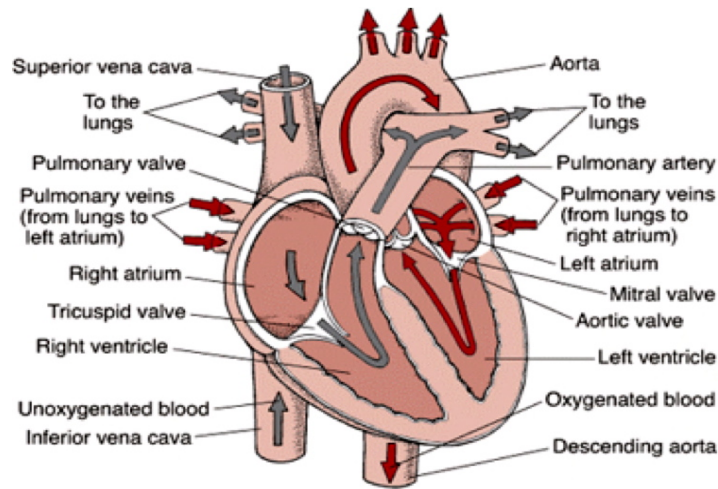


## PULMONARY HYPERTENSION



*Outline of a normal heart*

Your dog has been diagnosed with pulmonary hypertension (PH). Pulmonary hypertension is the term used to describe pathologically elevated pulmonary arterial pressure. It is a separate disease entity than systemic hypertension, which describes high blood pressure in the rest of the body.

In order for you to understand how this disease may affect your dog, it is important to understand how blood travels through the heart. The venous blood from the body drains into the right atrium, through the tricuspid valve, and into the right ventricle. The right ventricle then pumps this un-oxygenated blood to the lungs through the pulmonary artery. Moving through capillaries, the blood picks up oxygen from the lungs. This blood then drains through large pulmonary veins into the left atrium, through the mitral valve and into the left ventricle where it is pumped through the aorta and back to the body.

When dogs develop significant pulmonary hypertension, the right side of the heart enlarges (sometimes dramatically) in order to pump blood into the elevated pulmonary arterial circulation. If the pressure on the right side rises enough, the enlarged right side can impede normal filling of the left side. Subsequently, the amount of blood pumped into the systemic circulation to the body is reduced which causes weakness, exercise intolerance, and sometimes fainting. Also, the elevation in right-sided pressure can back up into the venous return from the body causing fluid to ooze out of the capillaries and into the abdominal cavity. This is called right-sided congestive heart failure.

The causes of PH are numerous. In some cases, it is secondary to chronic pulmonary thromboembolism (PTE). Diseases that predispose dogs to PTE include immune diseases, severe liver disease, kidney disease, endocrine disease (such as Cushing's disease), and cancer. Other causes of

pulmonary hypertension are chronic lung disease; chronic, severe left heart disease; Heartworm disease; and idiopathic. Idiopathic is a word used when the underlying cause cannot be identified. In most dogs, the underlying cause cannot be identified. An attempt should be made to identify the cause because in some cases, it can be treated or the disease process slowed.

The single most important test used to identify PH and assess its severity is the echocardiogram, which is used to diagnose PH as well as to assess its severity. Dogs with mild PH do well and rarely experience clinical signs. Dogs with moderate PH are variably affected. Most don't experience obvious clinical signs although they may be somewhat exercise intolerant or faint/collapse with exertion. Dogs with severe PH always experience clinical signs. They include trouble breathing, fainting with exertion, and/or right-sided congestive heart failure. The tests used to identify the *cause* of pulmonary hypertension are lab work (complete biochemistry profile, complete blood count, and urinalysis, Heartworm test, and d-dimer) as well as abdominal ultrasound if cancer or other abdominal disease is suspected.

If the underlying cause can be identified, every attempt should be made to treat it. Many of the diseases that cause PH are unfortunately, not amenable to therapy. In most dogs, treatment is directed at lowering the blood pressure in the lungs. This is done medically. The most effective medication for the treatment of PH is Sildenafil (Viagra). Approximately 65% of dogs respond to Viagra and although their pulmonary arterial pressure does not normalize, it is lowered enough to cause marked improvement in clinical signs. Viagra can be prohibitively expensive so it is only prescribed in cases of severe PH. There are other medications that can be beneficial that may be prescribed earlier.

Dogs with pulmonary hypertension should be monitored for a change in breathing pattern (increase abdominal effort with each breath; rapid, shallow breathing, etc), fainting or collapse, exercise intolerance, and abdominal swelling (which could indicate the onset of right sided congestive heart failure).

It is important to remember that many afflicted dogs never develop problems with Pulmonary Hypertension. It is also very important to monitor this condition through regular echocardiograms so that if changes occur, appropriate therapy can be prescribed.

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