

CANCER TREATMENT

When cancer is diagnosed in a pet continuous improvements in our knowledge and new and evolving methods of treatment give options to owners and their veterinarians. These notes are provided to help you understand the treatment options that may be considered for cancer in pet dogs or cats.

For general information on cancer in pets ask for our handout "What is Cancer". If not already performed your veterinarian may suggest certain tests to help confirm or eliminate the diagnosis, and to help assess treatment options and likely outcomes. Because individual situations and responses vary, and because cancers often behave unpredictably, science can only give us a guide. However knowledge, understanding and treatment of tumors in animals is improving all the time.

The main concern in deciding upon a course of treatment should be what is best for the quality of life of the pet. Sometimes, because of the type of cancer or its stage of progress, cure is unlikely. However for these cases treatment may help alleviate symptoms, such as pain, and greatly improve the quality of the pet's remaining life. This is called palliative treatment.

We understand that this can be a very worrying time. We apologize for the need to use some technical language. If you do not understand anything in these notes or in what you have been told please do not hesitate to ask us.

What types of treatment are available?

The standard treatment for almost all cancers is surgical removal of the lump, sometimes with part or all of the affected organ. Other treatments (special types of surgery, radiation treatment [radiotherapy], drug treatment [chemotherapy]) are not suitable for all cancers. Before selection or advice on these alternative treatments, there must be an accurate diagnosis of the cancer type and its extent in the animal. Cancer treatments often have significant side effects and many are available only at specialist centers, or are still under development for use in animals.

Local therapy (surgery, laser therapy and radiotherapy) is best for cancer that is apparently confined to a well-defined area in an accessible site.

Systemic (whole body) treatment, usually chemotherapy, is considered for tumors that are widespread, or for which there is significant and immediate risk of spread from the initial location.

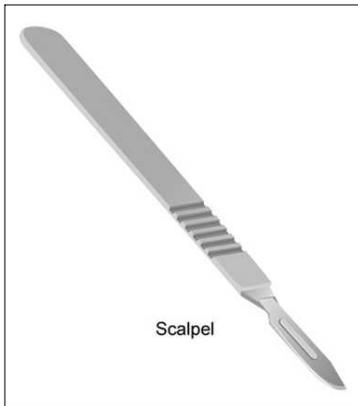
Mixed or multimodal therapy (use of several types of treatment in combination or using cocktails of anti-cancer drugs) sometimes offers the possibility of maximizing cancer cell killing.

There are many factors that your veterinarian will consider in advising the most appropriate course of treatment for the particular case, or proposing alternative courses to you.

Surgical treatment

Small surgical procedures can be done under local anesthesia. However most veterinarians will prefer to operate under general anesthesia as a wide margin of normal tissue





surrounding the cancer must be removed to help prevent recurrence. General anesthesia is a procedure with a very small risk in otherwise healthy animals but the risk is greater in animals that are sick or elderly.

Benign (non-invasive, non-spreading) cancers in a well-defined area and in an accessible location are almost always permanently cured by surgical removal. Surgery is also the best treatment for the majority of malignant cancers that have not yet spread (metastasized). Surgery is widely available although complex procedures may require referral to a specialist. Recovery from most surgery is rapid and post-surgical pain is controllable.

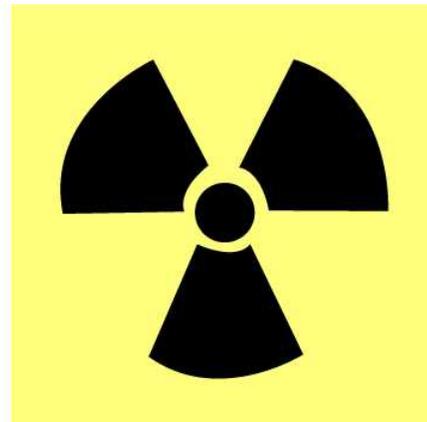
Special forms of surgery

The use in surgery of freezing temperatures (cryosurgery) or electric currents (electrosurgery) can improve results for some cancers. Laser therapy (light amplification by stimulated emission of radiation) using carbon dioxide lasers is an alternative to conventional surgery for some cancers. The narrow beam of light emitted by the laser can be focussed on the cancer to vaporise it. The light also sterilizes the site and controls bleeding by sealing blood vessels. It is the best treatment for some superficial carcinomas. Laser therapy is expensive and needs trained and expert operators, so is not available everywhere.

Radiotherapy

This treatment is only available at specialist centers. It uses high energy radiation (similar to x-rays but at a much higher energy level) that injures the DNA (genetic material) of cells. Cells that are undergoing more frequent cell divisions (multiplying) are the most sensitive to radiation and this is why tumor cells tend to be more susceptible. But normal healthy cells can also be damaged or destroyed by the radiation, particularly actively dividing cells like those of the intestinal lining, bone marrow and immune system.

Radiation therapy will often be used in combination with surgery and chemotherapy. it may be used before surgery to shrink very large tumors or after surgery to kill cancer cells that may have remained. Radiation therapy may be considered as palliative treatment when hope of cure is small but where improvement in quality of life by reducing symptoms such as pain, bleeding or loss of function can be achieved.



There are two main types of radiation treatment; external beam and interstitial brachytherapy. The former treats from the outside of the tumor; and in the latter, a radioactive isotope is implanted inside the tumor or administered by injection. In both types the radiation dose needs to be carefully planned. Tumor types that may respond well to radiotherapy, or where radiotherapy can improve quality of remaining life for instance by reducing pain, include mast cell tumors, sarcomas (cancer of bone, muscle or various connective tissue), lymphosarcoma, and tumors of the mouth, nose, brain and thyroid. Radiation therapy is often performed over several treatments and can only be administered to animals under general anesthesia.

Brachytherapy is less damaging to surrounding tissue than external beam therapy, but as the radioactive material is placed inside the cancer, the animal becomes radioactive. The pet

therefore has to be kept in a specially constructed compound until the radioactivity is reduced to a safe level.

Systemic chemotherapy

Chemotherapy with drugs given orally or by injection and acting throughout the body (systemic treatment) involves the use of drugs that are designed to be selectively toxic (damaging) to cancer cells but they typically have some toxicity for healthy cells, particularly those that are frequently dividing like the precursor cells for the blood and immune systems, and cells of the gastrointestinal system. Anemia, reduced resistance to infection and gastrointestinal upset are therefore common side effects to be monitored and treated. Fortunately there are continuous improvements in the drugs available for moderating side effects of chemotherapy.



Chemotherapeutic cancer drugs have been developed primarily for human use and are not specifically licensed for animal application. Veterinarians may use these drugs under their professional judgement and supervision. The aim of chemotherapy varies from complete remission and cure, or prolonging the period of remission to palliative therapy intended to minimize patient discomfort pain and suffering.

Most types of chemotherapeutic drug target dividing cells. As small tumors grow most rapidly, they are most susceptible to therapy. Despite this, only small numbers of cells are dividing in some cancers so the treatment is not helpful in all cases. Higher doses of drugs may increase the toxicity more than the increase in beneficial effects. Chemotherapy also selects cells for resistance to treatment (drug resistance) so a drug may become less effective in subsequent treatment. In general, the use of many drugs together (drug cocktail) is less toxic and more likely to benefit the animal than use of a single drug.

Contrary to the situation in human medicine, most cancers in veterinary patients will not be permanently cured by chemotherapy. In veterinary medicine chemotherapy protocols have been designed to maximize the patients' life-spans but most importantly their quality of life. These protocols are designed to minimize side effects. Side effects such as vomiting, diarrhea and lowered resistance to infection can occur. These effects can be moderated or eliminated by use of appropriate medications and adjustment of the chemotherapy protocol.

Anti-inflammatory drugs

Inflammation-promoting substances called 'prostaglandins' are produced by some tumors. Treatment with non-steroidal anti-inflammatory drugs that reduce prostaglandin production can therefore give some clinical relief. This treatment has caused remission of some bladder tumors in dogs. It is widely available and inexpensive. Patients have to be monitored for signs of gastrointestinal tract problems.

Immunotherapy

An animal's immune system is sometimes capable of recognizing cancer cells as abnormal and respond with special cells and factors that can destroy those cells. However in cases where cancer has developed, this immune response is typically weak or absent. Cancer cells in some cases themselves reduce the ability of the immune system to respond (immunosuppression). Therefore stimulating or enhancing the immune system may be helpful in some cases. Immunotherapy is the use of the immune system to kill cancer cells.

Various drugs (collectively referred to as 'immunomodulators') can affect the immune system, either suppressing or enhancing. Sometimes the same drug at different dosages can be suppressive or enhancing. Although some of these drugs show some promise in cancer treatment, both in topical and internal (systemic) use in people, there is generally little information on their use in dogs and cats.

A lot of current cancer research is aimed at investigating ways of stimulating the immune system to specifically recognize the cancer cells, for example by a vaccine approach. See also 'Gene Therapy' below.

Future Prospects for Cancer Treatment

Gene therapy

Gene therapy is the introduction of part of the reproductive code (gene) into a cell to reduce the adverse effects of a disease process. Target diseases include infections and inflammatory disease as well as cancer. The gene needs to be delivered by vectors, which include viruses, vaccines or physically in liposomes. The vector choice affects the targeting which tries to ensure the new gene is expressed more by the cancer than other cells. Mechanisms include "suicide genes" to make the tumor commit suicide, activation of drugs to kill tumor cells specifically and changing the immune system reaction to the tumor. In animals, this type of therapy is still at the experimental stage.

Photodynamic therapy

Photodynamic therapy uses a photosensitizing drug that enters the tumor. The drug within the tumor is activated by a specific wavelength of light to generate intracellular oxygen and lead to death of cells and loss of blood supply. This type of treatment is useful for superficial and bladder tumors but is not yet widely available.

Angiogenesis modulators

Cancers stimulate new blood vessels to grow. Angiogenesis modulators (or antiangiogenics) are various drugs that reduce this new blood supply and "starve" the cancer. They are not generally available but are now being introduced into human cancer treatment. Also some non-steroidal anti-inflammatory drugs (see 'Anti-inflammatory drugs' above) are thought to have this anti-angiogenic effect.

Symptomatic and palliative treatment

Many of the above treatments, and others, may be used to palliate (relieve) the effects of the cancer and improve quality of life. The potential side effects of treatment have to be balanced against the improvement achievable and life expectancy.

Special diets are reported to delay cancer progression and some (such as those designed to improve liver function or cancer patients in general) may palliate the clinical effects of cancer or the side effects of drug or other treatment.

Pain and inflammation reducing drugs may also improve the quality of life for your pet and techniques such as acupuncture have their advocates.



As in humans, our understanding of cancer in dogs and cats is increasing all the time. Survival rates are improving and many animals are alive and well as “cancer survivors”.

In making decisions on the course of action to be undertaken in a specific situation, your veterinarian will help you to come to an informed choice that considering all factors is the right decision for you and for your pet.

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