Cairn Terrier Club of Canada
Health Recommendations Executive Summary
2022

This is a condensed version of the Health Guidelines, Revised 2021-2022 by the CTCC Health Committee.
The full version of the Health Guidelines is available in the members section of the website and includes:

- Table of Acronyms.
- Clinical presentation, rationale and supplemental information for individual recommendations for each condition. In the interests of brevity, the Executive Summary does not discuss rationale or evidence supporting the recommendations.
- Where known, genetic etiology and inheritance patterns.

Supplemental documents (Preamble to Health Recommendations, Briefing Documents for individual conditions, Spay / Neuter Guidelines, Strategies for Supporting Genetic Diversity, and others) are available in the members section of the website.

List of Tables

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Definitions

carrier	A dog that carries one normal and one abnormal gene; usually used in reference to autosomal recessive conditions.
clear	A dog that carries two copies of the normal gene.
affected	A dog that has clinical evidence of disease.
sex linked	In sex linked conditions, a dog with one copy of the gene will be affected if male and a carrier if female.

Table 1a: Disorders detectable through genetic testing – High Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Craniomandibular Osteopathy	• **Strong** recommendation for genetic testing prior to first breeding for all dogs.	• **Strong** recommendation against breeding affected dogs. • **Strong** recommendation against breeding carriers.
Globoid Cell Leukodystrophy	• **Strong** recommendation for genetic testing prior to first breeding for all dogs. • Dogs may be considered clear by descent if both parents are tested and clear.	• **Strong** recommendation against breeding affected dogs. • **Strong** recommendation against breeding carriers.
Pyruvate Kinase Deficiency	• **Strong** recommendation for genetic testing prior to first breeding for all dogs. • Dogs may be considered clear by descent if both parents are tested and clear.	• **Strong** recommendation against breeding affected dogs. • **Strong** recommendation against breeding carriers.
Congenital Macrothrombo-cytopenia	• **Moderate** recommendation for genetic testing prior to breeding for all dogs. • Dogs may be considered clear by descent if both parents are tested and clear.	• **Moderate** recommendation against breeding two carriers together. • **Moderate** recommendation against removing carriers from breeding programs
Hemophilia B	• **Strong** recommendation for genetic testing prior to first breeding for all dogs.	• **Strong** recommendation against breeding affected males. • **Strong** recommendation against breeding female carriers.
Von Willibrand's Disease	• **Strong** recommendation for testing for genetic testing for Type 1 vWD prior to breeding for all dogs. • **Strong** recommendation that puppies resulting from a carrier-to-clear mating be tested prior to placement / breeding decisions.	• **Strong** recommendation to breed carriers only to clears, and only when such a breeding will significantly advance the goals of a breeding program. • **Strong** recommendation against breeding carrier to carrier due to high risk of producing offspring homozygous for the mutation (severe disease). • **Strong** recommendation against breeding affected dogs due to risks associated with breeding and whelping.

Table 1b Disorders requiring clinical / laboratory or radiologic evaluation: Eye Disorders – High Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Ocular Melanosis	• **Strong recommendation** for OFA eye examinations for breeding stock every 1-2 years, preferably yearly, starting at age 2. Testing should be done by board certified ophthalmologists. • Breeders are encouraged to not limit testing to breeding stock. Broader testing will aid in identification of at-risk lineages.	• **Strong recommendation** against breeding affected dogs. • **Weak recommendation** against breeding first degree relatives (siblings, offspring, parents) of an affected dog. This recommendation might be increased to Moderate if there are multiple affected dogs in the lineage.
Progressive Retinal Atrophy	• **Strong recommendation** for eye examination as per ocular melanosis. • Additional testing such as electroretinogram may be considered on a case-by-case basis.	• **Strong recommendation:** Do not breed affected dogs. Do not breed two carriers together: ○ Do not repeat matings that produce affected dogs. ○ Do not breed together two dogs that have both produced affected dogs. • **Moderate recommendation:** Do not breed parents, siblings or offspring of affected dogs. If considering such a breeding, consultation with veterinary ophthalmologist / geneticist is recommended.

Table 1c: Disorders requiring clinical / laboratory or radiologic evaluation: Heart / Kidney / Liver disease - High Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Renal Dysplasia **Renal Aplasia** and **Polycystic Kidney Disease**	• **Strong recommendation** for renal ultrasound of all breeding stock prior to first breeding. • **Consider the benefits** of performing ultrasound on all puppies prior to placement (as close to or later than 12 weeks). This will assist in selection of dogs to be retained in breeding programs. • Scanning should be done by an experienced ultrasonographer with knowledge or renal US morphology at all ages.	• **Strong recommendation** against breeding dogs with Renal dysplasia, unilateral renal aplasia, or polycystic kidney disease. • **Strong recommendation** against breeding together two dogs with speckling. A dog with speckling should be bred only to clear dogs with normal kidneys. • **Moderate recommendation** to NOT eliminate dogs from breeding programs with ultrasound findings limited to speckling, or minor findings not indicative of renal dysplasia.

Cardiac screening	• **Strong recommendation** for puppies to have a veterinary cardiac exam (by general veterinarian) prior to placement.
	  ○ No special investigations are required for asymptomatic puppies with 'innocent' murmurs. Puppies should be followed prospectively to document resolution. The breeder should disclose the presence of the murmur and plan to new owners.
	• **Strong recommendation** for breeding stock to have a cardiac exam (by general veterinarian) after reaching adulthood and prior to breeding.
	  ○ Breeding stock with murmurs should have further investigations (cardiologist exam +/- echo) prior to breeding to rule out structural causes.
		• **Strong** recommendation against breeding a dog with congenital heart disease.
		• **Weak recommendation** against breeding dogs with Mitral Valve Myxomatous Degeneration

Porto-Systemic Shunt (CPSS) and Microvascular dysplasia (MVD)	• **Strong** recommendation in favour of screening all puppies for CPSS / MVD with EITHER bile acid or fasting ammonia test. • **Moderate** recommendation in favour of screening puppies as LATE as possible before placement, preferably not earlier than 12 weeks. • **Insufficient** evidence is available to recommend a specific type of meal prior to post prandial testing of bile acids. **Testing notes** • Ammonia testing is preferred if testing early (can be done at 6 weeks). Testing must be done in specialized centers due to strict testing requirements. • Most breeders currently do 2 hr post prandial bile acid rather than both pre and post. There is **insufficient evidence** to recommend one strategy over the other. If post bile acids are abnormal then repeat testing with pre and post prandial bile acids is recommended.	• **Strong** recommendation against breeding dogs with CPSS or MVD

Table 2a: Disorders requiring clinical / laboratory or radiologic evaluation: Eye Disorders – Moderate Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Cataracts	• **Strong recommendation** for eye examination as per ocular melanosis. • **Moderate recommendation** for genetic testing for HSF4 gene mutations (included in panel tests).	• **Weak recommendation against** breeding dogs that are carriers for dominant mutations of the HSF4 gene (until relevance in Cairns is established). • **Moderate recommendation**: Carriers of the autosomal recessive mutations of the HSF4 gene should be bred only to dogs that are clear of HSF4 mutations, until relevance in Cairns is established.
Glaucoma	• **Strong recommendation** for eye examination as per ocular melanosis. • Additional testing such as High Frequency Ultrasound or Gonioscopy may allow early detection of glaucoma in dogs at risk and should be considered on a case-by-case basis.	**Weak recommendation:** Use caution in breeding affected dogs. • Consider pedigree to avoid doubling up on possible genetic factors. • Consult with a veterinary ophthalmologist / geneticist
Persistent Pupillary Membranes	• **Strong recommendation** for eye examination (once) prior to breeding.	Iris to iris PPMs (most common) – no breeding restrictions Iris to lens or Iris to Cornea PPMs – submit results to OFA for breeding recommendations.

Table 2b: Disorders requiring clinical / laboratory or radiologic evaluation: Orthopedic conditions – Moderate Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations

Hip Dysplasia	• **Strong** recommendation in favour of standardized radiologic assessments for HD (OFA / PENN hip) prior to breeding under the following circumstances:
	  ○ if there is a significant pedigree history of HD
	  ○ for any dog with clinical signs of HD
	• Follow the minimum age requirements for standardized radiologic assessments:
	  ○ OFA: 2 years
	  ○ Penn Hip: 8 months
	  ○ FCI: 1 year
	• **Insufficient** evidence to recommend universal screening for all Cairn Terriers, including breeding stock.
		• **Strong** recommendation against breeding dogs with **symptomatic** HD
		• **Moderate** recommendation against breeding dogs with a strong pedigree history of HD (multiple affected dogs in parents, grandparents and siblings of parents and grandparents). If breeding such a dog is considered important to a breeding program:
		  ○ Complete standardized radiologic testing prior to breeding.
		  ○ Ensure that the breeding partner is from a lineage free of HD.
		  ○ Move forward with puppies free of HD from resulting litters.

Patellar Luxation	• **Moderate** recommendation for testing puppies prior to placement. • **Moderate** recommendation for all puppies to be examined for PL at one year of age. • **Strong** recommendation for potential breeding dogs to be examined for PL prior to breeding. (> 1 year of age at exam).	• **Moderate** recommendation against breeding dogs with PL. (Does not apply to dogs with traumatic PL). • **Strong** recommendation to avoid matings where both sire and dam have PL of any severity.

Legg-Calves-Perthes Disease	• **Insufficient evidence** to recommend routine screening hip x-rays for LCP in breeding dogs.
	• **For dogs from lineages with multiple cases of LCP:** Consider screening x-rays prior to breeding.
		• **Moderate** recommendation against breeding dogs with symptomatic LCP.
		• **Strong** recommendation against matings where both sire and dam have LCP.
		• **For dogs from lineages with multiple cases of LCP:**
		  ○ **Moderate** recommendation against breeding asymptomatic dogs with radiologic evidence of LCP.
		  ○ *If a dog with symptomatic or radiologic LCP offers significant benefits to a breeding program, breed to a dog with a lineage clear of LCP.*

Table 3a: Disorders detectable through genetic testing - Low Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Hemophilia A	• **Insufficient evidence** to make a recommendation for testing using currently available genetic tests. • Dogs from affected lineages should undergo genetic testing on an investigational basis to facilitate recognition of relevant mutations in Cairn Terriers.	• **Strong** recommendation against breeding affected dogs. • Dogs from affected lineages should be bred with caution and only to dogs from lineages free of disease.
Gall Bladder Mucocele	• **Insufficient evidence** to make a recommendation for testing for the ABCB4 gene mutation.	• **Insufficient evidence** to make a recommendation for or against breeding. • **Moderate** recommendation to avoid line breeding if a lineage is known to have a history of GBM in multiple ancestors.
Calcium Oxalate Urolithiasis	• **Insufficient evidence** to make a recommendation for routine use of CaOx1 gene testing in Cairns. • **Moderate** recommendation for routine bladder scanning in association with renal ultrasounds (of adult breeding stock or routine screening for puppies) to detect evidence of precipitates or stones. • **Consider enrolling Cairn Terriers with documented stone formation in a study looking for gene markers of CaOx stones:** Contact University of Minnesota cgl@umn.edu	• **Insufficient evidence** to make a recommendation regarding breeding of dogs with minor precipitates on bladder scanning. • **Moderate** recommendation against breeding dogs with overt stone formation.

Table 3b: Genetic disorders of low or no concern in Cairn Terriers

N.B. These disorders are included not because of recognized risk in Cairn Terriers but because various genetic testing companies have made specific recommendations for such testing in Cairn Terriers.

Condition	Testing Recommendations	Breeding Recommendations
Chondrodystrophy Chondrodysplasia Intervertebral Disc Disease	• **Moderate** recommendation **against** testing. • Where testing is included in a panel, users must understand the limitations of the results (see complete version of recommendations)	• **Strong** recommendation **against** using results in breeding decisions for Cairn Terriers.
Degenerative Myelopathy	• **Moderate** recommendation **against** testing for the SOD1 gene mutation.	• **Moderate** recommendation **against** using results in breeding decisions. OFA recommends **against** use of this test in breeds NOT definitively proven at risk through correlation of spinal cord histology and gene testing.
Hyperuricosuric urolithiasis	• **Insufficient evidence** to make a recommendation FOR testing of Cairn Terriers for HUU.	• **Insufficient evidence** to make breeding recommendations if a Cairn is found to carry the SLC2A9 gene mutation

Table 3c: Disorders requiring clinical / laboratory or radiologic evaluation: Endocrine Disorders – Low Priority Conditions

Condition	Testing Recommendations	Breeding Recommendations
Addison's Disease	• **No recommendation** for screening tests (none available)	• **Strong** recommendation against breeding affected dogs – (NB: breeding a bitch with Addison's disease, even if well controlled is risky). • **Insufficient evidence** to make a recommendation against breeding first degree relatives of affected dogs. • **Weak recommendation** to avoid breeding two dogs that both have Addison's Disease in the pedigree.
Cushing's Syndrome	• **No recommendation** for screening tests (none available)	• **Strong** recommendation against breeding affected bitches because of adverse pregnancy outcomes related to treatment (teratogenicity). • **Insufficient evidence** to make a recommendation for or against breeding first degree relatives of affected dogs or breeding two dogs that both have Cushing's Disease in the pedigrees.
Diabetes	• **No recommendation** for screening tests (none available)	• **Strong** recommendation against breeding affected bitches -. diabetes is a high-risk situation to both the dam and her puppies. • **Insufficient evidence** to make a recommendation against breeding first degree relatives of affected dogs.
Hypothyroidism	• **No recommendation** for routine screening with Thyroid autoantibodies. • **Moderate recommendation** for thyroglobulin autoantibody testing of asymptomatic breeding dogs with affected first degree relatives. Test annually for the first 4 years then every other year.	• **Insufficient evidence** to recommend for or against breeding affected dogs. Affected dogs on appropriate replacement therapy may be successfully bred but consideration should be given to whether this breeding is necessary to advance breeding goals. • **Insufficient evidence** to make a recommendation against breeding first degree relatives of affected animals. • **Weak recommendation** to avoid breeding two dogs that both have Hypothyroidism in dogs close to them in the pedigree.

For all the above endocrine conditions, while there is insufficient evidence to allow for robust recommendations around breeding, breeders should give careful thought to the risks and benefits of breeding affected dogs. As a general rule, breeding affected dogs should be restricted to situations where there are compelling reasons for the breeding program, and with expert veterinary support. These conditions are most likely to arise as bitches are at, or nearing the end, of their breeding career, so in most cases the affected dogs can be removed from breeding programs with minimal impact on a breeding program or on genetic diversity. The etiologic basis for these disorders is complex (polygenic and multifactorial) and disease risk is likely related to the convergence of multiple risks. Where possible, if breeding a dog whose pedigree includes of one of these conditions, the breeder should seek out a pedigree that is free of the disorder. The closer the dog being bred to the affected dog in the pedigree the more diligent the breeder should be to seek a pedigree free of disease.

Table 3d: Disorders requiring clinical / laboratory or radiologic evaluation: Atopic Disorders – Low Priority Condition

Condition	Testing Recommendations	Breeding Recommendations
Atopic disease	• **No testing** available to predict risk of atopic disease in progeny or puppies. • **Strong** recommendation **against** use of hair / saliva tests in diagnosis of atopic disease due to unreliability.	**Insufficient evidence** to recommend against breeding dogs with atopy, or first-degree relatives of affected dogs. **Moderate** recommendation against removing dogs with mild to moderate atopy from breeding due to potential adverse effects on genetic diversity. **Weak** recommendation against matings in which both dogs are affected by moderate to severe atopy.