8. The Veterinary ophthalmologists' advice relating to hereditary eye disease control

In this manual, we choose the term « Veterinary Ophthalmologists' advice relating to HED control » and intentionally avoid the words "pass", "fail", « certifiable » and « registerable ».

The ECVO does not prescribe breeding rules, nor does it serve as a registry organization. Breed clubs and registry organizations operate independently of the ECVO and set their own standards for registration. Any registry organization may use the information in this manual and the results of examinations performed by ECVO diplomates and panellists (Eye Scheme Examiners under the ECVO Eye Scheme) for the registration of animals with respect to their suitability for breeding.

It is important to recognize that the sensitivity of genetic disorder detection is greater when larger numbers of dogs are examined. The large number of disorders listed in this manual for some breeds may reflect the popularity of the breed and the numbers of animals evaluated. Conversely, the lack of disorders listed for other breeds often reflects the paucity of examinations reported for each breed. This may vary from country to country.

For each breed, specific ocular disorders have been listed which are suspected, known or presumed to be inherited based on one or more of the following criteria:

· when the frequency is greater than in other breeds
· when the frequency increases in a given breed as a whole
· when the frequency is greater in related dogs within a breed
· when the lesion has a characteristic appearance and location
· when the lesion has a characteristic age of onset and course of progression (predictable stages of development and time for each stage to develop)
· when the lesion looks identical to an entity which has been proven to be inherited in another breed.

More specifically, also

-when there are published reports in the scientific literature regarding a condition in a particular breed with evidence of inheritance

-when there are DNA-based tests available for the eye disease

-when the incidence of affected animals (from a National ECVO Panel database, ECVO database and ACVO database which is the base of the OFA Eye Certification Registry (ECR) in the USA) is greater or equal to 1% of the examined population with a minimum of five affected animals per five-year period. Regardless of the population of dogs examined, if 50 or more affected individuals are identified in a five-year period, the entity will be listed for that breed

-when there is a specific request from a breed club, that a condition be included for their breed. Such requests are reviewed critically and must have received agreement by a majority of the HED committee

-when there is an overwhelming opinion by a majority of the HED committee members that clinical experience could indicate that a particular condition should be listed for a breed in spite of the absence of direct evidence of affected animals on the ECVO database, ECVO Panel database or the OFA ERC reports.

The veterinary ophthalmologists' advice is determined by the significance of the condition to vision and/or wellbeing of the animal, such as a condition that is either painful or necessitating surgical intervention or lifelong medication and/or there is a very strong evidence of heritability. Note: in instances that the causal gene mutation is known and a DNA-based test is available the advice may be different.

Three categories of advice regarding breeding have been established:

1- **OPTIONAL**
2- **NO BREEDING from the affected animal**
3- **NO BREEDING from the affected animal, its parents, or its offspring**

1- OPTIONAL:
The defect is presumed to be inherited (but there is no scientific evidence for its mode of inheritance) and the entity does not represent a prevalent or potential threat to vision or cause any other reduced ocular function, pain or distress to the animal. The breeder may decide whether to breed the animal or not, preferably after consultation and discussion with the kennel club and/ or the breed club.

2.- NO BREEDING from the affected animal:
Substantial evidence exists to support the heritability of this entity AND/OR the entity represents a major potential threat to vision or other reduced ocular function, pain or distress to the animal.

3.- NO BREEDING from the affected animal, its parents, or offspring:
Substantial evidence exists to support the heritability of this entity AND/OR the entity represents a major threat to vision or other ocular function, pain or distress to the animal.
This category is to be used when the mode of inheritance of the entity is likely or known to be recessive and therefore the affected animal's parents and off spring are likely to be carriers of the gene mutation. Use of the relatives of the affected animal may be considered when a DNA-based test is available for the mutation.
In the presence of the DNA-based tests in certain circumstances , the use of affected animals and carriers may be necessary. All such matings should be carefully controlled and all offspring subjected to DNA-based tests.

The veterinary ophthalmologists' advice hereby given is based on the diagnoses obtained during the ophthalmic examination conducted by an ECVO examiner (diplomate or panellist) undersigning the eye examination certificate.

The diagnoses refer therefore only to the phenotype (clinical appearance) of an animal. Thus, it is possible for a clinically normal animal to be a carrier (abnormal gentotype) of one or more genetic abnormalities.

The veterinary ophthalmologists' advice does not take into consideration the results of any genetic testing that may have been performed on the examined animal. This means that an animal may be for example DNA tested unaffected but is displaying clinical evidence of that inherited eye disease since that same disease may be caused by a different mutation in the same breed.

Finally, it is the opinion of the ECVO HED committee that it is up to the Kennel Clubs and/or the breed clubs to provide the actual Breeding Policy for each breed, which is often done together with geneticists. Other factors would then also be considered, such as frequency of a specific defect in the population and other defects affecting that specific breed of dog or cat, facilitating the establishment of an overall breeding policy.

The information contained in this manual can be used freely but the source (ECVO Hereditary Eye Disease committee) should be mentioned.

The veterinary ophthalmologists' advice relating to HED control, listed on the ECVO certificate, are given below for canine and feline breeds. The list is given in order to promote a general consensus among eye examiners in regards to evaluation of each disorder no matter breed (unless specified).

However, the advice might be different for a given breed, depending for example on the priority in a breed or the size of the actual breeding stock (the gene pool) in a certain breed. Specific advice is then given on the information sheet for each breed that follows in this manual.

Please note:

A - When the veterinary ophthalmologists' advice is **NO BREEDING** (either category 2 or 3), even a minor clinical form of the entity will make this animal (2), or this animal, its parents and its offspring (3) unsuitable for breeding.

B -For each disorder, if an animal shows **a severe form of this entity (e.g. blindness or severe pain)**, the veterinary ophthalmologist's advice should be a category 2: **NO BREEDING** from the affected animal.

1- Persistent Pupillary Membrane (PPM):

-Iris to iris: OPTIONAL
-Iris to lens: NO BREEDING from the affected animal
-Iris to cornea: NO BREEDING from the affected animal

2- PHTVL/PHPV:

-Grade 1 OPTIONAL
-Grade 2-6 NO BREEDING from the affected animal

3- Cataract (congenital):

NO BREEDING from the affected animal

4- Retinal Dysplasia (RD):

-(Multi)focal form in any breed: OPTIONAL. Note: different advice may be given for specific breeds (see under specific breeds).
-Geographic form : NO BREEDING from the affected animal
-Complete: NO BREEDING from the affected animal, its parents and offspring

5- Micropapilla/Optic Nerve Hypoplasia

NO BREEDING for the affected animal

6- Collie Eye Anomaly (CEA):

-Choroidal hypoplasia (CH)/chorioretinal dysplasia (CRD): OPTIONAL
-Coloboma and other defects (Retinal Detachment, Haemorrhage): NO BREEDING from the affected animal

7- Other:

Dermoid: OPTIONAL

Iris Hypoplasia: OPTIONAL

Atresia- Micropunctum: OPTIONAL

Lenticonus: NO BREEDING from the affected animal

Lens Coloboma: NO BREEDING from the affected animal

Microphthalmia: NO BREEDING from the affected animal

Multiple Ocular Anomalies: NO BREEDING from the affected animal

Retinal Dystrophy/RPE65 Mutation: NO BREEDING from the affected animal, its parents or offspring. Breeders may utilize the DNA-based test to use carrier animals that have exceptional characteristics while avoiding the production of affected offspring.

8- Pectinate Ligament Abnormality/Pectinate Ligament Dysplasia (PLD):

-Fibrae latae and/or laminae : OPTIONAL.
-Severe form of occlusion: NO BREEDING from the affected animal

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10-

11- Entropion/Trichiasis:

OPTIONAL

Note: In severe cases the advice may be: NO BREEDING from the affected animal.

12- Ectropion / Macroblepharon

OPTIONAL

13- Distichiasis/ Ectopic Cilia:

OPTIONAL.

Note: In severe cases the advice may be: NO BREEDING from the affected animal.

14- Corneal Dystrophy:

-Epithelial and/or stromal: OPTIONAL
-Endothelial: NO BREEDING from the affected animal

15- Cataract (hereditary, non congenital):

NO BREEDING from the affected animal

16- Lens Luxation (primary) (PLL):

NO BREEDING from the affected animal, its parents or offspring

17- Retinal Degeneration/Progressive Retinal Atrophy (PRA):

NO BREEDING from the affected animal, its parents or offspring
In instances where a DNA-based genetic test for recessive PRA is available breeders may choose to breed from carrier animals that have outstanding characteristics while still avoiding production of affected offspring.

18- Other:

Keratoconjunctivitis Sicca (KCS): OPTIONAL

Other types of bilateral breed-related retinopathies: NO BREEDING from the affected animal

Glaucoma (primary): NO BREEDING from the affected animal

Keratitis, Punctate: NO BREEDING from the affected animal

Chronic Superficial Keratitis/Pannus: NO BREEDING from the affected animal

Ocular Melanosis (Melanocytic Glaucoma): NO BREEDING from the affected animal

Pigmentary Uveitis: NO BREEDING from the affected animal

Uveal Cysts: OPTIONAL

Vitreal Degeneration: OPTIONAL

Figures of the PIEDs are found on the ECVO website at http://ecvo.org/inherited-eye-diseases/images-for-panellists