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Seeing to the end

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'Rage against the dying of the light', so wrote the Welsh poet, Dylan Thomas, to his dying father in 1951. He is referring to his father's impending death, but he uses the imagery of loss of facility and senses to convey this. For many, the fear of loss of sight is as great as death.

In an Australian study, over 65-year-olds named loss of vision and cancer as their two biggest concerns. From other research we have quantified the staggering 'costs' associated with the loss of functional vision to the sufferer, and to their carers. Loss of vision means loss of independence and leads to increased isolation and depression, increases the risk of injuries and falls, and can cause a reduction in length of life. So losing your vision is something to avoid if possible — but I suspect you knew that before now.

Ageing adds more perils to our health and our eyes are no exception. Most of the diseases that lead to loss of vision increase in frequency with age. It is great that we are all living longer, but it means we need to take a more planned and proactive approach to keeping our bodies functional.

Eyes are awesome

Let us take a moment to engage a little with our eyes — because they are remarkable. Almost all animals possess some form of eye, and eyes have independently evolved over four times — our human eyes are not a derivative of insect eyes, for example. Although we have some animal rivals for the best vision award,

humans have the best overall visual performance of any living creature. We also process and interpret images better than any other animal.

And we should be in awe of our eyes. For those with any experience with digital cameras, you will often be confronted with a megapixel (MP) count — this really means how detailed an image can the camera sensor record. For many cameras that is somewhere around 10 MP, or 10 million receptors (and that is a vast increase from the first digital cameras). This sort of image can give us a really nice standard photograph, which will work up to the size of a good print for the mantelpiece.

When they are working well, both eyes are 125 MP cameras and both are operating as movie cameras. More than that, they mostly working in unison and provide stereopsis, or the perception of three-dimensional vision. Our eyes adjust their sensitivity to light over a range that exceeds most cameras, and can colour balance almost instantaneously. And we can image stabilise in a way that we are unable to do except with very expensive hardware and software — so it doesn't feel like the world is moving when we are.

Eyes have two solid, optically clear parts: the cornea and the lens. Living tissue that is transparent is very unusual and requires very particular conditions to stay that way. Happily, the cornea usually remains clear over our life — but the lens mostly does not. When the lens becomes unclear or opaque we call this a cataract, but more about this later on.

Ageing eyes

One of the most obvious and unavoidable parts of ageing is the development of an attachment to reading glasses — usually at about age 45. In fact, as we age, we gradually lose the capacity to focus for near vision, until eventually we have vision that focuses at only one point. This process is known as 'presbyopia' and there are no known solutions to it. (Those that you see advertised are split-

ting the focus between the two eyes — one for near and one for distance. This may be a reasonable compromise if you really don't like glasses, but it is not the same as restoring variable focus to the eye.)

Presbyopia is due to an increase in the lens size inside the eye. The lens is a little bit like a glass onion, which keeps having layers added to it. Eventually, the layers make the lens so stiff that it cannot change in shape and thus no longer provides variable focus. In the most normal circumstances, it then becomes set for distance and you need to wear reading glasses, although there are many different varieties of this, particularly if you start off wearing distance glasses.

As presbyopia comes upon us, we notice that we have some decline in our ability to read as easily — better at certain times than others. The light, our tiredness, the type of print and contrast all make a difference. How well people manage the focus issues with age does vary — we all know of people in their eighties who read without glasses, but it is often because they have some short-sightedness, at least in one eye. Some people have quite small pupils which act as a 'pinhole' — this increases the 'depth of field' and thus allows reading some things without glasses better than someone with larger pupils.

In addition to the loss of focus, we do expect some loss of visual function with age. One recognisable and measurable effect of age is the recovery time from light stress. In practical terms, this is how long it takes for you to get used to the dark. Dark adaptation worsens with age irrespective of any eye problems. This is important because moving from lighter to darker areas really needs more care as one gets older as it takes longer for the eyes to adapt to the new low light. In other aspects it means generally as get older we feel less comfortable driving at night where there is a range of light intensities and we do not feel as comfortable in the low light.

Glasses

Many people fear that wearing glasses will make the eyes lazy — dependent on visual aids because one has worn them. This is not true. Wearing glasses does not hasten the process nor will not wearing glasses endanger you. Reading glasses are useful to reduce the tiredness one can feel and make reading easier and more enjoyable.

With increasing age we find that one set of glasses may not resolve all of our issues. But if you do have good distance vision, you can just put on a pair of 'over-the-counter' reading/magnifier glasses and these may work well. These pre-made glasses are not harmful and will not damage your eyes. But they are often not very good devices either — the lenses are of a lower quality, the frames have not been fitted to your head and nose, and the optical centre of each of the reading glasses has not been fitted to your head, which can be important. Nevertheless, they pose no threat, but equally they do not work as well.

Many people use multifocal glasses, a wonderful invention. Mostly, this means that the top part of the lens is set for distance and bottom part for near. Instead of there being a visible segment at the bottom of the lens (such as in bifocals), the lens power is graded (a synonym for these lenses is 'graduated'). Multifocal lenses come in a variety of different types, some a little bit more suited to reading vision and some a bit more suited to distance. This will matter very significantly as to how the user feels that they are fulfilling their tasks. A multifocal that is intended for distance and has only a small amount of reading may well frustrate the user who expected to be able to read better out of them, and vice versa.

All forms of multifocal and bifocals lenses have been known to increase the risk of falling. This is because they cause a blur where the feet are. Having reading glasses always at the ready is convenient, but if falls are starting to be a concern then consider whether glasses with a reading part in them are worth the risk.

Multifocals represent a compromise and as such, they may not be as good as glasses dedicated to a particular task. People who are struggling with their reading vision often do better with a pair of dedicated reading glasses. Dedicated (single vision) reading glasses do not require you to look down through the glass — which allows the glasses and the reading matter to be set up better. Multifocals are usually quite poor to read in bed with as when you look through anything other than exactly the centre of the lens, there is a significant amount of distortion. There is such a thing as near multifocals, which are excellent for people who want to sit and read and look at the computer, but they will sacrifice the distance vision.

Make sure that you talk carefully with your optometrist about what your needs and expectations are and how the glasses might be tailored to resolve these problems. A good pair of glasses is a wonderful thing and a bad pair can be very frustrating and even dangerous.

Glare

How do we manage this normal ageing? One corollary of this is the experience of glare. Glare is often managed with dark glasses. Many dark glasses though are designed for young sportspeople and have lenses that are way too dark for older aged people. More than that, some older folk do not like the modern glasses with the wraparound appearance and thus go for glasses that have a more traditional shape. These unfortunately do not work very well, as they let light in all around the sides of them and do not reduce glare significantly.

The best sunglasses as you get older are often those with a large frame, not too darkly tinted, and with less tint in the lower half of the lens to make seeing where your feet are more likely. The best sunglasses may also have your ‘refraction’ in them; in other words, they have your standard glasses script built into them. ‘Over-the-counter’ sunglasses often make it impossible to

read with them on and can make distance blur more obvious, so having some made for you maybe a good investment.

Photochromatic lenses go darker in the light and are very convenient but do have some disadvantages. These lenses do not lighten quickly when going into darker areas and thus pose a risk when moving from light to dark. Photochromatic lenses are often placed in normal glasses frames where the value in reducing glare is less as the frame is smaller, and they do not darken in the car because the car glass prevents the reaction in the lens.

Glare tends to make us want to lower the light, but if the light falls too low then visual performance drops off quite quickly — this is the 'flip-side' of the same issue. We need to optimise the light we read with — too little and reading ability will decline, too much and we will fatigue. Modern low-energy lighting actually produces less light although mostly it does not seem so — but for someone with reduced vision, changing the globes to new low energy can reduce their visual performance significantly. Low light contributes to falls — if you are changing the globes in someone's house with low vision be careful of the higher risk areas (for example, stairs) and perhaps suggest task lighting. The simple birthday present of a good head-torch can be greatly appreciated by the older person.

What causes people to lose their vision?

Although there are a range of eye diseases that can cause loss of vision, most of these do not cause sudden or complete loss of vision, and all of them have some treatment options, certainly more than they have had in the past. In order to institute some treatment or prevention, we really have to know what we are facing. This means watching out for visual symptoms and having an eye examination if you notice something or you are at risk — such as a family history of glaucoma.

The most common causes of loss of vision in our community are macular degeneration, glaucoma, cataract, and diabetic retinopathy.

All of these conditions get worse with age and all take some time to develop. They can all be detected with a routine eye examination, although sometimes it helps to be aware of the risks, particularly if you have a family history of glaucoma and, of course, if you have diabetes.

It is true that getting older usually involves some uncomfortable and sometimes unpleasant health experiences. Although we are fond of castigating those who deny their health problems, denial unfortunately is vital to managing. The important issue is to be clear about what you are going to ignore or deny. Denying some aches and pains in joints and spine is pretty much everyone's lot, but ignoring a risk of glaucoma could be disastrous.

Macular degeneration

Macular degeneration is a disease that affects the macula. Its full title is Age-Related Macular Degeneration (ARMD or AMD), which distinguishes it from other forms of macular degeneration. The macula is the central part of the retina, so named for its appearance; it is like a target. The macula is the bit that you use to read or focus on things; it is the area where light from the letter you are looking at or from the face you are trying to recognise or form the number you are trying to read, lands. Degeneration of the macular renders that tissue less effective, all the way to loss of central vision entirely with age.

The macula is a very unusual part of the retina and in fact has no blood supply in front it, relying entirely on the blood supply from behind. The retina is a beautifully constructed translucent structure which light passes through and is captured by the 'photoreceptors' at the back. Behind these receptors on the most outside layer is what is called the retinal pigment epithelium. This layer of tissue performs an amazing array of functions, including a barrier

for the blood vessels outside of it, which helps the flow of blood to the retina. The macula is under the most stress over one's lifetime, with light being focused on it and an immense turnover of chemicals related to vision. In macular degeneration, the retinal pigment epithelium loses function.

In general, there are two types of macular degeneration — 'dry' and 'wet' — although in reality the wet version is a complication of the dry. In dry macular degeneration we lose retinal pigment epithelial cells, and as a result some function of the retina overlying them. This leads to a loss of central sensitivity of vision evolving to patchy central vision and eventually to loss of sight. Dry macular degeneration is usually a slow process heralded by some changes that can be detected by looking in the back of the eye.

Disappointingly, dry macular degeneration is not a disease for which we have a lot of preventative strategies or remedies. There are some dietary supplementations, but for many, this will have no discernible value as its merit seems mostly in those who are fairly dietary deficient. We do know that smoking and a poor diet contribute (as they contribute to a range of diseases in adults). There are a number of tablets on the market, which include vitamins (antioxidants), zinc, and sometimes luteins and other pigments, but the evidence for their use is scant and it seems unlikely that dietary supplementation will have a large impact of dry macular degeneration.

Wet macular degeneration occurs where the retinal pigment epithelium (RPE) loses the waterproofing function and barrier function and allows vessels to come through underneath the retina. This is potentially disastrous and we now have good treatments for this, although they are cumbersome to administer, requiring injections into the eye of material that acts as a kind of weed killer for these new vessels. These injections are a great step forward, but the underlying dry macular degeneration still exists and progresses gradually with time.

There is a lot of research being undertaken in macular degeneration in the areas of prevention, genetics and treatment. One of the world class research units in macular degeneration is at the Royal Victorian Eye and Ear Hospital in Melbourne, and with its attachment to the Centre for Eye Research Australia, headed by Professor Robyn Guymer. Information is available to patients through the Macular Degeneration Foundation and through various other sources, including the American Academy of Ophthalmology (AAO).

Many people are concerned about the development of wet macular degeneration. One of the first symptoms of wet macular degeneration is distortion in vision, and using a grading pattern or regular pattern such as tiles, or a 'fly-wire' screen or the circled Amsler grid, are ways of detecting distortion.

Glaucoma

Glaucoma is a common disease affecting some 2.5% of the population after the age of 50. Glaucoma is painless and the loss of vision is often undetected as it occurs gradually and from the periphery. Glaucoma is the biggest cause of preventable blindness in Australia and the second most common cause of blindness in the world. Loss of vision from glaucoma can be devastating and produce extensive loss of peripheral vision, such that driving is impossible and safe independent living is threatened.

Mostly, glaucoma happens entirely without discomfort, redness and, in many ways, without being noticed by the person.

The first thing about glaucoma is to be aware of it and aware of the possibility. Glaucoma is a disease that is much more common as we age and much more common in people with a family history. Getting tested for glaucoma is simple, although it is not as simple as just having a pressure test. Many people with glaucoma do not have elevated or high eye pressure when they are first seen so we cannot purely rely on that.

Glaucoma is a disease that can be treated well. First line treatment these days is with drops or laser — in fact, there is a NHMRC funded study developed through one of the top eye research centres in the world, The Centre for Eye Research Australia, which is evaluating which is better in the long term.

In general, drops work quite well, but we need to be mindful of their side effects, which can range from local problems to having an effect on the whole of the body, including the heart and lungs. Laser, on the other hand, has very few side effects but does not work in everyone. Modern laser — selective laser trabeculoplasty (SLT) — is a safe procedure and can act as an alternative to using drops.

Sometimes glaucoma requires surgery, and happily glaucoma surgery has come a long way over the past 20 years. We now have a range of options for patients who require surgery for their glaucoma. There is almost always something we can do to slow or halt the disease, so sufferers should never accept the statement, 'there is nothing further we can do' without asking for a second opinion.

Glaucoma has very significant effects on the peripheral vision, which oddly enough can sometimes be unnoticed. This is because the lost areas do not appear as black; in fact, they just appear as blurred and objects can sometimes disappear in these areas. Loss of vision in the periphery can be disastrous for driving where objects and potentially pedestrians can be missed. Drivers' licensing boards now take a much stronger view around glaucoma and the requirement to prove good peripheral vision.

Cataract

Cataract is an opacity in the lens inside the eye and something which we are all likely to get if we live long enough. Cataracts are now very well treated: the new (artificial) lenses that go in the eye last forever. Cataract surgery offers the advantage of reducing the

need for glasses, a particularly big deal if you have had to wear strong glasses before surgery.

In general, cataract gets worse with age, and the development of cataract is inevitable although more common with a family history, trauma, inflammation and ill health. It also can come on with particular medications, particularly steroids, and it is worse with diabetes. Cataract produces all manner of different symptoms and can occur quite early in life.

The only solution for cataract is surgery, which involves the placement of a new lens inside the eye. That lens lasts forever and needs no maintenance, excepting for a laser to remove a film across the back surface of it in around 20% of eyes.

Cataract surgery is a modern miracle, with low rates of complication and discomfort and high rates of predictability. Cataract surgery is often called the most successful surgical procedure on earth and there is good reason to agree with that. Although it is obvious to say it, cataract surgery is successful only if the main problem is cataract. Cataract can coexist with macular degeneration, glaucoma and other problems and in this circumstance, successful cataract surgery may not yield the sort of improvement in vision the patient is looking for.

There is a lot of cataract surgery performed in Australia and there are those ophthalmologists who espouse certain techniques or lenses. By far the most common arrangement today is cataract surgery in both eyes, with lenses set either both for clarity for distance, or with one eye focus set for reading. Additions of more complicated lenses such as multifocal lenses or lasers to assist in cataract surgery do not produce demonstrable benefits for most patients. Cataract surgery as it stands is a highly evolved operation and one that, happily, is difficult to improve upon.

Look after your eyes — It works!

In general, we look after our eyes by having an eye check. We are not so good at self-diagnosing or sometimes even noticing subtle

changes, although more obvious changes will be detected. Many conditions in the eyes can be helped or headed off or even turned around, but they cannot unless you seek help. Often the first port of call is the general practitioner or the optometrist, but if anything significant has been detected or suggested, referral to an ophthalmologist (eye doctor) is the safest option.

Do not let the light die down from eye disease — raging won't help, prevention and good care will.