

## Client Information Series



# Chronic Degenerative Valve Disease (CVD)

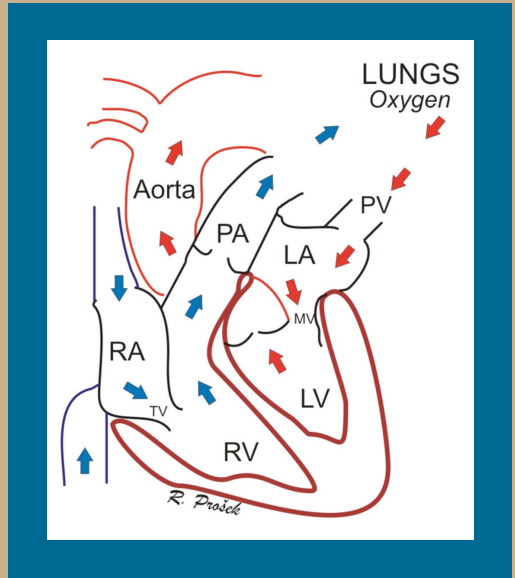


**VETERINARY MEDICAL  
TEACHING HOSPITAL**  
TEXAS A & M UNIVERSITY

### **How does the normal 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 right side of the heart pumps oxygen-deficient blood returning from the body through the lungs where it is re-oxygenated, and gets rid of the carbon dioxide waste that the body produces. After the blood passes through the lungs, it enters the left side of the heart where it is pumped out to the body through the aorta and other arteries. The picture below illustrates the pathway that blood takes as it moves through the heart. The structures shown in red contain blood that is rich in oxygen, whereas the structures shown in blue contain blood that has very little oxygen and high levels of carbon dioxide.

*Blue arrows represent deoxygenated blood flowing through the right side of the heart to the lungs, where red arrows represent oxygenated blood leaving the lungs through the left side of the heart. RA = right atrium, RV = right ventricle, TV = tricuspid valve, PA = pulmonary artery, PV = pulmonary vein, LA = left atrium, MV = mitral valve, LV = left ventricle.*



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 from the upper atrial chambers into the lower ventricular chambers. As the heart pumps (squeezes), these valves act as one-way gates allowing blood to flow from the atrium above to the ventricle below and preventing blood from flowing backwards into the atrium.

From the ventricles, blood is pumped out into the lungs through the pulmonary artery (on the right) or out to the body through the aorta (on the left) through a second series of one-way valves (the pulmonic valve on the right and the aortic valve on the left).

The number of heartbeats per minute (heart rate) and the type of heartbeats are controlled by the electrical system in the heart. Normal heartbeats start in the right atrium, but in sick hearts, the heart beats can start from any chamber and are called arrhythmias.

### **What is chronic degenerative valve disease?**

Chronic degenerative valve disease (CVD) has many other names, such as endocardiosis, valvular regurgitation, valvular insufficiency, chronic valve disease,

mitral regurgitation (MR), or myxomatous degeneration of the valve. This disease is a consequence of degeneration of the valves between the atrium and ventricle on both the right (tricuspid valve) and left (mitral valve) side of the heart, however the valve on the left side (mitral valve) is typically most severely affected. The degeneration process causes the valves to become abnormally thick and develop a nodular “lumpy” appearance. This process is NOT caused by an infection. The degenerative changes in the valves and the structures that support the valves impede their ability to form a tight seal between the atrium and ventricle when the heart is squeezing or pumping. This causes blood to leak backwards into the upper chambers (atria). The backwards leaking of blood through the abnormal valve is called “regurgitation” and causes an abnormal sound called a heart murmur that is typically heard with a stethoscope by your veterinarian. The consequences of CVD are discussed below.



### ***Who develops chronic degenerative valve disease?***

Chronic degenerative valve disease represents approximately 75% of all heart disease in the dog and is very, very rare in the cat. Approximately 60% of affected dogs have degeneration of the mitral valve, 30% have degeneration of both the tricuspid and mitral valves, and involvement of the tricuspid valve alone occurs in 10% of affected dogs. The risk of developing CVD increases as dogs get older and is rare before the age of 4 years. In addition, small breed dogs (dogs weighing less than 40 lb (18.2 kg) are more likely to get CVD than larger dogs. Certain breeds also have a higher risk of developing CVD.

### *General risk factors for the development of CVD:*

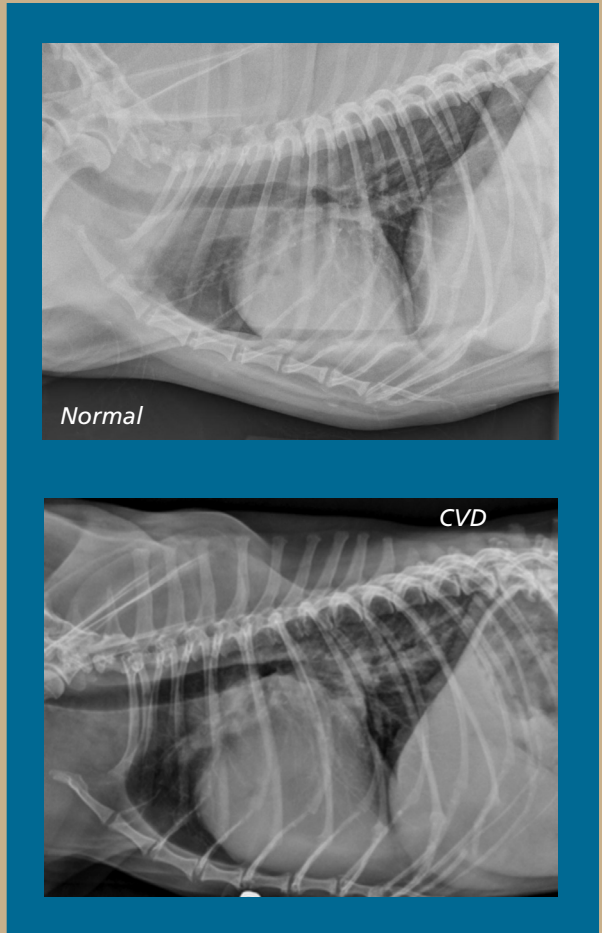
- Dog
- Older (> 5 years)
- Small breed (< 40 lb; (18.2 kg)
- High risk breeds, including:
  - *Miniature poodles, cocker spaniels, miniature schnauzers, Dachshunds, small terrier breeds*
  - *Cavalier King Charles spaniels (this breed is an exception in that they may develop CVD as young as 2-3 years of age)*

### **What causes CVD?**

CVD is a degenerative process associated with aging in predominantly small dogs. It is not caused by an infection. Many older dogs with dental disease also have CVD but the dental disease is not the cause of the CVD. However, good dental hygiene is an important part of ensuring that your dog lives a long and healthy life. In addition, there is likely a familial or inherited genetic component in some breeds, such as the Cavalier King Charles spaniel, however the specific genetic evidence for the majority of cases of CVD is lacking.

### **What happens to my dog when it gets CVD?**

The leak (regurgitation) caused by the degeneration of the valves eventually leads to enlargement of the heart chambers (the atria and ventricles). The majority of dogs with CVD feel and act normally and the only evidence that they have CVD is the sound of the leak (heart murmur) that is heard by your veterinarian when using a stethoscope. This is typically called the preclinical stage of the disease (or Stage B1 and B2), i.e. your dog is considered 'asymptomatic'. Most dogs with asymptomatic CVD never get sick from CVD, however about



1/3 will eventually develop 'clinical signs' or clues that you will notice (see list below). In general, dogs with very enlarged (the biggest) hearts (Stage B2) are more likely to develop 'clinical signs'. The regurgitation and intensity of the heart murmur typically gets bigger and louder, slowly, over years, but sometimes these changes can happen quickly. The bigger the leak, the bigger the heart gets and eventually when the heart is big enough, your dog can start to have problems (clinical signs) that you will notice, such as fast breathing, increased effort when breathing, coughing and other clinical signs (see the list below). The clinical signs occur when the pressures in the enlarged heart chambers cause fluid to leak out of the blood vessels into the lungs (called, pulmonary edema; 'water on the lungs') and sometimes the belly (ascites). The development of clinical signs is referred to as the 'symptomatic' stage of CVD (Stage C). The build up of fluid in the symptomatic stage is called congestive heart failure. In addition, sometimes in the symptomatic stage of CVD the heart cannot send enough blood forward to the body and this can cause dogs to become weak or tired or even faint.



***Clinical signs (clues) that your dog may have 'symptomatic' CVD and needs to be examined by your veterinarian:***

*Note: These clues represent clinical signs that may occur in dogs with CVD once they become 'symptomatic', but they can also occur with other diseases. However, if you know your dog has CVD you should always watch for their development and if they do, you should contact your veterinarian. It is important to note that not every dog will develop all of the following clinical signs and many dogs will have more than one.*

***Clinical signs that can be associated with CVD:***

- Fast (rapid and shallow) breathing when resting or sleeping (> 30-35 breaths per minute)

*Note: For details on how and why to evaluate this in your dog, refer to the section on evaluating home breathing rates below.*

- Increased effort associated with breathing

- Restless or agitation while sleeping, i.e. moving around a lot and changing positions due to the inability to find a comfortable position
- Change in the position that your dog sleeps in, i.e. if your pet no longer sleeps on its back or on its side, but more in a sitting or 'sphinx position'.
- Coughing or gagging
- Weakness
- Reduced ability to exercise
- Collapse or fainting
- Decreased appetite
- Weight loss
- Distended belly
- Depressed attitude or quiet and not interactive

### ***How can my veterinarian determine if my dog has CVD?***

The best screening test to detect CVD in your dog is listening (auscultation) with a stethoscope by your veterinarian once per year. Other tests will be recommended if your veterinarian hears a heart murmur. If you wish to have your dog 'cleared' for breeding purposes your veterinarian may recommend that you have your dog auscultated by a veterinary cardiologist.

### ***What tests might be recommended by my veterinarian once my dogs has CVD?***

#### ***Asymptomatic dogs with CVD:***

If your dog is asymptomatic (no clinical signs of CVD are present, as outlined above) and your veterinarian detects a heart murmur, further tests will be recommended to help determine how big the heart is and if your dog should start taking any heart medications. Some tests are done to determine if there are any other problems that could be detrimental for dogs with have CVD, for example high blood pressure or kidney disease.



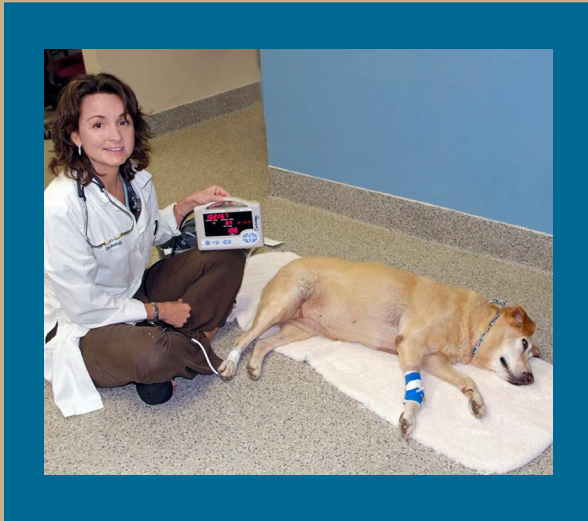
#### ***Symptomatic dogs with CVD:***

Dogs with a heart murmur and one or more of the clinical signs listed above could have heart failure, which requires medications. Your veterinarian will recommend tests to help determine the cause of the clinical signs and help them select the appropriate medications.



### *Possible tests for dogs with asymptomatic and symptomatic CVD:*

- Chest x-rays to evaluate the heart size, lungs and blood vessels
- Blood work to evaluate kidney function
- Urine test to evaluate kidney function
- Blood pressure
- Ultrasound (echocardiogram of the heart) to confirm the diagnosis and evaluate the size and function of the heart.
- A blood test called, NT-proBNP, to evaluate the pressure in the heart
- ECG to evaluate the heart rhythm
- Referral to a veterinary cardiologist may be suggested in some cases



### *How is CVD treated in dogs?*

#### *Asymptomatic CVD:*

Medication is not required if the recommended tests determine that the heart is not enlarged and the blood pressure is normal. However, if the tests detect heart enlargement and/or high blood pressure, medication(s) may be prescribed.

#### *Can I slow down or reverse the progression of CVD in my dog?*

Several studies have looked at preventing CVD from progressing to the development of congestive heart failure. Unfortunately, no drugs that have been tested thus far have been proven to be effective in either preventing or slowing down the progression of CVD. As new drugs are developed, they will also undergo testing, so there may be drugs in the future that could help with CVD progression.

#### *Symptomatic CVD (heart failure):*

Medications will be prescribed if your dog has clinical signs and the results of the recommended tests have led to a diagnosis of heart failure. These medications will be continued forever, although the doses and frequency of administration may change over time. Sometimes additional medications are required, while others are sometimes stopped. In addition, your dog may need to stay in the hospital for a few days while adjusting to the medications.

#### *Common medications used to treat heart failure due to CVD:*

- Furosemide, also known as Lasix®
- Pimobendan (Vetmedin®)

- Angiotensin converting enzyme inhibitor (ACEI), such as benazepril or enalapril
- Spironolactone
- Additional medications are frequently indicated in individual dogs

*Note: Some medications and herbal supplements can have adverse interactions with heart medications, therefore it is important that you not use any medications (new or previously prescribed) without talking to the veterinarian that prescribes your dog's heart medications.*

*Common side-effects of medication used to treat heart failure due to CVD:*

- Drinking large amounts of water more frequently  
*Note: It is critical that dogs on medications like furosemide have free choice access to water at all times.*
- Urinating larger amounts more frequently  
*Note: Accidents in the house can be limited by using 'doggy doors' and being sure to not give the furosemide pills within 2 hours of bedtime or leaving the house for an extended period of time. Dogs always need to urinate within 1-2 hours after receiving furosemide.*
- Reduced appetite or not eating normal amounts of food  
*Note: If this problem starts and persists, you need to talk to your veterinarian; it is important that your dog not lose weight.*

***What kind of follow-up will my dog need now that it has CVD?***

*Recommended follow-up in dogs with asymptomatic CVD (Stage B1 and B2):*

Your veterinarian will recommend recheck appointments every 3-12 months depending on how advanced the disease is. In addition, if and when a medication is started you may need to return in 10-14 days to have a blood test to check the kidney and liver values, and take your dog's blood pressure. However, if you notice any of the clinical signs listed above at any time, you should not wait for the next recheck appointment, but call and make an urgent/emergency appointment. If







the clinical signs are severe and or develop suddenly (your dog cannot breath, rest comfortably or sleep) you may need to take him to the nearest emergency facility as soon as possible. One of the best ways to help your veterinarian determine when to start or adjust your dogs heart medication(s) is to observe and record the home resting/sleeping breathing rate of your dog (see below).

*Recommended follow-up in dogs with symptomatic CVD (Stage C):*

Your veterinarian will recommend a recheck appointment every 2-4 months. In addition, if and when a new medication is started you may need to return in 10-14 days to have a blood test to check the kidney and liver values, and take your dog's blood pressure.

However, if you notice any of the clinical signs listed above at any time, you should not wait for the next recheck appointment, but call and make an urgent/emergency appointment. If the clinical signs are severe, and or develop suddenly (your dog cannot breath, rest comfortably or sleep) you may need to take him to the nearest emergency facility as soon as possible. One of the best ways to help your veterinarian determine when to start or adjust your dogs heart medication(s) is to observe and record the home resting/sleeping breathing rate of your dog (see below).

*Note: Please see the "Measuring Your Pet's Breathing Rate" brochure in this series for more information on how to monitor your pet's breathing rate at home.*

*Can special diets help dogs with CVD live longer?*

Some animal diet manufacturers have developed heart-specific diets. Some of these diets are severely restricted in salt and some are moderately restricted in salt. The diets that are severely restricted in salt should never be used in

asymptomatic dogs with CVD. They may be used in dogs with heart failure as long as the dog will eat them. The heart-specific diets that are moderately restricted in salt (or any diet that is moderately restricted in salt, such as most senior diets) can be used in asymptomatic dogs with CVD. However, while these diets are unlikely to be harmful if used as outlined above, they have not been shown to have any benefit. Therefore, it is unlikely that your veterinarian will recommend that you change your dog's diet if it is otherwise healthy. It is important that dogs and cats with advanced heart disease continue to eat.

*Note: It is often beneficial to limits treats that are high in sodium in dogs that have heart disease especially those in heart failure.*



### ***Are there any dietary supplements that may help dogs with CVD live longer?***

Supplements are unlikely to be harmful if used as outlined by a veterinarian who is familiar with all the medication your dog is receiving and what type and severity of heart disease your dog has. However, there is no proof that your dog needs to take any supplement(s) if they are on a high quality commercial dog food diet. The most common supplement recommended in dogs with CVD is omega 3 fatty acids. You should discuss any supplements your dog receives, or any new ones you wish to start, with your veterinarian.

### ***What about exercise in my dog once it has CVD?***

In general, dogs with both asymptomatic and symptomatic CVD should be allowed to exercise at their normal level if they want to. However, the duration of sustained strenuous activities such as ball retrieval, swimming, Frisbee etc. should be limited especially in really hot or cold weather. Some exercise is good for you and your dog and part of what helps your dog enjoy their life.

### ***Is there a surgical treatment option for dogs with CVD?***

In human medicine, it is common for patients with significant CVD to have the leaky valve(s) repaired or replaced by a surgeon. However this requires open-heart surgery and cardiopulmonary bypass and dogs, especially small dogs, are

very hard to perform cardiopulmonary bypass on. Thus, open-heart surgery and valve replacement or repair is not readily available in the dog. A few veterinary surgeons have performed these surgeries on a very limited number of dogs. There is a very high risk of death and the surgery is very expensive (at least \$10,000), therefore this option is not recommended at this time. If you wish to investigate the possibility of surgical repair or replacement, you should discuss this with your veterinarian. In the future, catheter-based (minimally invasive) techniques may become available and allow repair or replacement to be done safely without the need for cardiopulmonary bypass. Heart transplantation is not an option in dogs.

### ***How long will my dog live now that they have CVD?***

#### ***Asymptomatic CVD (Stage B1 and B2):***

On average, the majority of dogs with asymptomatic CVD will live for many years (1-5 years or longer) without ever developing any clinical signs of heart failure. It can be difficult to determine the rate of progression of CVD in individual dogs, and it is for this reason that your veterinarian recommends tests and recheck appointments. The amount of change in heart size and other factors between recheck appointments can help your veterinarian determine the how your dog is doing.

#### ***Symptomatic CVD (Stage C or heart failure):***

Once your dog develops clinical signs of CVD, medications can typically eliminate or reduce the severity of the clinical signs but the disease will still progress and eventually the medications will not work as well. Sometimes, new medications can be added or the doses of your dogs' current medications adjusted but eventually this will be insufficient in maintaining your dog's quality of life. Your veterinarian will help you recognize when and if this is the case for your dog. However, in general, with the appropriate medications and recheck appointments, many dogs with heart failure due to CVD live for 1-2 years or even longer.





**VETERINARY MEDICINE  
& BIOMEDICAL SCIENCES**  
TEXAS A & M UNIVERSITY

**Small Animal Clinical Sciences**  
*Cardiology Service*

**College of Veterinary Medicine  
& Biomedical Sciences**

Texas A&M University  
4474 TAMU  
College Station, TX 77843-4474  
Tel 979.845.2351  
Fax 979.845.6978

*[http://vethospital.tamu.edu/  
small-animal-hospital/cardiology](http://vethospital.tamu.edu/small-animal-hospital/cardiology)*