

# 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; 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”)
- Another term for lymphoma is “lymphosarcoma”

### GENETICS

- The expression of the tumor suppressor gene p53 in this tumor type is rare
- Gain or loss of chromosomes is documented in cancerous lymphocytes in dogs
- Immunophenotypes (the genetic expression of cells in lymphoma) are significant in determining prognosis

### SIGNALMENT/DESCRIPTION of ANIMAL

#### *Species*

- Dogs

#### *Breed Predispositions*

- Reported high-risk breeds—boxer, basset hound, golden retriever, St. Bernard, Scottish terrier, Airedale terrier, and bulldog
- Reported low-risk breeds—dachshunds and Pomeranians

#### *Mean Age and Range*

- Usually 5 to 10 years of age

### SIGNS/OBSERVED CHANGES in the ANIMAL

- 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)—generalized, painless lymph-node enlargement (known as “lymphadenomegaly”) 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; diarrhea; 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; labored breathing; difficulty breathing (known as “dyspnea”); 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”)
- Skin may have chronic and non-responsive plaque lesions; plaques may be raised, may fuse together, and may have discharge present
- 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”); 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

### CAUSES

- No specific cause proven

### RISK FACTORS

- Some breeds (such as boxer, Scottish terrier, golden retriever, German shepherd dog, poodle, basset hound) have higher than expected likelihood of this disease

## 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
- Inpatient—intravenous chemotherapy
- Outpatient—after remission, some protocols allow owner to administer drugs orally at home; owner should wear protective gloves when administering these drugs
- 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 patients 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 patients
- 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

- Restrict in patients with low white-blood cell (WBC) count or platelet count

## DIET

- As advised by your veterinarian

## SURGERY

- Usually indicated for biopsy only
- 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 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—effective in the short term (1 to 2 months)
- **Retinoids**—may be used for skin (cutaneous) lymphoma; example is isotretinoin
- Many alternative treatment protocols exist
- Lomustine (CCNU) or dacarbazine (DTIC)—may use for cases that do not respond well to other chemotherapeutic protocols
- Some centers combine chemotherapy with radiation therapy

## FOLLOW-UP CARE

### PATIENT MONITORING

- As advised by your veterinarian and veterinary oncologist
- Physical examination and microscopic evaluation of cells or tissue—all lymph nodes that do not respond to treatment
- Complete blood count (CBC) and platelet count
- After 2 to 3 courses of chemotherapy treatments, repeat tests with previously identified abnormal results before administering next treatment to confirm response
- Echocardiography and electrocardiography (ECG)—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”)
- Vomiting and diarrhea
- Lack of appetite (anorexia)
- Heart toxicity—potential side effect of doxorubicin
- Hair loss (known as “alopecia”)

- Inflammation of the pancreas (known as “pancreatitis”)
- 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 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
- 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 to 12 months; 58% to 90% of patients achieve complete remission
- Median survival time with combination chemotherapy is often 9 to 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
- Primary central nervous system lymphoma, diffuse gastrointestinal lymphoma, and multiple skin lesions due to lymphoma (cutaneous forms)—associated with poor response to treatment

#### **KEY POINTS**

- Usually a fatal disease, but many patients can live a long time in remission and enjoy a good quality of life during treatment
- Chemotherapy is rarely curative, and relapse usually occurs
- Side effects of chemotherapy drugs depend on the type used, but usually are associated with the gastrointestinal tract and bone marrow
- Most dogs have low white-blood cell counts (leukopenia) by day 7 to 10 of chemotherapy
- Response rate of 70% to 80% is seen with most chemotherapy protocols
- Quality of life is good while the patient is receiving chemotherapy and while it is in remission

