Canine Multicentric Lymphoma

WHAT IS LYMPHOMA?
Lymphoma is a cancer of the cells of the immune system called lymphocytes. Lymphocytes are present throughout the body, so dogs can have lymphoma in multiple organs. Lymphoma most often affects lymph nodes, but can also affect the liver, spleen, bone marrow, and other sites.

It is typically initially diagnosed using small needle samples (aspirates) collected from enlarged lymph nodes. In some cases, diagnosis may require sampling of bone marrow or other organs, tissue biopsy, or molecular testing (flow cytometry, PARR). Once a diagnosis is made, staging tests are recommended to assess the extent of disease. Complete staging includes blood and urine testing, non-invasive imaging (chest X-rays, abdominal ultrasound/sonogram), and additional aspirates. This evaluation provides prognostic information, a baseline for monitoring, and information regarding organ function and involvement. Results may influence treatment recommendations or help anticipate potential complications.

Lymphoma is categorized into five stages, depending on the extent of the disease in the body: single lymph node enlargement (stage I), regional lymph node enlargement (stage II), generalized lymph node enlargement (stage III), liver and/or spleen involvement (stage IV), and bone marrow and blood involvement (stage V). These stages are broken down into substages “a” and “b,” with substage “a” being patients who are not showing clinical signs of illness and “b” being patients who are showing signs of illness (such as vomiting, weight loss, lethargy, fever, decreased appetite, etc.).

WHAT IS THE DIFFERENCE BETWEEN B CELL AND T CELL LYMPHOMA?
In addition to staging and substaging, lymphoma can be further characterized based on the type of lymphocyte (T cell or B cell) that becomes cancerous. B cell lymphoma is more common, and dogs with this variant often achieve and maintain remission more readily than patients with T cell lymphoma. Because of this more favorable response to treatment, reported survival times are longer for dogs with B cell lymphoma. Individual survival and treatment response is patient dependent, however. Some dogs with T cell disease achieve durable remissions, and some patients with B cell disease do not.

WHAT ARE THE TREATMENT OPTIONS?
Selecting which treatment to pursue is dependent on your pet, including tolerance of visits, financial costs, and most importantly, quality of life. Our goal in veterinary medicine is to provide treatments and continue to promote an ongoing relationship with your pet including continuing with those activities that make your pet happy such as walks, swimming, and interacting with you. These are factors that improve both your pets and their family’s quality of life. Options include chemotherapy, supportive palliative therapy with steroids alone, or bone marrow transplant. An enzyme derivative, L-Asparaginase, may also be available as an induction agent. This therapy targets lymphocytes via enzyme deprivation and may result in positive initial therapy while additional treatments are considered.
WHAT IS THE PROGNOSIS?
Prognosis is determined by the susceptibility of the cancer to the treatment elected. It is patient dependent with many dogs having a good initial response to treatment. With standard of care treatment, B cell lymphomas with treatment may have an average survival of 9-12 months and those with T cell lymphomas may have an average survival of 6-9 months.

Lymphoma left untreated has a poor prognosis of 2-3 months with decline associated with decreased appetite, lethargy, and respiratory compromise in those patients with lymph node involvement.

WHAT ARE THE SIDE EFFECTS?
Side effects are treatment associated but most commonly including gastrointestinal upset such as vomiting or diarrhea. Decreased appetite and mild lethargy may also occur. Because these side effects are expected, your pet may be prescribed supportive medications for nausea (should decreased appetite, or increased salivation, drooling occur) and diarrhea. It is best to be proactive with these medications and provide these as soon as symptoms are noted. Should you have any questions, your oncology team is available to assist.

CONCERNS OF CHEMOTHERAPY FOR MY PET:
Chemotherapy is often associated with a negative impression especially with our understanding of chemotherapy in human medicine. Our approach to chemotherapy in veterinary medicine is focused on limiting severe side effects. Chemotherapy in human medicine is provided with intent to cure resulting in very high doses and increased side effects.

As quality of life is imperative for our pets, doses are adjusted and your pet is monitored to limit severe side effects. Hair loss is rare except in certain breeds such as poodles. Though there is a mild risk of hospitalization in our pet population and mild gastrointestinal upset, the majority of pets tolerate therapy well. Should you have concerns during therapy, speak with your oncologist in order to develop a tailored plan for your pet.

HOW DO I PREPARE?
We understand this is a difficult time and we are here to support you and your pet by providing the options and care necessary. Selecting a therapy is not binding and can be adjusted to you and your pet's needs. During treatment sessions, you will be provided with updates and any recommendations depending on your pet's response. Should any concerns arise, your oncology team will provide answers and help to guide you.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Prognosis- (median)</th>
<th>Treatment schedule</th>
<th>Approximate cost*</th>
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</thead>
<tbody>
<tr>
<td>Steroid (prednisone) alone *Lasparaginase may be provided</td>
<td>1 - 2 months</td>
<td>Oral medication provided daily at home.</td>
<td>$20 per month for prednisone, $250 - 300 per Lasparaginase (visit, administration, and medication cost.)</td>
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<tr>
<td>Frontline CHOP protocol: includes vincristine, cyclophosphamide, doxorubicin, and a tapered course of prednisone *Lasparaginase may be provided</td>
<td>B cell: 9 - 12 months T cell: 6 - 9 months</td>
<td>Alternating 3 chemotherapy drugs on a weekly basis with bloodwork performed on the 4th week. This is repeated 6 times and the oral chemotherapy can be administered at home after the first month.</td>
<td>$300 - $350 per treatment, $5500-$6500 over the course of the six-month protocol.</td>
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<tr>
<td>Single-agent doxorubicin</td>
<td>6 - 8 months</td>
<td>Intravenous chemotherapy every 2 - 3 weeks, for 6 treatments.</td>
<td>$350 - $400 per treatment.</td>
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<tr>
<td>Single-agent CCNU or CCNU and Lasparaginase</td>
<td>2 - 4 months</td>
<td>Oral chemotherapy every 3 weeks, for 5 treatments.</td>
<td>$300 - $400 per treatment, Lasparaginase adds $170 to expected visit cost.</td>
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<tr>
<td>Bone marrow transplant</td>
<td>Cure rate of: 33% B cell 19% T cell</td>
<td>Transplant provided after chemotherapy-induced clinical remission. Total body irradiation and hospitalization with supportive care.</td>
<td>$19,000 - $25000 one time treatment.</td>
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*Cost estimates are based on individual appointments and overall cost is dependent on patient response, which does not include additional supportive care or hospitalization.