Osteosarcoma is the most common bone tumor in dogs. While surgery followed by platinum based chemotherapy remains the standard of care, new therapy options are available both for management of the primary tumor and also for prevention of metastatic disease.

**Options for management of the primary tumor and associated pain.**

Amputation may not be an option for all dogs with osteosarcoma, nor desired by every client. In these cases stereotactic radiation therapy and bisphosphonate therapy may be useful.

**Stereotactic Radiation Therapy**

Stereotactic radiation therapy (SRT) is radiation that is delivered very accurately through the use of on-board imaging. This allows a higher dose of radiation therapy to be given per treatment, often in fewer sessions. Typical therapy is given over 3 days only. Similar to palliative doses of radiation therapy, stereotactic radiation therapy can alleviate pain but also has the added benefit of better long term tumor control. Large doses of radiation (per treatment) appear to stimulate an immune response against the cancer. Current studies are evaluating of best to take advantage of the stimulus to maximize tumor response.

**Bisphosphonate Therapy**

Bisphosphonates inhibit osteoclast activity and have been widely used for the treatment of osteolytic primary bone disease and metastases in people. Bisphosphonates bind strongly to hydroxyapatite on the bone surface and directly inhibit osteoclast-mediated bone resorption. An important proposed concept in the establishment of primary or metastatic bone tumors, including osteosarcoma, is a positive-feedback mechanism, in which activated osteoclasts and/or reabsorbed bone matrix release growth factors and metalloproteinases that in turn bind to receptors on tumor cells and promote proliferation and further secretion of these growth factors. Inhibition of osteoclasts by bisphosphonates may interrupt this feedback mechanism. In vitro and animal model studies have suggested that bisphosphonates also have direct anti-tumor effects in osteosarcoma.
While many bisphosphonates are commercially available, two of the more commonly used bisphosphonates in veterinary medicine are pamidronate and zoledronate. Both are administered as an intravenous infusion every twenty-eight days and have been demonstrated to maintain analgesic effects for up to four months. Overall, bisphosphonates remain a relatively safe and effective treatment for alleviating pain and improving quality of life in dogs with bone tumors. The anti-tumor effect of these drugs is the subject of ongoing research.

**Options for Prevention of Metastasis**

Standard of care chemotherapy for osteosarcoma is typically platinum (cisplatin/carboplatin) or doxorubicin based. While chemotherapy has been shown to extent survival times for dogs with osteosarcoma, the cure rate is less than 10%. Little advancement in therapy to prevent metastatic disease has been made in the last 10-15 years.

The use of treatments to stimulate the immune system has been found to improve survival times in dogs with osteosarcoma. One such treatment soon to be available is an HER2/Neu immunotherapy. The preliminary results from a study by Dr. Nicola Mason, Associate Professor of Medicine at the University of Pennsylvania School Of Veterinary Medicine suggest that this therapy may delay or prevent metastatic disease and prolong overall survival in dogs with osteosarcoma. Median survival in control dogs was 423 days (surgery plus chemotherapy) and the median survival in treated dogs (surgery plus chemotherapy and immunotherapy) was 956 days. A second study evaluating immunotherapy and radiation for dogs with primary osteosarcoma that cannot undergo amputation is underway. This therapy is licensed by Aratana with scheduled availability later this year.

References available upon request