

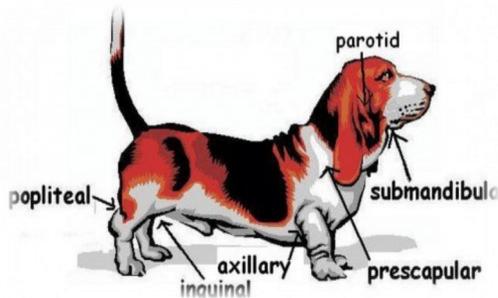


## LYMPHOMA IN DOGS

### What is Lymphoma?

A lymphocyte is a type of white blood cell, formed in lymphatic tissue throughout the body; lymphocytes are further divided into T lymphocytes (which are involved in cell-mediated immunity; for example, graft rejection) and B lymphocytes (which produce antibodies as part of the immune process).

Lymphoma is cancer (malignancy) of lymphocytes that usually involves lymph nodes or other lymphatic tissue of the body. Proliferation of cancerous lymphocytes in solid tissues, primarily in lymph nodes, bone marrow, and visceral organs;



occasionally, the skin is involved; T or B or non-T/non-B type lymphocytes may be involved.

Lymphoma in dogs is found in various anatomic locations in the body, including the mediastinum (known as the “mediastinal form of lymphoma”)—the mediastinum is the center portion of the chest that contains the heart and other organs (except for the lungs); the gastrointestinal tract (known as the “alimentary form of lymphoma”); the kidneys

### Breeds and Mean Age Range

Reported high-risk breeds are Boxers, Basset Hound, Golden Retriever, Saint Bernard, Scottish Terrier, Airedale Terrier, and Bulldog. Reported low-risk breeds are Dachshunds and Pomeranians. The breed appears to determine relative risk for B-cell or T-cell disease.

Lymphoma is usually seen in dogs between 5-10 years of age.

### Clinical Signs

- Depend on anatomic form and stage of disease
- All forms of lymphoma may have nonspecific signs, such as lack of appetite (anorexia); sluggishness (lethargy); weight loss
- Skin may have chronic and non-responsive plaque lesions; plaques may be raised, may fuse together, and may have discharge present

- Multicentric form (located in multiple organs/tissues throughout the body)—generalized, painless lymph-node enlargement (known as “lymphadenopathy”) most common; may note distended abdomen, secondary to liver enlargement (known as “hepatomegaly”); spleen enlargement (known as “splenomegaly”); or fluid build-up in the abdomen (known as “ascites”)
- Alimentary form (located in the gastrointestinal tract)—vomiting; diarrhoea; lack of appetite (anorexia); marked weight loss; abdominal discomfort; palpable abdominal mass; thickened gut loops; irregularities of the lining of the rectum
- Mediastinal form (located in the center of the chest)—coughing; difficulty swallowing; lack of appetite (anorexia); drooling; laboured breathing; difficulty breathing (known as “dyspnoea”); rapid breathing (known as “tachypnea”); exercise intolerance secondary to mass(es) and/or fluid build-up in the chest; muffled heart sounds due to fluid build-up between the chest wall and lungs (known as “pleural effusion”)
- Lymphoma involving tissues other than the lymph nodes (known as the “extra nodal form”)—vary with the anatomic site; eyes—excessive sensitivity to light (known as “photophobia”), inflammation of the lining of the eyes (known as “conjunctivitis”), inflammation of the front portion of the eye, between the cornea and iris (condition known as “anterior uveitis”), bleeding in the back of the eye (known as “retinal haemorrhage”); central nervous system—seizures, dementia, paralysis; kidney—pain over the lumbar spine, kidney enlargement, kidney failure; heart—exercise intolerance or fainting (known as “syncope”), irregular heart beat

### Treatment

#### Health Care

- Chemotherapy can be very effective in prolonging good quality of life
- A veterinary oncologist should be consulted regarding treatment, whenever possible
- Some veterinary oncology centers combine chemotherapy with radiation therapy
- Outpatient—after remission, some protocols allow owner to administer drugs by mouth (orally) at home; owner should wear protective gloves when administering chemotherapy drugs according to the direction of your pet’s veterinarian

- Inpatient—intravenous chemotherapy
- Radiation therapy—may be used to treat refractory lymph nodes (that is, those lymph nodes that do not respond to medical therapy), large mediastinal involvement, and solitary skin (cutaneous) areas; radiation therapy can be delivered to the central nervous system in cases with central nervous system involvement
- Radiation therapy is being used in combination with chemotherapy in some oncology centers
- Fluid therapy—may benefit pets with advanced disease; may benefit clinically ill, azotemic (in which excess levels of urea and other nitrogenous waste products are present in the blood; may be related to kidney failure and/or dehydration) and/or dehydrated pets
- Tapping the chest or abdomen to remove excessive fluid—recommended with marked fluid build-up between the chest wall and lungs (pleural effusion) or fluid build-up in the abdomen (abdominal effusion)

#### Activity

As advised by your pet's veterinarian

#### Diet

- As advised by your pet's veterinarian
- Provide adequate nutrition at all times

#### Surgery

- Usually indicated for biopsy only
- Lymph-node removal may be necessary for diagnosis in some cases
- May be very helpful in specific circumstances, such as bowel blockage or obstruction, if the tumour is not responsive to chemotherapy
- Rarely successful in treating lymphoma, unless cancer is limited to one accessible site

## What Medications are available?

- As advised by your pet's veterinarian and veterinary oncologist
- Combination chemotherapy—many protocols exist and some have superior remission and survival times, but toxicity may be increased; various drugs may be used, such as vincristine, cyclophosphamide, prednisone, methotrexate, l-asparaginase, doxorubicin, chlorambucil; drug selection and order of use is based on particular protocol being followed
- Single-agent therapy (doxorubicin)—associated with remission and survival times that are similar to those for some combination chemotherapy
- Steroids alone—not recommended as the sole medication used in treatment; however, can be effective for achieving partial remission in dogs for short periods of time (1-2 months)
- Many alternative and rescue treatment protocols exist; consult with a veterinary oncologist

- Lomustine (CCNU) or dacarbazine (DTIC)—may use for cases that do not respond well to other chemotherapeutic protocols

## Possible Complications

- Low white blood cell count (known as “leukopenia”) and low neutrophil count (neutrophils are a specific type of white blood cell that fight infection; low neutrophil count is known as “neutropenia”)
- Vomiting and diarrhoea
- Lack of appetite (anorexia)
- Heart toxicity—potential side effect of doxorubicin
- Hair loss (known as “alopecia”) in certain dog breeds receiving doxorubicin chemotherapy; these breeds include, among others, poodles, Old English sheepdogs, schnauzers
- Presence of pus-forming bacteria and their poisons in the blood or tissues (known as “sepsis”)
- Tissue sloughing—chemotherapeutic drugs tend to be very caustic; if the drug leaks into the tissues as it is being administered into the vein (intravenously), tissue damage may result and the tissues may slough (shed or fall off)

## Follow Up Care & Prognosis

As advised by your veterinarian and veterinary oncologist. Will require physical examinations and microscopic evaluation of cells or tissue—all lymph nodes that do not respond to treatment. Complete blood count (CBC) and platelet count performed prior to each chemotherapy treatment.

Echocardiography and electrocardiography (ECG)—periodically during and after doxorubicin administration to identify development of drug-related heart toxicity

- Immunophenotypes (the genetic expression of cells in lymphoma) are significant in determining prognosis; generally B-cell type lymphoma is more responsive to treatment, and has a better prognosis
- Survival depends on the type of lymphoma, location, response to treatment, and aggressiveness of the treatment
- Median duration of first remission with combination chemotherapy or doxorubicin—6–9 months, depending on immunophenotype
- With the use of more aggressive multiagent chemotherapy protocols, pets achieving complete remission should approach 90% or greater
- Median survival time with combination chemotherapy is often 9–12 months or more
- Mediastinal form (located in the center of the chest) of lymphoma and/or high levels of calcium in the blood (known as “hypercalcemia,” which can be seen in cases of lymphoma)—poorer prognosis
- T-cell lymphomas generally have shorter remission and poorer prognosis
- Primary central nervous system lymphoma, diffuse gastrointestinal lymphoma, and multiple skin lesions due to lymphoma (cutaneous forms)—associated with poor response to treatment