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## MDR1 Gene Mutation in Herding Breeds

### What is the MDR1 Gene and its Mutation?

Many herding dog breeds are afflicted with a mutation of the multi-drug resistance (MDR1) gene. This gene encodes a protein (P-glycoprotein) that is responsible for removing certain drugs and toxins from the brain. Dogs that carry the MDR1 genetic defect cannot rid their brains of the problem drugs. The result is a neurotoxic buildup that can cause abnormal neurological symptoms and/or death.

### Breeds known to carry the MDR1 mutation include:

- Australian Shepherds of all sizes
- Collies
- English Shepherds
- Longhaired Whippets
- Old English Sheepdogs
- Shetland Sheepdogs
- Silken Windhounds

This also means that if your mixed breed dog has, or you think s/he might have, any of these breeds in its pedigree, you should test your dog and avoid the drugs on the list until you have test results.

### Problem Drugs

Dogs from affected breeds who carry the mutated gene OR who have not been tested for the mutation should avoid using drugs from the MDR1 Problem Drugs List.

The most commonly prescribed drug on the list is ivermectin, a wormer used in many canine heartworm preventative treatments including Heartguard, Iverhart, Tri-Heart and Advantage DUO. Dogs in the affected breeds should use milbemycin oxide (Interceptor) for heartworm preventative instead of ivermectin, as it's generally considered a safer alternative. Ivermectin can also be found in many livestock wormers (dogs should be kept away during and for several days after livestock worming), and in home and yard insecticides (under the names avermectin or abamectin). NOTE: In reviewing various web articles, there is some conflicting information as to the safety of heartworm treatments that contain ivermectin because of the relatively low dose – however, when in doubt, either test for the gene or do not use the drug – better safe than sorry.

Other frequently used drugs on the list include loperamide for diarrhea (most commonly sold as Imodium); morphine; butorphanol for pain and cough suppression; and acepromazine (prescribed as Ace, ACP, or Atravet) for tranquilizing, calming, and anesthesia use.

These problem drugs are dispensed in many forms including pills, liquids, injections, and ointments. Check ALL drugs you are considering giving your dog against this list if your dog either carries the mutated gene or has not yet been tested for the gene.

<https://www.coxwellvet.com/mdr1-multi-drug-sensitivity/>

### **How do I know if my sheltie has the gene mutation?**

There is a test available to screen for the presence of the mutated MDR1 gene. Test results indicate if the dog carries two, one or no copies of the mutated gene. For further information on the MDR1 genetic mutation and the test, visit the website of the Veterinary Clinical Pharmacology Laboratory at Washington State University's College of Veterinary Medicine at <http://www.vetmed.wsu.edu/depts-VCPL/>

### **References/Additional Reading:**

<https://www.coxwellvet.com/mdr1-multi-drug-sensitivity/>

<https://vcahospitals.com/know-your-pet/multidrug-resistance-mutation-mdr1>

<https://www.wisdompanel.com/en-us/blog/mdr1-in-dogs>

[https://www.mspca.org/angell\\_services/mdr1-multi-drug-resistance-gene-mutation/](https://www.mspca.org/angell_services/mdr1-multi-drug-resistance-gene-mutation/)

[Washington State University VCPL - MDR1 Test \(wsu.edu\)](#)

<https://vcpl.vetmed.wsu.edu/problem-drugs>