

# Lymphangiectasia – Canine

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## Definition

**Lymphangiectasia** is dilation of the lymphatic system, and in particular, the mesenteric lymphatics draining the small intestine, including the lacteals of the intestinal villi. The condition can be *primary* (caused by a congenital, presumed to be genetic defect), *secondary* (occurs secondary to another disease process that disrupts lymphatic flow), or *idiopathic*. In most dogs, the disease is idiopathic, and is often associated with a protein-losing enteropathy (PLE) that occurs as a result of the primary disease process (lymphangiectasia). Dogs with hereditary or congenital forms of the disease are often severely affected and may have a significantly shortened life span. Alternatively, the disease in dogs with idiopathic or secondary forms of lymphangiectasia is quite variable, ranging from milder, clinically manageable disease to severe, life-threatening disease.

## Key Diagnostic Tools and Measures

Diagnosis of lymphangiectasia in dogs begins with a complete history, including dietary history and drug therapy, and physical examination, including rectal examination. Weight loss is a very important and early clinical sign of dogs with lymphangiectasia and PLE, and may precede development of diarrhea by months. Fecal stream analysis (e.g., fecal flotation, cytology, enzyme-linked immunosorbent assay [ELISA]/polymerase chain reaction [PCR] analysis) is important to rule out concurrent parasitic infections that may complicate the management of the disease.

A standard evaluation of the dog with weight loss—with or without diarrhea and hypoproteinemia—includes assessment for other systemic diseases, evaluation of liver function, ruling out proteinuria as the cause of hypoproteinemia, and evaluation of the gastrointestinal (GI) tract both functionally (trypsin-like immunoreactivity [TLI], cobalamin/folate, sugar absorption if available, possibly alpha-1 protease inhibitor) and structurally (imaging, histopathology obtained either via endoscopy or surgically). Once a diagnosis is made, supportive therapy (control of edema and protein loss) and nutritional management (ultra-low-fat diet to reduce exacerbation of the clinical disease in the intestine) is paramount unless a specific cause can be identified and corrected.

## Pathophysiology

The clinical signs of lymphangiectasia (weight loss and diarrhea) occur as a result of maldigestion and malabsorption of nutrients (protein, fat, and carbohydrate) that occurs as a result of the lymphatic dilation (lymphangiectasia) or the combination of lymphatic dilation and inflammation (that may be present as a result of inflammatory bowel disease (IBD) or a reaction to lipogranulomas) that occur. In dogs with severe PLE, protein loss resulting in weight loss may precede development of diarrhea. In dogs with lymphangiectasia, the severe maldigestion and loss of nutrients may also lead to clinically significant hypocalcemia, hypocholesterolemia, and hypomagnesemia resulting in ascites or edema formation and seizures or muscle weakness in the most severely affected dogs.

## Signalment

Common breeds of dogs affected by primary lymphangiectasia include Lundehunds, Yorkshire terriers, and soft-coated wheaten terriers; these breeds may show clinical signs at a very early age. Any breed of dog may develop secondary lymphangiectasia and PLE, so there is not a typical signalment for this particular form.

## Key Nutrient Modifications

Protein replenishment is the most pressing concern in dogs with edema or ascites due to severe hypoalbuminemia resulting from lymphangiectasia or PLE. As long as dogs with lymphangiectasia are continuing to eat, the best approach to replacement of protein is via **enteral nutrition**. Selecting a diet that is effective is the most challenging aspect of therapy of this disease. In dogs that are not eating, are too sick to eat, or cannot keep food down due to vomiting, **intravenous nutrition** may be necessary to provide protein and energy for metabolic function. The ideal diet will contain a moderate amount of highly digestible (or hydrolyzed) protein and carbohydrate, but is highly restricted in fat content. In the most severely affected dogs, an essentially ultra-low (<2 g/100 kcal fat) or no-fat diet may be essential to successful management of the disease, with gradual reintroduction of essential fatty acids and fat-soluble vitamins to prevent deficiency. In dogs with a suspected dietary allergy or concurrent IBD, a novel protein source (or one that is less antigenic, such as a hydrolyzed protein diet) may also be a necessary aspect of the dietary therapy. In addition to highly digestible protein sources, some dogs benefit from the addition of protein modules or elemental enteral diets such as Vivonex® T.E.N. (Nestlé Nutrition) to their hydrolyzed or ultra-low-fat diet.

The ideal carbohydrate (CHO) source for a dog with intestinal disease is generally believed to be cooked white rice or potato (without the skins) because they are highly digestible and do not contain gluten, which may be antigenic in some dogs. Other gluten-free CHO sources are tapioca and corn, but they are slightly less digestible than rice, and corn may cause hypersensitivities in some dogs. Dogs with severe lymphangiectasia often cannot handle corn unless it is completely ground into a mash.

In dogs with severe lymphangiectasia, the fat present in the diet should be in amounts that will supply the essential fatty acids (plant oils will provide some of these) and fat-soluble vitamins, but long-chain triglycerides should be avoided as much as possible. If additional fat is needed to supply energy, a source of medium-chain triglycerides can be used; however, these fat sources are often not palatable to dogs and may reduce the diet acceptability.

Reduced insoluble fiber in the diet is indicated in dogs with small bowel diarrhea, as this type of fiber reduces the digestibility of foods and may increase the risk of maldigestion or malabsorption of nutrients. This is particularly true in dogs with lymphangiectasia, as reducing the digestibility of protein and CHO sources may make the clinical signs worse (diarrhea), slow increase in protein levels and body weight, and increase the risk of bacterial disruption and thus may cause a new problem. Soluble fiber sources may be beneficial in some dogs as they are digested by the normal flora and may function as prebiotics to help maintain a healthy intestinal flora.

## Recommended Ranges of Key Nutrients

Nutrient	% DM	g/100 kcal	% DM	g/100 kcal
<b>Recommended dietary level</b>				<b>Minimum dietary requirement*</b>
Fat	5–15	1.5–4	5.0	1.4
Crude fiber	3–7	0.75–2.5	n/a	n/a

Modified intake of these nutrients may help address metabolic alterations induced by disease states. The recommended dietary composition is shown as percent of dietary dry matter and as g or mg per 100 kcal metabolizable energy. All other essential nutrients should meet normal requirements adjusted for life stage, lifestyle, and energy intake.

\*Nutrient requirement for adult animals as determined by the Association of American Feed Control Officials

## **Therapeutic Feeding Principles**

- Nutrients should be highly digestible (>90% digestibility) to minimize osmotic diarrhea, bacterial fermentation of undigested foods, and reduce intestinal gas.
- A high-quality, single-source protein (can be novel if IBD or food sensitivity is likely) or a hydrolyzed protein is indicated to maximize digestion and absorption.
- The carbohydrate source should be high quality, gluten free, and lactose free.
- Diets should contain low fat (less than 4 g/100 kcal at minimum; will likely need less than 3.5 g/100 kcal if severe PLE or lymphangiectasia is present).
- Increased omega-3 fatty acids (ratio of omega-6:omega-3 should be 5–10:1) can be added to improve eicosanoid profiles in the intestinal mucosa.
- Low insoluble fiber or moderate soluble or mixed fiber (3–7% total) is indicated to increase short-chain fatty acids and improve bacterial flora.
- Supplementation of fat-soluble vitamins (A, D, E, and K) is usually only necessary in severe cases of steatorrhea and long-term fat malabsorption.
- Adding a probiotic to the diet may be helpful to increase short chain fatty acid production and maintain microflora stability.

■ **Treats** – In general, treats should be avoided in dogs with intestinal disease until a definitive diagnosis is made. For example, if diarrhea is due to food sensitivity, an elimination diet trial will be necessary and this includes treats. If treats are important for the dog's daily routine, treats made using the therapeutic diet or based on the principles above can be given.

■ **Tips for Increasing Palatability** – If the dog will not eat the suggested diet, a small amount of low-sodium chicken broth can be added to the food. Alternatively, a small amount of the canned version of the dry food can be mixed with the food to increase interest.

■ **Diet Recommendations** – Prescription diets suitable for dogs with diarrhea are available through the veterinary clinic and should be formulated according to the therapeutic feeding principles listed above. Most low-fat OTC diets also have increased dietary fiber, and thus are not acceptable for this purpose.

## **Client Education Points**

- Feed only the recommended foods.
- Feed small amounts of the food more frequently—three to four times per day. Large amounts of food increase the workload of the GI tract and may contribute to diarrhea or vomiting.
- Make sure plenty of water is available at all times. If vomiting occurs or the dog stops eating or drinking, a recheck with your veterinarian is recommended to prevent dehydration from the ongoing diarrhea.

## **Common Comorbidities**

Conditions that commonly occur concurrently in dogs with lymphangiectasia include IBD and PLE, IBD and food allergy, and exocrine pancreatic insufficiency (EPI) and antibiotic-responsive enteropathy.

## **Interacting Medical Management Strategies**

Steroid therapy in IBD will increase thirst and appetite and may result in unintended weight gain, loss of muscle mass, or hepatopathy. In dogs with lymphangiectasia, steroid therapy may worsen edema in some cases. Immunosuppressive therapy for IBD or lymphoma may result in GI toxicity, common clinical signs of which can be vomiting or diarrhea. Antibiotic therapy may cause diarrhea due to disruption of the normal flora and increased numbers of pathogenic species.

## **Monitoring**

Fecal composition should be assessed to determine whether normal stool character is returning or if new problems (e.g., melena, hematochezia) are developing. Clinical condition must be monitored to be sure the dog is not dehydrated and is continuing to eat, with no new signs of illness (e.g., lethargy, weight loss, reduced or no appetite, or vomiting). If the dog is losing weight or becoming dehydrated, the feeding method and treatment should be re-evaluated and adjusted to the needs of the particular patient.

## **Algorithm – Nutritional Management of Canine Lymphangiectasia**

**Diagnosis of primary cause (if there is one) is first step, as it will alter the long-term treatment plan and prognosis**



The key to control of weight loss and diarrhea in most dogs with lymphangiectasia is feeding a highly digestible diet with moderate protein and an ultra-low-fat content



If lymphangiectasia is secondary to IBD or another cause of PLE, initiate appropriate drug therapy and start a highly digestible diet with very low fat content (in some dogs, fat concentrations < 3 g/100 kg may be needed) – a hydrolyzed diet may be beneficial in some dogs with PLE