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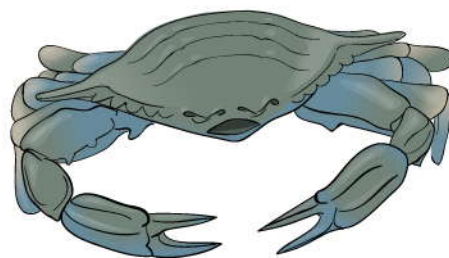
WHAT IS CANCER?

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Cancer is a disease in which abnormal cells divide in an uncontrolled fashion and these abnormal cells have the potential to spread throughout the body (metastasis). There are various kinds of cancer and they differ significantly in how frequently they arise, the tissue or organ they originate from and their potential to spread to other organs.

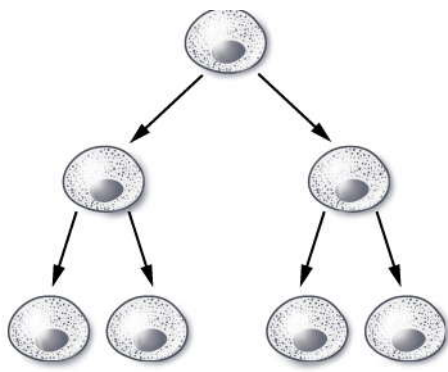
A few definitions

A tumor is described as a mass of tissue created by an abnormal process in which cells divide in an uncontrolled, relatively autonomous fashion, leading to a continual increase in the number of dividing cells. Tumors are subdivided into two fundamentally different categories based on differences in their growth patterns. One group consists of benign tumors, in which growth is confined to a local area and does not spread to other organs. In contrast, malignant tumors can invade surrounding tissues, enter the bloodstream or lymphatics and spread to distant parts of the body, a process called metastasis. The term cancer, which means "crab" in Latin, are malignant tumors and is used to describe a family of diseases. The uncontrolled proliferation of cancer cells, combined with their ability to spread throughout the body, makes cancer a potentially life-threatening disease.



What causes cancer?

The conversion of normal cells into a cancer cell is a complex, multi-step process that typically takes many years to unfold. Despite the complexity of this process, however, many initiating causes in people are known. These initiating causes are likely similar in our pets. Cancer is essentially the result of non-lethal genetic damage to cells (mutations in the DNA genome). Causes of such mutations include radiation, chemicals, hormones and infections. Some damage to cellular DNA is a daily "wear and tear" event but all mammals have many safeguards to prevent or repair such damage. Nonetheless, such protective mechanisms are not flawless. In some individuals there are even defects in such defences, resulting in a higher than expected prevalence of cancer. Some of those defects in protection can be inherited and in purebred dogs this can result in inherited predispositions to cancer development. In other instances, damage to DNA is caused by excessive cellular injury. The mutated DNA upsets the normal regulation of cell growth allowing uncontrolled and careless growth of the "altered" cells that no longer obey the rules governing coordinated cell activity.



Cell Division

Why has my pet developed cancer?

Cancer frequency increases with age. The more divisions a cell undergoes, the more probable a cell mutation can develop in time. Therefore, cancer is more common in cells that divide more frequently. For this reason and because our pets are living longer due to preventative medicine, cancer is more commonly diagnosed in older animals.

In other cases, an animal has been exposed to factors in the environment that cause or promote cancer (carcinogens). These include sunlight, radiation, chemicals and some infections. Some animals may have a greater tendency (genetic susceptibility) to cancer and cancers that arise because of such an inherited predisposition are called familial or hereditary. Certain breeds have been found to be far more susceptible to certain types of cancer compared to other breeds. Studies are underway to look for specific genetic changes that can predispose these breeds to cancer. Once that information is obtained, genetic testing may become available to evaluate animals at increased risk. Finally, on occasion, tumors require hormones to start growing or to enable them to persist.

Can my animal catch cancer from another animal or transmit it?

For the vast majority of cases the answer to both questions is “No”. However, animals can be infected with viruses or other microorganisms (bacterial or parasitic) some of which can promote the development of cancer. These infections can be passed down from their mother before or at birth but they can also be acquired by contact with other infected animals or transmitted through bites of ‘vectors’ such as fleas or ticks. Feline leukemia virus, for example, can cause cancers of the blood and lymphoid system in cats. The virus is occasionally transmitted from an infected queen to her kittens before birth but is more commonly acquired from close contact with infected cats that shed the virus in saliva, urine and feces. If your cat is infected, it can pass the infection to other cats.

How does cancer affect my pet?

The most obvious effect of most cancers is an enlarging mass, but not all masses are malignant and they may not be external and easily visualized. A mass may ulcerate, bleed or have physical effects (pressure, displacement, etc.) on the surrounding tissues. Benign tumors only enlarge locally, displacing normal tissue by expansion. In contrast, malignant cancers may invade into deeper tissues and spread to other organs through the blood or lymphatics. The cells may then be carried to distant tissues where the cells lodge and start new tumor masses (metastases). Additionally, tumor spread may occur through widespread distribution of a cancer. This occurs when cancer cells break away from the original tumor and seed in body cavities (such as the pleural cavity of the chest or peritoneal cavity of the abdomen).

Symptoms associated with a tumor are dependent upon its location, invasiveness and if tumor spread has occurred. Specific changes to monitor for in your pet can be discussed during your consultation. However, weight loss due to loss of body fat and muscle is common in malignant cancer and unexplained weight loss can be an important sign. A few tumors induce clinical signs that are not readily explained by local or distant spread of the tumors. These are known as paraneoplastic syndromes. Some syndromes are due to abnormal hormone production by the cancer. (Hormones are internal secretions that pass into the blood and stimulate other organs to action.) Examples of paraneoplastic signs and symptoms include loss of hair, increase or decrease in blood glucose, and increased blood calcium levels.

How is cancer diagnosed?

Cancer may be suspected from clinical signs (a visible mass, loss of appetite and energy, loss of weight for example). Additional diagnostics, such as X-rays, ultrasound, or CT scans may be useful in detecting internal tumors and for tumor staging. Blood tests can be helpful to diagnose some leukemias. However, in order to diagnose most tumor types, it is necessary to obtain a sample of the tumor tissue itself. Ways in which a tumor sample may be obtained include: needle aspiration, Tru-cut biopsy, punch biopsy, and full excision removal via surgery. The simplest and least invasive approach is the aspiration (suction removal) of tumor cells with a syringe and needle in which microscopic examination of cells (cytology) may provide a tentative diagnosis. In most cases, this procedure does not require general anesthesia or surgery.

A more reliable and accurate test however, requires removal of a larger tissue sample (biopsy), a procedure usually requiring anesthesia. The preparation and microscopic examination of stained sections from the removed tissue is called histopathology. This is performed at a specialized laboratory where the slides are examined by a veterinary pathologist.



The histopathology report typically includes a description that indicates whether a tumor is 'benign' (non-spreading, local growth) or 'malignant' (capable of spreading to other body sites), the origin or type of tumor, tumor margins (if the tumor was completely removed) and the tumor grade (degree of resemblance to normal cells). The histopathology report along with the diagnostics performed for tumor staging (how far it has spread) will help your veterinary oncologist to predict overall prognosis (probability of local recurrence or metastasis).

Can cancer disappear without treatment?

Cancer rarely disappears without treatment. However, the body's immune system can kill cancer cells using mechanisms that specifically target tumor cells that are recognized as "foreign". These mechanisms include immune system cells such as cytotoxic lymphocytes and macrophages and antibody production. Not all tumors are recognized as foreign and even when they are, the immune system is rarely 100% effective in eliminating the cancer. Rarely, loss of blood supply to a cancer, by pressure on its own supply for example, will result in tumor cell death but the dead tissue will probably need surgical removal.

What types of treatment are available?

The most common and often most effective treatment is surgical removal of the tumor. For tumors that are too big or too numerous to be removed or that are in inaccessible locations, other treatments can be considered. These include drugs (chemotherapy), immunotherapy (specific or non-specific stimulation of the immune system), and radiation. New approaches such as gene-based therapies are under development. More detailed information is given in the "Cancer Treatment" handout.

How do I know if the cancer is permanently cured?

In many cases, the diagnosis and prognosis indicate there can be a high likelihood of complete cure. Sadly, there are some cases where the diagnosis and prognosis indicate that surgical removal will only give transient relief and the cancer will recur or spread. As in people diagnosed with cancer, our understanding of cancer in dogs and cats is increasing. Survival rates are improving and some animals are alive and well as "cancer survivors".

*This client information sheet is based on material written by Joan Rest, BVSc, PhD, MRCPATH, MRCVS.
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