

Chemotherapy in Veterinary Medicine

Clinical Oncology Service

Ryan Veterinary Hospital of the University of Pennsylvania

The diagnosis of cancer is stressful for pet owners, and the prospect of chemotherapy treatments can be equally difficult. Many owners are rightfully concerned about potential side effects of chemotherapy, and certain treatments can be costly and involve multiple visits to the hospital over the course of several weeks to months. Knowing how anti-cancer chemotherapy drugs work and what to expect from treatments is integral in helping pet owners decide on the appropriateness of various therapies for their animals.

When do we use chemotherapy to treat animals with cancer?

Chemotherapy may be used as the sole treatment for certain cancers, or may be used in combination with other treatment modalities, such as surgery or radiation therapy. Chemotherapy can be recommended for metastatic disease (cancer that has spread to other areas of the body), for tumors occurring at more than one site (multicentric disease, systemic tumors such as leukemia or lymphoma), or for tumors that cannot be removed surgically (nonresectable disease). In some cases, chemotherapy can be used to shrink large tumors prior to surgery, or to eradicate microscopic cancer cells that cannot or have not been completely removed surgically. For cancers that have a high probability of metastasis early in the course of disease, chemotherapy can be used after surgery or radiation therapy to help slow the growth of cancer cells in other parts of the body.

How does chemotherapy work?

Chemotherapy drugs kill cells in the process of growth and division. Individual drugs have different mechanisms of action, such as damaging a cell's genetic material (DNA), or preventing cells from dividing. Chemotherapy drugs are nonspecific, in that they cannot distinguish between cancer cells and normal cells of the body. All rapidly dividing cells are potentially sensitive to chemotherapy. Toxicity to normal, rapidly growing or self-renewing tissues in the body is the reason behind many of the side effects seen with chemotherapy. Fortunately, these normal tissues continue to grow and repair themselves, and the injury caused by chemotherapy is rarely permanent.

What are the typical side effects of chemotherapy?

Compared to people who receive chemotherapy, pets experience fewer side effects of treatment. Veterinary oncologists use lower doses of drug, do not combine as many drugs as in human protocols, and often administer drugs at less frequent intervals. The normal tissues of the body that are typically most sensitive to chemotherapy are the intestinal lining, the bone marrow (which makes red and white blood cells and platelets), and the hair follicles.

Toxic effects to the gastrointestinal tract are responsible for decreased appetite, nausea, vomiting, and diarrhea. In most cases, these signs manifest 3 to 5 days post-treatment, however some side effects can occur earlier than this time period, or be prolonged. Most side effects are mild and self-limiting, or can be relieved with oral medications given at home. It is uncommon, though possible for animals to experience more severe side effects secondary to chemotherapy, which require hospitalization for more aggressive supportive care.

Suppression of the bone marrow by chemotherapeutic drugs may cause a drop in the white blood cell count, leading to increased susceptibility to infection. Development of a decreased white blood cell count and fever during chemotherapy treatment is considered an emergency situation which requires hospitalization for intensive care (typically intravenous fluids and antibiotics). If the white blood cell count is decreased, but your pet is feeling well and does not have a fever, antibiotics may be prescribed as a preventative measure. Decreases in the red blood cell count post-chemotherapy can occur on occasion, particularly with long-term chemotherapy administration, however this decrease is often mild. More significant anemias typically develop secondary to an animal's cancer. Decreases in the platelet count can also occur secondary to chemotherapy. Certain drugs affect the platelet count more than others. A markedly low platelet count can put an animal at risk for spontaneous bleeding; however this complication is rare secondary to chemotherapy. Bloodwork (complete blood count) is obtained regularly during the course of a treatment protocol and prior to chemotherapy administration to ensure it is safe to proceed with treatment, and to inform any dose adjustments that need to be made.

Hair follicle cells in dogs that are non-shedding may be particularly susceptible to chemotherapy. Certain breeds of dogs, such as terriers and poodles, will experience variable amounts of hair loss. Hair loss is most often evident on the face and tail. In cats, whiskers and the longer hairs over the eyes may fall out. Hair will regrow once chemotherapy is stopped, but often with a different color or texture. Hyperpigmentation (darkening) of the skin can also occur with certain chemotherapy drugs.

There are many different types of chemotherapy agents, each with a different mechanism of action and different likelihood of causing side effects. Some agents have unique side effects in addition to the general side effects of chemotherapy. The Oncology Service is proactive about keeping your animal as comfortable as possible during chemotherapy treatment. Your pet will usually be sent home with oral medications after receiving chemotherapy, such as anti-nausea or anti-diarrheal medicines and antibiotics, in an attempt to lessen or prevent side effects. You will also be provided with instructions as to what to do if and when a problem arises. With proper management, most animals are feeling better within a few days.

How is chemotherapy administered?

The route and frequency of administration of chemotherapy drugs is variable. Certain drugs are oral medications (pills or capsules) that are given at home. Others are injections (given under the skin or intravenously) that require an outpatient appointment for administration. In some instances, slow infusions are given that may require an animal to spend the day in the hospital. Treatments are typically repeated weekly to every few weeks.

The duration of treatment depends upon the type of cancer and extent of disease. Some animals receive chemotherapy for the remainder of their lives, while in others, treatment may eventually be spread out or discontinued after a period of time, provided that their cancer is well-controlled. Chemotherapy can also be reinstituted in animals that experience relapse (recurrence) of their cancer.

What can be expected from chemotherapy?

In many cases, a cure is unrealistic for our veterinary cancer patients. The goal of cancer treatment is to prolong survival while preserving a pet's quality of life. To this end, chemotherapy may be used to minimize cancer-induced discomfort, and/or slow the progression of disease. An animal's prior medical history, current medical problems, and practical concerns such as the need for repeated visits, a pet's temperament, and cost of treatment, all play a role in the decision of whether to pursue chemotherapy treatment. We encourage you to discuss any questions and concerns you may have prior to and during treatment with your oncologist.