

Genetic Inheritance of Cataracts in Labrador Retrievers:

A Practical Summary of the Peer-Reviewed Literature

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1. Overview: Not All Cataracts Are Hereditary

The peer-reviewed literature clearly distinguishes between **primary (hereditary) cataracts** and **secondary (non-hereditary) cataracts** in Labrador Retrievers. Secondary cataracts can result from trauma, aging, uveitis, nutritional deficiencies, and specific metabolic diseases such as diabetes mellitus and hypocalcemia [[Packer et al. 2023](#)]. This distinction is clinically and genetically critical for breeding program decisions.

The authoritative reference for breeding decisions involving ocular disorders in purebred dogs is *Ocular Disorders Presumed to be Inherited in Purebred Dogs*, commonly known as "The Blue Book," published by the Genetics Committee of the American College of Veterinary Ophthalmologists (ACVO) in collaboration with the Orthopedic Foundation for Animals (OFA). Now in its 15th edition [[ACVO Genetics Committee 2023](#)], "The Blue Book" is reviewed and updated at each annual ACVO conference meeting, with new editions published periodically. It is freely available online through both the ACVO ([acvo.org](#)) and OFA ([ofa.org](#)) websites and serves as the definitive guide for CAER examination coding, certification, and breeding recommendations.

2. Hereditary Cataracts in Labrador Retrievers

2.1 Prevalence

A large Dutch study reviewing 18,283 ophthalmic examinations of 9,017 Labrador Retrievers (1977–2005) found that from 1980 through 2000, the prevalence of hereditary cataracts was stable at approximately 8%, and offspring of cataract-affected dogs showed a significantly increased prevalence compared with offspring of unaffected dogs [[Kraijer-Huver et al. 2008](#)]. A UK survey using BVA/Kennel Club certification data found cataracts in 6.6% of Labrador Retrievers examined, of which 5.5% were of the posterior polar subcapsular type and considered hereditary [[Curtis 1989](#)]. A German/European study reported a higher figure of 15.6% primary non-congenital cataracts among examined dogs, with all affected animals being offspring of a frequently used stud dog or closely related ancestors [[Gelatt & MacKay 2005](#)].

2.2 The Characteristic Hereditary Form: Posterior Polar Subcapsular (Triangular) Cataract

The hallmark hereditary cataract in the Labrador Retriever has a distinctive morphological signature. It presents as a posterior subcapsular polar cataract at the confluence of the

lens suture lines — typically small, triangular, and usually not significantly impairing vision in early stages [\[Barnett 1985\]](#); [\[Barnett 1985\]](#). A second, more extensive form progressing to total cataract may reflect the same gene exhibiting variable penetrance [\[Packer et al. 2023\]](#).

The Dutch prevalence study confirmed that dogs with posterior polar (triangular) cataracts produced affected offspring with the same distribution of cataract types as the entire population of primary cataract-affected dogs, supporting the conclusion that the posterior polar form is genetically related to the broader category of hereditary cataract in the breed [\[Kraijer-Huver et al. 2008\]](#). The hereditary cataracts described in Labrador Retrievers include both posterior subcapsular (triangular) cataracts and anterior or equatorial cortical cataracts [\[Guerra et al. 2018\]](#).

The Blue Book notes that posterior polar cataracts, which are presumed hereditary in the Labrador Retriever and multiple other breeds, are small, often triangular, and usually do not significantly impact vision in affected animals in the early stages of the condition [\[Packer et al. 2023\]](#); [\[ACVO Genetics Committee 2023\]](#).

2.3 Genetics and Mode of Inheritance

Unlike some other breeds where specific causative mutations have been identified — for example, mutations in the *HSF4* gene causing autosomal recessive juvenile hereditary cataracts in Boston Terriers, Staffordshire Bull Terriers, and French Bulldogs, and autosomal co-dominant cataracts in Australian Shepherds — no validated causative DNA mutation has been published for the primary hereditary cataract of the Labrador Retriever [\[Mellersh et al. 2006\]](#). The Blue Book explicitly acknowledges that in most breeds, including the Labrador Retriever, the specific gene or genes involved in cataract formation remain unknown [\[ACVO Genetics Committee 2023\]](#). The mode of inheritance has not been definitively resolved to a simple Mendelian model, though the strong familial pattern is well established through pedigree analyses and population studies.

The ACVO Genetics Committee identifies a disorder as presumed inherited when, among other criteria: its frequency is greater in related dogs within a breed, it has a characteristic appearance and location, it has a characteristic age of onset and course of progression, or it looks identical to an entity proven to be inherited in another breed [\[ACVO Genetics Committee 2023\]](#). The Labrador Retriever posterior polar subcapsular cataract satisfies multiple of these criteria, supporting its classification as a presumed hereditary condition even in the absence of a defined molecular cause.

3. Non-Hereditary (Secondary) Cataracts in Labrador Retrievers

3.1 The ACVO Default Presumption

A foundational principle stated in The Blue Book is that cataracts should be assumed to be hereditary *unless* they are specifically known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases (such as diabetes mellitus), nutritional deficiencies, persistent pupillary membranes, or persistent hyaloid artery remnants

[ACVO Genetics Committee 2023]. This conservative default places the burden of proof on establishing a non-hereditary cause, rather than on proving heredity. In practice, a CAER examiner who suspects a cataract is not genetic in origin may mark the CAER form as "significance unknown/suspect not inherited," which may allow the dog to receive a Breeder Option code rather than an outright breeding disqualification [Packer et al. 2023].

3.2 PRA-Associated Cataracts

The most clinically important category of secondary cataract in the Labrador Retriever is the cataract arising secondary to **progressive retinal atrophy (PRA)**, specifically the progressive rod-cone degeneration (prcd) form, which is inherited as an autosomal recessive trait in this breed [Acland et al. 1998]. PRA-related cataracts arise as a consequence of retinal degeneration and typically involve the posterior cortex of the lens. In cases where a cataract obscures the retina and prevents fundoscopic examination, an electroretinogram (ERG) is required to distinguish primary hereditary cataract from PRA-secondary cataract [Packer et al. 2023]. A clinical diagnosis of PRA on a CAER examination results in a "NO" breeding recommendation regardless of the cataract status [ACVO Genetics Committee 2023].

The Dutch study explicitly separated PRA-associated cataracts from primary hereditary cataracts, examining 522 dogs with primary hereditary cataracts and 166 PRA-affected dogs with cataracts separately. The distribution of cataract types was found to be significantly different between these two groups, confirming that morphological pattern varies by etiology [Kraijer-Huver et al. 2008].

3.3 Lens-Induced Uveitis and Other Secondary Forms

Cataracts of any etiology — including hereditary cataracts in advanced stages — can trigger lens-induced uveitis (LIU) through leakage of lens proteins into the aqueous humor. LIU can itself cause further cataract progression and secondary glaucoma, complicating clinical differentiation [van der Woerd et al. 1992]. Additionally, metabolic cataracts (e.g., diabetic) and age-related cataracts (senile) represent non-hereditary forms. It bears emphasis that the ACVO/Blue Book standard is to treat all cataracts as hereditary unless a specific non-genetic cause can be identified [ACVO Genetics Committee 2023].

4. Distinguishing Hereditary from Non-Hereditary Cataracts

Table 1 summarizes the key clinical, morphological, and diagnostic criteria used in the peer-reviewed literature and by the ACVO Genetics Committee to differentiate hereditary primary cataracts from non-hereditary secondary cataracts in Labrador Retrievers [Curtis 1989]; [Kraijer-Huver et al. 2008]; [Barnett 1985]; [Barnett 1985]; [Guerra et al. 2018]; [Packer et al. 2023]; [ACVO Genetics Committee 2023].

Table 1. Criteria for differentiating hereditary (primary) from non-hereditary (secondary) cataracts in Labrador Retrievers.

Feature	Hereditary (Primary)	Non-Hereditary (Secondary)
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Location in lens	Posterior polar subcapsular, at suture line confluence; often triangular	Variable; posterior cortical if PRA-related; diffuse if metabolic or age-related
Laterality	Typically bilateral	Can be unilateral (trauma) or bilateral (PRA, metabolic)
Symmetry	Usually bilaterally symmetric	Less predictably symmetric
Age of onset	Typically younger to middle-aged adults; may be detectable early	Age-related: older dogs; PRA-related: concurrent with retinal signs
Associated ocular signs	No other primary ocular disease signs	PRA-related: retinal degeneration, night blindness, reduced ERG
Morphology / progression	Small, triangular/posterior polar; may be stable or slowly progressive to extensive	PRA-secondary: posterior cortical; metabolic/age-related: often diffuse cortical
Family history	Affected relatives; offspring of affected parents at elevated risk	No consistent hereditary pattern; no breed/familial clustering
Retinal function (ERG)	Normal electroretinogram	Abnormal ERG if PRA-related
CAER/Blue Book breeding advice	NO — breeding not recommended for any primary cataract	Depends on cause: PRA = NO; trauma/metabolic = significance may be noted as unknown; examiner may request BREEDER OPTION consideration
DNA testing	No validated Lab-specific causative mutation test currently available	prcd-PRA DNA test available to rule PRA in or out

In practical terms, the key diagnostic steps are: (1) **slit-lamp biomicroscopy** to characterize cataract location and morphology; (2) **indirect ophthalmoscopy** to evaluate retinal integrity where the lens opacity permits; (3) **electroretinography (ERG)** when retinal assessment is obscured by the cataract; (4) **pedigree analysis** to assess familial aggregation; and (5) **DNA testing for prcd-PRA** to exclude retinal disease as an underlying cause. Notably, The Blue Book advises that gonioscopy, tonometry, ERG, and ultrasonography are not routinely performed during a standard CAER certification examination, and that dogs with early PRA may therefore not be detected without these additional tests [\[ACVO Genetics Committee 2023\]](#).

5. The CAER Examination and Official Breeding Recommendations

The OFA Companion Animal Eye Registry (CAER) examination, performed by board-certified ACVO Diplomates, is the standard tool for ocular screening of breeding dogs in North America. The examination includes indirect ophthalmoscopy and slit-lamp biomicroscopy following pharmacological pupil dilation. Results are coded according to Blue Book criteria and submitted to OFA [\[ACVO Genetics Committee 2023\]](#).

The Blue Book establishes two formal categories of breeding advice for detected ocular conditions. The first, designated **"NO,"** indicates that substantial evidence supports the heritability of the condition and/or that it represents a potential compromise of vision or ocular function; breeding is not recommended for any dog carrying even a minor form of such a condition. The second category, **"BREEDER OPTION,"** indicates that the entity is suspected to be inherited but does not represent a potential compromise of vision or function; caution is advised and the condition may in time be reclassified to "NO" as evidence accumulates [\[ACVO Genetics Committee 2023\]](#).

Cataracts are among eleven ocular conditions for which The Blue Book issues a universal "NO" breeding recommendation across all breeds, independent of any breed-specific listing. The relevant standard states that breeding is not recommended for any animal demonstrating partial or complete opacity of the lens or its capsule, except in cases specifically known to be associated with trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies [\[ACVO Genetics Committee 2023\]](#). The ACVO Genetics Committee strongly recommends annual CAER evaluations for all breeding dogs, particularly because many hereditary ocular conditions — including cataracts — do not develop until later in life [\[ACVO Genetics Committee 2023\]](#).

6. Breeding Implications

The combined evidence from population studies and The Blue Book supports a conservative breeding policy for the Labrador Retriever. The large Dutch study concluded that it remains valid to exclude all Labrador Retrievers affected by any type of primary cataract from breeding, even in the absence of conclusive molecular genetic evidence of the causative mutation [\[Kraijer-Huver et al. 2008\]](#). This conclusion is fully consistent with the ACVO universal "NO" recommendation for cataracts in all breeds [\[ACVO Genetics Committee 2023\]](#).

Dogs affected only with PRA-secondary cataracts should be excluded from breeding on the basis of their PRA status, with available prcd-PRA DNA tests used to identify carriers as well as affected dogs [\[Acland et al. 1998\]](#). Because standard CAER examinations do not include ERG, early PRA-affected dogs may present with cataracts but no other detectable retinal signs at the time of examination; DNA testing for prcd-PRA is therefore a valuable complement to the clinical CAER exam for Labrador Retriever breeders [\[ACVO Genetics Committee 2023\]](#).

Because the specific genetic mutation(s) underlying primary hereditary cataracts in the Labrador Retriever remain unidentified, no DNA test can currently substitute for an annual clinical CAER examination. The ACVO Genetics Committee explicitly notes that until the genetic basis of an ocular disorder is defined in a peer-reviewed published report, registry data, ACVO Diplomate consensus, and clinical experience must guide breeding decisions [\[ACVO Genetics Committee 2023\]](#).

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Click any entry below to open the corresponding paper or document in a web browser.

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