

## The Link Between Tumors and Your Pet's Size and Color

Interestingly, the color of your pet, if he's from a certain breed, may influence his risk of cancer. And size appears to play a role in the development of some cancers. These are the 4 breeds of dogs at highest risk, and the top 10 warning signs you can't afford to miss.

Analysis by Dr. Karen Shaw Becker

### STORY AT-A-GLANCE

- Cancer is the leading cause of death in US dogs, and genetics play an important role in the development of canine cancer
- The gene pool in each dog breed is relatively small, which is how physical characteristics – including a predisposition to cancer – are passed from generation to generation
- Scientists believe there are multiple genes involved in the development of canine cancer, including genes for size and coat color
- Dogs exhibiting one or more signs of cancer should be seen by a veterinarian as soon as possible. Early diagnosis can increase the number of treatment options available

**Editor's Note: This article is a reprint. It was originally published September 30, 2015.**

There is nothing a dog parent fears more than hearing the devastating words, "Your dog has cancer." And one of the first questions many distraught pet owners ask is, "Why? Why my dog? How did this happen?" Often, feelings of guilt set in immediately as the person wonders what he or she could have done differently to help their pet avoid this horrible disease.

While there are many things you can do for your canine companion to lower the risk of cancer, the truth is that we can't discount the role heredity plays in determining whether or not a dog develops the disease.

### The Role of Genetics in Canine Cancer

When it comes to genetics, each dog breed is a "closed, isolated population," according to Dr. Ann Hohenhaus, a board-certified veterinary oncologist.<sup>1</sup>

In order to be registered with the American Kennel Club (AKC) and other kennel clubs, a dog must be the product of other registered dogs, thereby insuring no new genes are introduced into the breed. That means every purebred dog is a relative, however distant, of other dogs of that breed.

Since the majority of owners of purebreds don't breed their dogs, the gene pool stays small. Most **professional breeders decide which dogs to breed** based not on several generations of lifelong robust health, but on a specific set of physical traits they want to reproduce or "enhance."

The result is that in some breeds, the genes that increase the risk of cancer are reproduced in generation after generation of dogs.

The good news, such as it is, is that limited genetic diversity within dog breeds can help scientists identify the genes responsible for cancer and other inherited diseases.

*"Once the genes are identified, tests can be developed and used to help avoid breeding individual dogs with the 'bad genes,'" says Dr. Hohenhaus.*

Researchers are just beginning to identify these genes.

## **Several Mastiff Breeds Have a High Risk of Cancer**

The fact that all dogs have a common ancestor, the wolf, plays a role in the perpetuation of gene mutations that increase the risk for cancer.

Dr. Hohenhaus uses the example of the Mastiff group, which includes several breeds with a high incidence of cancer. These include the boxer (mast cell tumors), the Bernese mountain dog (histiocytic sarcoma), the golden retriever (lymphoma and hemangiosarcoma), and the rottweiler (osteosarcoma).

When researchers compare the DNA of golden retrievers with hemangiosarcoma and other breeds with the disease, the genetic abnormalities are different. Interestingly, golden retrievers in the UK, where the breed originated, rarely develop cancer.

Their genes are significantly different from those of US goldens, which indicates the risk of hemangiosarcoma in American goldens is the result, in part, of a fairly recent gene mutation.

Golden retrievers are also at significant risk for lymphoma, and researchers studying cancer in goldens have identified genetic alterations common to dogs with either type of cancer. These gene mutations "modify the regulation of the immune system's surveillance for tumor cells," according to Dr. Hohenhaus.

## **Genes for Size and Coat Color Also Play a Role**

Scientists believe that there are multiple genes that play a role in the development of cancer in dogs. Since many large and giant breeds develop bone cancer (osteosarcoma), but dogs under 55 pounds rarely do, it appears genes that program the size of a dog are also involved.

Dr. Hohenhaus uses the example of greyhounds and whippets, two breeds that are very similar both physically and genetically. However, greyhounds develop osteosarcoma at a high rate, but in whippets, the disease is rarely seen.

Dogs with black coats appear to have a much higher incidence of squamous cell carcinoma affecting the nail bed of one or more toes than lighter coated dogs of the same breed, for example, poodles.

The gene mutation that produces the cancer is present in dogs of both coat colors, but the poodles with white, apricot, and brown coats also have a variation in a different gene that provides a protective effect against the squamous cell carcinoma mutation.

According to Dr. Hohenhaus, two other black-coated breeds with a predisposition to this type of cancer, the briard and the giant schnauzer, also have the gene mutation.

## 10 Warning Signs of Cancer in Pets

Sadly, cancer is the leading cause of death in pet dogs (and cats) in the US. Up to 50% of pets will die of cancer.

According to Colorado State University's Flint Animal Cancer Center, the top 10 warning signs of cancer in pets are:<sup>2</sup>

1. **Unusual swellings that don't go away or that grow** — The best way to discover lumps, bumps, or swelling on your dog or cat is to pet him.
2. **Sores that won't heal** — Non-healing sores can be a sign of infection or cancer and should be evaluated by your veterinarian.
3. **Weight loss** — Illness could be the reason your pet is losing weight but isn't on a diet.
4. **Loss of appetite** — Reluctance or refusal to eat is another sign of possible illness.
5. **Bleeding or discharge** — Bleeding can occur for a number of reasons, most of which signal a problem. Unexplained vomiting and diarrhea are considered abnormal discharges, as well.
6. **Offensive smell** — An unpleasant odor is a common sign of tumors of the anus, mouth, or nose.
7. **Difficulty eating or swallowing** — This is a common sign of cancers of the mouth or neck.
8. **Reluctance to exercise or low energy level** — This is often one of the first signs that a pet is not feeling well.
9. **Persistent lameness** — There can be many causes of lameness, including nerve, muscle, or bone cancer.
10. **Difficulty breathing, urinating, or defecating** — These symptoms should be evaluated by your veterinarian as soon as possible.

If you see any of these signs in your dog, it's important to make an appointment with your veterinarian as soon as possible. Many of the symptoms of cancer are also present with other diseases.

Blood tests to detect certain kinds of canine cancer are available and continue to improve. Veterinary Diagnostics Institute (VDI) makes both canine and feline cancer panels, plus a test called InCaSe designed to be used during wellness checkups in apparently healthy animals.<sup>3</sup> There is also the Tri-Screen Canine Lymphoma Assay Kit.

The earlier a diagnosis is made, the better your pet's treatment options may be. It's also important to take your canine companion for regular wellness exams – I recommend twice annually for young, healthy dogs and more often for older pets and those with chronic conditions.

If your dog belongs to one of the breeds predisposed to cancer, you might want to consider more frequent checkups as well.

### Sources and References

[VetStreet, March 12, 2015](#)

<sup>1</sup> [VetStreet, March 12, 2015](#)

<sup>2</sup> [CSU Animal Cancer Center](#)

