

## VP Client Information Sheets

By VIN Community Contributors



# Dilated Cardiomyopathy

**Authored by:** Dr. Robert Prošek

Dilated cardiomyopathy (DCM) is one of the most common acquired heart diseases in dogs. DCM is a disease of the heart muscle ("cardio" – heart; "myo" – muscle; "pathy" – disease) in which the muscle (myocardium) of the lower pumping chambers (ventricles) loses its ability contract normally. DCM most commonly affects the left side of the heart (the side that receives blood from the lungs and pumps it to the body) – specifically, the left ventricle. Since the myocardium cannot pump blood out of the left heart effectively, blood begins to "back up" within the left side of the heart and within the pulmonary veins that feed into the left heart. This leads to an enlargement of the heart in an attempt to compensate for the ineffective pumping.

As blood "backs up," left-sided congestive heart failure (CHF) or pulmonary edema (fluid within the lungs) develops. This is not a feature exclusive to DCM, but is a common feature of many types of left-heart disease.

Although less common, DCM affecting the right ventricle can also occur. Blood "backs up" on the right side (which receives blood from the body and pumps it to the lungs) resulting in right-sided CHF, where fluid accumulates in the abdomen (ascites) and chest (pleural effusion).

In some dogs, DCM affects BOTH the right and the left side.

### What Breeds get DCM?

There are several breeds that are genetically predisposed to DCM. These include Doberman Pinschers, Great Danes, Boxers, Newfoundlands, Portuguese Water Dogs, Dalmatians and Cocker Spaniels. No genetic tests exist to identify affected individuals at this time, but researchers are trying to identify the genes associated with DCM.

DCM is not just limited to specific breeds. Large and giant breeds are most commonly affected, but it also occurs in smaller breed dogs and cats as well.

The causes of DCM in these breeds vary, as explained below.

### What Causes DCM?

Because of the strong breed association, DCM almost certainly is inherited. However, specific genetic defects have not yet been identified and no genetic tests exist. When they are developed, these tests will likely be breed-specific.

In some dogs, DCM is due to a nutritional deficiency. Taurine is an amino acid required for the development and function of the myocardium. Consequently, pets may develop DCM on taurine deficient diets, such as vegetarian diets, and may benefit from appropriate supplementation. Some breeds, such as Cocker Spaniels and Newfoundlands may have a predisposition to Taurine-deficiency, possibly through defects in metabolizing taurine. Not all cases that are supplemented with taurine will improve. If your pet is diagnosed with DCM, testing for a taurine deficiency may be warranted. Breeds such as Doberman Pinschers and Great Danes do not have taurine-deficient cardiomyopathy. Some cats may develop taurine deficient DCM, although this has become rare with taurine supplementation of virtually all quality cat foods.

L-carnitine is another amino acid that has been implicated in the development of DCM in people. It is required for the myocardial cells to produce energy and thus contract. There is some evidence that a deficiency in this molecule will contribute to myocardial dysfunction in Boxers (one small study only). However, the role of carnitine in most DCM cases seems limited but has not been fully explored in dogs.

Occasionally, toxins can cause DCM. The most common "toxin" is doxorubicin – an anti-cancer drug used to treat various cancers in dogs. In some cases, dogs receiving doxorubicin (Adriamycin) will develop DCM.

Infectious causes of DCM are rare. Puppies infected with parvovirus at 2 to 4 weeks of age, can develop DCM. These days, vaccination of the dam confers protection to puppies against parvovirus during this susceptible period, so this cause of DCM is rarely seen. Chagas' disease (Trypanosomiasis) can cause DCM in areas where it is found (Texas, Mexico).

### What are the Signs of DCM?

Signs of DCM vary depending on the breed of dog and stage of the disease. Loss of appetite, pale gums, increased heart rate, coughing, difficulty breathing, periods of weakness, and fainting are signs commonly seen. Since blood is "backed up" into the lungs, respiratory signs (CHF) are due to pulmonary edema. Blood returning to the right side of the heart from the body may also back up leading to fluid accumulation in the abdomen (ascites) or in the chest cavity (pleural effusion). Weakness or collapse may be caused by abnormal heart rhythms (arrhythmias) and occasionally, decreased blood flow to the body (depressed cardiac output).

In some breeds, sudden death or fainting can occur well before any signs of CHF.

### How is DCM Diagnosed?

The diagnosis of DCM can be complicated. There are two different types of diagnosis: (A) during a screening exam of an apparently normal dog (e.g. as part of a breeding program), and (B) during examination of a dog with clinical signs of heart disease.

### *Screening Exams for DCM*

Many conscientious breeders and owners screen their pets for heart disease to minimize the risk of transmitting the disease to offspring. Screening for DCM in dogs can be expensive and complex. The screening test of choice depends on the breed of the dog and the stage of the disease.

The first step is a good physical examination. In most cases, the physical examination is completely normal. Occasionally, the veterinarian may detect an arrhythmia (abnormal heart rhythm). In Doberman Pinschers and Boxers, a 24-hour ECG recording using an ambulatory monitor (Holter monitor) is often the best way to screen dogs for early signs of DCM – abnormal rhythms occur before any detectable changes in myocardial contractility. An echocardiogram (an ultrasound scan of the heart) can also help identify dogs with DCM before they develop clinical signs, but many dogs with mild disease have equivocal findings. This examination is best performed by a certified veterinary cardiologist.

### *Diagnosis in Dogs with Clinical Signs*

A thorough physical examination by your veterinarian, coupled with your pet's clinical signs and specific breed, may help make the presumptive diagnosis of DCM. Tests that help support the diagnosis are an ECG (electrocardiogram) and x-rays (radiographs) of the chest. The ECG may show an arrhythmia and/or an elevated heart rate. The chest radiographs may show an enlarged heart and/or fluid in the lung tissue or chest cavity. Some dogs may have normal chest radiographs, but have arrhythmias on their ECG. These pets may be in the early stages of DCM (see above).

In dogs with clinical signs of heart failure, an echocardiogram is necessary to confirm the diagnosis of DCM. With an echocardiogram a cardiologist can visualize the interior of the heart and assess its function. A decrease in heart pumping function (contractility) means that the patient has DCM. Your veterinarian may also perform blood tests to look for any underlying nutritional or infectious conditions if the specific case warrants such investigation.

### **How is DCM Treated?**

Treatment is based on clinical presentation of each individual patient. Drugs commonly used are diuretics, ACE inhibitors, and digoxin. Newer drugs, such as pimobendan, are also generally recommended for treatment of DCM, but still require government approval for their use. In nutritional DCM, specific supplements will be prescribed. Patients with right-sided heart failure will also have fluid physically removed from the abdomen and/or chest cavity by the veterinarian to make the patient more comfortable.

Novel therapies such as stem-cell therapies are currently being investigated in animal models of disease, but are not available to the general public.

In humans, heart transplants are usually performed for patients with DCM, however, this option does not exist for veterinary patients, as it would require the killing of another animal to obtain a suitable heart (human donors are largely motor vehicle accident victims). No veterinarians are performing heart transplants.

Other surgical procedures have been evaluated, but currently none are being offered for patient care.

### **What is the Prognosis of a Pet Diagnosed with DCM?**

Unfortunately, in many cases, DCM is a progressive, irreversible, and ultimately terminal disease. Survival depends on the stage of diagnosis, the breed of the patient, the specific type of DCM that patient has, and patient/owner treatment compliance. In taurine-deficient DCM, correction of the deficiency in cats results in complete cure. In dogs, correction of the deficiency may result in prolonged survival; however some cases relapse after several years.

DCM is a slowly progressive disease. If it is diagnosed in the early stages, the patient may live several years before developing clinical signs. In some breeds, such as Doberman Pinschers, sudden death accounts for 30% of the deaths from DCM, well before these dogs ever develop CHF.

In other breeds with DCM, such as Doberman Pinschers and Great Danes, that are showing clinical signs of CHF, medical therapy can help prolong survival. Historical average survival for Doberman Pinschers with clinical DCM was 2 to 3 months. However, with pimobendan, recent studies have extended survival for this breed to 1 year. Less is known about outcomes of other breeds with DCM. Once the diagnosis of DCM is made, ask your veterinarian to discuss your pet's prognosis on an individual basis.

### **Can I do Anything to Prevent DCM or Slow its Progression?**

Currently, no therapies have been shown to alter the course of DCM, unless it has a nutritional basis (i.e., taurine deficiency). Since the majority of cases are thought to be genetic, breeding from lines unaffected by the disease helps reduce the chance of inheriting DCM. Genetic tests, when they become available, will be of value in determining breeding strategies. Drug therapies in early stages of the disease do not appear to affect outcome, but there has been little research into this.

### **What about Other Supplements?**

Multivitamin supplements, nutritional supplements, Co-enzyme Q10, and non-western herbal supplements have all been used for DCM, but none have been examined critically to determine if they hurt or help patients. Use of these supplements is best discussed with your veterinarian.