Canine cutaneous and subcutaneous soft tissue sarcomas (STS) arise from mesenchymal tissues and they account for 4% to 8% of all neoplasms of the skin and 20.3% of malignant neoplasms of the skin. They form a group of tumors that share a common biologic behavior. This behavior is characterized by: 1) local invasiveness, 2) relatively low rate of metastasis with a) the rate of metastasis being grade dependent, and b) when they do metastasize, it is most often to the lungs.

The most common histologic types included in this group of tumors are: fibrosarcoma, myxosarcoma, peripheral nerve sheath tumor, and perivascular wall tumor (hemangiopericytoma). Histologic types that are sometimes included in this group in the literature: rhabdomyosarcoma, liposarcoma, leiomyosarcoma, synovial cell sarcoma, pleomorphic sarcoma, and undifferentiated sarcoma. The histologic types that are typically excluded from this group are: histiocytic sarcoma, hemangiosarcoma, osteosarcoma, and malignant melanoma.

Arguably, the easiest test to perform in order to provide a diagnosis when a tumor of the skin or subcutaneous area is found is a fine needle aspirate (FNA). FNA has good to excellent diagnostic accuracy for cutaneous and subcutaneous tumors. However, a negative diagnosis (i.e. nondiagnostic sample or no tumor cells seen) is not strong evidence that the mass is not a STS. For
those cases and for cases where the treatment leads to significant morbidity (e.g. amputation), a biopsy is recommended. The biopsy can either be excisional or incisional depending on the circumstances. Size and location of the mass are the two most important factors that decide to do an excisional or incisional biopsy. The goal of the biopsy can be not only to provide a histologic diagnosis but also a grade in the instance of a soft tissue sarcoma (grade has prognostic significance and can alter treatment decisions). When a biopsy is performed for the purpose of obtaining a grade, it is important to remember that it is 59% accurate, with underestimating the grade in most cases where it lacks accuracy.

Once a diagnosis of STS is made or it is highly suspected, the workup includes bloodwork (CBC and chemistry profile), urinalysis, and chest radiographs or CT. Lymph nodes that are accessible to FNA can be aspirated, although STS metastasis to a lymph node is uncommon. Lymph nodes that are of normal size can still have metastasis (as a general rule with cancer). Abdominal ultrasound can be performed but its value as a test to find metastasis is limited in the presence of a STS. The value is more to evaluate the abdomen for other concurrent problems or lesions. Imaging the chest is the staging test of choice given the lungs are the most common site of distant metastasis. Three view radiographs is arguably the easiest imaging test but less sensitive. Computed tomography is more sensitive but requires anesthesia.

**Surgical excision**

Local control of STS in the absence of metastasis is the main focus of the treatment. But because these tumors are locally invasive, local control can be challenging. Surgical excision is the therapeutic mainstay for these tumors.
At surgery, STS can appear as if they are well encapsulated but this is typically not the case. STS usually are surrounded by a pseudocapsule. What this means is that they are locally invasive and, at the microscopic level, go beyond the edges of the tumor that can be visualized, imaged, and palpated. Therefore wide excision or radical excision is typically required for a complete excision. In certain instances, depending on the size of the tumor and the anatomic location, advanced imaging such as CT or MRI can be very valuable in planning the surgery. Ultrasound can be a good alternative when CT or MRI is not possible. Wide excision is defined as taking 2-3 cm margins all around the tumor and one fascial plane deep to the tumor. The reason for taking a fascial plane is that it is a vascular-poor, collagen-rich tissue and tissues with these features are natural barriers against cancer. A radical excision is removal of the entire anatomic compartment from which the tumor is arising from. A great example of a radical excision is a limb amputation.

In numerous studies, wide or radical excision decreased the likelihood of local recurrence and extended survival times. More important however is the status of the margins histologically. Incomplete margins are a risk factor for local recurrence and shorter disease-free interval. Because of this, after resection of a STS, if incomplete margins are achieved, further therapy is indicated. Further therapy can be re-excision of the previous surgical scar, radiation therapy, or metronomic chemotherapy. Median time to local recurrence is about 1 year and can be seen even up to 5 years. In one study, the estimated rate of local recurrence by the Kaplan-Meier survival analysis for tumors that were incompletely excised was about 70% after approximately 2000 postoperatively.

Grade of a STS is given by the pathologist based on 3 criteria: mitotic index, tumor differentiation, and tumor necrosis. Grade has been shown to be prognostic for local recurrence. In one study (McSporran 2009), grade was associated with the rate of local recurrence.
recurrence. In that study, tumors where tumors were excised with complete margins, none had local recurrence, irrespective of grade. Of the tumors that were marginally excised (<1mm of tissue or no tissue outside pseudocapsule), local recurrence was as follows: 3 of 41 grade 1 tumors (7%), 14 of 41 grade 2 tumors (34%), and 3 out of 4 grade 3 tumors (75%). This could indirectly suggest that grade correlates with the degree of local invasiveness.