

Heart Failure Therapy

Long-Term Therapy for Heart Failure

When the heart is not able to pump out the volume of blood it receives (backward failure) or cannot pump out enough blood to supply oxygen to the body (forward failure), the goal is to avoid or resolve a life-threatening crisis. Once the short-term disaster is resolved, we look to a more long-term therapy plan.

The Basics of Short-Term Heart Failure

In the short term, the body has an assortment of mechanisms to preserve circulation to the heart and brain and keep blood pressure up. The problem is that these mechanisms evolved for protection against blood pressure drop due to bleeding (as in predator attack). Protection against heart failure is an added benefit in the short term but in the long term problems arise.

So let's say blood pressure drops. It could be because a predator has taken a bite out of a large blood vessel and there is bleeding or more relevant to the topic of this discussion, it could be because the heart just is not moving an adequate quantity of blood forward. Either way the tissues of the body need more blood supply and they need it quickly. What does the body do?

Neurologic reflexes are activated that cause the heart to pump faster and stronger to move the maximum blood with each contraction.

Antidiuretic hormone and aldosterone (an adrenal hormone) are released telling the kidney to hang on to every last sodium atom it sees. Where there is sodium, there is water and water (blood is mostly water) is the medium through which supplies reach our tissues and wastes are removed from our tissues. If we are going to have adequate blood, we need adequate water and that means hoard sodium.

A hormone system called the renin-angiotensin system kicks on to produce a material called angiotensin II. Angiotensin II is one of the strongest vasoconstrictors known to science. It closes off vessels supplying non-essential areas, preserving circulation for the heart and brain that must be kept perfused at all costs.

So, in short, our heart works harder, our vessels close off, and we retain salt. This is all wonderful but if the heart is weak, it cannot handle the extra blood volume brought on by retaining salt, nor can it push blood through constricted vessels or continue pumping faster and harder all the time.

Long-Term Heart Failure Management

Managing the failing heart is all about creating a balance for what a sick heart can handle and lifting the burden created by the protective mechanisms of the crisis. Our patient should be comfortable and able to perform modest exercise. We want to minimize discomfort due to coughing, fluid build-up, or collapse.

Heart failure can be staged according to the severity of the signs and therapy can be selected from the options reviewed below based on the patient's stage.

Clinical Stages of Heart Failure

STAGE I

The patient has heart disease but there are no clinical signs of any kind.

STAGE II

The patient has heart disease and clinical signs of heart failure occur with exercise but not at rest.

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STAGE III

Heart disease is producing clinical signs of failure with day to day activity.

STAGE IV

Severe signs of failure are present even at rest.

Patients in Stage IV require emergency care while those in earlier stages have the leeway of oral medication trials at home. Not every patient will respond to therapy and it may take weeks to achieve the desired balance.

Sodium Restriction

In most heart failure scenarios, the heart is unable to handle the blood volume with which it is presented. Fluid backs up and leaks out, creating either fluid in the lung (pulmonary edema) or fluid buildup in the belly. In the long term, the last thing we want is to retain sodium and give the heart more blood volume to pump.

A sodium-restricted diet is helpful in relieving some of the heart's burden if the pet will eat it. Some commercial diets are available but are generally bland. Using purified water for drinking may also help as many geographic areas contain water with high sodium levels.

Poor appetite bodes poorly in heart failure as does loss of muscle tone. One must balance the blandness of the low sodium diet with keeping the pet's appetite up.

Beware of Treats

Most pets receive food treats and, unfortunately, these are frequently laced with sodium. Similarly, medications are often given hidden in a piece of cheese or lunch meat. The therapeutic diet can be totally undermined by too many high-salt treats. Safe treats for dogs include: apple slices, baby carrots, banana slices, and orange sections. In commercial treats for dogs, look for less than 13 mg of sodium per treat, and for cats make it less than 3 mg of sodium per treat. Limit intake to only a couple of treats per day. "No salt added" styles of peanut butter can be used to administer medication. Home-cooked meats can be used but not processed lunch meats. Medications can often be made into palatable liquid formulas by a compounding pharmacy. Ask your vet if you need more suggestions.

Omega 3 Fatty Acids

Supplementation with omega 3 fatty acids is currently being researched as a possible treatment for the drastic weight loss (cardiac cachexia) that occurs with some cases of heart failure. If a pet enjoys these fishy flavored supplements, this may be a particularly helpful way to encourage appetite.

Activity Restriction?

People often ask how much restriction in exercise they should impose. Some exercise is good for the pet's well-being and life quality. Avoid exercise that leads to excessive panting or weakness.

Diuretics

A diuretic is a drug that increases urine production. Diuretics are life-saving in a heart failure crisis where the lungs are filling with fluid because the heart cannot pump blood in quantities large enough to prevent fluid build-up. The dose needed for long term comfort is highly individual and may change depending on the stage of disease. Furosemide is almost always the first diuretic used as it is one of the most powerful. It is often used in combination with an ACE inhibitor or with the newer drug, pimobendan (which strengthens heart contractions), for long-term therapy. Spironolactone is another diuretic commonly used especially in patients who do not respond adequately to furosemide alone.

ACE Inhibitors

ACE stands for angiotensin converting enzyme. We briefly mentioned the renin-angiotensin system above. Angiotensinogen is an inactive product made by the liver. It circulates all the time and converts to a substance called angiotensin I at a rate so slow as to be completely innocuous. When blood pressure drops, receptors in the kidney detect the drop and release a hormone called renin. Renin is a catalyst. It makes the conversion of angiotensinogen to angiotensin I happen much faster to

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create a large amount of circulating Angiotensin I. The final activation occurs in the lung where ACE converts angiotensin I to angiotensin II, completing the transformation from Clark Kent to Superman.

During an emergency we need Superman but on a day to day basis we want less Superman and more Clark Kent.

By using medication to inhibit ACE, we get less sodium retention and we keep blood vessels open. When the heart is overwhelmed by the amount of blood it is asked to pump forward (i.e., it receives more blood than it can pump out), it is helpful to dilate peripheral blood vessels. Another analogy might involve a freeway system or turnpike with an inefficient tollbooth: Opening up more side streets, reduces traffic on the main freeway. Opening up peripheral blood vessels means less blood volume for the overloaded heart to pump.

Disadvantages

One of the effects of the ACE inhibitor is reduced blood flow through the kidney. The kidney's normal function depends on receiving good blood flow. Borderline kidney function may suffer from ACE inhibitor use, particularly when it is combined with diuretics - as it usually is for heart failure - thus necessitating monitoring tests for kidney function. ACE inhibitors can also drop blood pressure excessively and may lead to retention of potassium.

Pimobendan

Pimobendan is a relative newcomer to the cardiac drug armamentarium. It works by helping the heart pump more efficiently and strongly. It also dilates blood vessels both going to and from the heart thus giving the "extra" blood a place to go so as not to overload the heart. Relatively stable heart failure patients are commonly started on this medication in addition to a diuretic and sometimes also with an ACE inhibitor.

Digoxin

Dogs are often prescribed digoxin in combination with the above medications.

It yields several benefits:

It causes the heart to pump slightly stronger and more efficiently without pumping faster.

It reduces certain types of rhythm disturbances.

It reduces stimulation by the sympathetic nervous system to reduce heart rate.

The biggest down side is what is called a narrow therapeutic range. This means that there isn't much leeway between a dose that helps and a toxic dose. Blood levels must be regularly monitored. Upset stomach can be a side effect. Concurrent use of certain other drugs can influence the strength of any given dose of digoxin so it is important for your veterinarian to know of all medications your pet is taking. The advent of pimobendan has made the use of digoxin far less common.

It is important to realize that heart failure is a symptom of a structural heart disease. Beyond simply managing heart failure, it is important to determine why the heart failed in the first place and identify the disease process that is responsible. More specific therapy may be helpful.

Learn How to Check your Pet's Respiratory Rate

A patient with heart failure distress will have an increased respiratory rate. A pet with controlled heart failure may have a respiratory rate that is greater than normal. It is helpful to know what is normal for your pet and check several times daily. Simply watch the number of chest excursions during a 15-second period. A change in respiratory rate is a good sign the pet needs a check up with the veterinarian. With cats, be sure the cat is not purring when respiratory rate is checked. Do not count panting for dogs.