

Primary open angle glaucoma – POAG

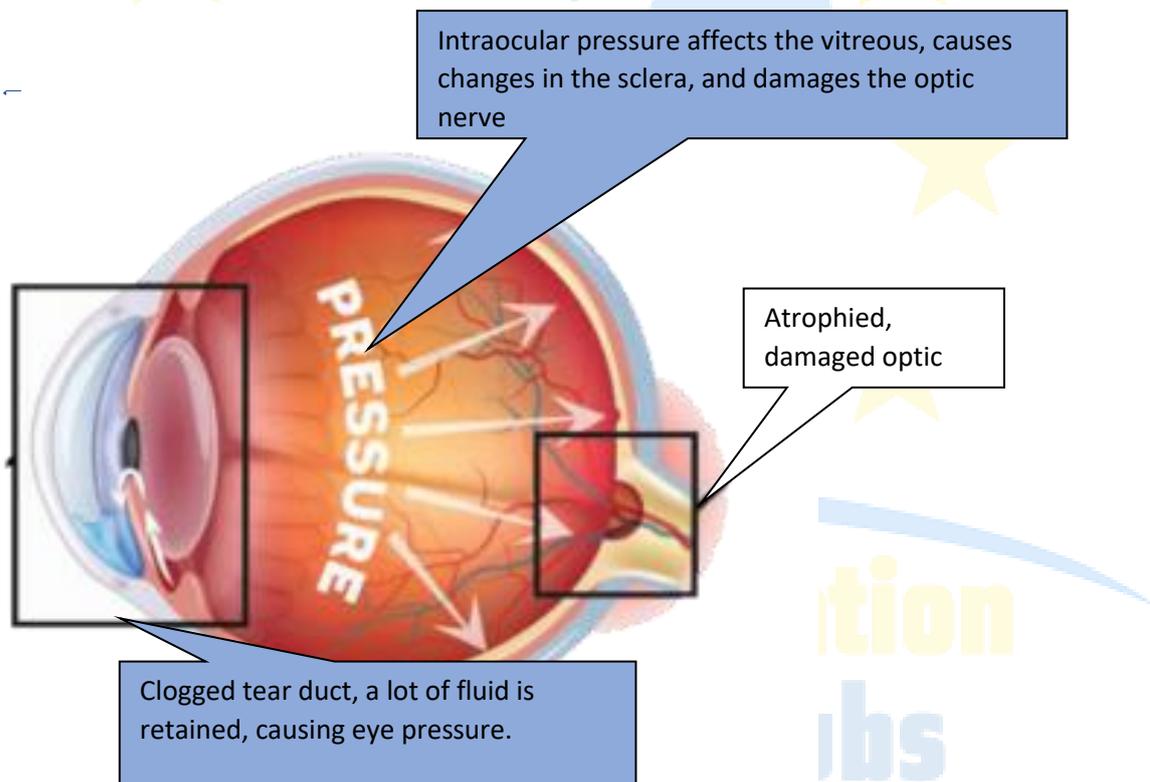
Author: Mgr. Viera Staviarska

Primary open angle glaucoma, POAG, is an inherited eye disease that is more or less common in several breeds (Beagle, Shar Pei, Basset Hound, Shiba Inu, Retriever, Siberian Husky, American and English Cocker Spaniel, Welsh Springer Spaniel, Spanish Water Dog, Dandie Dinmont, Great Dane, Hungarian Vizsla, Golden Retriever and Welsh Terrier... more recently, cases in crossbreed dogs have also been reported)¹.

The disease manifests itself at a young age. The first symptoms can be observed as early as 9–18 months of age. Sometimes they are very mild and the owner may not notice them in time. **And it is the early diagnosis and pharmacological support of the affected dog that is very necessary. Treatment can stabilize the problem at the initial stage, stop the progression, or slow it down.**

The progression of the disease is extremely painful for the dog and its quality of life becomes very low and miserable. Early detection of the disease is extremely important.

Glaucoma is defined differently in the literature. In general, it is always a permanent pathological increase in intraocular pressure leading to devastating changes in the retinal area and optic nerve atrophy.^{1,2}



Symptoms to watch for^{1,2}:

- Behavioural changes – nervousness, lack of appetite, preference for dark places, depression, aggressive behaviour, eye scratching
- Dilated pupils – notice the opalescent, shiny pupils in half-light, when the light changes
- Eye pain
- Varying pupil size
- Blepharospasm – spasmodic contraction of the eyelids
- Corneal swelling which causes a smoky bluish to milky colouration of the cornea

- Hyperaemic whites of the eyes
- Increase in ventricular pressure
- Changes in vision, impaired orientation
- Exophthalmos – protrusion of the eye from the orbit
- Len luxation – displacement from normal position
- Shallow anterior chamber of the eye – reduction of the ventricular angle – professionally diagnosed



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You will sometimes only notice the corneal discoloration as a faint opalescent overlay. Often in twilight or when you turn on the light. Gradually, it develops into an opacity. Later, like milky glass.



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Later stages manifest themselves variably. They are accompanied by great pain in the eyes and/or head. Also, bulging, dry eye is common. In some breeds, you can observe ejection of the eye from the eye socket due to the high pressure. In combination with primary lens luxation (PLL), lacrimation and eye infections may occur. The final stage may be blindness.

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Clubs

The disease is severe and very painful. Therefore, it is necessary to raise awareness about it among breeders and owners, especially in breeds that are affected by POAG. **Successful treatment depends on early detection. Therefore, genetic testing may be a useful preventive measure.**

POAG is a hereditary disease. The degree of genetic burden can be diagnosed. Primary open angle glaucoma (POAG) has a pattern of simple autosomal recessive inheritance. Carriers do not show symptoms of the disease. In breeding, it is essential that two dogs carrying one or two copies of the mutation are not crossed. It is therefore necessary to take advantage of the availability of genetic tests and to eliminate the disease from the bloodlines by targeted controlled breeding.

Have you received your genetic test results and are wondering what the abbreviations mean? What is your dog's result? And how to proceed with its use in breeding?

POAG disease only develops in individuals which inherit the mutated gene from both parents. That is, if both parents are positive. These individuals are referred to as P/P (Positive/Positive). Carriers of the mutated gene (N/P, i.e. Negative/Positive) are clinically healthy. They are not affected by the disease, but pass the disease on to their offspring. In the case of mating two heterozygous individuals (N/P), theoretically 25% of the offspring will be completely healthy (N/N), 50% will be carriers (N/P) and 25% of the offspring (P/P) will inherit the mutated gene from both parents and will be affected by the disease. This is a statistical calculation, an assumption. However, the % composition may vary.²

Results on the certificate. What do they mean?³

On the certificate, you can see one of the results which are shown below.

POAG/POAG	Postihnutý/ Affected	The individual carries two copies of the gene mutation and is homozygous for POAG. The dog is affected and will always carry a copy of the POAG gene mutation. The disease can manifest itself in him, so watch for possible symptoms. Preventive supplements are recommended. In case of the first symptoms, contact your veterinarian as soon as possible. Start treatment as soon as possible.
POAG/n	Nositel/ Carrier	Both normal and mutated variants are present. A dog is a carrier, even if it is not itself affected. He can transmit the disease to his offspring, so careful selection of the second parent is necessary.
n/n	Čistý/free- Clear	The dog is tested negative for POAG. He is not affected and does not transmit the disease to his offspring. To keep the POAG pure bloodline, select the other parent equally n/n.

Heredity - Statistical assumption			
X	Male affected	Male carrier	Male free
Female affected POAG-PLL/POAG-PLL	100% affected	50% affected 50% carrier	100% carrier
Female carrier POAG-PLL/N	50% affected 50% carrier	25% free 25% affected 50% carrier	50% carrier 50% free
Female free N/N	100% carrier	50% free 50% carrier	100% free

Is glaucoma in a dog only hereditary?^{2,4}

Glaucoma can be primary or secondary. Primary is hereditary. Glaucoma in a dog can also be caused by another disease. Such glaucoma is secondary. It can affect one or both eyes. In such cases, early treatment and exclusion of genetically determined glaucoma is also necessary.⁴

Diagnosis and confirmation of the disease.^{1,2,4}

When glaucoma is suspected, the intraocular pressure is measured using a tonometer. In addition to the confirmation of glaucoma, other examinations are needed to characterize the type of glaucoma and the degree of involvement (assessing the extent of damage to the optic nerve and retina). Only then may the correct and effective treatment be determined. In secondary glaucoma, there may be another serious disease, so examinations should be performed to detect and then treat the primary/underlying disease causing the glaucoma.⁴ The causes of glaucoma may include, for example, another eye disease (PLL) – lens luxation, or haematological, cardiological disease, tumour, trauma...

Is POAG curable?

Treatment should be initiated as early as possible to prevent irreversible changes to the eye. Pressure reduction is usually done by pharmacological therapy in the form of eye drops; several types of active agents are available.⁴ The choice will be made by the veterinarian based on the involvement and the type of glaucoma. The affected individual must be monitored regularly. The intraocular pressure needs to be checked regularly and maintained within desirable values. Surgery is sometimes necessary to drain the ventricular fluid as well as laser therapy.⁴

Some interventions can be challenging. Therefore, early detection and diagnosis of the disease is emphasized. This prevents serious and painful complications.

The disease can be controlled and well managed so that the dog has a good quality of life and does not suffer from limitations and pain.

Is your dog positively diagnosed?

You will certainly ask yourself questions about how to improve his/her life as much as possible. Early diagnosis is necessary. According to the first signs, you can see the beginning changes in the eye. A positively diagnosed dog should have regular eye tests from the age of 2 year, even if the disease has not yet manifested. Pay attention to:

- Every change on the lens
- Do not expose the dog to stress, long nervous barking

- Prevent eye inflammation
- Keep the eye clean, remove carp
- Minimize the risk of eye injury
- Minimize strenuous physical activity and other causes of increased blood pressure

Diagnosis and treatment

From the characteristics of the disease, it is obvious that it requires consultation and treatment at a veterinary clinic with the necessary technical equipment.

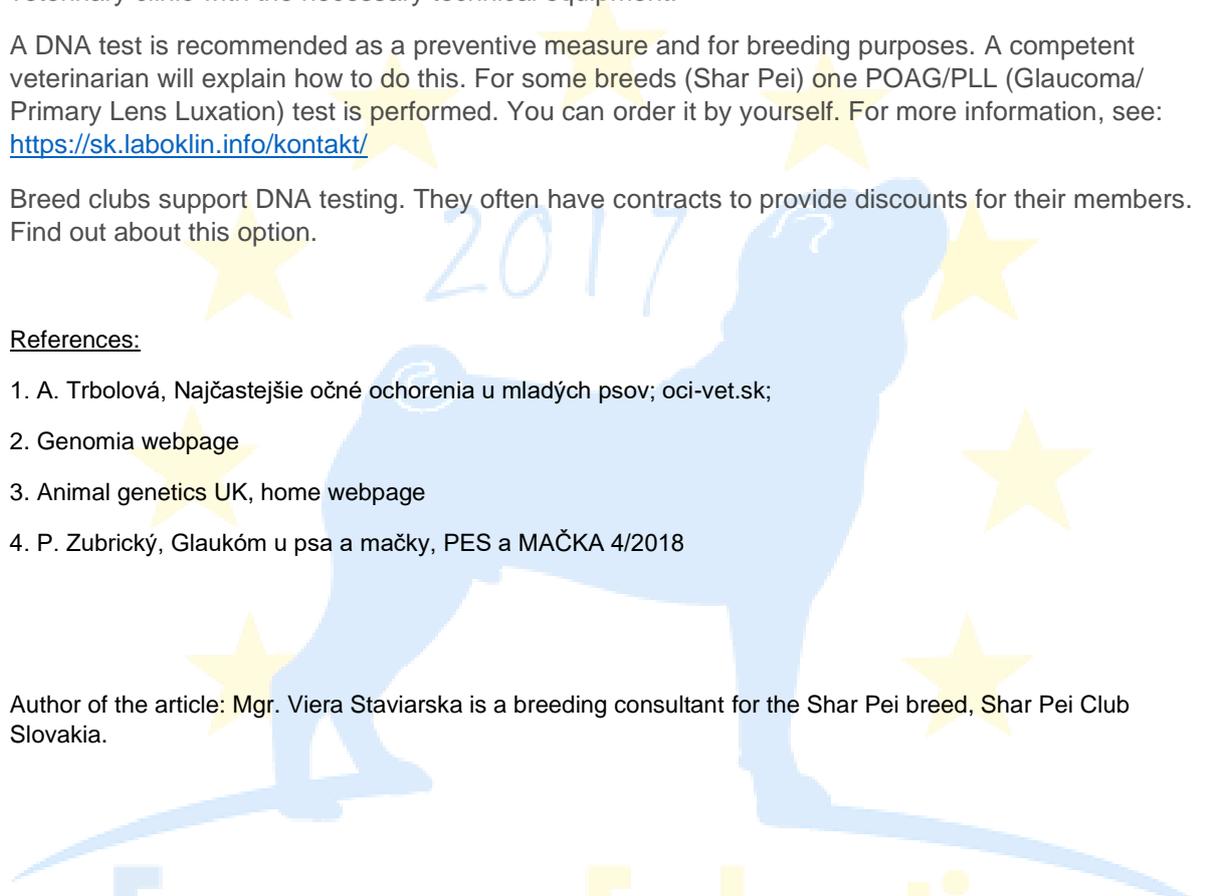
A DNA test is recommended as a preventive measure and for breeding purposes. A competent veterinarian will explain how to do this. For some breeds (Shar Pei) one POAG/PLL (Glaucoma/ Primary Lens Luxation) test is performed. You can order it by yourself. For more information, see: <https://sk.laboklin.info/kontakt/>

Breed clubs support DNA testing. They often have contracts to provide discounts for their members. Find out about this option.

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4. P. Zubrický, Glaukóm u psa a mačky, PES a MAČKA 4/2018

Author of the article: Mgr. Viera Staviarska is a breeding consultant for the Shar Pei breed, Shar Pei Club Slovakia.



**European Federation
of Shar Pei Clubs**