

Causes of Cancer

By *Manuals Staff*

Last full review/revision May 2020 | Content last modified May 2020

Cancer is not a new disease. Physicians have been aware of cancer in humans for over 2,000 years. As a result, researchers have studied cancer in humans for generations. During the past hundred years, considerable progress has been made in understanding the spread and development of cancers in humans. Much of this knowledge is useful for veterinarians. As mammals, many molecular systems are the same or similar between species. Some spontaneous cancers in animals are very similar to those in people, for example, breast cancer. Unfortunately, veterinarians may know less about some specific cancers in animals because much less research has been done on malignancies in animals.

Many veterinarians and pet owners have observed that pets develop cancer more frequently during the late stages of their lives. Animal researchers do not yet understand the exact relationship between advancing age and cancer development. One speculated cause is that age weakens the immune system and makes it easier for cells to mutate into precancerous (initiated) cells. This is one, but probably not the only reason that age may play a role in the higher rates of cancer in older animals.

Based on research in both humans and animals, we know that cancer is a complex process that can be triggered by hereditary, environmental, and nutritional factors. In both people and animals, cancer development is a complex process that proceeds gradually through the interaction of multiple factors.

Family History and Genetic Factors

Statistics on animal cancers support the idea that hereditary risk factors play a role in the occurrence of cancer among pets. For example, among dogs, Golden Retrievers, Boxers, Bernese Mountain Dogs, and Rottweilers are generally more likely to develop cancer (and specific types of cancer) than other breeds. This suggests that there are genetic characteristics that contribute to the higher rates of cancer among these animals. The increased cancer risk these animals face may be caused by a combination of genes or by a single gene. More research is needed to gain a better understanding of which genetic factors are involved.

Environmental Factors

Research in humans shows that a large majority of human cancers are related to risk factors present either in the environment or in the diet. It is likely that these same risk factors play a major role in the development of cancers in pets. Because pets live in the same environment as their owners, pets are exposed to many of the same environmental hazards that have been identified as risk factors for humans.

Known carcinogens (see below) that may directly contribute to the development of cancer in pets include ultraviolet radiation from long exposure to the sun; second-hand tobacco smoke; a variety of herbicides, insecticides, and pesticides commonly used in agriculture; and the air pollution and smog common in many urban areas. Nickel, uranium, benzidine, benzene, radon, vinyl chloride, cadmium, and asbestos are all common substances that have been identified as carcinogens.

Just as humans differ in their response to carcinogens, so do animals. Your pet is an individual and may have higher or lower sensitivity to risk factors. It is not possible to reliably establish whether a high rate of cancer in a particular family of animals is due to risk factors in the environment, hereditary factors, or to chance.

Age

Cancer occurs more frequently in older humans and animals. While we do not know the exact causes of cancer in either humans or animals, it is possible that the weakening of the immune system due to age plays a role in the body's ability to control mutated cells that could become malignant. Because healthy cells divide and reproduce continuously, veterinary

cancer specialists (oncologists) speculate that as an animal ages it becomes more and more likely that a cell will divide incorrectly, not be repaired correctly, and end up with a mutation. Such a mutation could, in turn, lead to cancer. Also, the longer a pet lives, the longer the animal is potentially exposed to environmental carcinogens and the higher the chance that a carcinogen could affect the genetic material (DNA and RNA) in a cell and cause cancer. Thus, there are multiple reasons for the observed relationship between advancing age and cancer.

Viruses, Carcinogens, and Other Known Causes of Cancer

The specific causes of some cancers have been identified by veterinary researchers. Almost all species of domestic animals develop squamous cell carcinoma, a malignant neoplasm (cancer) that develops in superficial skin cells. Although researchers have not been able to pinpoint the exact cause of this common cancer, they have learned that prolonged exposure to the ultraviolet light that is present in sunlight is a significant risk factor. In addition, it has been shown that white cats, white dogs, and horses with white facial markings are more likely to develop squamous cell carcinoma. Environmental carcinogens, such as those found in cigarette smoke, have been shown to contribute to the development of squamous cell carcinomas found in the mouths of cats.

Viruses are known causes of some cancers in pets. For example, feline leukemia virus is a common cause of death in cats. Up to 30% of cats persistently infected with this virus develop cancer. A type of benign neoplasia forming warts (known as oral papillomas) that develops in the mouth of dogs, especially younger dogs, is caused by a virus.

Some cancers are sexually transmitted. The genital cancer of dogs known as canine transmissible venereal tumor is transmitted during sexual intercourse. The cancerous cells are transferred during contact between a healthy animal and an affected animal.

While specific answers about the causes of many cancers are lacking, veterinarians and researchers do know that cancer cannot be caused by short-lived physical injuries such as bumps and bruises. However, the sites of serious traumatic injuries may develop cancer, occasionally years after the injury. For example, the location of bone fractures (especially if the fracture is recurring) or the sites of implants (such as pins or metal plates) have been shown to have a higher risk for sarcomas than other areas of the body. This information has caused speculation that chronic inflammation may contribute to cancer development.

Vaccinations are an important part of the care of your pet; they protect the health of your companion. However, in the early 1990s veterinarians began to notice that sarcomas were more likely than normal to occur at vaccination sites in some cats. In the years since, researchers have established a [link between vaccination and sarcoma](#) development in a small number of cases. Rabies and feline leukemia virus vaccinations were most often associated, but other vaccines and injected medications have also been implicated. This information has led to changes in recommended vaccine protocols that limit the type and frequency of vaccination given to cats.

Much research remains to be done about neoplasias of all kinds in both humans and animals. As we gain new information about the causes of neoplasia, the outlook for pets with cancer will be much more hopeful, and our treatment of pets with cancer will improve. In the future, we hope to both prevent and cure cancer in our pets.
