

## OSA Metastasis

The diagnosis of osteosarcoma with metastatic disease is historically associated with a poor prognosis for long term survival. One study showed that dogs with a Stage III osteosarcoma (*distant metastasis*) showed a median survival time of 76 days, with a range of 0-1583 days with various treatment options including surgery, palliative radiation therapy, and chemotherapy (*Boston et al, JAVMA 2006*).

In other words, without any treatment, the prognosis for this stage of osteosarcoma is about two months. With treatment, about six months.

### Diagnosing OSA Metastasis:

The following diagnostic tests may be performed to grade the severity of the metastasis, and determine the appropriate course of action that can provide the best overall quality of life for your dog. Tests are listed in order of complexity and depth.

Diagnostic Method:	Estimated Cost:
<b>Chest X-Rays</b>	\$252
<b>CT Scan of Lungs with interpretation</b>	\$750
<b>Technetium scan of Legs / Vertebrae and X-Rays of Spine</b> ( <i>rarely do people elect to do a full body CT scan for screening the bones due to the cost and associated anesthesia time</i> )	\$450
<b>Abdominal Ultrasound</b>	\$287
<b>Nuclear Scan or X-Rays of the Long Bones. 8 screening radiographs.</b> ( <i>A nuclear scan will light up in areas of the affected bone, then x-rays are taken to confirm any lesions. Alternatively, you can do the x-rays as a first line to screen for bone lesions</i> )	\$672

Once confirmed, treatment options for OSA Metastasis include:

Treatment:	Description:	Treatment Notes:	Considerations:	Estimated Cost:
<b>Pulmonary Metastasectomy</b>	<p>Surgical removal of lesions in the lung.</p> <p>One study showed the median survival time after surgery alone to be 176 days (range 20 to 1495 days) with an overall survival time of 487 days from the time of original diagnosis (<i>O'Brien et al Vet Surg 1993</i>).</p>	<p>Candidates include:</p> <ul style="list-style-type: none"> <li>● those with the primary tumor in remission for &gt;300 days</li> <li>● only 1 or 2 visible nodules within the chest</li> <li>● no other metastatic lesions in other areas of this body</li> <li>● a long doubling time of the metastatic lesions (&gt;30 days)</li> </ul>	<p>Will work if no more than 50% of lung needs to be removed.</p> <p>Recovery time: 2 – 4 days in the hospital</p>	<p>\$1500 to \$3000 depending on complications and recovery.</p>

Treatment:	Description:	Treatment Notes:	Considerations:	Estimated Cost:
<b>Palliative Care</b>	IV Chemotherapy	<p>In the metastasis phase of this disease, chemotherapy is not very promising.</p> <ul style="list-style-type: none"> <li>● One study showed a response rate of 9% with Adriamycin for metastatic disease</li> <li>● One out of 11 dogs responded for 21 days (<i>Ogilvie et al JAVMA 1993</i>)</li> <li>● Response rates overall to any chemotherapy at this site have been reported to be 2%</li> </ul>	<p>Standard treatment of one IV infusion, every 3 weeks</p> <p>If a dog has not had previous chemotherapy, there is a slight chance that outcomes rates could be better.</p>	<p>Adriamycin treatment is roughly \$500 per treatment every 3 weeks. Varies according to number of treatments</p>
<b>Metronomic Chemotherapy</b>	<p>Also known as “low dose chemotherapy” designed to arrest tumor blood vessel development (anti-angiogenic).</p> <p>The goal of this therapy is not to eliminate the disease completely, but to arrest its growth and spread.</p> <p>Anti-tumor effects of similar protocols have been proven in laboratory animals and humans with advanced, chemotherapy resistant cancer.</p>	<p>Cytoxan, Piroxicam and Doxycycline are the three drugs used in this therapy.</p> <p><u>Cytoxan</u>: a chemotherapy agent given every other day. At this low, chronic dose it's been shown to inhibit blood vessel growth.</p> <p><u>Piroxicam</u>: a non-steroidal drug with potent COX-2 inhibiting properties. COX-2 is a receptor that's been found to play a role in tumor development. In one study, 77% of osteosarcoma expressed the COX-2 receptor (<i>Mullins et al JVIM 2005</i>).</p> <p>Other non-steroidal drugs include the name brands of Metacam, Rimadyl, and Previcox.</p> <p><u>Doxycycline</u>: an antibiotic when given at low doses has been shown to inhibit blood vessel formation, which feed tumors. Does not affect the existing tumor(s).</p>	<p>Non-steroidal drugs help keep inflammation down, which can keep cells in better condition and more resistant to further cancer damage, resulting in better overall health for the patient.</p> <p>Treatment can be given at home.</p> <p>Side effects rarely include: bone marrow suppression, and inflammation of the bladder wall (cystitis). There is about a 5% chance of this occurring.</p> <p>CBC blood counts will be monitored periodically.</p> <p>This treatment is still undergoing study, therefore a life expectancy prognosis cannot be given with any certainty.</p>	<p>Depending on the dog's size:</p> <p>Cytoxan: varies from \$100 to \$200 per month.</p> <p>NSAID: varies from \$50 to \$100 per month.</p> <p>Doxycycline; varies from \$30 to \$60 per month.</p>

<b>Treatment:</b>	<b>Description:</b>	<b>Treatment Notes:</b>	<b>Considerations:</b>	<b>Estimated Cost:</b>
<b>Clinical Trials</b>	There are always ongoing clinical trials that may be available in their area (usually through veterinary universities) and inhalational chemotherapy as an option for pulmonary metastasis.	<p>As of 3/08, the following organizations were conducting osteosarcoma clinical trials. Contact the following to see if they are conducting studies on pulmonary metastasis:</p> <p><u>Veterinary Cancer Clinic</u>, Santa Fe NM  <u>Colorado State University</u>  <u>Gulf Coast Veterinary Specialist</u>, Houston TX  Louisiana State Univ. Cancer Treatment Center  <u>North Carolina State University at Raleigh</u>  <u>Ohio State University</u> at Columbus  <u>The Animal Medical Center</u>, NY, NY  <u>The Animal Clinical Investigation</u>  <u>University of Illinois</u> at Urbana-Champaign  University of Missouri at Columbia  <u>University of Pennsylvania</u>  <u>University of Wisconsin</u> at Madison</p>	<p>Among a variety of other requirements, clinical trials can require participant to:</p> <p>live within the area</p> <p>agree to having an autopsy performed on the participating canine</p> <p>agree to a designated number of follow up visits and tests</p>	Varies. Some trials will cover all costs associated with treatment, some will partially cover.