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## Congestive Heart Failure and Medical Therapy

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### What is the treatment for congestive heart failure?

The mainstay of medical therapy of congestive heart failure is the careful use of a class of drugs called diuretics. Diuretics cause the kidneys to excrete sodium (salt), which in turn causes water loss through the kidneys, resulting in a reduction of the overall body water and blood volume. This lowers pressure on the veins in the lung tissue and thereby decreases the formation of heart failure fluid (pulmonary edema). Since diuretics affect the kidneys, overzealous use can lead to dehydration and blood salt (electrolyte) imbalances. This may be manifested as lethargy, vomiting and a lack of appetite. Clinicians monitor patients on diuretics with blood tests. The most common diuretic prescribed is a drug known as furosemide (*Lasix*®, *Salix*®). Other diuretics that are commonly used include spironolactone (*Aldactone*®), and hydrochlorothiazide (*Thiuretix*®, *Esidrix*®, *HydroDIURIL*®). Diuretics are the most important medications an animal with acute congestive heart failure receives, and can save the life of a pet in crisis.

Another group of drugs commonly prescribed to animals suffering from congestive heart failure affect the blood pressure. The most common medications used inhibit an enzyme called angiotensin-converting enzyme (ACE). These include enalapril (*Enacard*®), benazepril (*Lotensin*®) and lisinopril (*Zestril*®). These medications reduce blood pressure and decrease the workload on the failing heart. They also limit the kidneys' ability to retain salt and water, and temper the effect of certain hormones on the failing heart. Routine lab tests are required for pets in congestive heart failure to monitor the kidney function over time. Other drugs can also be used to lower peripheral blood pressure and improve heart output. These medications include amlodipine (*Norvasc*®) and hydralazine (*Aprisoline*®). Regular monitoring of blood pressure is necessary to prevent overdose.

Cardiac glycosides (digitalis glycosides) have been used for centuries in medicine to treat congestive heart failure and are used primarily as an adjunct therapy for management of arrhythmias. The most common drug used is digoxin (*Lanoxin*®), though occasionally digitoxin (*Crystodigin*®) is used as well. More recently, a class of drugs called inodilators has been approved for use in dogs with congestive heart failure that often replaces the use of cardiac glycosides. Inodilators provide both a decrease in peripheral vascular pressure

(vasodilation) and improved heart muscle strength (positive inotropy). These medications can strengthen the contractile force of the heart muscle, making it function better as a pump. Pimobendan (*Vetmedin*®) is currently approved for use in dogs with congestive heart failure. Digitalis glycosides may be used to slow the heart rate down, allowing for better filling of the heart chambers. It has a relatively narrow therapeutic range, and animals exhibiting signs of overdose may be inappetent, or exhibit vomiting and diarrhea. If a pet on these medications shows any of these signs, it is wise to inform the veterinarian.

Beta-blocking agents are antiarrhythmic drugs that may be administered to pets after they recover from their outward signs of congestive heart failure. Beta-blockers can help slow scarring that occurs with long-standing heart disease, stabilize the heart rhythm, and slow the resting heart rate. A slower resting heart rate allows for more effective filling of the heart and can improve heart function. Examples of beta-blockers include propranolol (*Inderal*®), atenolol (*Tenormin*®), metoprolol (*Toprol*®), carvedilol (*Coreg*®) and sotalol (*Betapace*®). Careful monitoring by the veterinarian is necessary to minimize side effects, which can include low blood pressure, collapse and worsening of congestive heart failure.

Calcium-channel blockers are another group of antiarrhythmic drugs that animals with congestive heart failure may be given. These drugs also can be used to slow the heart rate, and are often used in combination with digoxin to effectively treat those patients with fast or irregular heart rates that are contributing to or caused by congestive heart failure. Examples of calcium-channel blockers include diltiazem (*Cardizem*®, *Dilacor*®) and verapamil (*Isoptin*®, *Calan*®, *Verelan*®).

Pets diagnosed with congestive heart failure may ultimately be placed on multiple medications, and careful monitoring by the veterinarian is necessary to minimize adverse effects. Many medications are started at a low dose, and slowly increased depending on how well the animal is tolerating therapy. Since arrhythmias may necessitate specific therapy, additional medications may be required. Some animals with congestive heart failure may also have fluid accumulate in the chest cavity outside the lungs (pleural effusion) or in the abdomen (ascites). Intermittent drainage (thoracocentesis or abdominocentesis, respectively) may be necessary to improve the pet's ability to breathe. Clopiogrel (Plavix) and/or aspirin may be prescribed to cats at risk of developing a thrombus or "clot." Dietary manipulation in the form of lower sodium diets may also improve the quality of life in pets with congestive heart failure. At some point, medical therapy becomes less effective, and despite alterations in drug regimens, animals may become refractory to therapy.

Updated 6/2/2010: Ashley Saunders, DVM, Diplomate ACVIM (Cardiology)  
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