



Q&A: EMERGING TOPICS

A Novel Treatment for Feline Gastrointestinal Lymphoma: Radiation Therapy

Jaclyn P. Christensen, BAS, LVT, VTS (Oncology)

Texas A&M Veterinary Medical Teaching Hospital, College Station, Texas

Abstract

Lymphoma is the most common hematopoietic cancer in cats. Of the various forms, gastrointestinal lymphoma predominates, accounting for 72% of diagnosed cases of feline lymphoma. Diagnosing gastrointestinal lymphoma is an ongoing challenge for primary care veterinarians and specialists. Over the past few decades, treatment options have remained fairly unchanged and consist primarily of chemotherapy and corticosteroids, often administered long term until disease progression becomes apparent or the patient is unable to tolerate continued treatment. Oncologists and researchers are now considering a novel therapy, whole-abdomen radiation therapy, which has yielded promising results.



Take-Home Points

- The most commonly diagnosed lymphoma in feline patients is gastrointestinal lymphoma, which is made up of 3 primary types with varying behaviors and prognoses.
- Chemotherapy has long been used as the treatment of choice for gastrointestinal lymphoma.
- Radiation therapy, or radiotherapy, is an essential modality of cancer treatment that is typically used for localized disease.
- Despite the systemic nature of lymphoma, it has been shown to be responsive to radiation therapy.

Cancer is among the leading causes of death in companion animals; approximately 50% of dogs and 35% of cats older than 10 years die of cancer.¹ The number of patients with cancer is increasing, and clients are looking to veterinarians to guide their treatment decisions to extend their pet's life while also preserving their pet's quality of life. Unfortunately, some of the most common types of cancer are also among the most difficult to treat. Furthermore, over the past few decades, little progress has been made in the search for novel treatment options. Fortunately, oncologists and researchers are investigating new treatments. One modality that has proven to be promising is radiation therapy.

Radiation therapy is frequently used as a local therapy and is not widely used to manage systemic disease. Systemic neoplasia, such as lymphoma, often requires systemic treatment (i.e., chemotherapy). However, new research suggests that radiation therapy may be beneficial for the treatment of systemic disease, particularly one of the most common types of neoplasia diagnosed in feline patients: gastrointestinal (GI) lymphoma.

Q What is feline gastrointestinal lymphoma?

Feline GI lymphoma, or alimentary lymphoma, is the most common neoplasia found in the GI tract of cats.² This type of cancer originates in lymphocytes and affects the lymphatic tissue of the GI tract. Although it develops most commonly in the small intestine, it can subsist in any area of the GI tract and may also involve the liver, spleen, intraabdominal lymph nodes, and occasionally other sites outside of the abdomen. The diagnosis of GI lymphoma is further specified by histologic grade and cell size, an important distinction

that dictates appropriate treatment and prognosis. The type of lymphoma largely determines a feline patient's clinical signs.

- **Low grade/small cell:** Common clinical signs include chronic weight loss, vomiting, and/or diarrhea. The patient is doing well overall, and clinical signs are mild but progressive. Abdominal palpation may be within normal limits, or one may detect mild to moderate intestinal thickening.
- **Intermediate–high grade/intermediate–large cell:** Common clinical signs include acute weight loss, vomiting, anorexia, and/or diarrhea. The patient is generally reported to be sick at home with progressive clinical signs. Abdominal palpation may be abnormal; masses, organomegaly, and/or lymphadenopathy may be noted.
- **Large granular cell:** Common clinical signs include acute weight loss, vomiting, anorexia, and/or diarrhea. The patient is most often reported to be doing poorly at home. Abdominal palpation is abnormal with masses, organomegaly, lymphadenopathy, and/or effusion noted.



Feline GI lymphoma, or alimentary lymphoma, is the most common neoplasia found in the GI tract of cats.²



Why do we need alternative therapies for gastrointestinal lymphoma?

Traditional therapies for GI lymphoma have changed minimally over the past few decades, and most cats with GI lymphoma die of the disease in time. The traditional treatment of choice is chemotherapy and corticosteroids. Depending on the type of lymphoma, treatment protocols and survival times vary.

- **Low grade/small cell:** Longer remission times are often noted in patients that receive the oral chemotherapy drug chlorambucil in combination with prednisolone. These medications are administered daily; the response rate is 80% and the median survival time is 1.5 to 3 years.²
- **Intermediate–high grade/intermediate–large cell:** Multiagent drug protocols such as CHOP or COP are recommended (**BOX 1**). These drugs are administered weekly or biweekly; the response rate is approximately 50% to 65%. For cats that achieve complete remission, the median survival time is 7 to 10 months.² Lomustine is an oral chemotherapy drug that may also be considered as a first-line therapy or as a rescue therapy (i.e., a therapy for patients that do not respond positively to first-line protocols).
- **Large granular cell:** Treatment recommendations are the same as for intermediate–high grade/intermediate–large cell lymphoma; however, the response rate, and therefore treatment duration, is considered low. Approximately one-third of cases respond to therapy, and the median survival time is 45 to 90 days.²

BOX 1

Multiagent Drug Protocol Definitions

CHOP: Acronym for the multiagent drug protocol that alternates cyclophosphamide, hydroxydaunomycin (also known as doxorubicin), Oncovin (trade name for vincristine), and prednisolone.

COP: Acronym for multiagent drug protocol that alternates cyclophosphamide, Oncovin (trade name for vincristine), and prednisolone. This protocol is often preferred for use in cats because renal toxicity has been noted with hydroxydaunomycin administration.

The traditional therapies often require frequent veterinary visits and life-long medication administration, which, in addition to their potential side effects, can negatively affect a cat's quality of life. Also, the chronic nature of treatment imposes financial burdens on clients. These factors, coupled with lower survival times, support the need for alternative therapies to treat feline GI lymphoma.



Why consider radiation therapy for the treatment of feline gastrointestinal lymphoma?

In 1902, scientists discovered the effectiveness of radiation therapy for the treatment of human lymphoma, eventually proving that malignant lymphocytes are radiosensitive.³ In human medicine, radiation therapy continues to be a treatment modality for certain types and stages of lymphoma.⁴ Radiation therapy is also used to treat canine patients with

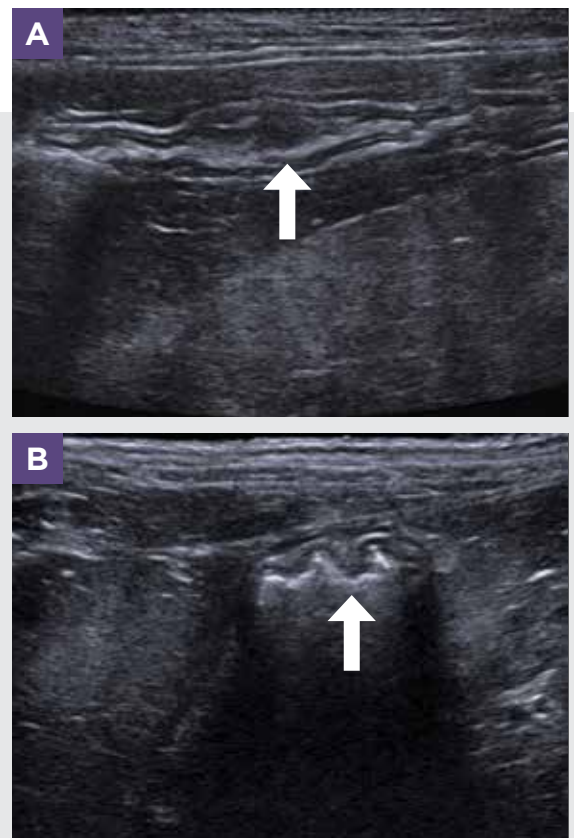


FIGURE 1. Imaging from a feline patient with gastrointestinal lymphoma. **(A)** Gastric wall thickening and loss of layering (**arrow**) visible by ultrasonography. **(B)** Resolution of gastric wall thickening and loss of layering (**arrow**), visible by ultrasonography, 1 week after administration of radiotherapy.



Case Example

In 2012, the author's feline companion received a diagnosis of intermediate-high grade lymphoma of the gastric wall. When the cancer did not respond to chemotherapy protocols, whole-abdomen irradiation was pursued; the patient became the first cat to undergo whole-abdomen irradiation at the institution managing his care (**FIGURE A**). He did not die of gastrointestinal lymphoma until more than 4 years after treatment, at the age of 18, which far surpasses the reported median survival time of 7 to 10 months. To date, an additional 34 cats have undergone whole-abdomen irradiation at the same institution.



FIGURE A. The author's cat, who underwent whole-abdomen irradiation for gastrointestinal lymphoma.

lymphoma. When used in combination with chemotherapy, remission rates and survival times increase.⁵ In feline patients, radiation therapy is considered standard of care for many types of localized lymphoma (e.g., nasal lymphoma). After the successful treatment of localized lymphomas, researchers began to explore the use of radiation therapy for the treatment of GI lymphoma via whole-abdomen irradiation.

The first published study that investigated the use of whole-abdomen irradiation is a retrospective study that includes cases from 2001 to 2008. Published in 2011, the study evaluated data from 11 cats with varying types of lymphoma (low grade/small cell, intermediate-high grade/intermediate-large cell, and large granular cell). All cats were in partial to complete remission and received chemotherapy before radiation therapy. The reported response rate was 90%; the median survival time was 355 days, a remarkably positive finding, particularly for patients with high-grade lymphoma.⁶

Few other studies have examined the application of whole-abdomen irradiation, but available data indicate that survival times range from comparable to substantially longer than those achieved with chemotherapy alone.^{7,8}

According to the limited number of applicable studies and the author's experience (see **CASE EXAMPLE** sidebar), whole-abdomen irradiation therapy is generally well tolerated and has minimal reported adverse effects. After radiation therapy, chemotherapy is often stopped; in some patients, corticosteroid administration may also be gradually reduced or discontinued (**FIGURE 1**).

Q How is radiation therapy administered?

Radiation therapy is administered by a linear accelerator, which has become increasingly common at specialty centers. To protect healthy tissues from being radiated, patients must be immobilized during treatment, typically via use of general anesthesia. To ensure the same body position is replicated with each treatment, patients are also placed in body molds with a bite block (**FIGURE 2**).

Radiation dose is defined as the absorbed dose of energy deposited in a tissue. The dose is measured in Gray (Gy) units, and the number of treatments is referred to as fractions.⁹ For example, a cat administered 2 Gy for 2 fractions would receive a total radiation dose of 4 Gy to the abdomen.



FIGURE 2. Anesthetized feline patient placed in a body mold and bite block for radiation therapy.



Whole-abdomen irradiation should be described to clients as a novel therapy that can be used as a first-line therapy or rescue therapy for GI lymphoma.



There is not a standard radiation protocol for the treatment of GI lymphoma, but it is generally accepted that a sufficient protocol consists of 2 fractions dosed at 2 Gy each. Whole-abdomen irradiation time is short (average of 2 minutes), which minimizes the duration of general anesthesia.



What information should be relayed to clients about radiation therapy?

Whole-abdomen irradiation should be described to clients as a novel therapy that can be used as a first-line therapy or rescue therapy for GI lymphoma. Retrospective data and the author's experience reveal that the best outcomes transpire in cats that undergo radiation therapy when they are in partial or complete remission after chemotherapy. Clients must know that this novel treatment may have adverse effects that have not yet been discovered. No concerning acute adverse effects have been reported, but further studies are needed to assess if there are any chronic effects. Clients pursuing whole-abdomen irradiation therapy can expect treatment costs to exceed \$1500, although estimates will vary with each location.

SUMMARY

Veterinary nurses play a crucial role in many aspects of veterinary medicine, including novel therapies. In patients undergoing radiation therapy for both traditional and novel purposes, veterinary nurses assist in a variety of ways. This could include preparing patients for anesthesia (e.g., IV catheter placement, fluid therapy, preanesthetic medication administration); assisting in the induction, maintenance, and monitoring of anesthetized patients; positioning patients appropriately for radiation therapy; and even performing radiation therapy as instructed by a radiation oncologist.

In settings where novel therapies aren't often utilized, veterinary nurses can contribute by seeking continuing education to stay up to date on exciting new treatment modalities that are on the horizon for veterinary patients. **TVN**

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Jaclyn P. Christensen

Jaci has worked in veterinary medicine for more than 20 years. She obtained her LVT certification in 2008 after graduating from McLennan Community College in Waco, Texas. In 2015, she completed a bachelor's degree in veterinary technology from Tarleton State University. In 2021, she earned VTS certification in oncology. She currently manages the oncology service at the Texas A&M University, where she has worked since 2009. She is passionate about teaching others, including nervous clients and veterinary professionals, about all things related to cancer. Her clinical interests include feline gastrointestinal lymphoma, cancer biology, and chemotherapy safety.