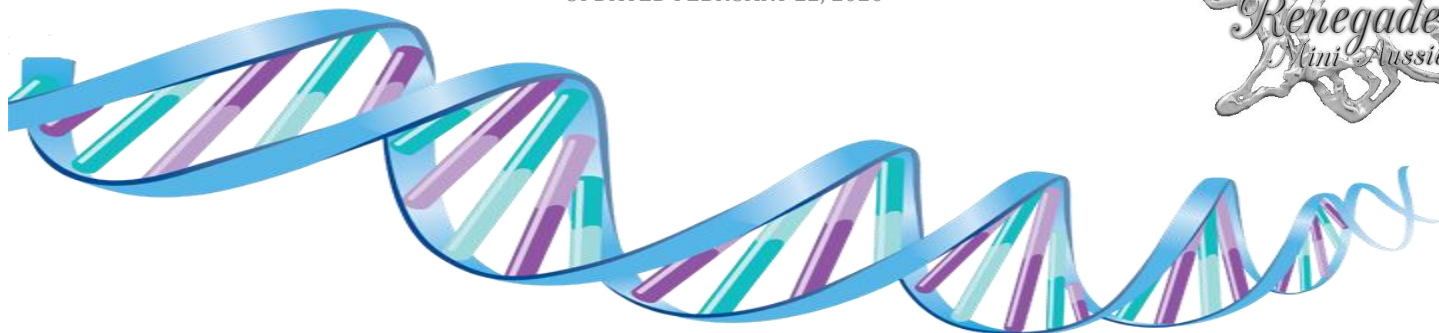


# What is MDR1 and why do I need to know?

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Aussies are amazing- no one denies that! BUT there are certain aspects of Aussies that EVERY owner needs to know about, because believe it or not, the consequences of not knowing can be deadly.

If you have done any research at all on Aussies I am certain you have seen this abbreviation. \*MDR1\* This is by far the most common issue found in Aussies as it has a breed prevalence of 50%! That means that for every two dogs you look at, one of them will have at least one MDR1 mutation.

**So what is it?** Multi-Drug Resistance Gene, (MDR) codes for a protein that is responsible for protecting the brain by transporting potentially harmful chemicals away from the brain. In certain breeds, a mutation occurs in the MDR1 gene that causes sensitivity to Ivermectin, Loperamide, and a number of other drugs. Dogs with this mutation have a defect in the P-glycoprotein that is normally responsible for transporting certain drugs out of the brain. The defective protein inhibits the dog's ability to remove certain drugs from the brain, leading to a buildup of these toxins. As a result of the accumulation of toxins, the dog can show neurological symptoms, such as seizures, ataxia, or even death.

**Now don't panic!** It's not nearly as bad as it sounds when you know what you are dealing with.

1. MDR1 mutant dogs must receive the mutant gene from BOTH PARENTS to be considered "affected". Carriers, dogs with only one mutant gene, are still affected, though to a lesser degree. In this case, simply avoid drugs in the ivermectin family and your dog will live a long, normal life!

2. Whether your dog is N/N ("Negative" or "Clear"), N/M ("Carrier"), or M/M ("Positive" or "Mutant") for MDR1, the breed as a whole is more sensitive than other breeds to the ivermectin based drugs and should avoid them whenever possible. **2020 UPDATE! It is now believed that a second MDR1 gene may be at play, causing the ivermectin related reactions and deaths of dogs TESTED NEGATIVE for the MDR1 gene. More on this after speaking with Washington State University about their current progress directly.**

**Please be aware that a general veterinarian may not relate that your dog is an Aussie and may have this gene mutation. Even with their degree, there are simply too many breeds with their own quirks for a single vet to know every single pet species, breed, and all of each breed's nuances. It is up to YOU to advocate for your dog and bring this up with your vet. Even then, not all vets are familiar with this list or the MDR1 mutation so please be prepared and take this to them, ESPECIALLY if your dog is affected!**

**Genetic testing for MDR1 is available, and recommended, but don't rely too heavily on the results- especially if clear. Treat *\*ALL\** Aussies as if they are affected as even clear dogs have died from ivermectin poisoning!**

### **How to have your dog tested for the MDR1 gene:**

*\*Testing is very simple and does NOT require a vet visit! \**

General veterinarians do not have the lab equipment required to perform these specific DNA tests, so they cannot provide this service in their office. (If they say they do- please be aware that they are simply ordering the test from one of the labs that does this service and charging you for the test plus the office visit.) Use one of the laboratories below to order your test and follow the instructions you receive with your kit to send in your sample and get your results.

<https://www.pawprintgenetics.com/products/tests/details/93/?breed=39>

<https://vcpl.vetmed.wsu.edu/cheek-swab>

<https://www.gensoldx.com/product/multidrug-sensitivity-mdr1/>

[https://www.animalgenetics.us/canine/Genetic\\_Disease/MDR1.asp](https://www.animalgenetics.us/canine/Genetic_Disease/MDR1.asp)

Typical instructions are:

1. Be sure the pup hasn't had anything to eat or drink within 30 minutes before swabbing.
2. Place the swab between the gums and cheek, lightly pressing on the cheek, and roll it between your fingers to spin the brush and collect their DNA. For best results, do this for at least 10 seconds on each side of the mouth.
3. Place the swab back in the package provided and drop it in the mail.

That's it!

Here is a great graphic to show which medications to AVOID or use great caution with!

Print this out and give it to your vet to keep on file if you'd like!

**Australian Shepherd DANGEROUS DRUGS**

**1** ANTIPARASITIC  
**2** ANTIDIARRHEAL  
**3** ANTIEMETIC  
**4** PRE-ANESTHETIC / ANALGESIC  
**5** ANTILULCER  
**6** ANTI-EPILEPTIC  
**7** STEROID  
**8** ANTIPROTOZOAL  
**9** IMMUNOSUPPRESSIVE  
**10** CARDIAC  
**11** ANTIBACTERIAL  
**12** ANTIFUNGAL  
**13** ANTINEOPLASTIC  
**14** IMMUNOMODULATOR

**1** Ivermectin  
 Doramectin  
 Abamectin  
 (Profender) **Emodepside**  
 (Milbemax, Program) **Milbemycin**  
 (Advocate) **Moxidectin**  
 (Stronghold) **Selamectin**  
 (Flagyl) **Metronidazole**  
 (Lopitol) **Nitroscanate**

**2** (Fortasec, Imodium, Salviaacolina) **Loperamide**

**3** (Primperán, Emepriid) **Metoclopramide**

Acepromazine  
 Butorphanol  
 Morphine **4**  
 Buprenorphine  
 Fentanyl

Ranitidine  
 Cimetidine **5**  
 Domperidone  
 Ondansetron

Phenytoin **6**

Estradiol **7**

(Milteforán) **Miltefosine** **8**

**9** Cyclosporin  
 Dexamethasone

Digoxin  
 Digitoxin  
**10** Quinidine  
 Diltiazem  
 Verapamil

Doxycycline  
 Erythromycin  
**11** Grepafloxacin  
 Sparfloxacin  
 Rifampicin

**12** Ketoconazole  
 Itraconazole

Vincristine  
 Vinblastine  
 Doxorubicin  
**13** Paclitaxel  
 Dactinomycin  
 Mitoxantrone  
 Etoposide

**14** Levamisole

**Legend:**  
 ● Totally Prohibited  
 ● Potential High Risk  
 ● Caution and minimum doses  
 ● Prevention for some past cases of toxicity

Information: Dra. Maribel Pelaez de Lucas / Diagramming: MT · APERC 2012

Renegade Mini Aussies  
 www.RenegadeMiniAussies.com

Commonly Used Drugs to AVOID: Ivermectin, "Heartguard", Loperamide, Imodium, Doxorubicin, Vincristine, Vinblastine, Cyclosporin, Digoxin, Acepromazine, Butorphanol

Note, Heartguard is on the list because it can cause seizures in sensitive Aussies. Use Interceptor or Sentinel instead. Interceptor® is a non-Ivermectin based heartworm treatment safer for most mini Aussies. For those that can no longer find Interceptor, Sentinel proves to be a good replacement. Sentinel® combines Interceptor® and Program® into one pill. As always, please seek your own vet's advice, but be knowledgeable enough to stand up for your dog when they can't stand up for themselves! Do not blindly trust anyone, as everyone is only human. Do your research! Ask questions! Don't be afraid to get a second opinion or ask for them to order in a different medication if you aren't comfortable with what they offer regularly.

## References and Additional Links

<http://www.ashgi.org/home-page/genetics-info/faq/mdr1-faqs>

<https://www.pawprintgenetics.com/products/tests/details/93/?breed=39>

<http://www.animalgenetics.us/Canine/Genetic Disease/MDR1.asp>

<https://vcpl.vetmed.wsu.edu/>

<http://www.vetstreet.com/dr-marty-becker/multidrug-sensitivity-what-you-need-to-know>

<http://www.australian-shepherd-lovers.com/ivermectin-for-dogs.html>

<http://www.dogaware.com/articles/wdjmdr1.html>

Please feel free to ask questions! This isn't something to be scared of, but it is certainly something you need to understand if you own an Aussie. Get your pups tested so you know, and then carry on with your Aussiesome life!

