Don’t lose sight of Glaucoma.

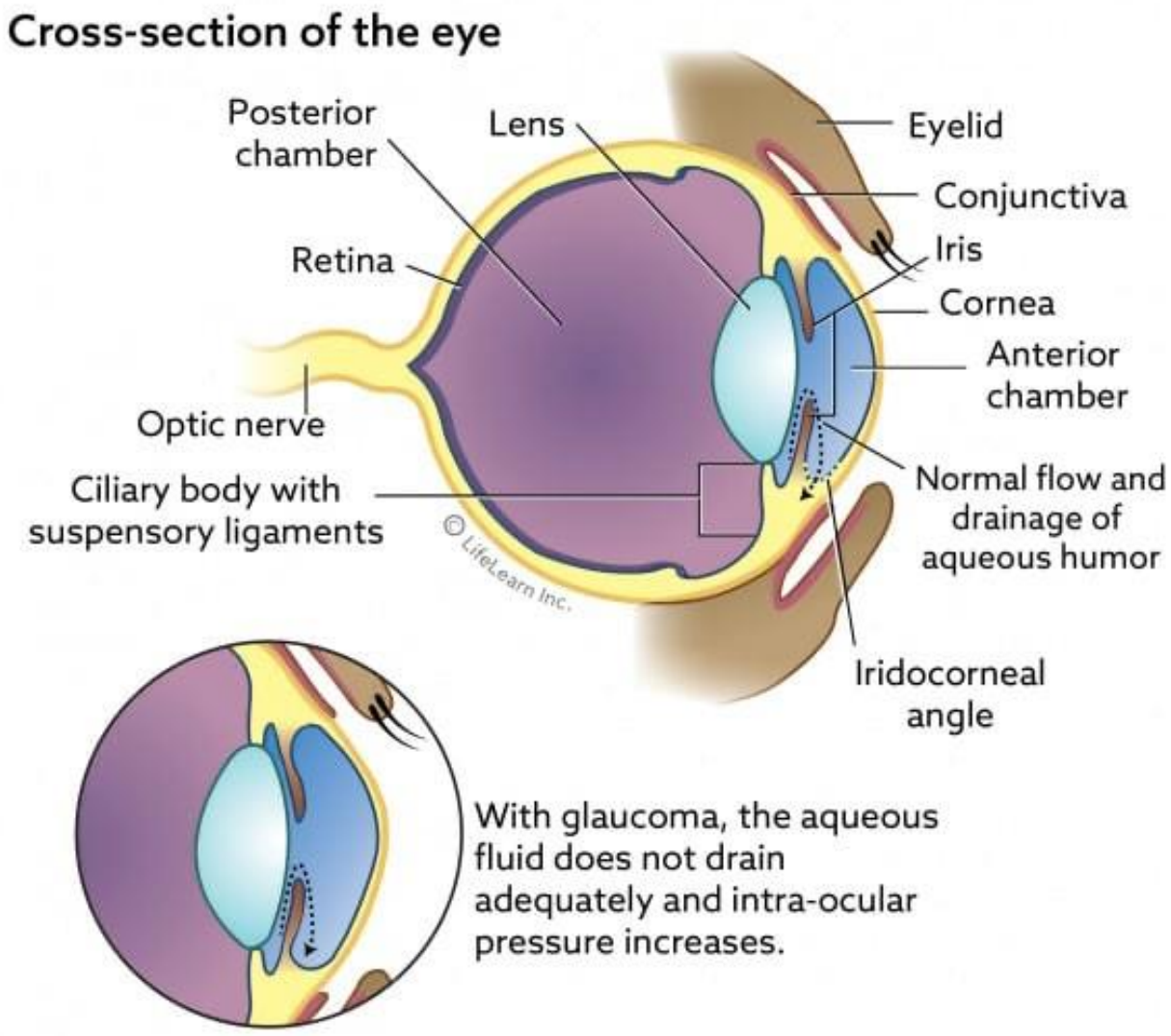
Information on primary angle closure glaucoma in Bouviers des Flandres

What is glaucoma?

Glaucoma is an eye disease where aqueous humor builds up, increasing the eye's intraocular pressure (IOP). This increased pressure will damage the optic nerve and can lead to blindness.

What are the essential eye structures in glaucoma?

Anterior chamber, Cornea, Iris, Iridocorneal angle, Ciliary cleft, and Optic nerve



How is glaucoma classified?

It is called **primary** when the fluid buildup is linked to genetic abnormalities in the drainage pathway or **secondary** when another ocular disease (e.g., lens luxation, uveitis) is present. Also, glaucoma can be classified according to the state of the drainage angle. The angle may be **open** (in which case the obstruction is further downstream), **narrow,** or **closed**.

What causes the intraocular pressure to increase?

Aqueous humor is continuously being produced. It contains nutrients and oxygen used within the eye. As new fluid is made, the old fluid exits the eye through the drainage angle (between the cornea and iris). The drainage angle is also called the iridocorneal angle. The ciliary cleft and pectinate ligaments are vital structures in the drainage angle. Blockage of the drainage pathway allows for increased IOP. Iridocorneal angles are classified as open or narrow/closed that are identified with a test called a gonioscopy or a UBM.

What is primary angle closure glaucoma (PACG) in Bouviers?

PACG is genetic. The dog inherits abnormalities of the drainage pathway; in other words, the pathway angles are narrow or closed, interfering with the draining of the aqueous fluid. In addition, Bouviers are known to have pectinate ligament dysplasia (PLD), an inherited abnormality that is a factor in the narrowing of the drainage angles. However, only a small proportion of dogs with PLD will develop PACG in their lifetime.

How do you test for primary angle closure glaucoma?

Two tests are commonly done. The first is tonometry. This test is for IOP. The second is a gonioscopy test. This test is used to evaluate the drainage angles. Dogs with narrow angles and other risk factors, such as a history of glaucoma in a close relative (litter mate, parents, or grandparent), are at risk of developing PACG. Therefore, they should have an additional test called ultrasound biomicroscopy (UBM). This test provides more detailed information on the drainage pathway, particularly evaluating the ciliary cleft. Angles are NOT measured with the CAER exam.

Eye angles are not static. They change as the dog ages and must be monitored throughout the dog's life.

What are the risk factors for developing PACG?

- Aging
- Narrow or closed angles as evaluated with gonioscopies or UBMs
- History of glaucoma in a close relative, such as a litter mate, parents, or grandparent

What are the symptoms of primary angle closure glaucoma (PACG)?

- Sudden redness of the white part of the eye
- Watering of the eye
- Eye pain (eye rubbing or turning away when being pet)
- Bulging or swelling of the eyeball
- Cloudy bluish appearance to the cornea
- Dilated pupil – or pupil does not respond to light

All of these signs can occur very suddenly with acute glaucoma.

How can primary angle closure glaucoma (PACG) be treated?

Obtaining medical care as quickly as possible is essential to reduce the risk of irreversible damage and blindness.

- Analgesics to control pain
- Medications that decrease fluid production and increase drainage
- Long-term medical therapy may involve drugs such as carbonic anhydrase inhibitors (e.g., dorzolamide 2%, brand names Trusopt®), prostaglandin analogues (latanoprost 0.005%, brand name Xalatan) or beta-adrenergic blocking agents (e.g., 0.5% timolol, brand names Timoptic® and Betimol®) or combination drugs (e.g., dorzolamide 2%- timolol 0.5%, brand name Cosopt).
- Medical treatment often must be combined with surgery in severe or advanced cases
- Removal of the eye may be required to control pain

What can be done to protect your dog from vision loss?

- Daily eye checks
- Know the risk factors
- Know the warning signs
- Regular eye screening, including gonioscopy and in high-risk dogs UBMs
- This problem is not static; drainage angles and IOP can change suddenly. If your dog demonstrates any of the symptoms listed above, seek immediate emergency care - this will provide your dog with the best chance for a good outcome

What is the role of the responsible dog breeder?

- Educate your puppy owners on proper lifelong eye testing
- **Start the conversation** - pedigree analysis demonstrates this is a recessive inheritance problem
- Know what eye testing has been done on the sire and dam before you breed.
- Encourage your new puppy owners to stay in contact with you and inform you of any eye changes in their dogs
- Notify puppy owners of any eye changes in the litter or other relatives.

This article was reviewed for accuracy by Dr. Sara Thomasy DVM, PhD, DACVO, Professor of Comparative Ophthalmology, School of Veterinary Medicine, University of California at Davis