

The following article has been compiled to help new potential border collie owners have a better understanding of some of the health conditions associated with the breed.

Firstly it is important to understand that **ALL** living things, including humans, and **all** breeds of dog, including cross breeds and 'designer' dogs **will** carry some undesirable genes for conditions we would rather not have. Some will be very minor, and not bother dog or owner, others can be more serious, and it is the more serious conditions' that good breeders will try to eliminate when choosing individuals for breeding.

As time goes on, more conditions will undoubtedly be recognised, and as they do, breeders will be working hard to try and find tests for them

Some of these conditions will be 'recessive' meaning that the undesirable gene has to be carried, and passed on, from both parents in order to produce the condition in the pup.

Some conditions are 'dominant' and can be passed on from just one parent,

And some will be 'polygenic' and need a combination of genes to be passed on from either one or both parents in order to produce the condition in a pup.

Some conditions can also be influenced by the way the pup is reared, or by other 'outside' factors.

The fact that there seems to be a lot of health tests available for border collies does not mean that, as a breed, they are more un-healthy than other breeds that have fewer tests. It means the opposite in fact, that breeders have put a lot of work, time and money into researching conditions that we know to exist, and have had scientific tests developed to find out which dogs are the least likely to produce these conditions, to ensure that the puppies bred have the best possible chance of a long, active, healthy life.

DNA tests have been developed for some conditions. This involves sending a blood sample from an individual to a specialised laboratory, for the DNA to be extracted and then looked at, to see if a particular gene is present and if so, if there is just one or two copies of it present.

This is the best way of testing as it can tell if an animal is genetically 'clear' and has no copy of the undesirable gene at all, so can **never** develop, pass on, or produce the condition in any of its pups.

If the individual is a 'carrier' and has just one copy of the undesirable gene. In which case it will never suffer from, or show any sign of the condition itself, but could, if bred from, pass its copy of the undesirable gene on to **some** its pups.

Or if an individual is 'affected' and has two copies of the undesirable gene, in which case it will develop symptoms of the condition and will pass on a copy of the undesirable gene to **all** of its pups.

Other conditions can be looked for by a physical examination from a vet specialising in the relevant condition. This is useful as it can tell if an animal is affected or not, but it can not tell if it is a 'carrier' or not, or if it could pass on the condition to pups. Obviously no responsible

breeder would breed from a dog that they knew was affected with an identifiable health condition. This method of examination is not quite so reliable as it is open to human error, even the best vet can have an -off day - and can miss-diagnose. This method of testing is used for conditions that we do not yet have a DNA test developed for.

Conditions we have DNA tests for include –

TNS.

TNS stands for Trapped Neutrophil Syndrome.

In normal individuals white blood cells are developed in the bone marrow, and then released into the blood stream, where they fight infections. In affected pups, these white blood cells are not released into the blood stream, and so the pup has no immunity to fight infections. Pups become weak and sickly, and very rarely survive past four months of age. They can be helped with anti biotic and steroids, but will eventually need to be put to sleep to end suffering.

In 'normal' individuals there is no copy of the TNS gene in the DNA.

'Carriers' will have one copy of the TNS gene, which could be passed on, but they will never develop the condition themselves or have any ill affect from it.

Affected individuals will have 2 copies of the TNS gene, one inherited from each 'carrier' parent, and will develop the condition.

A pup from one 'normal' and one 'carrier' parent, may be either 'normal' or 'carrier' itself, but will never develop the condition, and would need a DNA test performed on a sample of its own blood to find out its status.

CEA/CH

CEA/CH stands for Collie Eye Anomaly / Choroidal Hypoplasia.

This is an inherited eye condition, where parts of the inside of the eye do not develop normally. It is present at birth, and can normally be seen in affected pups from 6 weeks of age by a vet specialising in eye conditions by physical examination. It is non progressive, and in most cases only has a minimal affect on the dogs vision. In a few, very severe cases, the eye could haemorrhage internally leading to blindness. It is not possible for this physical examination to distinguish between genetically 'normal' or 'carrier' animals, which is where the DNA test comes into its own, telling us how many copies, if any, of the CEA/CH gene the individual has.

It is inherited 'recessively' in the same way as TNS, and so the same breeding results as for TNS will apply.

No CEA gene = genetically clear.

One copy of the CEA gene = carrier, but will never develop the condition.

2 copies of the CEA gene = clinically affected and has developed the condition.

CL

CL stands for Ceroid Lipofuscinosis.

This is a very rare inherited condition, but a particularly nasty one, where one of the enzymes that would normally remove certain waste products from the blood, is missing. These waste products then build up in the body's cells, particularly in the brain, and as brain cells have very little room to contain this waste, pressure starts to build up, killing off healthy brain cells. This can lead to unusual behaviour, problems with vision and movement, and demented behaviour. Symptoms do not normally show until around 18 months of age.

It is inherited recessively, the same as TNS and CEA/CH, and so the same breeding results apply. Fortunately the DNA test that is available allows breeders to ensure that they do not produce any affected pups. An identical disease which occurs in humans, is known as Batten's Disease

If you think you would like your dog DNA tested for any of the above conditions, you can find more information and download the necessary paperwork from <http://www.pbhf-dog.com> or <http://www.bordercolliehealth.com> or contact your local breed club.

Physical Tests

Gonioscopy. This is a relatively new test, and at the moment this test can only be performed by a specialist vet as a physical examination.

The vet looks into the eye, with specialised equipment, looking at the drainage channels within the eye. The eye itself is filled with a fluid, which continually drains and is replaced. If the drainage channels within the eye are not formed properly, and are very narrow or blocked, the fluid cannot drain properly so pressure can build up within the eye and this can result in **Glaucoma**, blindness and possible eye loss. Research is being done at the moment to try to establish if there is a specific gene or genes responsible for increasing the likelihood of a dog having these narrow drainage channels. If this is the case, then it is hoped that a DNA test will become available for this condition. More information can be found here <http://bc-glaucomadatabase.synthasite.com> and here <http://www.pbhf-dog.com> This test can only tell if the drainage channels are abnormal, and at this point there is no test available to tell if these abnormalities will cause the dog to go on to develop glaucoma, or if it will pass on this abnormality to all or some of its pups.

PRA

Progressive retinal atrophy

This is an hereditary eye condition, now thankfully rarely found in border collies, but is still one that is tested for regularly, it is Similar to retinitis pigmentosa in humans, and results in progressive degeneration of the retina, eventually leading to blindness. At the moment we do not have a DNA test available for this condition, but hope to have one in the future. It is diagnosed by physical examination by a vet specializing in eye conditions,

normally when the dog is over one year of age as it is not visible in young pups. As it can appear as the dog gets older breeding animals should be tested for it on a regular basis.

Epilepsy

Seizures can be caused by a host of different circumstances. Reaction to vaccine or other medication, head trauma, blood clot, severe allergic reaction, high or low blood sugar, heavy infestation with parasites, tumour, high temperature with a fever & poison, to name a few. Obviously none of the above are likely to be hereditary, and although they could lead to regular seizers, they are not true epileptic attacks.

Just like people, some dogs do have true epilepsy, and it can be controlled with drugs, There does seem to be a hereditary link in true epilepsy, but at the moment there is no clear indication as to how it is inherited. No sensible breeder would intentionally breed from a dog that was likely to produce epilepsy, or one that had fitted itself, and research is currently underway in Finland, and at the animal health trust to try to find out more about this condition. If and when the mode of inheritance is discovered, and a test developed, I am sure most breeders will be queuing up to ensure that their lines are free from this distressing condition.

Hip dysplasia

Hip dysplasia, (HD) is a common inherited orthopaedic problem of dogs and a wide number of other mammals, including humans. It is caused when the hip joint, which is a 'ball & socket' joint, does not develop properly, and as a result, the hip joint, is loose, or badly fitting. In severe cases, the badly fitting joint can develop arthritis, or the hip can dislocate, causing pain and lameness in the dog. This can be helped with medication and/or surgery.

It is complicated in its mode of inheritance, and can also be influenced by the way a puppy is reared.

Very few dogs (of any breed) have perfect hips, x-raying, and 'scoring' the hips of dogs, before they are bred from, and then breeding from animals that have low 'scores' is the best way of trying to ensure that their puppies do not go on to develop bad hips.

Dogs hips can be x-rayed once they are over twelve months of age, and the x-ray plates are then sent off to a panel of experts, who examine them, and measure the angles of the joints within different areas of the hip. They then give a score for each hip, from 0 - the best possible to 53 the very worst case.

This is normally shown as L 0 - R 0 up to L 53 -R 53. Often these are just totalled up so that a dog that may have a score of L3 - R 4 would be said to have a total score of 7.

Remember that the total worst score a dog can have is total 106, so 7 would be considered as a very good score, and would not cause problems at all for the dog concerned. The average score, at the moment, in border collies is 13, so by breeding from parents, that do not have scores above average, there is a very good chance that the pups will also go on to develop good, low scoring hips.

Because the way HD is inherited, there can be no guarantee that low scoring parents will produce only low scoring pups, but it should help.

Hips can also be made worse by environmental factors as the pup develops.

Allowing a pup to become overweight, incorrect diet, over exercising, putting abnormal excess strain on soft joints that are still developing by encouraging such activities as racing up and down stairs, jumping on and off furniture, jumping up and down at fences etc. can all put a strain on the joints, and result in a poor hip score. Injury can also lead to a bad score, and there is no way for the experts to tell if excess wear has been caused by damage or development.

Deafness.

It is believed that deafness could be hereditary, but at the moment, it is not clear to what degree.

Special tests are available called BAER Hearing Testing, which involve putting tiny needles into a dogs scalp, and then getting a computerised read out of its brain waves as clicking noises are made close to each ear, one ear at a time. This can show the degree of hearing ability in each ear, and can be carried out on any dog over about 6 weeks of age. It can not tell if a particular dog, will go on to produce puppies with perfect or defective hearing.

Unfortunately it is not yet clear how deafness is inherited, and deaf, or partially deaf pups can be produced from two parents with perfectly normal hearing. At least one test mating has been done with Dalmatians, who have quite a serious problem with deafness within the breed, where two completely deaf dogs were bred together and produced a litter of pups all with perfectly normal hearing ! There does seem to be some evidence that dogs that have a lot of white on them, are more likely to have hearing problems than darker dogs, but this is in no way conclusive.

While it would be quite difficult to train a dog that is completely deaf, and not something to be undertaken lightly, a dog with partial hearing can lead a perfectly normal life, and puppies that are completely deaf should be fairly easily identified by an observant breeder at an early age.

Having breeding animals tested, could help reduce the chances of producing puppies with the problem, but is not a 100% guarantee.

Studies are being made into the mode of inheritance for deafness, and should a gene responsible for the condition be discovered, I am sure breeders will leap at the chance to get breeding stock tested.

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