



## **CANINE SOFT TISSUE SARCOMAS**

### **What is a soft tissue sarcoma?**

Soft tissue sarcomas are a group of malignant cancers that arise from the skin and subcutaneous connective tissues, such as fat (liposarcoma), muscle (rhabdomyosarcoma, leiomyosarcoma), cartilage (chondrosarcoma), fibrous connective tissue (fibrosarcoma), nerves (schwannoma, malignant peripheral nerve sheath tumor, neurofibrosarcoma) and the “pericytes” of small blood vessels in the subcutis (hemangiopericytoma). These tumors are often considered collectively because of their similarity in clinical behavior.

Soft tissue sarcomas may arise from any anatomic site. They tend to appear discrete and well encapsulated, but are very invasive into surrounding tissues. Metastasis (spread) to other sites, most commonly lungs, can occur in up to 25% of patients, depending on tumor type. Hemangiopericytomas tend to have the lowest metastatic rate of all the soft tissue sarcomas (<5%). Local regrowth of the tumor is common after conservative surgical removal. Soft tissue sarcomas are graded as low, intermediate and high grade. High grade sarcomas have a higher potential for metastasis (up to 50%)

### **How are soft tissue sarcomas diagnosed?**

A diagnosis of a soft tissue sarcoma is often difficult with needle aspirates, as the tumors do not readily exfoliate or “shed” cells. Often a needle aspirate will confirm the presence of a “spindle cell tumor”, which will alert your veterinarian that a biopsy or surgical removal is indicated. A biopsy is necessary to classify the type of soft tissue sarcoma.

Once a diagnosis of a soft tissue sarcoma is made, X-rays of the lung are indicated to evaluate for tumor spread. Routine bloodwork is recommended to assess your pet’s overall health.

### **What is the treatment?**

#### Surgery

Surgery is the mainstay of treatment for soft tissue sarcomas. Surgery must be wide and deep in order to remove all of the tumor tissue. Tumors for which aggressive surgery results in “clean” surgical margins, no further treatment may be necessary. Routine rechecks of the surgical site, in addition to regular lung X-rays are recommended as follow-up.

#### Radiation therapy

In some instances, aggressive surgery is not possible without severe disfigurement or loss of function. In cases where aggressive surgery is not possible, or if tumor cells remain at the margins despite an aggressive surgical resection, radiation therapy is used to prevent or delay regrowth of the tumor. Radiation therapy is extremely well-tolerated in dogs and cats. Side effects are minimal and limited to the site where radiation therapy is performed. Please refer to the Radiation Therapy handout for more detailed information.



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Radiation therapy may be used for large tumors that cannot be surgically removed. Radiation therapy for measurable tumors is not considered to be as effective as radiation therapy for microscopic tumors after surgery. These tumors do not rapidly regress after radiation and “control” may be defined as a slowly-regressing (6 months or longer) or stable-sized tumor. In some instances, the tumor may regress enough to make surgical removal possible.

### Chemotherapy

#### Systemic

Systemic chemotherapy is often recommended for high grade sarcomas to prevent or delay the onset of distant metastases. Doxorubicin has been shown to be the most active chemotherapy for soft tissue sarcomas. Doxorubicin is administered every 3 weeks for 5 treatments. It is often combined with other chemotherapy drugs such as cyclophosphamide. Chemotherapy may be used for large tumors that cannot be surgically removed, but must be considered palliative at best. Chemotherapy is well-tolerated in dogs and cats. Please refer to the chemotherapy handouts for more information.

#### Intralesional

Intralesional chemotherapy involves the delivery of a chemotherapy drug directly into the surgical field. 5-fluorouracil (5-FU) is combined with sterile sesame oil for injection. The treatment is administered once per week for 4 weeks, then every 2 weeks for 2 treatments, then every 4 weeks for 3 treatments (total of 9 treatments). The treatment is well tolerated and systemic side effects such as nausea, vomiting and diarrhea are not routinely observed. Patients will occasionally develop swelling at the site of injection.

#### Metronomic

Metronomic chemotherapy involves the administration of very low doses of chemotherapy on a daily or every other day schedule. Cyclophosphamide is used commonly in metronomic dosing and is often combined with piroxicam, a non-steroidal medication that has anti-tumor effects. This combination is often recommended for patients with incompletely excised STS where radiation therapy or intralesional chemotherapy is not possible. This combination is proving beneficial in delaying recurrence of tumor over surgery alone. Metronomic chemotherapy may be used in combination with intralesional chemotherapy. The added benefits of this combined therapy are not yet known.

### **What is the prognosis?**

Soft tissue sarcomas that are low to intermediate grade and can be removed completely with aggressive surgery have an excellent long term prognosis. Radiation therapy is very effective at controlling soft tissue sarcomas following an incomplete surgery. Control rates for adjuvant radiation therapy following an incomplete resection are approximately 80% at 1 year and 60% at 2 years. Approximately 50% of dogs will still have their tumors controlled at 3 years or longer.



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By comparison, the majority of dogs with incompletely excised soft tissue sarcomas that receive surgery without follow-up radiation therapy will have their tumors regrow by 1 year after surgery. Many of these tumors often regrow within the first few months after surgery.

The metastatic rate is relatively low for low grade tumors (<10% for most tumor types). When a soft tissue sarcoma is classified as high grade, the metastatic potential increases to up to 50%. Chemotherapy may be beneficial in delaying the onset of metastases. However, it is impossible to predict whether an individual dog will ultimately develop metastases. The best time to treat with chemotherapy is before metastases develop.

The best time to treat a soft tissue sarcoma is the very first time it occurs. Tumors that regrow after an initial surgery are often more aggressive in their behavior. This makes the potential for metastases greater and our ability to control the tumor locally, even with adjuvant radiation therapy, much more difficult.