FLINT ANIMAL CANCER CENTER
COLORADO STATE UNIVERSITY

Radiation Fact Sheet

Radiation therapy, surgery and chemotherapy are the three most common modalities used in the treatment of cancer. Radiation therapy and surgery are modalities that can locally control solid tumors such as carcinomas and sarcomas. Radiation therapy can also be used to provide relief of pain, or improve function in patients suffering from advanced cancers. Radiation therapy has been used for over 100 years, but technical advancements in the last decade have vastly improved the ability to deliver dose specifically to the tumor while sparing normal tissue structures.

What is radiation therapy?

Radiation therapy uses ionizing radiation to damage the DNA in tumor cells, resulting in tumor cell death. The most common type of radiation therapy is external beam radiation therapy, also known as teletherapy. Teletherapy is delivered by a radiation producing machine like a linear accelerator, or from a machine housing a radioactive source, such as a cobalt machine. The patient is precisely positioned on a table, also called a couch, near the machine. Radiation travels from the machines to the patient, where the radiation "dose" is delivered to the tumor and surrounding normal tissues. While the patient remains in the exact same position, the machine actually revolves around the patient so that radiation is delivered from many different angles. Each treatment takes just a few minutes and does not cause any discomfort.

How does radiation therapy work?

Radiation therapy kills cells by damaging the DNA. The damage is from the localized release of ionizing radiation, which can damage the DNA directly, or more commonly, through the formation of oxygen free radicals. The cells generally do not die until the cell goes to divide. This is known as mitotic cell death. One of the reasons it is effective against cancer cells is that cancer cells are routinely dividing. Radiation can also cause a more immediate death in some cancers cells, called apoptotic cell death. This is seen frequently in tumors such as lymphoma.

What are the goals of radiation therapy?

Radiation is usually administered with the goal of achieving long term tumor control. This is referred to as ***radiation therapy with curative intent***. Depending on the part of the body

bearing the tumor, most veterinary patients treated with curative intent protocols are treated over a 3-4 week period. A small "fraction" of radiation is delivered each day. Sometimes, depending on the location, there can be side effects, known as ***acute effects*** from this type of treatment. New technology is helping us minimize acute effects.

What is palliative radiation therapy?

Sometimes radiation is administered to relieve the patient of pain and compromising symptoms and/or improve quality of life. This is referred to as palliative radiation therapy. Palliative protocols are most commonly used when the patient has advanced cancer, metastasis, or some other critical condition that would limit life expectancy. These protocols vary and may involve weekly treatments or treatments given over the course of a few days. Palliative radiation therapy usually relieves pain and may even shrink the tumors a bit while rarely causing acute effects. Unfortunately, the duration of tumor control is far shorter than patients treated with more aggressive (curative) protocols.

Which patients develop acute effects and why?

Patients treated with curative intent, fractionated radiation therapy may develop side effects, called ***acute*** effects during or shortly after treatment. New radiation technological advances, such as the Varian Trilogy linear accelerator at CSU, are able to decrease the severity of, or even eliminate acute effects for tumors in some parts of the body. Nasal tumors, bladder and prostate cancers, oral tumors, and brain tumors now have minimal acute effects. Unfortunately, when tumors are located close to the skin surface, it is necessary for the skin to receive radiation doses that may cause discomfort. Your clinician will discuss potential side effects with you prior to treatment.

What is SRT and how is it different from curative intent or palliative radiation therapy?

Stereotactic Radiation Therapy (SRT) is also called stereotactic radiosurgery, gamma knife therapy and cyberknife therapy. There is no surgery involved, rather it got the name because the radiation is a precise as a scalpel at focusing on the tumor. SRT protocols are generally delivered in 1-5 fractions (doses) on consecutive or alternating days. SRT requires special radiation therapy equipment including the ability to confirm the location of the patient and tumor right before therapy; that is the stereotactic aspect that the Trilogy provides. For some tumors, SRT can be used with curative intent. For other tumors it is used for palliation, but for far more durable palliation than what can be achieved using traditional methods. SRT is easy on the patient and client because treatment can be completed in such a short period of time

and acute radiation effects are minimal. However, it is not indicated for all tumor types/location. A radiation oncologist with knowledge about your pet's specific tumor may be able to determine if this is an option.

What are the most common tumors treated with radiation therapy?

The most common veterinary tumors treated with radiation are brain tumors, pituitary tumors, tumors of the body and extremities (soft tissue sarcomas, mast cell tumors, vaccine associated sarcomas), lymphoma, nasal tumors, oral tumors, bladder tumors, prostate tumors, perianal tumors, and bone tumors.