The Vision Centre

Australian Research Council Centre of Excellence in Vision Science

MEDIA RELEASE

January 7, 2009

UNCOVERING THE KEY TO LONG, HEALTHY VISION

Humans are starting to outlive their eyeballs – and need to take much greater care of their vision early in life if they wish to keep it in old age.

A team of Australian researchers led by Professor Jonathan Stone of The Vision Centre say there is now persuasive evidence that cumulative exposure to light all through life causes deterioration and loss of sight in age.

“We’re born with about 150 million light-sensitive cells – known as photoreceptors – in each eye. All through our life we lose these at a steady rate of hundreds every day, but some people lose them much faster than others, with the result that they go blind – sometimes quite early in life.”

These light-sensitive photoreceptors are remarkably tough, and most people still have 100 million or so left by the time they reach their 70s or 80s, Professor Stone says. However in later decades of life the individual is starting to outlast their eye cells and eyesight begins to dim.

“The eye contains a great many highly-specialised genes, which affect no other part of the body, and these in turn produce many random mutations. It is these mutations which make the normally gradual degeneration of the retina more acute in some people than in others.

“However our research clearly indicates that there are also environmental factors at work which cause the eye to lose photoreceptors more rapidly, especially in people with a certain genetic makeup.”

When light enters the eye it triggers a ‘beautiful’ cascade of chemical reactions, some of which our brain processes and recognises in the form of vision, he says. “But this cascade of events also causes collateral damage to the eye so, in simple terms, light both causes us to see and also harms the organ we see with by causing oxidative damage to the vision cells.

“We do extraordinary things with light – but we also pay a high price for it.”

This loss of photoreceptors leads to gradual dimming of vision in advancing age, which is first noticeable from the eye’s failure to detect very faint light in dark conditions. Ultimately it can lead to complete loss of vision.

The main way to avoid this is to limit the amount of light entering the eye throughout life, but especially during middle and old age. “Most sunglasses will reduce by 25-50 per cent the amount of

outdoors light from entering the eye and, knowing what I now do as a result of years of work in this field, I never go outside without my sunnies," Prof. Stone says.

"Other groups at the Vision Centre have found a certain amount of light is necessary to prevent eyeball distortion and myopia in childhood and adolescence – and this is a beneficial effect.

"But we should be aware that harmful effects also result from over-exposure to light, so it is a case of striking the correct balance between more outdoor exposure in youth, to prevent myopia, and greater use of light protection in the form of sunglasses to prevent age-related degeneration.

"After the eyeball has stabilised, from one's 20s on, it is a good idea to wear protection at all times when in bright conditions.

"This will result in a larger population of photoreceptors in advanced age, and will be especially important for those whose genes predispose them towards the loss of these vital cells."

Another reason loss of vision is becoming more common is that society commonly protects people who suffer from early loss of sight. "Among wild animals those with mutations leading to loss of sight would not survive and so their genes would be lost from the population gene pool. Nowadays we are preserving far more of these mutations in the human gene pool," he explains.

However the good news is that damage to the photoreceptors may be treatable. Recent experiments point to a diet high in protective antioxidants as one way to slow the loss of vision into age, and new research is uncovering other methods by which damaged sight may even be improved.

"It appears that by managing the oxygen levels in the eye, through diet and other methods, we can slow down and possible even reverse the loss of photoreceptors, and we are planning a clinical trial to test this idea," Prof. Stone says.

"If it confirms what we think is going on in the eye, then it may be possible both to preserve sight into old age much better – and maybe even to improve it by some quite simple treatments."

More information:
Professor Jonathan Stone, The Vision Centre, University of Sydney and Australian National University, ph +61 (0)2 93827279 or + 61 (0)2 9351 4740 or 0400 582 766
Professor Trevor Lamb, The Vision Centre, ph +61 (0)2 61258929 or 0434022375
Professor Julian Cribb, The Vision Centre media contact, 0418 639 245