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## Arrhythmias and Antiarrhythmic Therapy

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### **What is an arrhythmia?**

The heart is a muscle which is stimulated to contract (or beat) by electrical signals. An arrhythmia is a disturbance in the electrical activity of the heart which causes an irregularity in the heart beat. Dogs and cats may have arrhythmias secondary to underlying cardiac disease or from non-cardiac causes. Careful assessment of a patient's heart by the veterinarian is necessary when an arrhythmia or irregular heart beat is identified and blood tests, radiographs (x-rays), electrocardiography (EKG), Holter monitoring (24 hour EKG), event monitoring and echocardiography (ultrasound of the heart) may be required to identify the underlying cause.

Arrhythmias are broadly classified into those that cause excessively slow or fast heart rates. Examples of those causing slow heart rates include atrioventricular block (AV block) and sick sinus syndrome. Examples of fast arrhythmias include atrial fibrillation (AF or "A-fib"), supraventricular tachycardia (SVT) and ventricular tachycardias (VT or "V-tach"). Some arrhythmias can compromise patient health by reducing blood flow or blood pressure to the body, thereby exacerbating heart failure (fluid accumulation in the lungs or abdomen) or by producing signs of sustained weakness/ lethargy or episodic fainting (syncope). Some arrhythmias pose of a risk of sudden collapse and death. For patients experiencing overt signs, or for those animals with an arrhythmia known to confer a risk of sudden death, treatment is warranted.

Medication has limited ability to treat slow arrhythmias and typically, cats and dogs with these arrhythmias require pacemaker implantation. Drugs used to suppress fast arrhythmias are called antiarrhythmics of which there are many types. The body's normal response to heart failure (fluid accumulation in the lungs) is a fast heart rate (sinus tachycardia), and for some types of heart disease, this can worsen the animal's condition. In these patients, antiarrhythmics may be prescribed to slow the heart rate, allow for better blood filling of the heart's chambers and improve the heart's ability to function as a pump.

### **What is the treatment for a fast arrhythmia?**

*Sodium-Channel Blockers*, are a group of antiarrhythmic drugs which are commonly used to treat ventricular tachycardias. These drugs act specifically on diseased cells in the heart to increase the threshold for electrical excitement. Examples of these medications for oral use

at home include procainamide (*Procanl*®), *Pronestyl*®), mexiletine (*Mexitil*) and disopyramide (*Norpace*®).

Another group of antiarrhythmic drugs are called *Beta-Adrenergic Receptor Blockers* or *Beta-Blockers*. These drugs can be used to effectively lower high heart rates and, for some types of heart disease this can augment control of congestive heart failure. These drugs are effective for treating a range of arrhythmias but they are most commonly prescribed for animals with atrial fibrillation and supraventricular tachyarrhythmias. Examples of beta-blockers include propranolol (*Inderal*®), atenolol (*Tenormin*®), metoprolol (*Toprol*®), carvedilol (*Coreg*®). Beta-blockers can cause the heart to contract with less energy. Careful monitoring by the veterinarian is necessary to minimize side effects such as low blood pressure, collapse and, for some types of heart disease, worsening of congestive heart failure.

*Potassium-Channel Blockers* are a group of antiarrhythmics that act by reducing the ability of the heart to initiate arrhythmias. Examples of these include amiodarone (*Cordarone*®) and sotalol (*Betapace*®). They may be prescribed to treat a range of arrhythmias including supraventricular and ventricular tachycardias.

*Calcium-Channel Blockers* comprise yet another group of drugs with antiarrhythmic activity. These medications can be useful for supraventricular tachycardias including atrial fibrillation, and may be used in combination with other drugs to optimize their effects. Examples of calcium-channel blockers include diltiazem (*Dilacor*®, *Cardizem*®) and verapamil (*Isoptin*®, *Calan*®, *Veleran*®). Other calcium-channel blockers such as amlodipine (*Norvasc*®) selectively act on smooth muscle in the peripheral arteries and are used to treat high blood pressure (hypertension).

Any antiarrhythmic has the potential to produce deleterious side effects and, under certain circumstances, antiarrhythmic drugs can exacerbate dangerous arrhythmias. Since not all arrhythmias require treatment, careful assessment by a veterinarian experienced with treating arrhythmias, is essential to ensure that a prescribed antiarrhythmic type and dose is efficacious and safe for your pet. Since the underlying disease precipitating the arrhythmia is often progressive, regular rechecks are typically advised to confirm that a certain antiarrhythmic treatment continues to remain appropriate.

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