrew Neals, UK

I used to have fantastic eyesight and spent more than 34 years flying aircraft in the RAF. At the age of 52, I was thinking of leaving the RAF to pursue a second career in the civilian aerospace industry. I had noticed my eyesight was deteriorating but simply put it down to getting older.

However, things started to get worse. I had misty vision on first waking up, glare from headlights when driving at night, and a worsening long distance vision. I decided to go to a consultant and was diagnosed with Fuchs’ Corneal Dystrophy.

In the summer of 2010, I noticed a real soreness in both my eyes and I put it down to larking around in the swimming pool with my grandson. On returning home, I went to our local optician. She was concerned that I either had an infection, or possibly a burst blister as the Fuchs’ had become much more pronounced.

I was referred to a doctor at the Bridgend Eye Clinic, Princess of Wales Hospital, Bridgend. His conclusion was that I had a blister on my cornea, which had burst, and this is what was giving me the feeling of having a piece of sandpaper in my eye. He prescribed some medication and said it was up to me when I should come back to him for surgical help but, as I lead an active lifestyle, he suggested that I would wish to undergo surgery within the year. How right he was.  

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High-Order Aberrations and Corneal Transplantation for Fuchs Endothelial Dystrophy

You might have heard the terms “aberrations” or “high-order aberrations”, but what are they, and do you need to worry about them? Eye doctors often refer to high-order aberrations as “irregular astigmatism” and they result in vision not being sharp or being degraded by starbursts or halos, especially around lights. All normal eyes have some high-order aberrations, but usually small enough not to upset vision. However, larger degrees of high-order aberrations can occur, especially after penetrating keratoplasty (PK), thwarting visual outcomes. High-order aberrations can originate from any irregular surface in the eye, but especially from the front surface of the cornea because of the large change in refractive index at that surface compared to any other in the eye. The front corneal surface after PK was frequently irregular because of wound construction and corneal sutures, and this often resulted in suboptimal vision, even with thick or distorting glasses. For Fuchs dystrophy, with the treatment trending away from PK and towards endothelial keratoplasty (EK), eye doctors assumed that high-order aberrations were also in the past, but that is not entirely true.

After studying the visual outcomes and optical function of the eye and cornea after EK, we have learned that high-order aberrations still exist and can still upset vision after EK. Although visual outcomes have improved with EK, with the major advantage over PK being better uncorrected (without glasses or contact lenses) vision, best-spectacle-corrected vision after EK often remains less than 20/20 because of high-order aberrations.

High-order aberrations arise from the front and back surfaces of the cornea, but the front surface aberrations dominate because of the much larger change in refractive index at that surface. In normal corneas and corneas after PK, the front and back surfaces are parallel, and therefore aberrations from the back surface counteract those from the front surface to a small degree. But after Descemet-stripping endothelial keratoplasty (DSEK or DSAEK), the surfaces are no longer parallel and aberrations from the back surface can add to those from the front surface, depending on how the graft conforms to the shape of the host cornea resulting in parallel surfaces. Therefore DMEK offers the potential for better vision compared to DSEK. But there are no rigorous randomized clinical trials data to indicate exactly how much better vision can be after DMEK than after DSEK, and the role of the front corneal surface, which dominates aberrations, would be the same with either procedure, but is often not considered.

How does the front corneal surface contribute to high-order aberrations after EK if the front surface is not surgically altered as it is with PK? We are learning that the front surface of the cornea can be irregular in Fuchs dystrophy, i.e. the underlying disease process rather than the type of EK. This irregularity probably begins earlier in the course of disease than at which EK is usually performed, and can persist after EK resulting in increased high-order aberrations and vision short of 20/20. The cause of front surface irregularity in Fuchs dystrophy is not fully understood yet, but it is probably related to known abnormalities in cellularity and structure in the front of the cornea.

The degree of high-order aberrations after EK should not be the sole factor that influences which type of EK to have for Fuchs dystrophy. Although high-order aberrations do affect vision, different types and mixes of aberration have varying effects on vision, i.e. not all aberrations affect vision equally. The choice of corneal transplant procedure should depend more on its impact on quality of life, which may be minimally improved by small improvements in vision, and to the long-term success of the procedure, so that patients obtain the highest value and benefit of care over their lifetime.

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Professor & Chair of Ophthalmology  
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Dr. Patel was a guest speaker at the July 2013 Milwaukee Symposium. DVDs of the symposium are available on the CDF website.
HELPFUL TIPS:

1. **Take eye breaks.** Give your eyes a break by focusing on something other than on your computer. A good rule of thumb is the 20-20-20 rule: Every 20 minutes, take your eyes off your computer and look at something 20 feet away for at least 20 seconds.

2. **Blink often to refresh your eyes.** People blink less often when working at a computer, which can result in dry eyes. Blinking produces tears that moisten and refresh your eyes.

3. **Consider using artificial teardrops.** Over-the-counter artificial tears can help prevent and relieve dry eyes that result from prolonged sessions at the computer. Your doctor can suggest which drops might be best for you. Avoid eye drops with a redness remover, as these may worsen dry eye symptoms.

4. **Improve the air quality in your workspace.** Help prevent dry eyes by using a humidifier, lowering the thermostat and avoiding smoke.

5. **Practice relaxation.** Place your elbows on your desk, palms facing up. Let your weight fall forward and your head fall into your hands. Position your head so that your hands cover your eyes, with your fingers extended toward your forehead. Close your eyes and take a deep breath through your nose; hold it for four seconds, then exhale. Continue for 30 seconds.

6. **Get appropriate eyewear.** If you wear glasses or contacts, make sure the correction is right for computer work. Most lenses are fitted for reading print and may not be optimal for computer work. Glasses or contact lenses designed specifically for computer work may be a worthwhile investment.

UPCOMING EVENT!

**2015 CORNEAL DYSTROPHY SYMPOSIUM**

When: May 8 – 10, 2015
Location: San Diego Area

Note: date and location specifics to be confirmed. To receive updates, visit us at www.cornealdystrophyfoundation.com

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“A donation in support of the amazing support and education you give to those of us with compromised vision. Thanks to you, I found the right surgeon for me and now have almost 20/20 eyesight. Truly a miracle! With deepest gratitude…Carol”

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CARPE DIEM! continued

For the surgery, the doctor suggested that, even though I had no cataract problem, I should nevertheless have the cataract operation, and then a DSAEK transplant in both eyes, with an interval of 3–4 weeks between cataract and DSAEK in the first eye, and then 6 months before the same process in the second eye. He recommended that, rather than doing the cataract and DSAEK in an eye during the same operation; the cataract should be done first, with a suitable short interval before conducting the DSAEK.

We went for this first procedure in March/April 2011, a few months before my 63rd birthday. The immediate result of the cataract operation was that my vision was more “sparkling and silvery”. I had the DSAEK 4 weeks later on a Saturday morning. I wore an eye guard at night and a pad over the eye during most of the next few days. On the following Wednesday it was time to go live. When I woke up in the morning the first words I said to my wife were “Wow – this is fantastic!” reading better than the requirement for a UK driving license.

That eye alone was reading better than the requirement for a UK driving license.

Six months later, I went through the same process on my right eye. Within a fortnight, my combined eye vision was back to what it was when I was just 18 years old. Two years later I still read the penultimate bottom line on the eye test chart with both eyes open or just one eye, and easily read the bottom line through a pinhole.

As a result of my experiences, I would urge you to consider the following:

“Carpe Diem!” Seize the moment. Don’t wait. Go for the optimal solution right now so that you can enjoy life to the full!

Andrew is a member of the United Kingdom’s Fuchs’ Friends group. For Andrew’s complete story visit the CDF website.

Thank you to all our supporters for your contributions and participation.
We couldn’t do it without you!