

# Lymphoma—Dogs

## Basics

### OVERVIEW

- 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 or nervous system 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 (known as the “kidney or renal form of lymphoma”); multiple organs/tissues throughout the body (known as the “multicentric form of lymphoma”); and a single organ/tissue in the body (known as the “solitary form of lymphoma”)



### GENETICS

- Gene expression profiling can be used to separate distinct subtypes
- Gain or loss of chromosomes is documented in cancerous lymphocytes in dogs
- Immunophenotypes (the genetic expression of cells in lymphoma)

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs

#### Breed Predilections

- Reported high-risk breeds—boxer, basset hound, golden retriever, Saint Bernard, Scottish terrier, Airedale terrier, and bulldog
- Reported low-risk breeds—dachshunds and Pomeranians
- Breed appears to determine relative risk for B-cell or T-cell disease

#### Mean Age and Range

- Usually 6–9 years of age

## SIGNS/OBSERVED CHANGES IN THE PET

- 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
- Multicentric form (located in multiple organs/tissues throughout the body)—from no signs to 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”); vomiting, diarrhea, fever, increased thirst or urination (associated with high blood levels of calcium)
- Alimentary form (located in the gastrointestinal tract)—vomiting; diarrhea; lack of appetite (anorexia); marked weight loss; abdominal discomfort or fluid buildup in the abdomen (known as “ascites”); palpable abdominal mass; thickened gut loops; irregularities of the lining of the rectum; malabsorption of nutrients
- Mediastinal form (located in the center of the chest)—coughing; difficulty swallowing; lack of appetite (anorexia); drooling; labored breathing; difficulty breathing (known as “dyspnea”); rapid breathing (known as “tachypnea”); exercise intolerance secondary to mass(es) and/or fluid buildup in the chest; muffled heart sounds due to fluid buildup between the chest wall and lungs (known as “pleural effusion”); pitting edema (fluid buildup under the skin) of head, neck and forelimbs
- Skin may have chronic and non-responsive plaque lesions; plaques may be raised, may fuse together, be reddened (known as “erythematous”) ; focal ulcers and reduced skin pigmentation, and may have discharge present; mycosis fungoides—scaling, itchy, loss of hair, later nodules, plaques and ulceration; may involve the moist membranes of the oral cavity
- Lymphoma involving tissues other than the lymph nodes (known as the “extranodal 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 hemorrhage”) or bleeding at the front of the eye (known as “hyphema”); central nervous system—seizures, dementia, partial paralysis or full paralysis; Liver and kidney changes include—pain over the lumbar spine, kidney enlargement, kidney failure; yellow discoloration of membranes (known as “icterus”)

## CAUSES

- No specific cause proven but possible breed risks (heritable), chromosome changes, retrovirus infection, Epstein-Barr virus infection, and environmental factors

## RISK FACTORS

- Some breeds (such as boxer, basset hound, golden retriever, Saint Bernard, Scottish terrier, Airedale terrier, bulldog) have higher than expected likelihood of this disease

## Treatment

### HEALTH CARE

- Chemotherapy can be very effective in prolonging good quality of life; multiple agent protocols therapy of choice
- A veterinary oncologist should be consulted regarding treatment, whenever possible
- Some veterinary oncology centers combine chemotherapy with radiation therapy
- Inpatient—intravenous chemotherapy
- 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
- 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
- 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)
- Tapping the chest or abdomen to remove excessive fluid—may be recommended with marked fluid buildup

between the chest wall and lungs (pleural effusion) or fluid buildup 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 tumor is not responsive to chemotherapy
- Rarely successful in treating lymphoma, unless cancer is limited to one accessible site

## **Medications**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- 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, l-asparaginase, doxorubicin, chlorambucil; drug selection and order of use is based on particular protocol being followed
- Single-agent therapy (doxorubicin, lomustine)—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
- Many alternative and rescue treatment protocols exist; consult with a veterinary oncologist
- Dacarbazine (DTIC), melphalan, dexamethasone, actinomycin-D, cytosine arabinoside, mitoxantrone, adriamycin as part of different protocols—may use for cases that do not respond well to other chemotherapeutic protocols

## **Follow-Up Care**

### **PATIENT MONITORING**

- As advised by your veterinarian and veterinary oncologist
- Physical examination weekly
- Complete blood count (CBC) and platelet count performed prior to each chemotherapy treatment to check for bone marrow toxicity of chemotherapy drugs
- Echocardiography—periodically during and after doxorubicin administration to identify development of drug-related heart toxicity

### **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”)—usually 4-7 days post-treatment, usually reversible
- Vomiting and diarrhea and lack of appetite (anorexia)—2-5 days after chemotherapy
- Heart toxicity—potential side effect of doxorubicin
- Hair loss (known as “alopecia”) in certain dog breeds receiving chemotherapy; these breeds include, among others, poodles, Shih tzu etc.
- Presence of pus-forming bacteria and their poisons in the blood or tissues (known as “sepsis”) with fever
- 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)

## **EXPECTED COURSE AND PROGNOSIS**

- 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 multi-agent chemotherapy protocols, pets achieving complete remission should approach 80% in the first month
- Median survival time with combination chemotherapy is often 12–14 months or more and 6–9 months for dogs with high-grade tumors
- 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
- Diffuse gastrointestinal lymphoma, and multiple skin lesions due to lymphoma (cutaneous form of mycosis fungoides)—associated with poor response to treatment

## **Key Points**

- Many affected pets can live a long time in remission and enjoy a good quality of life during treatment
- Chemotherapy is rarely curative, and relapse usually occurs
- Response rate to most multi-agent chemotherapy protocols is high; greater than 80% response
- Median survival time with combination chemotherapy is often 12–14 months or more
- T-cell lymphomas generally have shorter remission and poorer prognosis
- Side effects of chemotherapy drugs depend on the dose and type(s) used, but usually are associated with the gastrointestinal tract and bone marrow systems