

Half Body Radiation in Dogs with Lymphoma: Pushing the Boundaries

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1. Overview

For decades, chemotherapy has been the primary treatment modality for canine multicentric lymphoma. Despite a multitude of chemotherapy protocols, new drug development and improving technology, median progression free intervals remain only mediocre and survival times have struggled to surpass one year¹⁻⁵. However, half body irradiation (HBI), when used in combination with chemotherapy, is becoming increasingly common and the literature suggests a significant survival benefit for dogs with B cell multicentric lymphoma. We will discuss the history and science behind HBI, current literature supporting its use, early data from our clinic, and future areas of research.

2. History

Although canine lymphoma was noted to be responsive to radiation as early as the 1960s⁶, HBI was not reported in the literature for canine multicentric lymphoma until 1989, during which radiation using a cobalt-60 machine was used as the sole agent in naïve and relapse setting and found to have significant side effects, including 2 dogs that died, while providing minimal tumor control compared to traditional chemotherapy⁷. Therefore, radiation for multicentric canine lymphoma was largely abandoned for approximately the next decade. In 2004, Williams published utilization of chemotherapy followed by HBI⁸, thus setting the foundation for current protocols. Shortly thereafter, hematologic monitoring and toxicity was established for HBI utilizing a population of 29 dogs and showing that, although HBI has myelosuppressive effects, these effects are temporary⁹. Throughout this early history, there were still struggles to identify the ideal time between treatments of the half body. When used with a month gap between sessions, a prospective study found no improvement in survival over traditional CHOP or CHOP+CCNU/MOPP consolidation¹⁰. Closer to home and more recently, Lurie prospectively compared 6 Gy and 8 Gy radiation with 2 weeks interval between doses, finding a very encouraging survival benefit and noting that adverse effects were dose dependent¹¹. In 2023, another study out of Australia comparing a historical CHOP group vs a prospective CHOP+HBI group (2x6Gy) found a significant survival benefit for HBI with only 11% of the CHOP group vs 78% of the CHOP+HBI group alive at 2 years¹². This was supported by the most recent study on HBI, which also found a significant survival benefit for dogs undergoing HBI + CHOP vs CHOP alone, though this group used a 4x4Gy (2x4Gy to each half) radiation protocol¹³.

3. Scientific Background

Lymphoma is of special interest for radiation oncology due to unique properties of lymphocytes which make them particularly radiation sensitive¹⁴. Specifically, while most cells undergo a mitotic cell death when exposed to radiation, lymphocytes undergo an apoptotic death.

4. Our Data

A retrospective medical records search was performed using the Small Animal Specialist Hospital radiation database for dogs with cytologically or histologically confirmed multicentric lymphoma treated with half body radiation between May 2021 and May 2025. Thirty-six dogs were enrolled, ranging in age from 2 years to 12 years (median 8 years) at lymphoma diagnosis. All dogs received 6 Gy to each half either at 100 cGy/min (effectively ~75 cGy/min) or 50 cGy/min (effectively ~35 cGy/min) with a two week gap between cranial and caudal halves. L-asparaginase was administered 1 week post the first half.

5. Future Research

Although the body of literature regarding HBI with canine B cell lymphoma is rapidly expanding, the most efficacious protocol, including dose, dose rate, interval between cranial and caudal doses, and how this interval fits within the chemotherapy regimen remains to be elucidated. Most studies utilize either 2 consecutive treatments of 4 Gy to the cranial half body with a time interval gap of 2-6 weeks, followed by the same treatment for the caudal half or 6-8 Gy delivered in 1 fraction to the cranial half, followed by a time gap of several weeks and an additional 6-8 Gy to the caudal half. The rate (cGy/minute) at which this dose is delivered is not standardized among protocols, resulting in variability. There also remains a dearth of information regarding HBI for canine T cell lymphoma, other lymphoma sites, and multicentric lymphoma in other species. These are all areas in need of future research, ideally in a prospective study design.

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