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## MDR1 FAQs

### What is MDR1?

MDR1 is the abbreviated name of a gene called Multi-Drug Resistance 1. A mutation of this gene causes sensitivity to Ivermectin and a number of other drugs. Dogs with the mutation will react to those drugs. Whether a dog reacts depends on the dosage of the drug. A dog may not react to very low doses, as with the amount of Ivermectin found in heart worm products. Typical doses of a variety of medications will cause reactions in dogs with two copies of the mutation, but some drugs- most notably several chemotherapy agents- can cause reactions in dogs with only one. Dogs with this mutation have a transport defect- the drug goes in to their brains, fails to be transported out, and builds up to toxic levels. This causes serious neurological problems including seizures and sometimes death.

### Which Drugs Cause MDR1 Reactions?

Ivermectin was the first drug recognized to cause a reaction, but it is far from the only one. Ivermectin at low dosage, as found in heartworm medications, will not cause a reaction. The larger doses need for worming will. Other commonly administered drugs on the list include acepromazine and Immodium. Fortunately, there are alternative medications available if your dog requires treatment.

Approximately 50% of Aussie's have at least one copy of the gene.

### How do I know if my dog has the MDR1 mutation?

If your dog has already reacted to one of the listed drugs, it has the mutation. However, reactions can be so dangerous to your dog it is advisable to have the dog tested so you know whether it is sensitive before it receives any of these drugs.

### What do the MDR1 test results mean?

This is a DNA mutation test. It will determine whether or not a dog has the MDR1 mutation and, if it does, whether it has one copy or two. The test report will provide you with the genotype for your dog,

generally listed as Normal/Normal, Normal, Mutant, or Mutant/Mutant. Dogs with even one copy of the mutation should be considered sensitive to listed drugs.

Do I need to tell my vet about my dog's MDR1 test result?

Yes. If your dog has the mutation, provide a copy of the test results and a copy of the listed drugs to every veterinarian who treats your dog and let them know your dog cannot have those drugs. If you leave your dog in someone's care, make sure that person has a copy of the test results and drug list in case they have to take the dog to someone other than your regular vet. You might also consider putting a medic alert type collar tag on your dog.

What does being a MDR1 carrier mean?

Some testing labs refer to having one copy of MDR1 or other genes as having a "carrier" status. This is only accurate if the gene mutation in question is recessive. That is not the case with MDR1, which is incompletely dominant. Dogs with one copy are affected, though to a lesser degree. They will react to every drug on the list if the dosage is high enough.

What does having MDR1 dogs mean to my breeding program?

You may breed dogs carrying the MDR1 mutation, even if they have two copies. MDR1 dogs react to certain drugs. Before these drugs were introduced into veterinary practice, no one was aware this mutation existed, even though it had been around for at least a century and a half. The MDR1 drugs listed, while valuable for veterinary care, are not a part of nature and can be readily avoided when you know a dog's MDR1 status.

Can eating feces cause MDR1 reaction?

If a dog with the MDR1 mutation eats feces from horses or livestock that have recently been dosed with Ivermectin or related worming products the dog may suffer a reaction. These reactions can be lethal. It isn't clear how long Ivermectin and related medications will persist after excretion. However, reported reactions were linked to feces from horses and sheep that had been treated within a couple days prior to incident. If your dog has even one copy of MDR1 mutation, keep it away from horses and livestock that have recently been wormed. If you don't know your dog's MDR1 status, you should get the dog tested.

Drugs to Avoid if your dog has MDR1 (provided by WSU Veterinary Clinical Pharmacology Laboratory)

Antiparasitic Agents: Ivermectin, Milbemycin, & Related Drugs

Antidiarrheal Agents: Imodium

Anticancer Drugs: Vincristine, Doxorubicin, & Others