

Effect of PetVisionPro™ in a Canine with Lenticular Sclerosis

(An - *In Vivo* – study)

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Abstract

Lenticular Sclerosis is an age-related change in the density of the lens's nucleus that occurs in all older animals. The nucleus takes on a blue-gray, cloudy appearance.

It is not uncommon for lenticular sclerosis to be confused with a cataract; these two conditions can be distinguished by performing distant direct ophthalmoscopy.

Typically, signs of lenticular sclerosis begin around 6 to 8 years of age in the dog and slowly become more obvious as the dog ages.

The effects of **PetVisionPro™** were investigated using canine eyes with lenticular sclerosis and after the application (1-2 drops, 3 times for day) of **PetVisionPro™** for 40 days the blue-gray/cloudy appearance decreased.

The data analysis supports the hypothesis; **PetVisionPro™** reduces the blue-gray/cloudy appearance in the eye lens and maintains its clarity.

Lenticular Sclerosis in dogs

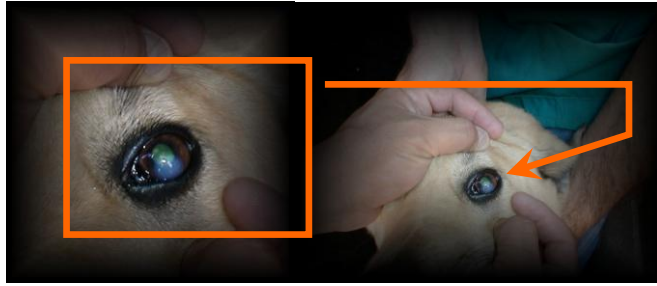
As pets age, changes occur within their bodies, including the eye. The lens of the eye is responsible for directing and focusing light onto the retina in the back of the eye. This light is then detected and results in vision.

The lens is encased in a membranous capsule. The lens is a continuously changing structure, with new layers being laid down on top of one another throughout the life of the animal. Because the eye is fixed in size and the lens capsule does not stretch a great deal, the lens cannot get larger as these new layers develop.

Instead, the inner layers of the retina become compressed, which allows room for the new layers to be laid down. The oldest layers of the lens are in the center of the lens, and this area is called the nucleus. The newest layers of the lens surround the nucleus and this outer area is called the cortex.

As the animal ages the nucleus of the lens becomes denser, harder and somewhat cloudy in appearance. The nucleus may have a blue-gray tint to it, while the cortex remains completely clear and transparent. This aging change of the lens is known as lenticular or nuclear sclerosis.

Typically, signs of lenticular sclerosis begin around 6 to 8 year of age in the dog and slowly become more obvious as the dog ages.



Lenticular or Nuclear Sclerosis

In the geriatric dog, lenticular sclerosis can be so cloudy that the condition is easily mistaken for a cataract of the lens. Cataracts can also result in a gray-white appearance to the eye due to cloudiness within the lens.

What to Watch For

- As the animal ages the pupils will lose their jet-black color and will become mildly bluish white or gray.
- Vision usually remains normal until the animal is quite old.
- If the animal lives long enough, then mild changes in vision may become apparent, such as not being able to distinguish between individual people at a distance and acting as if a person is not recognized until they get quite close to the animal.
- More significant changes in vision may indicate the presence of aging or degenerative changes in other structures of the eye, such as the retina.

Diagnosis

- Lenticular sclerosis can be diagnosed by a veterinarian during an eye examination. Dilation of the pupil is often necessary to distinguish this condition from a cataract of the lens.
- Your veterinarian may refer your pet to a veterinary ophthalmologist for further evaluation using specialized instrumentation, such as slit lamp biomicroscopy and Opacity Lensmeter.



Slit lamp biomicroscopy

- It is important also to assess other structures in the eye for aging or degenerative changes.

How Lenticular Sclerosis is reduced

Using:



PetVisionPro™

Materials and Equipment

Materials

- 14 canine eyes with Lenticular Sclerosis (Blue-gray opacity).
- 22 droppers of PetVisionPro™ with 8 milliliters each dropper (This Ophthalmic solution is sterile, free from foreign particles and specially prepared for instillation into the canine eye).

Equipment

- Opacity Lensmeter – IntraOptics Model 701, Manufacturer: Schlieren / Switzerland,
- Slip Lamp Topcon - Model SL D8Z -, Manufacturer: Topcon Medical Systems, Inc. USA.

Methodology

Direction for use of PetVisionPro™

Apply 1-2 drops in the effected eye or eyes, minimum 3 times daily, for a minimum of 40 days to see measurable improvements.



Application of eye drops into canine eye

NOTE: PetVisionPro™ is not to be used on pets taking a Corticosteroid, or derivative, as the benefits from PetVisionPro will be cancelled.

Allow 2- 3 weeks for the steroid to pass from the pet's system before applying the drops. There will be no detrimental effect on the pet in the event that PetVisionPro eye drops are introduced into a pet who is on a steroid.

DOSE INFORMATION

Effective dose (ED)

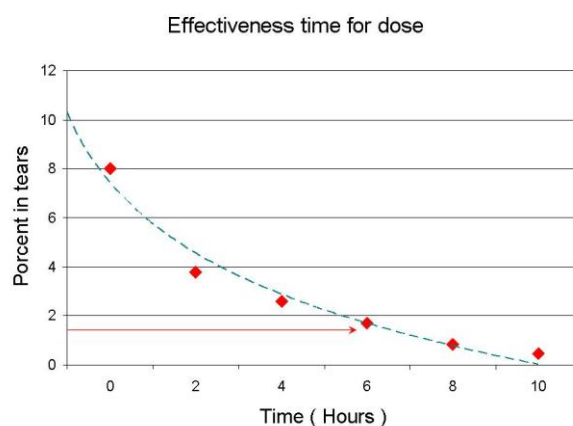
Drop volume of 0.05 milliliters

Median effective dose (ED 50)

A container with 8 milliliters of solution

Effectiveness time of dose

6 hours



Slit Lamp Examination

The slit lamp is a microscope with a light attached that allows the veterinary ophthalmologist to examine the canine eye under high magnification. This instrument is primarily used to view the anterior structures of the eye such as the cornea, iris, and lens.

To open the pupil the ophthalmologist Applies Phenylephrine (2.5%) to produce Mydriasis (dilatation of the pupil) in the canine eye.

With the ophthalmoscope approximately 6 to 8 inches from the patient's eye and 3 to 4 diopters of plus power dialed in, use retro-illumination to detect any opacities (this procedure is known as distal ophthalmoscopy).

For the initial evaluation, use a parallelepiped beam positioned at a 45-60° angle. Perform a thorough scan of the front and back half of the lens. To localize opacities within the lens, use an optic section with the beam at a 45-60° angle. One can also use retro-illumination to detect lens opacities with the slit lamp.

Canine lenticular sclerosis inspection using a Slip Lamp Topcon - Model SL D8Z-, Manufacturer: Topcon Medical Systems, Inc. USA.

Measurement of Lenticular Sclerosis in dogs

The opacity lensmeter 701 is a new instrument for quantifying the lens density, the basic concept is the measurement of stray light transmitted by the lens.

The handling of the instrument is very simple. It is mounted on a slit lamp-like table, after adjusting the instrument to the canine eye, the measurement is initiated by depressing a console button.

Visual acuity and scattered light were determined in canine eyes with lenticular Sclerosis using the Opacity Lensmeter 701 set at 700 nm.

The influence of pupillary diameter on the scattered light measurement was examined in 14 canine eyes.

In all the canine eyes significant correlations were found between pupillary diameter and scattered light measurements.

Results

Slit Lamp Examination

The examination technique used involves directing the light from a direct ophthalmoscope, set on zero diopters, through the pupil, in a darkened room.

A bright tapetal reflection will still be visible in patients with nuclear sclerosis. In contrast, as a cataract is a true opacity of the lens, it will cast a black shadow on the tapetal reflection.

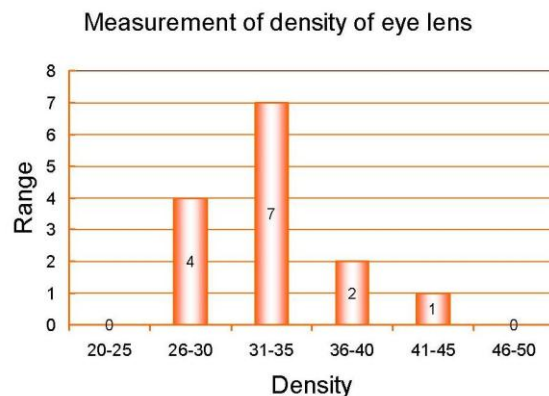
- **With the previous technique it was possible to diagnose the 14 canines eyes with Lenticular Sclerosis.**

Measurement of density of the blue – gray opacity

14 canine eyes with Lenticular Sclerosis were measured for density using an Opacity Lensmeter Model 701, Manufacturer: Schlieren / Switzerland.

And the results are:

Range	Density (grs/cm ³)
20 – 25	0
26 – 30	4
31 - 35	7
36 - 40	2
41 - 45	1
46 - 50	0



The change of density vs. time

A correlation between initial density and final density was found in a first order reaction.

$$X_2 = X_1 \{e^{-k} (Y_2 - Y_1)\}$$

Where:

X1 Initial density
 X2 Final density
 (-) k Rate Constant
 (Y2 - Y1) Days of application

The Linear representation of density vs. time

$$\ln X_2 = \ln X_1 - k (Y_2 - Y_1)$$

Where:

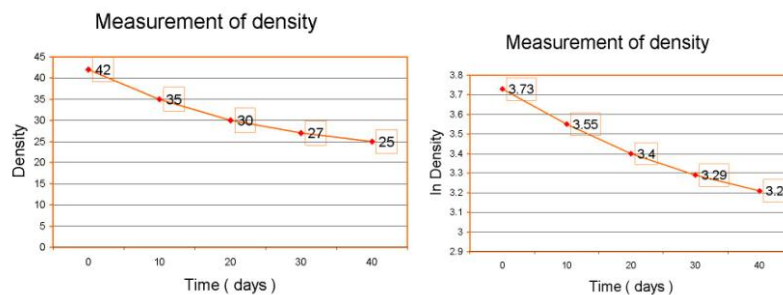
ln X1 Initial density
 ln X2 Final density
 (-) k Rate Constant
 (Y2 - Y1) Days of application

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Data Table

Time (Days)	Density
0	42
10	35
20	30
30	27
40	25

Exponential and linear graph of the Data Table



Calculating the rate constant from:

$$\ln X_2 = \ln X_1 - k (Y_2 - Y_1)$$

Then

$$k = (\ln X_2 - \ln X_1) / (Y_2 - Y_1)$$

In this particular case the value of k is:

$$\underline{k = 0.013}$$

Calculus of the reduction of the density :

➤ **For 0 days of application:**

$$\text{Density} = 42 \{ e - (0.013) (0-0) \}$$

$$\text{Density} = 42 (e - 0.00)$$

$$\text{Density} = 42 (1)$$

$$\text{Density} = 42$$

➤ **For 10 days of application:**

$$\text{Density} = 42 \{ e - (0.013) (10-0) \}$$

$$\text{Density} = 42 (e - 0.13)$$

$$\text{Density} = 42 (0.87)$$

$$\text{Density} = 36.88$$

➤ **For 20 days of application:**

$$\text{Density} = 42 \{ e - (0.013) (20-0) \}$$

$$\text{Density} = 42 (e - 0.26)$$

$$\text{Density} = 42 (0.77)$$

$$\text{Density} = 32.38$$

➤ **For 30 days of application:**

$$\text{Density} = 42 \{ e - (0.013) (30-0) \}$$

$$\text{Density} = 42 (e - 0.39)$$

$$\text{Density} = 42 (0.67)$$

$$\text{Density} = 28.43$$

- **For 40 days of application:**

$$\text{Density} = 42 \{e - (0.013) (40-0)\}$$

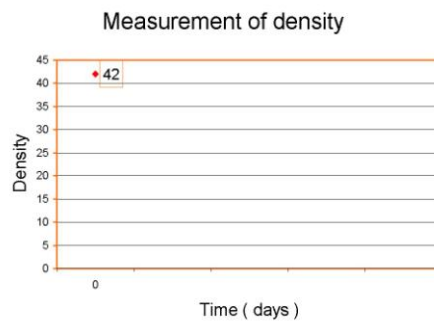
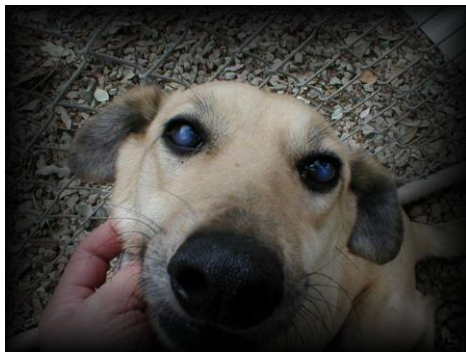
$$\text{Density} = 42 (e - 0.52)$$

$$\text{Density} = 42 (0.59)$$

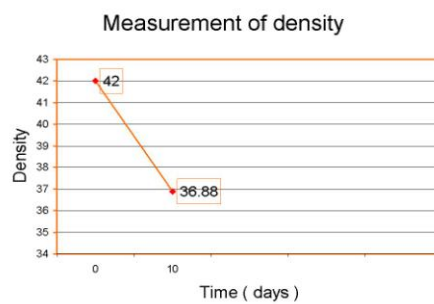
$$\text{Density} = 24.96$$

Photo Gallery of the reduccion of the density

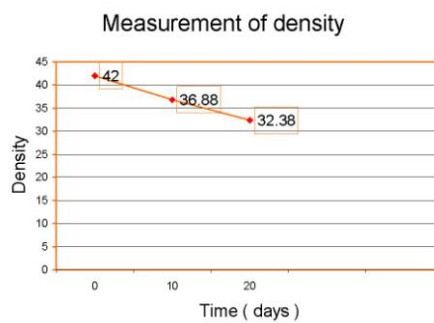
- **0 days of application:**



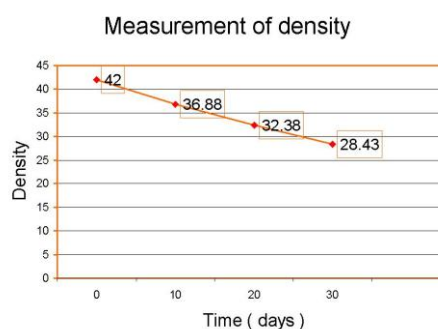
- **10 days of application:**



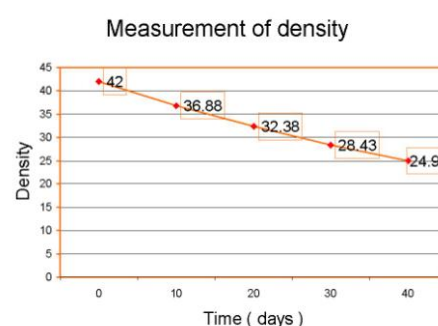
- **20 days of application:**



➤ **30 days of application:**



➤ **40 days of application:**



Discussion

Today in the U.S. there are 73.9 millions dogs, the population of senior dogs estimated at more than 20 million. Surveys by the American Veterinary Medical Association found that almost 18 percent of dogs cared for by veterinarians are age 10 or older.

Geriatric medicine is a growing area for veterinarians

With early diagnosis, many diseases of geriatric dogs can be successfully treated, aging is not a disease; it is a normal process of life. People who own senior dogs need to understand how their pets' organs and body systems change.

Here are some of the signs of aging:

- **BODY WEIGHT**, as a dog ages, it undergoes body wide changes, including a decrease in metabolism (the rate of chemical reactions in the body). As a result, a dog becomes less physically active and often gains weight.
- **ARTHRITIS**, the incidence of arthritis increases significantly in old age and one of every five dogs are affected.
- **CHANGING BEHAVIORS**, a bluish tint to the eyes may indicate lenticular sclerosis or cataract development and a loss of visual acuity.
- **TEETH**, periodontal disease is almost universal in geriatric dogs.
- **NUTRITIONAL NEEDS**, according to the Merck Veterinary Manual, there's no documentation that old dogs have different nutritional requirements from middle-aged dogs, although feeding a food with a higher or lower fat and fiber content may be needed to maintain optimal body weight and condition.

The present study has established that topical application of **PetVisionPro™** may contribute to the overall therapeutic effect in its use for the reduction of **LENTICULAR SCLEROSIS** in senior dogs.

Our data analysis supports our hypothesis; **PetVisionPro™** reduces the blue gray cloudy appearance into the eye lens and maintaining its clarity.

References

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