

The Chinese Crested is a generally healthy breed but, like all breeds, is predisposed to certain genetic diseases. These diseases can be tested for and some can be prevented entirely by screening parent animals before breeding. It is important to test breeding stock before breeding takes place to do everything possible to prevent genetic disease from being passed on to offspring. Though testing does not guarantee the elimination of genetic disease, it does greatly reduce the incidence of passing on genetic disease to the next generation. There are also a number of inherited conditions where no testing is available so researching pedigrees is crucial in ensuring sound decisions are made when buying or breeding. Below is a brief outline of genetic diseases known to affect the Chinese Crested breed and how they are tested for.

#### **THE MOST COMMON GENETIC DISEASES IN CRESTEDS ARE:**

**Progressive Retinal Atrophy (PRA-prcd & PRA-rcd3)** - There are at least two different types of PRA that affect the Chinese Crested Breed. PRA causes a progressive degeneration (decay) or detachment of the retina in the eye which gradually causes complete blindness. PRA can begin to show in the eyes in mid puppyhood to late adulthood but is genetically present at birth if the dog has inherited the disease. A yearly CERF exam can detect active PRA but will not detect PRA that has not yet become active within the eye. Both forms of PRA known to affect out breed can currently be detected using DNA (with a blood or cheek swab sample). It is entirely possible to prevent the transmission of both forms of PRA to offspring by testing parents before breeding. **Yearly CERF exams are still needed to monitor for other eye conditions which may affect the eye, several of which are hereditary.**

Another Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Progressive+Retinal+Atrophy+.PRA.+html>

**Primary Lens Luxation (PLL)** - Primary Lens Luxation (PLL) is a well-recognised, painful and blinding inherited eye condition. In affected dogs the zonular fibres which support the lens breakdown or disintegrate, causing the lens to fall into the wrong position within the eye. If the lens falls into the anterior chamber of the eye glaucoma and loss of vision can quickly result.

Dogs need one genetic test in order to ascertain their status for this disease. If tested Clear they will have two normal copies of DNA and will not develop PLL (unless as a result of Trauma to the Eye). If found to be a Carrier they will have one copy of the mutation and one copy of normal DNA and have a very low risk of developing PLL but it is recommended that all carriers have their eyes examined by a veterinary ophthalmologist every 6- 12 months, from the age of 2, throughout their entire lives. If tested as an Affected these dogs will have two copies of the mutation and will almost certainly develop PLL during their lifetime. It is advised that genetically affected dogs have their eyes examined by a veterinary ophthalmologist every 6 months, from the age of 18 months, so the clinical signs of PLL are detected as early as possible.

In terms of Breeding Advice, it is currently considered that only allowing Clear to Clear mating's could have a devastating effect on breed diversity and substantially increase the likelihood of new inherited diseases emerging. Therefore it is currently believed that mating genetically Clear to Carrier dogs is acceptable; however it is then advised that all progeny be genetically tested to determine their status.

**Keratoconjunctivitis Sicca (KCS) or Dry Eye** - In this disease, the cornea and membranes of the eye are dry and inflamed due to a reduction or absence in the water portion of the tear fluid production from the tear glands, leaving only oil and mucus production resulting in only a gooey, yellow discharge as opposed to normal lubrication. "Dry Eye" is the most common term used for this condition as it describes the

appearance of the eye without normal tear production. There are several causes for this disease - the most common is thought to be an auto-immune response where the dogs own immune system damages and gradually or rapidly destroys the lacrimal (tear producing) glands. Other causes are damage to the nerves supplying the gland from eye injury and severe, uncontrolled eye infection. (Temporary dry eye can also be caused by a reaction to anesthesia.) This disease can show itself as either a reduction in lubrication or a total absence of lubrication and can be seen in either one or both eyes.

Dry eye causes pain, inflammation and scarring of the cornea. If not controlled, it can lead to eventual blindness and unremitting pain. Dry eye is diagnosed using the "Schimer Test" - a quick and painless procedure which measures the amount of tear production using a sterile testing strip. Treatment consists of controlling infection, use of lubricating eye drops daily and sometimes the use of eye medication which helps the eye to produce a small amount of tear fluid. In the most severe cases, the eye must be surgically removed to prevent pain and continued infection. This disease often presents in adulthood and is thought to be genetically linked, though there is no known genetic marker at this time.

Another Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Keratoconjunctivitus+Sicca+.KCS.+or+Dry+Eye.html>

### **Glaucoma**

Glaucoma refers to a group of diseases that affect the optic nerve and involves a loss of retinal ganglion cells in a characteristic pattern. Raised intraocular pressure is a significant risk factor for developing glaucoma (above 22 mmHg or 2.9 kPa). Untreated glaucoma in dogs leads to permanent damage of the optic nerve and resultant visual field loss, which can progress to blindness. Canine glaucoma can be divided roughly into two main categories, primary or secondary glaucoma. In dogs, most forms of primary glaucoma are the result of a collapsed filtration angle, or closed angle glaucoma. Dog glaucoma often goes unnoticed until it is in a more severe state. There are rarely any symptoms in the early stages of the disease so regular eye checks by qualified veterinary professionals are important. Dogs will sometimes rub the eye if it is painful. An eye affected with glaucoma may be red, swollen, sore, or become clouded in appearance.

Glaucoma can be tested for by a simple one off physical exam by a BVA vet and should always be done prior to breeding.

**Epilepsy** – this is common in our breed and is in most lines somewhere. It can be mild or severe and often cases of mild epilepsy can go undetected by their owners. There are also a wide array of things which can cause seizures, so it is important to ensure you are clear on the cause as seizures are not always a result of hereditary epilepsy. The key thing is to research your pedigree in order to evaluate the risk. There is a lot of information online about epilepsy affected dogs and with a bit of research it is relatively easy to gain significant knowledge on where potential issues are likely to arise. There is currently research being undergone in the USA into Epilepsy in our breed so hopefully over time a test will be developed.

**Patellar Luxation** - Along with nearly all toy breeds, the Chinese Crested is genetically predisposed to patellar luxation, or slipping of the knee caps. This is caused when the indentation the patella (knee-cap) sits in is too shallow to properly form the knee joint. There are varying degrees of severity, with the moderate to severe luxations requiring surgery to repair the knee and to prevent lameness and pain in the animal. Patellar Luxation can be tested for by manual manipulation of the knee by your veterinarian. The OFA (Orthopedic Foundation for Animals) certifies the absence of Patellar luxation and breeders should be able to provide proof of testing with either an OFA certificate or OFA form signed by their veterinarian.

Though testing of parent animals greatly reduces the incidence of patellar luxation in offspring, it is not a guarantee that a pair of animals who have been tested clear of patellar luxation will not produce an affected puppy.

Another Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Patella+Luxation.html>

**Legg-Calve-Perthes Disease (LCP)** - LCP is the degeneration (decay) of the hip joint, specifically, the head of the femur (the "ball" of the joint) In LCP affected dogs, the femoral head first begins to degenerate and then heal - during the healing process the joint develops scar tissue induced malformation and no longer fits cleanly into the hip socket, producing lameness and pain. The most common treatment for this disease is Femoral-Head Osteotomy - the removal of the ball of the hip joint. This eradicates pain and produces free movement of the leg. It is not known exactly what causes LCP and there is no known genetic marker, and therefore no DNA test that can be performed to detect its presence. LCP can be tested for using a hip x-ray but is most often detected in pups at 4-12 months of age by the onset of the disease and the resultant pain, inflammation and lameness.

Another Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Legge.Calve.Perthes+.LCP..html>

**Genetic Deafness and Closed Ear Canals** - A small percentage of chinese crested puppies are born deaf due to lack of pigmentation within the inner ear. This happens most often in "pink" or white animals and animals who are predominantly pink" or white - most especially on the head region. Deaf animals have been known to produce deaf offspring and should never be bred. Suspected puppies as young as 6 weeks of age can be tested for deafness using the brainstem auditory evoked response (BAER) test, a quick a painless procedure which uses an electrical read-out to show whether or not the brain is perceiving sound.

The Chinese Crested breed has also been known to produce puppies born with closed ear canals. This can be either unilateral (one ear) or bilateral (both ears). In many of these puppies, exploratory surgery reveals an incomplete or absent inner ear structure. In rare instances, the inner ear was complete and hearing was restored with surgery. Puppies born with closed ear canals should never be bred due to the likelihood of passing on the defect.

**Von Willebrand disease type II (VWDII)** – Von Willebrand disease type II (VWDII) is an inherited bleeding disorder affecting Chinese crested. Dogs affected with VWDII have decreased levels and abnormal function of von Willebrand coagulation factor (vWf), which is an essential protein needed for normal blood clotting. Affected dogs generally have moderate to severe signs of a bleeding disorder. Affected dogs may bruise easily, have frequent nosebleeds, bleed from the mouth when juvenile teeth are lost and experience prolonged bleeding after surgery or trauma. The bleeding may be severe enough to cause death. Due to variable severity of the disorder, affected dogs may not be identified until a surgery is performed or trauma occurs at which time excessive bleeding is noted. Veterinarians performing surgery on known affected dogs should have ready access to blood banked for transfusions. Dogs can have a normal lifespan with this condition although they are susceptible to life-threatening bleeding with an accidental injury or any surgical procedure. You can test for this via Blood sample or buccal swab. The breed is currently showing to have a fair number of carrier and affected's in this disease but currently none are known to be symptomatic so it is a condition being looked into further to gain a better understanding of. In the meantime, testing is being recommended

## LESS COMMON GENETIC DISEASES AFFECTING CRESTEDS:

**Thyroid Disease** - under or over active thyroid glands may produce symptoms that include rapid weight loss or gain, lethargy or hyperactivity, hair loss, panting, and appetite changes. Thyroid disease can be tested for using simple blood tests. Treatment can include medications and/or surgery.

**Addison's disease (Hypoadrenocorticism)** is a severe or complete loss of function of both adrenal glands caused by a destruction of the adrenal cortex. The adrenal glands produce aldosterone, cortisol and corticosterone. Of the three hormones, the loss of aldosterone is most important clinically. Aldosterone is responsible for maintaining the equilibrium of sodium and potassium in the body.

The cause of Addison's disease is suspected to be an autoimmune disease. The major cause of Addison's disease results from an auto-immune reaction in which the body's immune system erroneously makes antibodies against the cells of the adrenal cortex and slowly destroys them: The dog's immune system attacks its own adrenal glands. That process takes months to years.

A Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Addisons+Disease+.Hypoadrenocorticism.html>

**Heart Disease** can be either present at birth or acquired. Acquired heart disease is more common.

A Congenital heart defect is an abnormality that is present at birth, while an acquired heart disease is an abnormality that develops after birth.

There are two common types of heart disease in dogs: In one type, a dog's heart valves lose their ability to close properly, causing abnormal blood flow. In the other type, the muscular walls of a dog's heart become thinned and weakened. Both types develop gradually over time.

A Useful article on the subject can be found here:

<http://www.chinesecrested.no/en/articles/health/Heart+Disease+.html>

**Degenerative myelopathy** - Degenerative myelopathy is an inherited neurologic disorder caused by a mutation of the SOD1 gene known to be carried by Chinese crested. This mutation is found in many breeds of dog, though it is not clear for Chinese crested whether all dogs carrying two copies of the mutation will develop the disease. The variable presentation between breeds suggests that there are environmental or other genetic factors responsible for modifying disease expression. The average age of onset for dogs with degenerative myelopathy is approximately nine years of age. The disease affects the White Matter tissue of the spinal cord and is considered the canine equivalent to amyotrophic lateral sclerosis (Lou Gehrig's disease) found in humans. Affected dogs usually present in adulthood with gradual muscle Atrophy and loss of coordination typically beginning in the hind limbs due to degeneration of the nerves. The condition is not typically painful for the dog, but will progress until the dog is no longer able to walk. The gait of dogs affected with degenerative myelopathy can be difficult to distinguish from the gait of dogs with hip dysplasia, arthritis of other joints of the hind limbs, or intervertebral disc disease. Late in the progression of disease, dogs may lose fecal and urinary continence and the forelimbs may be affected. Affected dogs may fully lose the ability to walk 6 months to 2 years after the onset of symptoms. Affected small breed dogs, such as the Chinese crested, often progress more slowly than affected large breed dogs and owners may postpone euthanasia until the dog is paraplegic.. This can be tested via blood sample or buccal swab and will again help ensure any genetic inheritance has not been passed on.

**Canine multiple system degeneration** – Canine multiple system degeneration (Chinese crested type) is a progressive inherited neurological disease affecting Chinese crested dogs. Affected dogs present at 3 to 6 months of age with tremors, abnormal gait and poor balance. Dogs gradually progress to severe gait abnormalities, balance issues, frequent falling, abnormal body posture, abnormal eye movement and eventually are unable to move. Dogs continue to show normal mental awareness and social behavior despite movement disturbances. Most dogs die due to disease complications or are humanely euthanized by 2 years of age. Again this can be tested via blood sample or buccal swab to ensure no genetic inheritance.

## **Below you will find Testing information**

Pawprint Genetics currently offer a great value panel consisting of both types or PRA that affect our breed, PLL, VWDII, DM & CMSD

Pawprint offer a fixed discount through the club which can be used all year round or run regular special offers giving you fantastic savings.

All tests are done via buccal swab

<https://www.pawprintgenetics.com/>

### **PLL Testing Available From**

**AHT (Officially Recognised by the Kennel Club)**

[http://www.aht.org.uk/cms-display/genetics\\_canine.html](http://www.aht.org.uk/cms-display/genetics_canine.html)

Price at March 2015 £35 + VAT

### **LABOLKIN**

<http://www.laboklin.co.uk/laboklin/GeneticDiseases.jsp?catID=DogsGD>

Price at March 2015 £55 Incl VAT

### **ANIMAL DIAGNOSTICS**

<https://www.animaldnadiagnostics.co.uk/page/products>

Price at March 2015 £33 + VAT

### **prcd-PRA Testing Available From**

**Optigen (Officially Recognised by the Kennel Club)**

[http://www.optigen.com/opt9\\_test\\_prcd\\_pra.html](http://www.optigen.com/opt9_test_prcd_pra.html)

Price at March 2015 \$195 or \$156 for multiple dogs

### **LABOLKIN**

<http://www.laboklin.co.uk/laboklin/GeneticDiseases.jsp?catID=DogsGD>

Price at March 2015 £89.95

Or £165 for handling KC Approved Optigen test

### **BVA Routine Eye Examinations**

List of Approved Examiners:

<http://www.thekennelclub.org.uk/download/11215/eyeschemepannellists2011.pdf>

### **Routine Eye Examination (inc. VAT)**

<http://www.bva.co.uk/Canine-Health-Schemes/Eye-Scheme/>

Current Charges at March 2015

An examination under the Scheme should cost £54.00 (inc VAT) for one dog. For 2 to 24 dogs examined in one session, the cost per dog is currently £47.50 (inc VAT). If there are more than 25 dogs, the cost falls to £37.00 (inc VAT) per dog. There is a reduced rate of £32.00 (inc VAT) for re-examinations of dogs over the age of eight. The cost of litter screening is currently £32.00 (inc VAT) per litter of up to three puppies. If there are four or more puppies, the cost is £11.00 (inc VAT) per puppy.

Gonioscopy per dog (no discount for more than one)    £54.00

However if you have this done at the same time as a BVA eye exam its is £47.50

### Testing Data

Firstly we would like to thank everyone for testing and for sharing their results openly and honestly for the good of the breed. There are several resources where you can both post and look up test results.

### Crested Health Database

The database below is an excellent resource which relies on owners and breeders adding their dogs details. Please do take the time to complete the quick form and add your results

<http://www.crestedhealth.net/>

### Kennel Club

The KC have will now be recording all health test results for prcd-PRA & PLL along with all BVA eye test results and these will be available to view at the link below. You may also send copies of past results to be included.

<http://www.the-kennel-club.org.uk/services/public/mateselect/test/Default.aspx>

AHT

The following data was provided by Dr N.G.Holmes on 23rd April 2012 regarding numbers tested in their laboratories for PLL

	Clear	Carrier	Affected
All	1029	457	27
UK	107	34	2