RCVS Fellowship Day 2017

Fellows in Focus: Causes and cures for cataracts

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Veterinary ophthalmologist, David Williams, discussed the underlying causes of cataracts and how better understanding these causes could help slow their development in both animals and people.

He began by explaining how cataracts developed. The lens of the eye was almost entirely protein, he said, and these proteins were formed during gestation. It was not normally possible to see through a mass of protein – he cited the example of sirloin steak – so what made the lens transparent?

He explained that the proteins forming the lens were tightly packed together, and contained cysteine amino acids. Cysteine contained a sulphydryl (–SH) group. This was a 'phile' group and attracted water to itself. Just enough water was attracted to keep the proteins in a liquid crystal formation, making them transparent.

However, the purpose of the lens was to focus light on the retina, so light would be passing through it all the time. Light caused photo-oxidisation of the –SH groups in cysteine to produce a disulphide bridge. Too many disulphide bridges would cause the proteins to aggregate and too many aggregated proteins would produce a cataract.

So, a lens with cataracts was always in an oxidised state, Dr Williams said. He had been funded by Waltham to look at the occurrence of cataracts in 2,000 normal dogs and at whether a diet rich in antioxidants would help slow their development. He had found that, by 11 years of age, every dog he examined as part of the study had shown evidence of cataracts.

The next stage was to look at whether cataract formation could be prevented or slowed.

One hundred dogs had been fed diets containing a variety of antioxidant formulations. He found that antioxidants that would be typically found in fruit and vegetables, such as vitamin C, vitamin E, flavonoids and carotenoids, were quite good at slowing down cataract formation. However, a single molecule – alpha-lipoic acid – was found to slow down cataract formation in ageing dogs and also prevented diabetic cataracts forming in dogs with diabetes.

Dr Williams suggested that the dog was a much better model for cataracts than the typical mouse or rat model used in medical research. The canine eye was a similar size to the human eye and the lifespan of a dog was longer than that of mice and rats. Dogs were also fed a variety of diets.

From an ethical point of view, dogs were also better models – they would benefit from having the development of cataracts slowed.

However, it was a challenge to persuade the medical community to take the findings on board.

He concluded that alpha-lipoic acid could allow people to ‘live to see better for longer’!