



# Half Body Irradiation

medical oncology + radiation oncology + surgical oncology

## Primary Vet Information

### + Outcomes For High-Grade Canine Lymphoma

High-grade canine lymphoma is an aggressive cancer which has an average survival of about one month without treatment. The response to chemotherapy in most dogs with lymphoma is dramatic with approximately 90% of cancer cells killed with each dose and complete remission rates of 80 to 90%. Unfortunately, most dogs will eventually relapse and succumb to the disease with fewer than 10% of dogs likely to be cured by chemotherapy alone. Average remission duration is approximately 12 months with chemotherapy.

Over the last 10 or 20 years there have been many efforts to improve the long-term outcome for dogs with high-grade lymphoma but despite many attempts and many studies using variations on available chemotherapy treatments, clinically significant improvements in outcome have not been achieved.

Several strategies have been developed in an attempt to achieve a clinically significant improvement in outcomes for our canine lymphoma patients with the three most promising strategies being:

- **Half Body Irradiation** – see below
- **Bone Marrow Transplantation** – bone marrow ablation with high dose cyclophosphamide followed by autologous bone marrow transplantation has previously been offered in Australia and has shown promising results. We are very lucky to have bone marrow transplantation available in Australia (in Sydney), however, access to this treatment is currently limited and the cost of bone marrow transplantation is high.
- **Immunotherapy** – the use of passive (eg CD20 monoclonal antibody) and active immunotherapy has shown great promise and is standard of care for B cell lymphoma in humans. Currently there are no established immunotherapy treatments for lymphoma in dogs and due to the species specific nature of these treatment and the high development costs it is likely to be some time before these are established as standard of care.

### + Half Body Irradiation

Half body irradiation (HBI) is an emerging treatment showing great promise when combined with chemotherapy to treat lymphoma in dogs. This treatment makes use of a linear accelerator to expose half of the body to radiation. Lymphoma cells are extremely sensitive to radiation and areas exposed to this dose are likely to experience death of 99% of cancer cells. While irradiating the entire body is possible, the dose required to kill the cancer would also result in the need for a bone marrow transplant. With HBI, the front half of the body is radiated first, followed by the second half two weeks later. This allows the bone marrow cells to migrate between the halves and thus recover without needing bone marrow transplantation. Cancer cells are much less efficient at repopulating in patients showing complete remission. In addition, between the two doses of HBI we administer a single dose of chemotherapy which kills cancer cells without significantly damaging the bone marrow; this minimises the opportunity for the lymphoma cells to “jump” across the body between doses of radiation.

This is a very exciting development in the treatment of lymphoma in dogs and early studies have not only demonstrated increased survival times but suggest that the percentage of dogs cured of their lymphoma increases from approximately 10% to approximately 35 to 45%.

In 2020, BVSC and the Australian Animal Cancer Foundation presented the results of the first case controlled prospective study assessing the benefits of half body irradiation in our patients. This study was presented at the European College of Veterinary Internal Medicine on line congress. Our results were even better than those previously published in the USA with 56% of treated dogs still in their first remission at 2 years.

## + Side-Effects

Side-effects from HBI are not dissimilar to those experienced from chemotherapy, both in terms of severity and frequency. The most common side effects are mild to moderate gastrointestinal signs such as a reduced appetite and mild lethargy for 2 to 7 days after the second treatment. A small number of dogs show significant reductions in white blood cell and platelet counts and in most cases these can be managed easily with supportive care. It should also be noted that a portion of dogs will suffer some temporary hair loss (particularly breeds with continuous coat growth such as poodles) and/or a change in coat colour (it may become paler) which may or may not be permanent.

Week	HBI & Chemotherapy
1	Vincristine
2	Cyclophosphamide
3	Vincristine
4	Doxorubicin
5	
6	HBIcr
7	Chemotherapy
8	HBIcd
9	
10	Vincristine
11	Cyclophosphamide
12	Vincristine
13	Doxorubicin
14	
15	Vincristine
16	Cyclophosphamide
17	Vincristine
18	Doxorubicin

## + Protocol

HBI is provided on site at Brisbane Veterinary Specialist Centre and can be provided as an outpatient service. Our recommended protocol is to replace the second round of chemotherapy treatments with the two HBI treatments and a single dose of L-asparaginase chemotherapy.

It is important to note that HBI is a "consolidation" treatment rather than a rescue. So, patients need to be in apparent remission (based on lymph node palpation) before they are treated.

This is an example of our standard chemotherapy and half body irradiation protocol. However, we can incorporate HBI into any other lymphoma chemotherapy protocol

## + Summary

Referring your patients to BVSC for HBI will be allowing them access to treatment with unprecedented outcome for canine lymphoma.

Of course we continue to invite all lymphoma referrals with the full range of options available to suit the financial, personal and emotional position of all clients. Such options include full discussion of the disease and prognosis, palliative therapy, standard chemotherapy and rescue chemotherapy alongside the half body irradiation.

For further information, please contact Dr Darren Fry by emailing [info@bvsc.com.au](mailto:info@bvsc.com.au).