The Benefits of Stereotactic Radiotherapy for Your Cancer Patient

Radiation therapy has been used for decades as a treatment for veterinary cancer patients. However, its success with respect to tumor control has been limited by the risk of undesirable side effects. Since tumor killing is directly correlated to radiation dose, and since tumor dose is limited by the radiation tolerance of the normal organs surrounding a tumor, radiotherapy can be thought of as the art of sparing normal tissue. The ultimate goal and challenge of radiotherapy is to deliver a radiation dose sufficient to kill a tumor while minimizing radiation exposure of normal tissues.

Recent technological advances in imaging and radiation delivery techniques have resulted in increasingly sophisticated treatment options. New technologies such as TomoTherapy, CyberKnife, and other forms of intensity-modulated radiation therapy allow highly conformal or focused radiation to be delivered to the tumor while sparing normal tissues.

This means that high doses of radiation can now be safely administered to tumors in fewer treatments and with less risk of side effects. This treatment approach is called stereotactic radiotherapy (SRT) or stereotactic radiosurgery and requires high-precision radiation delivery with image guidance to ensure accurate tumor localization.

SRT administers very high doses of radiation using many radiation beams of various intensities aimed at different angles to precisely target the tumor. Normal tissues receive minimal radiation doses, so complications are reduced.
Treatment may be given as a single, high dose called *stereotactic radiosurgery* (SRS) or as fractionated doses given daily for up to five days. This is in contrast to standard protocols that involve small daily doses for up to one month.

SRT requires fewer hospital visits, fewer anesthetic episodes, and is likely to result in fewer short term side effects, which greatly appeals to pet owners and clinicians alike. Due to the large doses used per treatment long term side effects are still possible.

SRT begins with appropriate patient selection. In people, the best candidates for this technique are patients with small, well-defined tumors for whom surgery is not an option. Invasive tumors with microscopic extensions are not optimally treated with SRT because the microscopic disease extending into neighboring normal tissue cannot be safely treated with ablative radiation doses. Small tumors are more amenable to sharp dose fall off from their edges, minimizing dose to surrounding normal organs. These same principles also apply in veterinary medicine.

Here are some numbers to illustrate this point. Radiation doses are measured in units called gray (Gy). In traditional radiation therapy, 10-20 treatments of 2-4 Gy are given daily over 2-4 weeks, and for SRS approaches, 15-30 Gy is given once as a single treatment. Typical SRT protocols involve three treatments of 8-10 Gy given over 3-5 days.
Treatment of some cancers is further complicated by the need to reduce or account for tumor motion caused by breathing or normal organ movement (e.g., gastrointestinal, urinary bladder, cardiac tumors or tumors on the body wall).

To date, SRT in veterinary medicine is most commonly used to treat canine osteosarcoma, intranasal tumors, brain tumors, and other select malignancies that are well defined and limited in size.

The availability of highly conformal radiotherapy and SRT presents an exciting opportunity in veterinary medicine. These and other emerging technological advances greatly enhance our ability to achieve tumor control or prolonged palliation with minimal morbidity.

It is important to remember that there are limited clinical data on the effectiveness and normal tissue complications associated with SRT.

We are excited to have the ability to offer Stereotactic radiation as a delivery technique to our patients!