

Genetic Impact of Disease Risk: Understanding Prevention & Treatment

Jaime Modiano, VMD, PhD, University of Colorado Health Sciences Center, said that cancer is the leading cause of disease-related death in dogs as well as a leading cause of death in humans. Dogs and people have similar types of cancer with comparable histories of incidence, age of onset, location, progression, and outcome. Because pet dogs share our environment, it is possible to study both heritable risk factors and environmental factors in cancer susceptibility.

All vertebrates are prone to cancer. Cancer cells will outcompete surrounding cells. Many genes influence cancer susceptibility, and researchers must consider both genetic predisposition and environment. It is not possible to breed out a cancer gene to eliminate the disease, but it may be possible to identify risk factors in dogs and breed them out.

Many alternative therapies for cancer have been used, but such therapies should be tested for safety and success. Many therapies are derived from plants, but that does not mean herbal remedies work.

There is more cancer in dogs now than there was in the past, which some people have concluded is a result of environmental factors such as pollution or commercial products. In fact, however, there is more cancer than in the past because dogs are not dying earlier from parvovirus and other now preventable causes.

Cancer risks cannot be eliminated; cancer occurs during the process of cell division. Dr. Modiano said, "Life is the single highest risk factor for cancer." Researchers must design tailored therapies for canine cancer. Non-Hodgkins Lymphoma (NHL) is among the top three dog tumors. The lifetime risk for dogs to get NHL is one in 10 to 20; for people, it is one in 50. In treating cancer in dogs, success is defined as surviving one year after treatment. That survival rate now is at 55%.

Some breeds, including Boxers, Golden Retrievers, Labradors, Scottish Terriers, Basset Hounds, Saint Bernards, and Dobermans, are at higher risk. NHL is most common in middle-aged dogs, no matter what the breed.

About 60% of dogs with cancer have B-cell lymphoma, 35% T-cell lymphoma, and the rest are unidentified. Some breeds are more prone to B-, some to T-cell tumors. As with humans, there are more T-cell cancers in younger dogs and more B-cell tumors in older dogs.

Dr. Modiano said his research had looked at related breeds as groups based on AKC groups, then as groups by genetic clusters. T-cell disease was more prevalent in older breeds and B-cell more prevalent in recent European breeds. Boxers are at greater risk for NHL than other Mastiff breeds. There are parallels among humans: Caucasians have more T-cell cancers than Asians, pointing to patterns of inheritance.

Researchers are looking closely at tumors to see if abnormalities are related. They have compared tumors in Golden Retrievers to tumors in the rest of the dog world and found deletions on chromosome 14 in all B cell tumors in the Golden Retrievers, but in few other dogs. Matthew Breen's research team has compared the deleted section of chromosome 14 in dogs to chromosome 7 in humans to see what parts had been deleted and identify the genes to look at for cancer susceptibility. If the susceptibility in dogs becomes better understood, that information may be transferable to lymphoma in people.

Dr. Modiano said research on canine Non-Hodgkins Lymphoma is in progress. He has received conditional grant approval from CHF, pending club support.

An audience member said, "I'm in awe about what you are doing, with others, about cancer in dogs." He urged people to ask their veterinarian for chemotherapy instead of euthanasia when a dog was diagnosed with cancer. He also encouraged Dr. Modiano to think about co-factors affecting heredity. Dr. Modiano replied, "I have a simple answer, which is that I agree."