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TODAY OUR BREED EXPERT Carol Price looks at an inherited health issue in Border collies that many owners may not know about.

### **BORDER COLLIE HEALTH: THE MDR1 GENE DEFECT**

Today I wanted to write about the MDR1 (Multi Drug Resistance) gene defect in Border collies, which can make both dogs who are affected by it, or carriers of it, far more vulnerable to different toxins entering their brains - including some more regularly prescribed veterinary medications. In the worst case scenario the effect can be fatal. You may have sometimes heard of people getting their dogs DNA tested for the "MDR1 gene", when what they really mean is the MDR1 gene DEFECT.

Although Rough collies and Australian shepherds are most susceptible to this defect, as well as some other herding breeds, it can occur in Border collies too. As well as mixed breeds who may have inherited the problem from either or both of their parents. So it is definitely worth knowing about.

#### **WHAT THE MDR1 GENE DOES**

When acting normally, the MDR1 gene has the effect of keeping any kind of toxin pumped out of cells in the body, and most crucially - at the blood-brain barrier - stops them getting to the brain. However, when the gene is defective it cannot perform this function so well, and thus toxins can more readily access a dog's brain, leading to some more severe neurological symptoms and even potentially death.

If dogs only have one copy of this genetic defect, the effects may be milder, but if they have inherited the defect from both parents they can be far more dangerous. Drugs known to trigger these more dangerous toxic reactions in affected Border collies include parasite treatments, like Ivermectin, plus a range of different sedatives, heart drugs, antidiarrhoeal agents, pain killers and chemo drugs for cancer treatment. A fuller list will appear at the end of this feature.

#### **SCREENING**

One of the main problems in the past with this genetic defect in collies is that neither owners nor vets could know if a dog had it, before giving them a drug that then produced a more devastating reaction in them. However today there is a simple DNA screening test available that highlights if a dog has inherited either one copy of the mutation from a parent dog, or the same mutation from both parents; the latter making them more severely affected. Most good Border collie breeders now routinely do this test on their dogs, along with a bundle of other breed related inherited conditions you can now DNA

screen for. If both parent dogs are clear of the MDR1 defect – or ‘normal’ – then it will not be passed on to their offspring.

Other owners whose collies’ parents were not screened for it, or whose status for this defect is less known, may want to do this test just to put their mind at rest before giving their dog any more potentially risky treatments. Although the chance of your collie having this genetic defect may be relatively low, compared to other breeds, sometimes you just cannot put a price on peace of mind.

Meanwhile, should it further help other owners, breeders or vets, here is a fuller list of medications potentially more harmful to dogs with the MDR1 defect:

#### 1. DRUGS THAT SHOULD NOT BE USED IN DOGS WITH THE MDR1 DEFECT:

Ivermectin substances ("Anti parasites") - Diapec®, Ecomectin®, Equimax®, Eqvalan®, Ivomec®, Noromectin®, Paramectin®, Qualimec®, Sumex®, Virbamec®

Doramectine substances "Anti parasites": (Dectomax® )

Loperamide substances "Anti-diarrhoeal ": (Imodium®)

Moxidectine substances "Anti Parasites" (Cydectin®, Equest®)

#### 2. DRUGS THAT SHOULD ONLY BE USED UNDER STRICT VETERINARY SUPERVISION

Cytostatics "Chemotherapy drugs": (Vinblastine, Vincristine, Doxorubicine, Paclitaxel, Docetaxel, Methotrexat, Vincristine)

Immunosuppressive drug: (Cyclosporine A)

Heart glycosides: (Digoxine, Methyldigoxine)

Opioids: (Morphium)

Antiarrhythmics (Heart meds) : (Verapamil, Diltiazem, Chinidine)

Antiemetics (Anti-sickness drugs) (Ondansetron, Domperidon, Metoclopramide )

Antibiotics (Sparfloxacin, Grepafloxacin, Erythromycin)

Antihistamin (Ebastin)

Glucocorticoid (Dexamethason)

Acepromazine (tranquiliser and pre-anaesthetic agent) \*

Butorphanol "analgesic and pre-anaesthetic agent" \*

OTHER DRUGS: Etoposide, Mitoxantrone, Ondansetron, Paclitaxel, Rifampicin

### 3. DRUGS THAT CAN ONLY BE USED IN THE PERMITTED APPLICATION FORM AND DOSE

(Anti-parasite treatments): Selamectin (Stronghold®), Milbemax® and Advocate®).

\* In dogs with the MDR1 mutation, Acepromazine and Butorphanol tend to cause more profound and prolonged sedation in dogs. It is recommended to reduce the dose by 25% in dogs heterozygous for the MDR1 mutation (MDR1 / N – or carrying one faulty copy of the gene ) and by 30-50% in dogs homozygous for the MDR1 mutation (MDR1 / MDR1 – or carrying two faulty copies – one from each parent). Also be aware there may be other problem drugs or treatments for dogs with this gene defect yet to be identified.

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