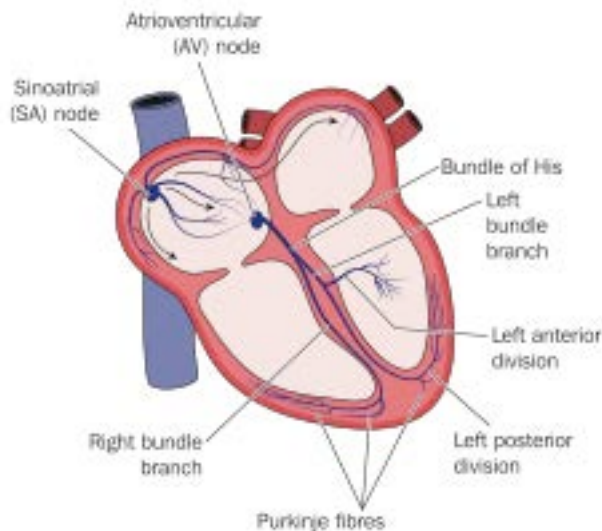


## Common Arrhythmias of Dogs and Cats

The heart is a pump, and it works in a coordinated fashion which is driven by the heart rhythm. The term cardiac arrhythmia encompasses all cardiac rhythms other than a normal sinus rhythm, including both abnormally slow heart rates and abnormally fast heart rates. Cardiac arrhythmias can be benign or life threatening.



In the normal heart, the electrical conduction system generates electrical impulses that travel through heart, stimulating the heart muscle to contract. The sinus node (SA node) located in the top of the right atrium, is a collection of cells that act as the initiator of electrical impulses within the heart, triggering the heart to beat, or contract, by firing off electrical surges. There is another node of cells called the atrioventricular (AV) node situated in the bottom of the right atrium, close to the ventricle. The AV node receives impulses from the SA node, and after a small delay, directs the impulses to the ventricles. This delay allows for the atrium to eject blood into the ventricle before the ventricular muscles contract.

An electrocardiogram (ECG or EKG) is a recording of these electrical impulses. Below is a description of some of the more common abnormalities in heart rhythm seen in dogs and cats.

### Atrial fibrillation (AFib)

Atrial fibrillation is usually associated with underlying structural heart disease that results in atrial enlargement, disrupting the normal conduction pathways. With atrial fibrillation, hundreds of electrical impulses per minute are generated all throughout the atrial chambers, which causes the atrial walls to move chaotically and rapidly. Some of these impulses are able to transfer through the AV node to the ventricles, and this occurs at irregular intervals. The result is a rapid and chaotic heart rhythm and reduced heart function. Atrial fibrillation can cause lethargy, decreased appetite, collapse and worsening heart failure. Occasionally, atrial fibrillation may occur in the absence of structural heart disease in large or giant-breed dogs and this is referred to as lone atrial fibrillation. Two therapeutic strategies exist: rate reduction with oral medications

or cardioversion to normal sinus rhythm. Cardioversion to a normal rhythm is rarely attempted, since most patients have severe underlying heart disease that predisposes them to atrial fibrillation. Usually in veterinary medicine, treatment of atrial fibrillation is aimed at slowing the heart rate to increase the time the ventricles have to fill with blood in between heart beats, thereby improving cardiac output.

**Premature contractions** are heart beats that come too early. There are two broad categories of premature beats. Those that arise from the tissue above the ventricles are known as supraventricular premature beats and include **atrial premature contractions** (APCs). Premature contractions that originate from the ventricular tissue are known as **ventricular premature contractions** (VPCs). Premature beats on their own, in isolation are often not a problem as they don't cause hemodynamic changes. However, they may serve as markers for underlying cardiac or systemic disease. If premature beats occur frequently, and especially if they occur in a row (termed tachycardia), they may require treatment as the fast heart rhythms can lead to lethargy, weakness, collapse, or even sudden death.

### **Atrioventricular (AV) block**

AV block implies that there is a delay (1st degree AV block) or a complete blockage (2nd or 3rd degree AV block) of conduction of electrical impulses from the atria down to the ventricles through the AV node. Some breeds of dogs, especially the brachiocephalic breeds have an increase in the vagal tone that makes them predisposed to 2nd degree AV block. Certain medications can also cause 2nd degree AV block. Usually high grade 2nd degree and 3rd degree AV block is due to disease of the conduction system. With 2nd degree AV block, some of the impulses get through, while others are blocked. With 3rd degree AV block, none of the impulses get through, and so the ventricles have to generate their own impulse to maintain the heart beat. The rate of this backup or "escape" rhythm is much slower than a normal heart rate. With high grade 2nd or 3rd degree AV block, a patient can experience symptoms of lethargy, decreased appetite, weakness, or have collapse episodes. Often a permanent pacemaker is recommended for therapy and to avoid sudden death.

### **Sinus node dysfunction**

Sick sinus syndrome is characterized by a heart rhythm whereby the sinus node does not discharge an impulse to trigger the heart to contract. If the heart stops for several seconds the dog will collapse/faint. Sometimes the heart will have another part of the heart initiate a beat to rescue the heart from complete arrest. Most of the time the sinus node will eventually start up again to do its job but the dog has a rhythm with many long pauses. Some dogs with sick sinus syndrome have a constant slow rate because the sinus node has a low firing rate. Other dogs with sick sinus syndrome will have periods of excessive tachycardia (rapid rate) in addition to the pauses or bradycardia. When a dog has clinical signs of sick sinus syndrome medical therapy is usually unsuccessful and it is almost always required that a pacemaker be implanted.

