

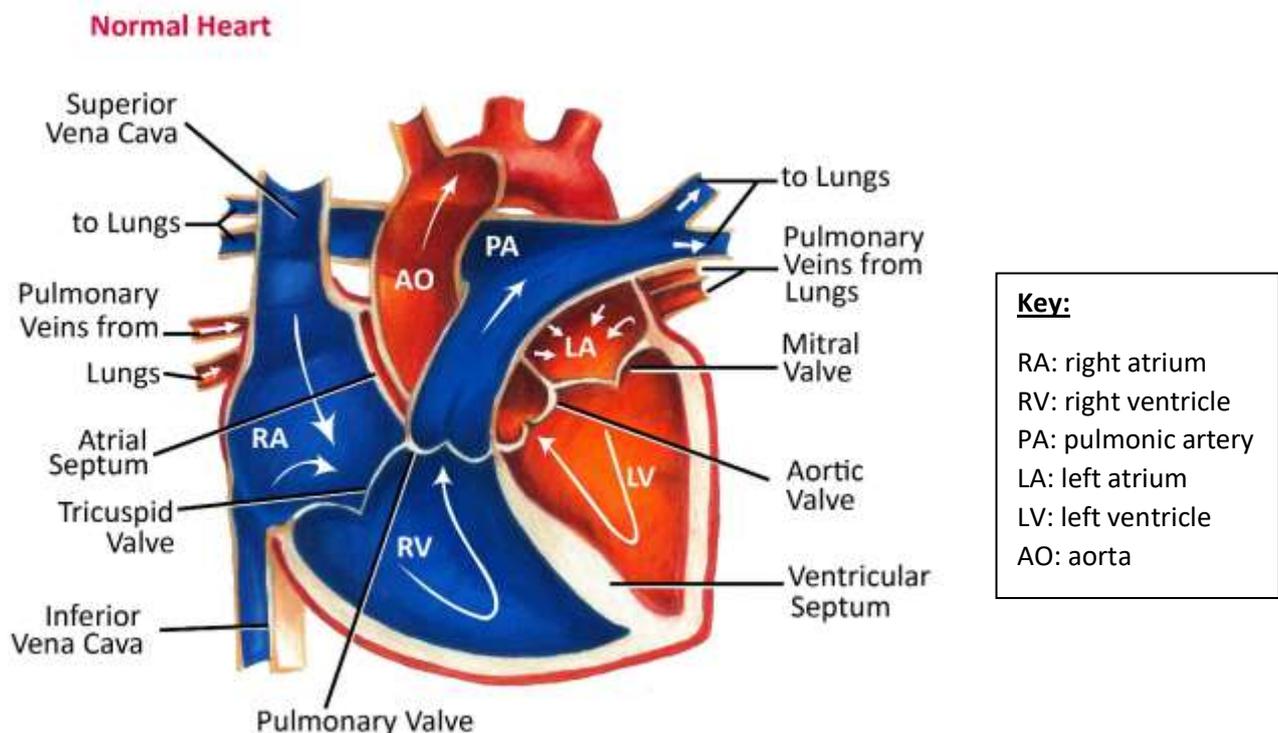


Dilated Cardiomyopathy

How does the heart work?

The heart is the organ responsible for pumping blood to and from all tissues of the body. The heart is divided into right and left sides. The job of the right side is to pump oxygen-deficient blood returning from the body into the lungs where fresh oxygen is collected and carbon dioxide is removed. The oxygen-rich blood returning from the lungs enters the left side of the heart where it is pumped into the aorta then to the rest of the body via the arterial system.

Each side of the heart has two chambers, an upper atrium and a lower ventricle. Between the atrium and ventricle on each side lies a valve – the tricuspid on the right and the mitral on the left – that regulates blood flow into the chambers. As the heart pumps, these valves act as one-way gates allowing blood to flow from the atrium above to the ventricle below and preventing blood from flowing back into the atrium. From the ventricles, blood is then forced to flow out into the pulmonary artery (on the right) or the aorta (on the left) through a second series of one-way valves called the pulmonic valve and the aortic valve, respectively.

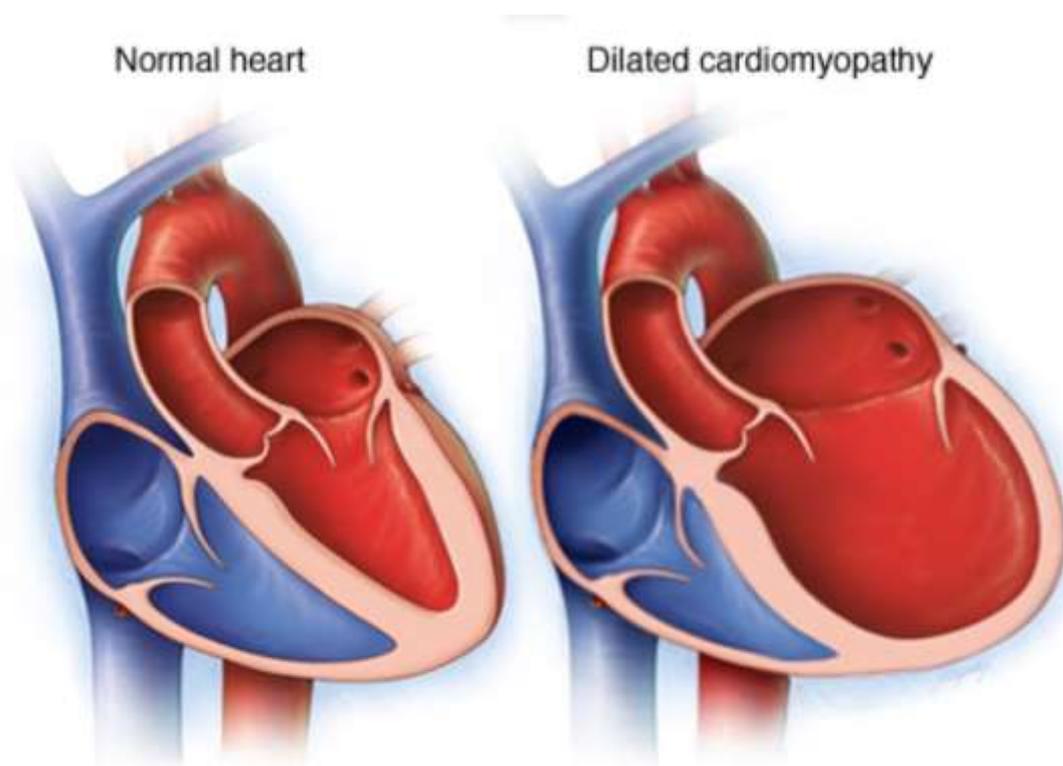




What is Dilated Cardiomyopathy?

Dilated cardiomyopathy (DCM) is one of the more common acquired heart diseases in dogs. DCM is a primary disease of the heart muscle (cardio = heart; myo = muscle; pathy = disease) in which the heart muscle of the lower pumping chambers (ventricles) becomes weak and so loses its ability to 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. As a result, the heart cannot effectively pump blood around the body. This reduced blood flow is sensed by the kidneys, which in turn begin to limit the amount of fluid lost from the body. The result is an increased blood volume returning to the heart. This additional blood volume within the heart causes the ventricles to enlarge which helps to compensate for the ineffective pumping. This is beneficial for many years, but ultimately results in a build-up of blood “upstream” of the left ventricle – namely the left atrium and the pulmonary (lung) circulation. As the blood backs up, fluid is forced from the pulmonary capillaries into the lungs and chest cavity causing pulmonary oedema (called left-sided congestive heart failure, or CHF).

Although less common, DCM affecting the right ventricle can also occur. Blood backs up on the right side of the heart (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/or chest (pleural effusion). DCM affecting the right ventricle is almost always accompanied by DCM of the left ventricle.

What breeds get DCM?

There are several breeds that are predisposed to DCM. These include Doberman Pinschers, Great Danes, Irish Wolfhounds, Boxers, Newfoundlands, Portuguese Water Dogs, Dalmatians and Cocker Spaniels. 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 in many breeds. Genetic mutations that are associated with DCM have been identified in Doberman Pinschers, Boxers and Standard Schnauzers. Genetic testing for these mutations is possible.

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 American Cocker Spaniels, may have a predisposition to taurine-deficiency, possibly through defects in metabolising taurine. Many, but not all, cases that are supplemented with taurine will improve. Some also need carnitine supplementation. If your pet is diagnosed with DCM, testing for 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 as taurine is now added to virtually all quality cat foods.

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 treatment will develop DCM.

Infectious causes of DCM are rare. Puppies infected with parvovirus at two to four weeks of age can develop DCM. These days, vaccinating the mother protects the puppies against parvovirus during this susceptible period, so this cause of DCM is rarely seen.



What are the signs of DCM?

Signs of DCM vary depending on the breed of dog and stage of the disease. Decreased appetite, weight loss, increased respiratory rate, laboured breathing, pale gums, weakness and fainting are signs often seen. Since blood backs up into the lungs, respiratory signs due to pulmonary oedema are most common. 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, fainting or even sudden death can occur well before any signs of CHF.

How is DCM diagnosed?

There are two different methods used to diagnose DCM: (1) during a screening exam of an apparently normal dog (e.g. as part of a breeding program), and (2) during examination of a dog with clinical signs of heart disease.

Screening Exams for DCM

Many breeders and owners of dogs that are predisposed to DCM screen their pets for heart disease to try to minimise 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) or a heart murmur (abnormal heart sound). In Doberman Pinschers and Boxers, a 24-hour ECG recording using a Holter monitor is often the best way to screen dogs for early signs of DCM since an abnormal rhythm commonly occurs before any detectable changes in contractility. An echocardiogram (an ultrasound scan of the heart) is also used to 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 board certified veterinary cardiologist.

Genetic testing should be considered on the specific breeds where a mutation or mutations have been identified.



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 radiographs (x-rays) 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 visualise the heart and assess its function. A decrease in heart pumping function strongly supports a diagnosis of 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 of heart failure is based on each individual patient. Drugs commonly used are diuretics (most commonly frusemide), ACE inhibitors and pimobendan. The diuretic forces the kidneys to excrete more sodium and water. This in turn eliminates pulmonary oedema (fluid in the lungs) and so improves your pet's breathing. Pimobendan increases the force of contraction of the ventricles and dilates blood vessels. Both frusemide and pimobendan are effective treatments that prolong survival and improve quality of life.

Pimobendan has also been shown to increase the time until the onset of congestive heart failure in Doberman Pinschers with DCM (administered while the dog is still in the asymptomatic phase).

Treatment of arrhythmias is often an important part of managing DCM. Dogs with atrial fibrillation are most commonly treated with medications designed to reduce the heart rate. Sotalol alone or in combination with other antiarrhythmic drugs (e.g. mexiletine) are often used to suppress ventricular arrhythmias to decrease the risk of fainting and sudden death.

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.

In humans, DCM patients may have a heart transplant. However, this option does not exist for veterinary patients. 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 most cases DCM is a progressive, irreversible, and ultimately fatal disease. Survival depends on the stage of disease, the breed, the specific type of DCM, and patient/owner treatment compliance. In taurine-deficient DCM, cure is sometimes possible (unfortunately this form of DCM is uncommon).

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 percent of the deaths from DCM, well before these dogs ever develop CHF.

In dogs that have developed congestive heart failure secondary to DCM the prognosis is generally poor. Medical treatment for heart failure can improve quality of life in these pets however sadly the life expectancy from this point is usually months rather than years.

Can I do anything to prevent DCM or slow progression?

The primary intervention that has been shown to alter the course of DCM is nutritional supplementation in dogs with a nutritional deficiency (i.e. taurine deficiency).

Since most cases are thought to be genetic, breeding from lines unaffected by the disease, helps reduce the chance of inheriting DCM. Genetic tests, when they are available, are of value in determining breeding strategies. In Doberman Pinschers with preclinical DCM (i.e. DCM present but no clinical signs apparent), administration of pimobendan has been shown to delay the onset of clinical signs.

What about other supplements?

Multivitamin supplements, nutritional supplements 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.

Additional Resource:

<http://vetmed.tufts.edu/heartsmart/>

This is a very useful and well-written resource, providing pet owners with a clear and credible source of information about veterinary cardiology.