

Multidrug Resistance Mutation (MDR1) in Dogs

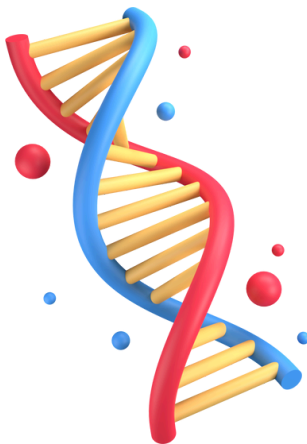
Most dogs have no problems with medications prescribed by a veterinarian. But some dogs can experience serious side effects due to a genetic mutation in the MDR1 gene.

What is the MDR1 gene?

The MDR1 gene codes for a protein that helps remove toxins from cells. This protein, P-glycoprotein, prevents some drugs from crossing the blood-brain barrier. P-glycoprotein helps protect the nervous system from toxins.



What happens when there are mutations of MDR1?



When dogs have one or two mutations of the MDR1 gene, medications are not properly broken down. The medication stays in the dog's cells for longer and at higher levels. In some cases, medications cross the blood-brain barrier. Dogs can experience weakness, tremors, seizures, or blindness. Certain medications can even cause death in affected dogs.

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

A genetic test can tell you if your dog has one, two or no mutations of the MDR1 gene. A dog with no mutations will have healthy P-glycoprotein function. Any dog with one or two copies of the mutation will be at risk for medication reactions. Dogs with two copies will be highly likely to show drug sensitivity.

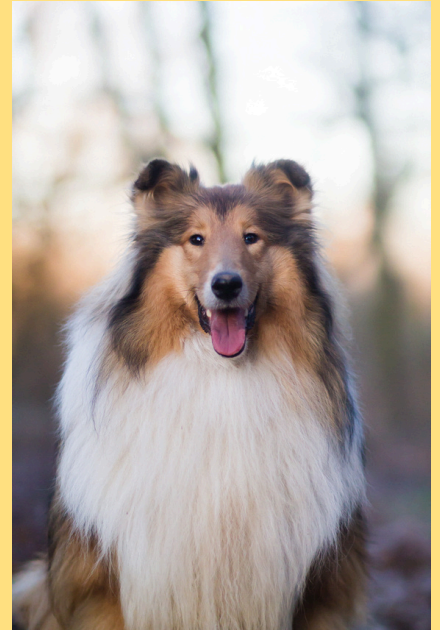
Dogs inherit one copy of the MDR1 gene from each parent.

What breeds are most likely to carry the MDR1 mutation?

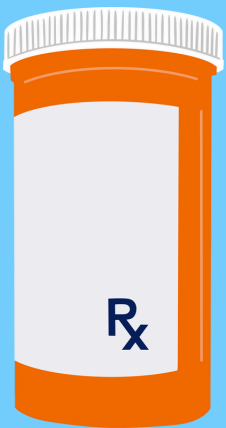
- Herding breeds, such as Collies, Australian Shepherds, Miniature Aussies, and Shetland Sheepdogs
- Sighthounds, including Whippets
- German shepherds
- Silken Windhounds
- McNabs

Approximately 70% of Collies carry at least one MDR1 mutation.

Mixed-breed dogs, especially with herding ancestry (e.g., Aussie doodle), may also have the mutation.



What medications will my dog be sensitive to if they have the MDR1 mutation?



- Ivermectin (at high doses)
- Imodium (loperamide)
- Some sedatives (such as butorphanol and acepromazine)
- Antiemetics (medications for nausea)
- Chemotherapy medications

A complete list is available at:

<https://prime.vetmed.wsu.edu/2022/03/01/problem-medications-for-dogs/>

What can I do to keep my dog(s) safe?

- Ask your breeder whether they test their dogs for MDR1
- If you breed dogs, test your dogs for the MDR1 mutation before choosing your breeding stock
- If you aren't sure about your dog's status, test them for the MDR1 mutation
- Tell your veterinarian if your dog has the MDR1 mutation