

Radiation Therapy – Soft Tissue Sarcomas

Soft tissue sarcomas (STS) are a group of tumors arising from connective tissues, which include muscle, bone, cartilage, fat, blood vessels, and nerve sheath tissue. They comprise about 15% of skin and subcutaneous tumors in dogs and 7% in cats. Most pets present with a single tumor, and they are usually middle-aged to older animals. Large breed dogs tend to be overrepresented, and these tumors can arise from any part of the body.

The diagnosis of these tumors is based on getting a sample of the mass. Getting a needle sample is often the first step. However, a non-diagnostic sample is not uncommon for these tumors, which don't shed cells very easily. A biopsy has a better chance of determining a diagnosis and also helps us determine how aggressive this tumor may be. This measurement of aggressiveness is called a "grade". Low-grade, (grade 1 or some grade 2) tumors often do not spread beyond the skin mass, while high-grade (some grade 2 or grade 3) are more prone to spreading to other organs (metastasis). The risk of metastasis is very low for grade 1 STS, about 20% risk for grade 2 STS, and 40-50% risk for grade 3 STS. Local therapy may be the only treatment required for low-grade tumors, such as surgery and/or radiation, while it is recommended to combine local therapy with chemotherapy for high-grade tumors.

If a STS can be removed with complete, or "clean", surgical margins, this may be all the treatment required locally. **Importantly, the first surgery provides the best opportunity for local tumor control.** STS can be tricky, however, because they tend to have microscopic tendrils of tumor cells extending beyond the bulk of the mass. A consultation with an oncologist to assess the surgical margin and grade of the tumor is the best way to determine if more therapy is needed. Grade 1 STS uncommonly grow back even with marginal surgical margins (7% risk of recurrence), so they are often just monitored over time. The recurrence rate after surgery of grade 2 tumors is 30-40%, and up to 75% for grade 3 tumors.

When tumors are not amenable to complete surgical resection, or there is no surgical option at all, radiation therapy has become a useful treatment modality. Radiation therapy can be combined with surgery when clean excision was not possible. This consists of 18 treatments of radiation daily, Monday through Friday. The radiation is delivered via a machine called a linear accelerator (LINAC), and a single or multiple beams of radiation are directed and centered on the tumor. The patient is anesthetized for a brief time for each of these treatments, usually between 30-45 minutes, and just "deep" enough that they lay still. There is no pain associated with the delivery of radiation itself.

Radiation is most effective when the tumors cells remaining are in the microscopic setting (such as after surgery). With this protocol, approximately 80-90% of dogs will respond to treatment and live for 3-5+ years without evidence of tumor regrowth. If the tumor is found on the chest or abdomen, sometimes a computed tomography (CT) scan is required for more targeted radiation planning.

Side effects relating to this protocol of radiation are most common of the skin. About 2 weeks into the protocol, we can see hair loss, redness, or irritation to the skin, and by the end of the protocol we often see skin ulcerations. These side effects may get worse up until about 1-2 weeks after completing the radiation protocol, then in the majority of patients heal over the next couple weeks with no long-term complications. Keeping the region of radiation side effects clean, dry, and uninfected (no licking, biting, or rubbing by the patient) is the best way to ensure appropriate healing.

If surgical resection is not an option, not pursued, or the tumor grows back, radiation can be performed on the bulky (or gross) disease. A palliative, hypofractionated ("hypo" meaning "low" or "few" numbers of treatments) radiation protocol can be employed in these situations. These protocols are not as aggressive as the previously

mentioned option, however there is some literature available showing good tumor responses. Median survival times range from a few months to over 1 year following treatment with radiation delivered once or twice a week for 4-6 total treatments. These studies were performed on visible, bulky STS. There is a 20-50% chance of shrinking the tumor in size, but radiation was able to stop tumor growth in >50% of patients for a few months.

The protocols used at VSC are:

- Once a week for 4-6 doses
- Twice a week for 5 doses
- Once a day, Monday through Friday, for 5 days

We believe the efficacy is similar between these protocols, with similar control of the tumors. The risk of any side effect is low, since this is a moderate dose of radiation whose intent is to prolong good quality of life. Depending on the location of the tumor, a CT scan may or may not be required.

Thank you for considering bringing your pet to us for treatment. We understand and value the trust you have placed in us. Should you have any questions regarding radiation therapy for the treatment of soft tissue sarcomas, please do not hesitate to ask to be put in contact with a member of our radiation oncology team.

Veterinary Specialty Center is guided by the belief that companion animals deserve state-of-the-art medical care in a kind and comforting environment. The courage of our patients, the loyalty of their human families, and the devotion of our referral veterinarians inspire our vision. It is sustained by the contributions of our compassionate, knowledgeable and dedicated staff and built upon a tradition of providing unsurpassed healthcare for animals.
