



"YOUR DOG NEEDS BIFOCALS"
GERIATRIC CHANGES IN THE EYES OF DOGS AND CATS
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Several "normal" aging changes occur in the eyes of dogs and cats. Occasionally, these changes need to be differentiated from possible pathologic problems which may present in a similar manner.

LENTICULAR SCLEROSIS

The most common change noted in the aging animal is lenticular sclerosis, or hardening of the lens. The lens is added onto throughout life, gaining layers of protein. This process is similar to the growth of an onion's layers. However, unlike an onion, the lens cannot continue to grow past a certain size, as the eye cannot accommodate it. Therefore, as the new layers of cortical protein are added, the older, inner layers are compacted together, and become harder. The hardening of the lens fibers doesn't allow for the change in shape of the lens needed for focusing. As aging occurs in dogs, cats, and us humans, a point is reached where near vision becomes a bit out of focus without the help of "reading glasses". In most people, this occurs in our forties. In dogs and cats it usually manifests itself about nine to ten years of age. Dog owners may recognize a hesitancy with stairways, as the dog may have difficulty determining how far down that first step is. Occasionally owners may see a decreased ability to catch toys, or an occasional nip on the finger tip when giving a treat. With dogs in their teens, owners may notice a "flinching" response when the animal is approached, due to the lack of depth perception. Lenticular sclerosis rarely causes any major vision changes, just depth perception difficulties. Of course, dogs and cats with sclerosis would benefit from bifocals, but we're not quite there YET!



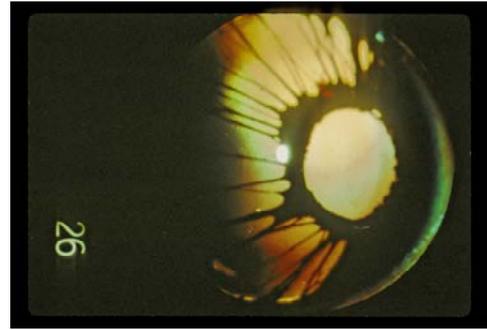
Lenticular sclerosis is sometimes referred to as "senile cataracts", although this term can be misleading. With true cataracts, opacities exist within the lens, obscuring vision. With sclerosis, light passes through the lens, but may be refracted differently. After dilation with a short acting mydriatic such as Tropicamide, transillumination of the sclerotic lens may show the lens to appear like two concentric circles, the inner, older nucleus being denser than the outer, younger cortical fibers. Frequently the older dog with sclerosis may also develop concomitant cataracts. Thorough ophthalmoscopic examination of the fundus is essential when cataracts begin to appear to determine if the animal will be a candidate for cataract surgery if and when the cataracts progress.

IRIS ATROPHY

Thinning and atrophy of the iris sphincter muscle and/or the stroma of the iris is another frequent aging change. Atrophy of the iris sphincter muscle occurs significantly more frequently than does atrophy of the iris stroma.

Thinning of the stroma is, however, seen commonly in Yorkshire Terriers and Toy Poodles. This atrophy may give the iris a lacy appearance, almost as if the dog has more than one pupil. The absence of a normal pupillary light response causes an inability for the eye to control

how much light is entering it, therefore occasionally causing the animal with iris sphincter atrophy to squint in bright light. In some instances, avoiding exposure to bright sunlight might be indicated, walking the dog instead early in the morning and at or after dusk.



Atrophy of the muscles of the pupil sphincter causes a decreased pupillary light response, and dilation of the pupil. Since the atrophy may not be symmetric in both eyes, anisocoria is commonly diagnosed. The naturally occurring pupil sphincter atrophy needs to be differentiated from pathological abnormalities such as glaucoma, Horner's syndrome, uveitis, other cranial nerve abnormalities, and other causes of anisocoria.

ASTEROID HYALOSIS

The vitreous is the gel-like substance which fills the cavity between the lens and the retina, a large percentage of the globe's contents. The vitreous is high in calcium, which frequently precipitates with aging, forming small white precipitates suspended within the vitreous body. The appearance may be likened to one of the small toys which depict a scene, and when shaken "snow". Previous posterior uveitis, pars planitis, or other inflammations can also cause vitreous changes similar in appearance to asteroid hyalosis, but called syneresis. In syneresis, the precipitates tend to be larger in size, almost like "floaters" in the vitreous. Asteroid hyalosis usually doesn't cause any major visual impairment, other than some cloudiness to the vision.

ENDOTHELIAL DEGENERATION OF THE CORNEA

The cornea is made up of three major layers, the outer epithelium, the inner-most endothelium, and the middle, largest part, the stroma, made up of layers of collagen. The collagen layers are arranged in layers, allowing light to pass through them unimpinged. This is part due to the fact that these collagen layers are dehydrated in relation to the inner aqueous humor of the anterior chamber, and the tear layer outside the epithelium. A failure of either the epithelium or endothelium in keeping fluid out of the collagen layers causes the cornea to become edematous or cloudy with a blue-grey appearance. In most species examined, it has been determined that a certain finite number of endothelial cells are present. When these cells die, as a function of age, trauma, or inflammation, they are not replaced. The remaining cells enlarge and 'move' toward each other to fill up the space. As the eye is always under a certain amount of intraocular pressure, there is a forward movement of the intraocular fluid into the cornea. Under normal circumstances, the endothelial cells biochemically "pump" the fluid back into the anterior chamber, keeping the collagen fibers dehydrated. As more and more of the endothelial cells degenerate, the efficiency in which the remaining cells function decreases, and they allow fluid to enter the collagen. The collagen fibers swell, and the cornea becomes edematous and cloudy in appearance. With the forward motion of the fluid, the fluid may accumulate between the stroma and the epithelium, forming small bullae of "water blisters". If these rupture, small recurrent corneal ulcerations may occur. The resulting ulcerations have a tendency to become refractive due to the edema and decreased healing due to age. This condition is known as Bullous Keratopathy. While there is no "cure for this condition, it may be controlled with hyperosmotic 5% NaCl ointment, readily available. This may prevent the chronic reoccurrence of the ulcerations, and occasionally facilitates partial

clearing of the cornea. The presence of corneal edema does have an effect on the animal's vision. Because the cornea is no longer clear, it is somewhat like looking through frosted glass, causing a distortion of the objects visualized. It is common to see corneal edema due to endothelial degeneration in the older animal. There are inherited forms of this endothelial change, as seen in the Boston Terrier and Airedale. Corneal edema associated with endothelial degeneration must be differentiated from corneal edema due to glaucoma or uveitis.

RETINAL CHANGES

Occasionally in the aging dog or cat, some peripheral thinning of the retina may be identified. As the photoreceptor cells of the canine and feline retina are predominantly rods, responsible for night vision, this thinning of the retina may be associated with some decrease in night vision. Usually, however, no change in vision is reported by the owner. The predominant differential for this slight retinal thinning is Progressive Retinal Atrophy, which in many breeds (ie: Poodles) can be late in onset. Reexaminations of several months or an Electroretinogram is indicated to differentiate whether the process is pathologic or not, especially if the animal in question is still being used for breeding purposes. As veterinary medicine becomes more advanced and sophisticated, our patients are living longer and longer. It is becoming more and more frequent that we are presented with an animal with problems that are age-related in nature. It is therefore important for us to recognize the "normal" aging changes which may occur.

