

Rescue Protocols for Canine Lymphoma

Most dogs with lymphoma treated with CHOP chemotherapy achieve a complete remission, meaning we can no longer detect cancer cells in their body. The duration of remission varies from a few months to a year or more after completion of treatment. Remission does not equal cure, and 95% of dogs have detectable disease at some point following chemotherapy. When this occurs, the dog is “out of remission” because their disease **relapsed**.

Some dogs achieve only a partial response to CHOP chemotherapy. This means their disease burden decreases, but never to the point where we cannot detect it. Alternatively, some dogs initially show a complete response, but their disease becomes detectable before finishing the 6-month course of treatment. The cancer cells of these partially/initially responding dogs have developed **resistance** to CHOP chemotherapy.

Relapse and resistance are devastating, but expected, consequences of having lymphoma. When they occur, we recommend treatment with “rescue” chemotherapy. Common rescue protocols are listed below. We will discuss the pros and cons of each protocol as they relate to your dog and your goals and assist you in choosing the best plan of action.

With rescue treatment, we aim for at least a durable partial remission, therefore the remission rates below include both partial and complete responses. Should you decide to pursue further chemotherapy, we will recheck lab work (complete blood count, serum chemistry panel, and urinalysis) to ensure your dog is good candidate for treatment. Other diagnostics are recommended on a case by case basis.

FOR DOGS WITH RELAPSED LYMPHOMA

Restarting CHOP chemotherapy: If more than two months has elapsed between finishing CHOP and relapse, we recommend restarting CHOP treatment. This option has an 80% chance of inducing another durable complete remission. The duration of remission depends on the length of the first remission. Side effects are the same as during the first CHOP protocol.

Note: If your dog received 6 doses of doxorubicin during their first CHOP protocol, due to concerns for cardiotoxicity, we will discuss substituting doxorubicin for another chemotherapy drug (mitoxantrone).

FOR DOGS WITH RELAPSED *OR* RESISTANT LYMPHOMA

L-asparaginase (L-spar)/CCNU (Lomustine):

L-asparaginase is given as a subcutaneous injection and CCNU is an oral drug. This combination is given every 3 weeks. There is an 80-90% chance of remission. Responses typically last about 3 treatments but could be longer. Should a complete remission be attained, we recommend a total of 6-8 treatments.

Side effects include temporary low white blood cell counts. Upset stomach signs (vomiting/diarrhea/poor appetite) are rare. CCNU can cause liver damage and affect platelet counts, so lab work is monitored closely during treatment. Note: L-asparaginase is given with the first 1-2 treatments only.

Estimated cost: \$1,300-\$1,400 total for first 2 treatments, \$500 per treatment thereafter

MOPP (Mustargen/Vincristine/Prednisone/Procarbazine):

This protocol involves administering 2 injectable chemotherapy drugs (mustargen and vincristine – given at the same time) along with oral medications (prednisone and procarbazine) which are given at home. Dogs receive both injectable drugs on day 1 and this is repeated one week later. The oral drugs are given at home starting on day 1 and continued for 14 days. This 14-day period is called a cycle of MOPP. This cycle is followed by a one week “rest” and then repeated. There is a 65% chance of remission. Responses typically last about 2-3 cycles, but could be longer. Should a complete remission be obtained, we recommend a total of 6-8 cycles.

Side effects are rare, but include temporary upset stomach signs and temporary low white blood cell counts.

Estimated cost *per cycle*: \$1,500

Tanovea (rabacfosadine):

This is an injectable chemotherapy drug given once every 3 weeks. There is 50-75% chance of remission which usually lasts between 1-4 treatments but can be longer. Should a complete remission be obtained we recommend a total of 5 treatments.

Side effects include temporary upset stomach signs. Rare side effects include liver value elevation, skin changes, and scarring of the lungs.

Estimated cost *per treatment*: \$600-\$700

Mitoxantrone:

This is an injectable form of chemotherapy given once every 3 weeks. The chance of remission is about 50%. Typical responses last for about 4 treatments. Should a complete remission be obtained, we recommend a total of 6 treatments.

Side effects include temporary upset stomach signs and/or low white blood cell counts.

Estimated cost *per treatment*: \$350-\$450

Dacarbazine (DTIC):

This is an intravenous chemotherapy treatment given as a long infusion (5-6 hours) every 2-3 weeks. The chance of remission is 35%. Typical responses last for 2-3 treatments. Should a complete remission be obtained, we recommend a total of 6 treatments.

Side effects include temporary upset stomach signs and/or low white blood cell counts and decreased platelet counts. In some cases, we recommend combining dacarbazine with other drugs (e.g. CCNU, doxorubicin, or mitoxantrone) to potentially increase efficacy.

Estimated cost *per treatment*: \$500 (combination treatment will increase cost)

Temozolamide

This is an oral version of dacarbazine (DTIC). Treatment is given for 5 consecutive days. The chance of remission is about 30%, but the duration is usually short lived with the average patient only responding to one treatment. Therefore, when appropriate, we recommend combining this drug with another chemotherapy drug (typically doxorubicin). This can increase the both the chance of response to about 60-70% and the duration of response to about 3-6 weeks.

Estimated cost *per treatment*: varies with patient size and source of drug

L-asparaginase (L-spar)/prednisone:

L-asparaginase is administered as an injection under the skin and prednisone is given orally at home. This is a highly effective treatment, but dogs quickly develop resistance. This option is the LEAST likely to cause any side effects (beyond using prednisone alone). Treatments can be repeated every few weeks or as needed. Repeat use can lead to allergic reactions.

Estimated cost *per treatment*: \$300

Prednisone alone:

This is a 'palliative' protocol where you administer prednisone at home. Prednisone can be an anti-cancer treatment for some dogs with lymphoma, and also can be a drug that helps them feel better and maintain their appetite and energy. The benefit doesn't typically last more than a few weeks to months once a dog is out of remission.

Note: Prednisone is frequently prescribed in conjunction with the protocols listed above.

Estimated cost *per month*: \$20-\$30

The aforementioned options are not mutually exclusive and many patients receive multiple protocols as long as they continue to feel well.