

# Lymphoma

This is a cancer of the lymphocytes, which are a type of white blood cell that helps the immune system fight off infection. It primarily affects lymph nodes or solid organs such as the liver and spleen. In dogs it usually presents in middle-aged to older individuals, involves multiple organs, and affects males and females equally. Many dogs are asymptomatic at the time of diagnosis with only swollen lymph nodes to indicate disease.

## Major Lymph Nodes Most Easily Felt in the Dog



For a long time, lymphoma was treated as a single disease. With the development of sophisticated diagnostic techniques researchers were able to look at lymphoma more closely and they quickly learned there are many different subtypes of the disease, each with its own unique features and treatment response.

We're still learning more about each type of lymphoma, but it's important for dog owners to have the latest information in case their dog is diagnosed with this common cancer.

## Types of Lymphocytes

The two types of lymphocytes involved in lymphoma are B cells, which manage humoral immunity, manufacturing antibodies that help the body recognise specific foreign invaders; and T cells, which manage cellular immunity, phagocytising (ingesting) and killing foreign invaders. T cells are further divided into two types – helper T cells which provide signals to other cells of the immune system to amplify or suppress an immune response, and cytotoxic (killer) T cells which help kill abnormal cells. Lymphoma arises when either B cells or T cells start to divide uncontrollably.

## Diagnostic Testing

Knowing whether a lymphoma is predominantly B cell or T cell in origin is important for prognosis and treatment. Each form has aggressive and less aggressive subtypes, and diagnostic testing can provide important information. Diagnostic testing includes:

1. Flow cytometry which is run on live cells suspended in liquid (blood, cavity fluid samples, or aspirates suspended in saline). Antibodies attached to fluorescent dyes and specific for surface markers are applied to the sample cells. When labelled cells pass through a light source, the fluorescent intensity detected by the instrument correlates with the presence of that specific surface marker.
2. Immunohistochemical staining – this is performed on cells from a fine needle aspirate or biopsy that have been fixed to a slide. Like flow cytometry, labelled antibodies bind to specific proteins on the cell surface, but they are visualized under the microscope instead of passed through a laser.
3. PCR – this is used for antigen receptor rearrangements it is an advanced test to amplify DNA and assess the variable regions

of B- and T-cell receptors. If it shows many cells with the same genes, they are suspected to be clones of a single cell, denoting malignancy.

## Types of Lymphoma

Many factors determine which of these tests should be run for any individual patient. Once diagnostic testing is performed, one of several subtypes of lymphoma will be identified. Some of the most common are:

- > Peripheral T cell lymphoma – this common form of lymphoma usually starts with enlarged lymph nodes but often affects other organs. Dogs with this form of lymphoma have an average survival time of around seven to eight months with chemotherapy.
- > Diffuse large B cell lymphoma – this is the most common form of lymphoma in dogs. This form of lymphoma presents in the same way as T cell lymphoma but prognosis with chemotherapy is much better, with average survival times of 12 to 24 months.
- > T zone lymphoma – unlike peripheral T cell lymphoma, this type of lymphoma has an excellent long-term survival, with many dogs living three or more years, sometimes with no chemotherapy.
- > Precursor lymphoma/leukemia – tumours derived from immature lymphocytes are the most aggressive form, with median survival times measured in days, even with treatment. Cytology and histology are unable to distinguish immature neoplasms from mature B and T cell lymphoma. This distinction can only be made by flow cytometry.

Other less common types of lymphoma include cutaneous lymphoma, nodal marginal zone lymphoma and follicular lymphoma. These types of lymphoma have a broad range of survival times, and all require a biopsy sample for diagnosis.

The Golden Retriever Lifetime Study is a unique opportunity to study lymphoma in a prospective, real-time way. The study currently has 43 dogs diagnosed with lymphoma.

### Signs & Symptoms of Lymphoma in Dogs

#### In Lymph Nodes

- Lymph node enlargement

#### In the Skin

- Single or multiple lumps in the skin, or mouth
- These lesions can be red, itchy, and ulcerated

#### In Stomach/Intestine

- Vomiting
- Diarrhea
- Appetite loss
- Weight loss
- Lethargy



There are many reasons for determining subtype:

Different forms of lymphoma have different risk factors – understanding the lymphoma subtype will help us better understand causes

By subtyping canine lymphomas, we can draw parallels to their human counterparts. Dogs can benefit from new therapies developed in human patients

Different forms of lymphoma have dramatically different outcomes, and subtyping can help inform owner decisions about treatment.

If your dog is facing this diverse and sometimes confusing disease, ask your veterinarian to discuss with you all the available diagnostic and treatment options, so you can work together and determine the best course of action for your dog.

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