



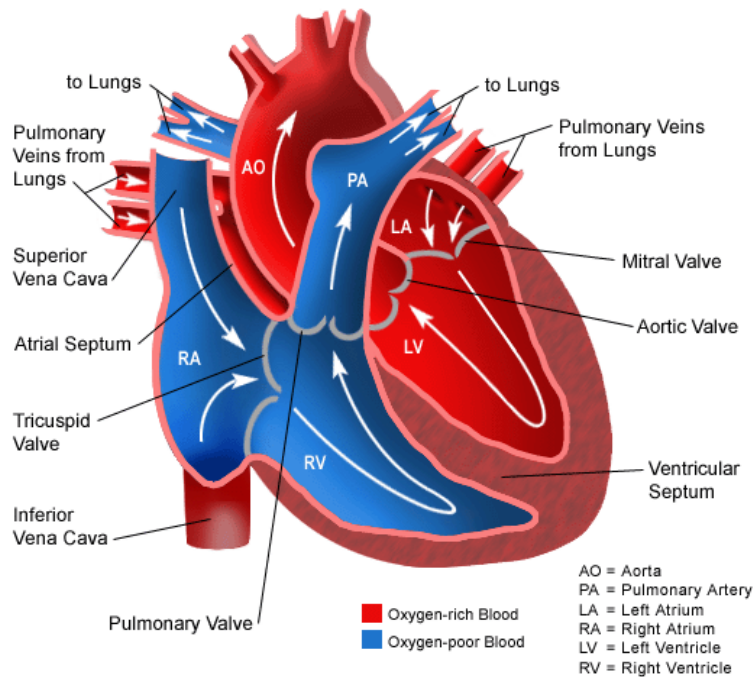
Pulmonary Hypertension

BRIEFLY, HOW DOES THE HEART WORK?

The heart has four chambers. The upper chambers are called atria. One chamber is called an atrium, and the lower chambers are called ventricles. In addition to the upper and lower chambers, the heart is also considered to have a right and left side.

Blood flows from the body into the right atrium. It is stored there briefly, then pumped into the right ventricle. The right ventricle pumps blood into the lungs, where it receives oxygen. It flows from the lungs into the left atrium; it is held here briefly before going into the left ventricle. The left ventricle contains the largest muscle of the heart so the blood can be pumped out to all parts of the body.

Movement of blood results from electrical impulses that are transmitted from the brain to the heart. The impulses not only direct the heart to beat but also to maintain a steady, regular rhythm.





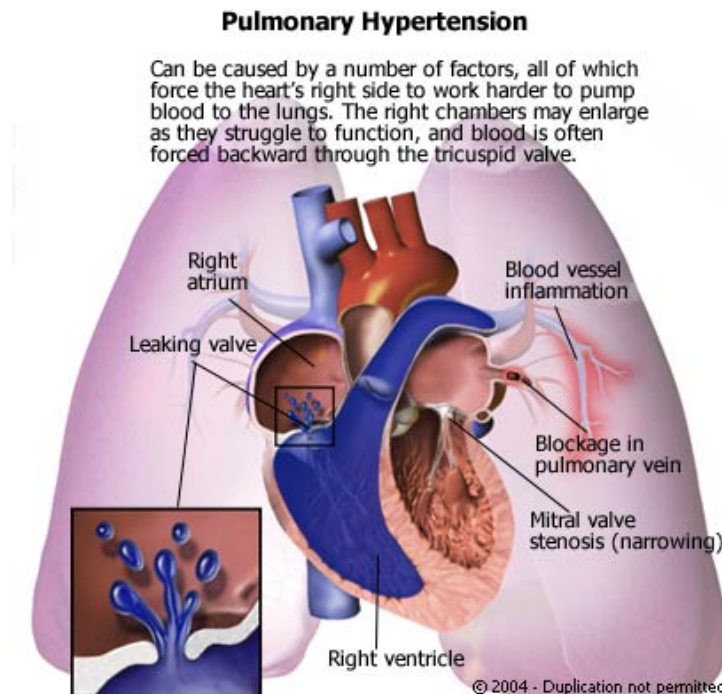
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WHAT IS PULMONARY HYPERTENSION?

Pulmonary hypertension is the term used to describe an increase in blood pressure in the pulmonary artery, pulmonary vein, or pulmonary capillaries, together known as the lung vasculature. It is a separate disease entity to systemic hypertension, which describes high blood pressure in the rest of the body.

WHAT ARE THE CONSEQUENCES OF PULMONARY HYPERTENSION?

Pulmonary hypertension involves the tightening of blood vessels (vasoconstriction) connected to and within the lungs. This tightening makes it harder for the heart to pump blood through the lungs, and overtime, the affected blood vessels become stiffer and thicker (fibrose), further increasing the blood pressure within the lungs and impairing their blood flow. In addition, the increased workload of the heart causes thickening and enlargement of the right ventricle, leading to right-sided heart failure.





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WHAT ARE THE SIGNS OF PULMONARY HYPERTENSION?

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.

Signs to look out for may include;

- increased respiratory effort
- increased respiratory rate
- lethargy
- exercise intolerance
- non-productive cough
- fainting/syncope (especially with exertion)
- right sided congestive heart failure (which leads to a build up of fluid in the abdomen and/or around the lungs, and can cause a pot-bellied appearance and/or breathing difficulties)

DOES THAT MEAN THAT HEART FAILURE WILL OCCUR SOON?

Congestive heart failure begins when the heart is not able to pump blood with adequate oxygen to the tissues. Without adequate oxygen, the body's cells become desperate and trigger a series of responses. Various hormones are released by several organs in an attempt to correct the problem. These hormones conserve fluid in an effort to increase blood volume and the output of oxygenated blood by the heart.

For a variable period, these compensatory responses help the situation. However, increased fluid retention eventually becomes harmful. More and more fluid leaks out of the capillaries, causing increased gagging and coughing, and reduced stamina. Fluid may collect in the abdominal cavity and body tissues. Fluid in the lungs is called pulmonary oedema, fluid below the skin is called peripheral or limb oedema, and fluid in the abdomen is called ascites. Congestive heart failure is common cause of these signs.





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HOW IS PULMONARY HYPERTENSION DIAGNOSED?

The single most important test used to identify pulmonary hypertension and assess its severity is the echocardiogram. This gives the most accurate determination of the size of each heart chamber, the thickness of heart walls, a visual on valves and a look at the direction and velocity of blood flow through the chambers.

The tests used to identify the *cause* of pulmonary hypertension are blood work and heartworm test, as well as an abdominal ultrasound if cancer or an abdominal disease are suspected. Other tests may be performed depending on clinical signs.

IS THERE TREATMENT FOR PULMONARY HYPERTENSION?

In most animals, 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. Sildenafil can be prohibitively expensive so it is only prescribed in cases of severe PH.

Pimobendan, a veterinary drug, has similar actions to sildenafil, but may not be as effective, so may be used in addition, or as an alternative in cases where cost is an issue.

There are other medications such as bronchodilators and diuretics that can be beneficial to the patient and may be prescribed earlier.

It is very important to monitor your animal's sleeping respiratory rate (below 30 breaths per minute when sleeping is normal) and if changes occur, seek appropriate treatment.

