

EM: Chapter 40: Ophthalmology – eyes are so very precious

Thank you Dr Jose Mendonca, brilliant facio-maxillary surgeon, for your ideas and insights

“The soul, fortunately, has an interpreter - often an unconscious but still a faithful interpreter - in the eye.”

Charlotte Brontë, 21 April 1816 – 31 March 1855, Jane Eyre

There seems to be a general acceptance that we will lose sight with age and little can be done to prevent. Not so! When sight is the prize, motivation and determination improve. Sight is so precious and prevention all important.

All eyes, mammals and insects, evolved in full spectrum sunshine

We have receptors in the retina for all wave-lengths - essential not just for vision but also our circadian rhythms. Sunglasses are not good for the eyes! A pin hole pupil protects the lens from light damage. Bright light is also essential for the eye to exercise the muscles of the iris and ciliary body.. Further protection is afforded by vitamin C - remember most eye damage is sugar driven! SO when indoors, use bright full spectrum light – ideally window light, or employ full spectrum and incandescent light bulbs. Artificial LED, halogen, blue light etc are no replacement.

Ensure good anti-oxidant status with vitamin See (whoops - I mean vitamin C).

The business of sight requires huge amounts of energy. The job of the retina is to convert the stimulus of a photon landing on it into an electrical signal that the brain can work with. The brain weighs 2% of body weight but consumes 20% of all the energy generated. The retina, weight for weight, demands energy at a rate ten times higher than the brain. No system can generate energy perfectly without some collateral damage. These damaging units are free radicals. For the chemist, free radicals have an unpaired electron – this makes them very sticky and in sticking they denature and damage to cause degeneration. Indeed, this is part of the mechanism that results in the three major eye diseases of cataract, glaucoma and macular degeneration. To mop up these free radicals we need an excellent anti-oxidant system - see chapter 36 for how to quench the inflammatory fire with good doses of antioxidant.

Spectacles drive pathology

There is a general acceptance that, especially with ageing, reading glasses become essential. However, it is biologically plausible, and there is excellent and growing evidence, that glasses cause macular degeneration, cataracts and glaucoma. How so?

We see because light is focused on the retina. However, it is not just the lens of the eye which achieves such, the whole of the eye is involved. We need to see at a distance and close to. To achieve such the lens is constantly changing shape, as is the whole structure of the eye! The muscles of the eye change the shape of the eye from a sphere to an egg and this pulls the retina forward for distance vision or back for close vision. Think about it – the ciliary muscles contract to focus on near objects - not only does this allow the lens to fatten, but its anchor is in the sclera, the tough but flexible shell of the eye, so this too will pull the eye into an egg shape so the retina falls back.

The eye needs constant exercise and practice to stay in focus. Essentially the shape of the eye is the coarse tuning whilst the lens is the fine tuning. For the connective tissue of the eye to remain elastic to allow these changes you need lots of vitamin See.

The problem with spectacles is they make the eye lazy – the muscles of the eye no longer have to work hard to focus the lens and keep the eyeball in shape. The muscles weaken through lack of exercise, so the eyeball and lens become stiff and out of shape. It is the old story - use it or lose it.

Spectacles, like drugs, are addictive and make for short term gain, long term pain. Why do we do it? Follow the money. Opticians make a fortune selling spectacles.

Age related long-sightedness

This is the commonest problem which manifests typically in the late 40s with difficulty reading. I suspect this is largely due to the lens stiffening due to vitamin See deficiency. The lens needs to be elastic so it can “fatten” to focus on things close to. If this elasticity is lost, the focal point is behind the retina. The same focusing problem arises as the ciliary muscle weakens with the lens not fattening and, guess what, lack of eye exercise renders them weaker. The eye elongates and becomes egg shaped to compensate.

Being short-sighted or myopic

The myopic eye is egg shaped, so the focal point is in front of the retina. The myopic eye can see objects close to, but distance vision is poor. Spectacles to correct distance vision perpetuates the egg shape.

The problems of an egg shaped eyeball

The vitreous membrane no longer fits snugly at the back of the eye – it starts to peel off - you see floaters.

The retina no longer fits snugly at the back of the eye – it starts to peel off - retinal detachment!

The blood vessels to the back of the eye may be stretched, so they are more vulnerable to damage from sugar and free radicals with potential for bleeds and macular degeneration

The quality of the vitreous humour changes so oxygen can diffuse more readily – the back of the eye is oxygen rich, the lens is oxygen poor – too much oxygen to the lens drives cataracts. Vitamin See further mops up the free radicals generated by oxygen.

The “plughole” or trabecular mesh work which drains aqueous humour of the anterior chamber lies in the angle between the iris and the cornea. This may be pinched as the eye goes egg shaped, so the aqueous cannot drain out. The pressure of the aqueous rises. This is thought to be the mechanism of glaucoma.

How to keep the eye ball in shape

Take vitamin See to bowel tolerance to keep elastic all the tissues of the eye

Exercise the eye. If you are doing close work, every so often look up and focus at something in the distance before returning to close work. A simple exercise is to hold a finger close to the nose and one at arm’s length – focus on one then t’other. As you do so you will see two copies of the other. Choose a hobby that involves looking at and focussing on things in the distance – such as ball games or bird-watching. When I go walking, I am glued to the sight of my terrier Nancy hunting in the distance!

Blink often – occasionally screw your eyes up tight to massage and stretch the eyeball

Always work in bright, full spectrum light.

If you already use glasses – where to go?

Wear a pair of glasses which are half a dioptré too weak. Initially things will be slightly out of focus.

Do all the above exercises wearing these weaker glasses and take vitamin See. After a few weeks, possibly months you will have sharp vision. Repeat the process with a weaker pair.

Do the above exercises to keep the eye in shape

If you apply this process to children, then change glasses by quarter of a dioptre at a time – the child may not want to see for other reasons (such as a really boring teacher) and not be so motivated to focus on distal objects. Play ball games, take ‘em hunting!

I no longer need glasses for reading. Dr Jose Mendonca, diagnosed with myopia and prescribed spectacles since age 11, now flies a plane and reads with minimal corrective lenses and improving since 2018.

In summary

What	Why	How
Focusing starts with light passing through the film of tears of the eye	Sjogren’s syndrome (dry eye) is very common	Avoid switching on autoimmunity (see Chapter 51). PK diet – water, fat and minerals are essential for proper hydration Blinking and screwing up the eyes massages the tear gland
Cataracts	Oxygen and sugar (free radical) damage to the lens	PK diet Vitamin See to bowel tolerance Do not wear spectacles or sunglasses
Glaucoma	Blockage to the flow of aqueous humour due to an egg shaped eyeball	Do not wear spectacles Do eye ball exercises as above to pull eye into a sphere Vitamin See to bowel tolerance
Macular degeneration	Impaired blood supply to the retina Free radical damage	PK diet Vitamin C to bowel tolerance Vitamin A essential for night vision (fish and carrots) Do not wear spectacles Do eye ball exercises as above to pull eye into a sphere
Retinal detachments		Do not wear spectacles Do eye ball exercises as above to pull eye into a sphere Vitamin See to bowel tolerance

Note from Craig – I wear spectacles for both long vision and short vision, and having just read this section, am now motivated to try out these easy solutions. I do the PK diet and Vitamin See interventions but will need to work on the ‘exercises’ and ‘eye-life-style’ interventions.

The fact that changing eye-ball shape has an effect on vision was determined (not first) by my mathematical hero, Sir Isaac Newton (1642-1727) in his famous ‘bodkin in the eyeball’ experiment. Newton inserted a bodkin (a long, flat needle) behind his eye and observed what effect the distortion of his eyeball shape had on his vision. More than this, he stimulated his retina in many spots and noted a "phosphene" or glowing spot that resulted from the pressure. From this he was able to "map" his own retina against where he saw the spots. This map conformed to the map on the back of a rabbit's retina that he had made by shining light from a window, through a pinhole, into the rabbit's eye that had an opening cut away from the sclera allowing him to see into the rabbit's eye. Thus, Newton showed how the rays of light enter our eye by an optical system now called the camera design and how

the retina represents the outside world but with inversion (up is down and left is right). This experiment is not recommended! It took a long while before Newton's eyesight returned to normal and he was lucky not to have blinded himself in pursuit of knowledge!

Acute Eye Symptoms

- Any loss of vision requires urgent assessment by a professional
- Any major inflammation or pain or eye injury needs the same
- Mild inflammations such as conjunctivitis can be effectively treated by iodine oil (make sure this is a very weak mix or it will sting something awful!) – see chapter 32
- Be incentivised by any eye symptom to re-read this section!