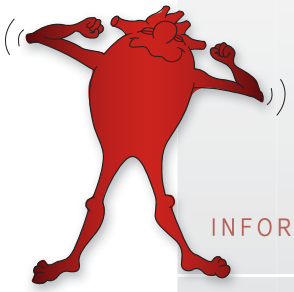
Penn Medicine

A Stronger Pump:
A GUIDE FOR PEOPLE WITH ALL TYPES OF HEART FAILURE



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PRITCHETT & HULL ASSOCIATES INC
STE 110
3440 OAKCLIFF RD NE
ATLANTA GA 30340–3006

1-800-241-4925

2012 Edition

A StrOnger Pump

a guide for people with all types of

Heart Failure

by
Julia Ann Purcell, RN, MN, FAAN
Barbara J. Fletcher, RN, MN, FAAN

This book can help you understand heart failure and how to manage it. If you still have questions after reading it, ask your doctor.

If you just found out that you have heart failure, you may feel scared and alone. But you're not. There are nearly 6 million Americans with this chronic disease.

Make sure that you share this book with your loved ones. The more you and your loved ones know about your heart failure, the better you can manage it and the better your chances for living a longer, fuller life.

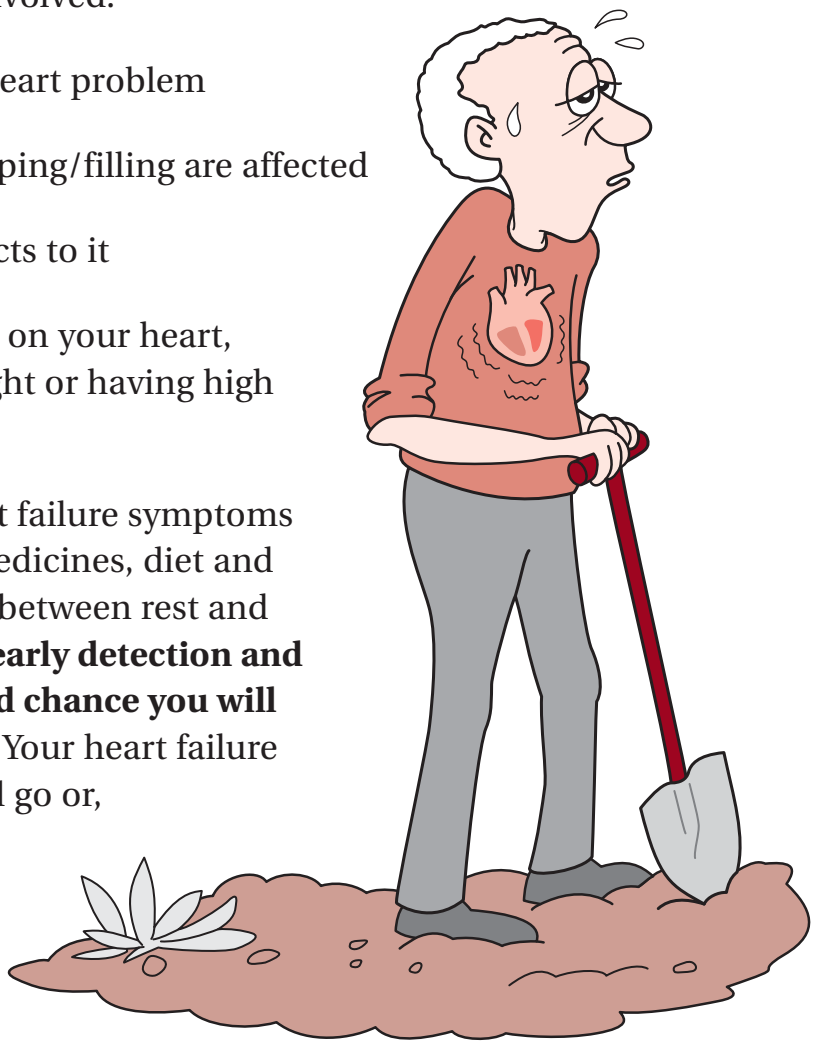
This book offers guidelines that can help your heart become a more efficient pump. The book is not designed to replace your doctor's advice or treatment.

Heart failure

A healthy heart pumps out enough oxygen-rich blood to feed all parts of the body. When your heart can no longer do that, you have heart failure. Blood backs up into your lungs and other parts of your body. This causes symptoms such as shortness of breath or swelling in the belly, hands, legs and feet.

Heart failure, or congestive heart failure (CHF), can range from mild (more common) to severe. There are many factors involved:

- the cause of your heart problem
- the way heart pumping/filling are affected
- how your body reacts to it
- any extra demands on your heart, like being overweight or having high blood pressure.

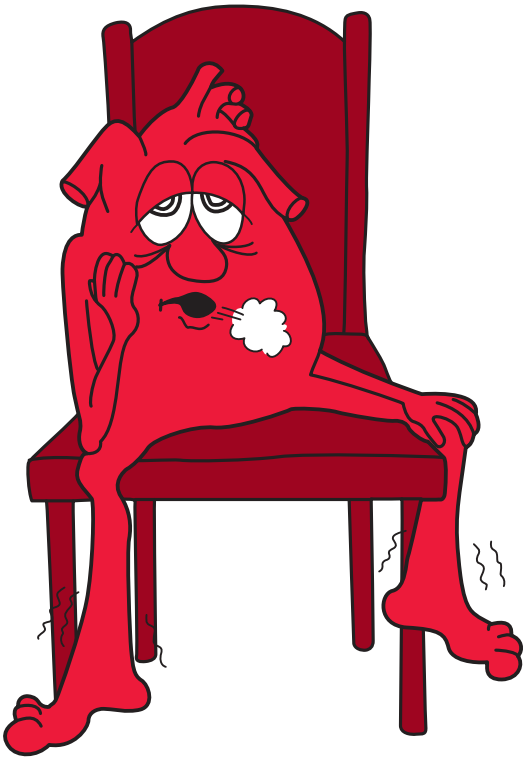


Most often, your heart failure symptoms can be controlled with medicines, diet and finding the right balance between rest and low-level exercise. **With early detection and treatment, there is a good chance you will lead a more normal life**. Your heart failure symptoms may come and go or, in a few cases, go away completely.

How you may feel

As heart failure gets worse, you may notice some or all of these:

- **sudden weight gain**
  (3–4 lbs in 1 to 2 days or 2 lbs overnight)
- **swelling of the legs and ankles**
- **swelling, bloating** (making you feel full much earlier at meals) **or pain in the belly**
- **trouble sleeping unless propped up on 2 or more pillows** (may also be caused by problems other than heart failure)
- **shortness of breath** (may be all of the time, with exertion or only when waking up breathless at night)
- **frequent, dry, hacking cough**
  (most often when lying down)
- **loss of appetite** (or nausea)



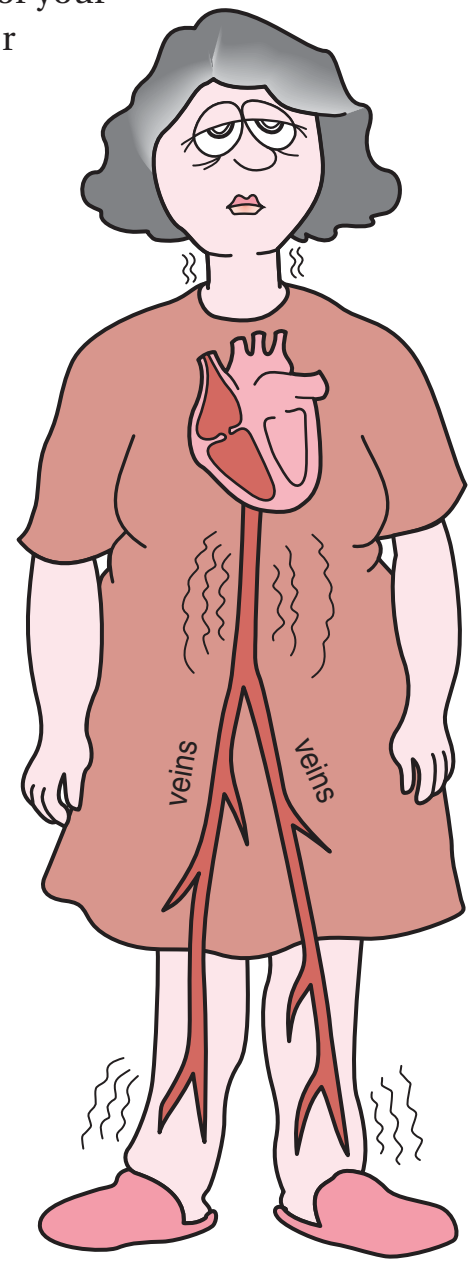
You may also get tired from very little effort. This happens when your blood flow is sluggish. You may wake up feeling tired or get drowsy in the afternoon. This is even more likely if you aren't breathing well when you sleep. Your family may notice snoring or louder snoring than before.

Many of these symptoms happen for other reasons, too. So your doctor will check your heart and lungs and, if needed, order a blood test* (and/or a sleep study) to help find out the cause.

* BNP=brain (or b-type) natriuretic peptide or NT-proBNP

When the heart is pumping well, blood goes from the veins to the **right** side of your heart and is pumped to your lungs for more oxygen. Then, the blood goes to the **left** side of your heart and is pumped out through the main artery (aorta) to your body.

If your heart failure is due to pumping weakness, it may start in the **right** or **left** side of your heart, but soon **both** left and right chambers are strained.



right heart failure

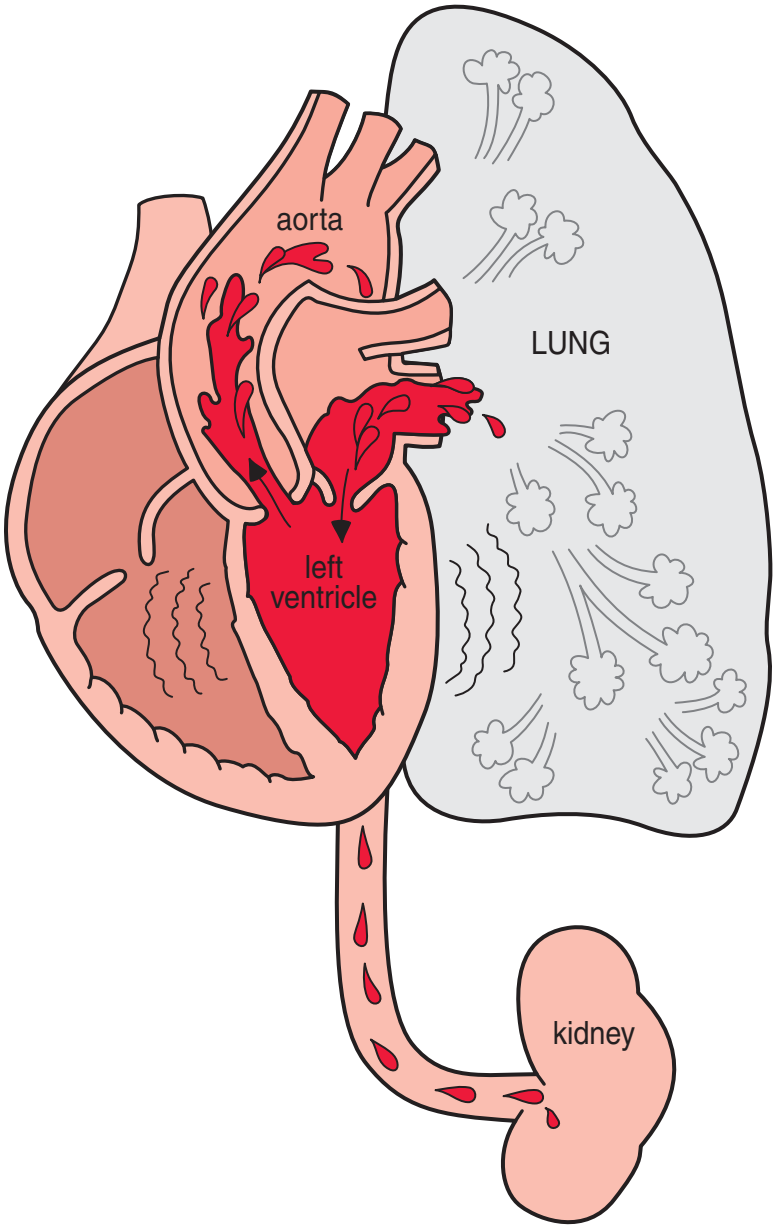
When the right side of your heart has a pumping problem, blood backs up in your veins. You may not notice it, since veins can stretch and hold the extra blood.

Days or maybe weeks later, you may notice that your legs and ankles are swollen. You may also feel sore or swollen in the upper right side of your belly. And you may feel tired and not want to eat.

left heart failure

When the left side of your heart does not pump out all the blood it gets, fluid backs up into your lungs. You may:

- feel short of breath
- have a dry hacking cough
- have trouble sleeping if you do not prop up on pillows
- wake up feeling out of breath



You may also feel swollen or bloated. This is because your body is holding too much fluid. This adds to your heart's workload. Your weak heart has to pump all of this extra fluid along with the blood.

Why your body holds fluid:

A weak heart sends less blood to the kidneys. The kidneys think the body doesn't have enough blood. So, instead of passing it out in the urine, the kidneys keep this water and salt in the blood.

A sudden weight gain is one sign the kidneys are holding salt and water in your body. To check for this, **weigh each morning** after you urinate and before eating or getting dressed. **Write down your weight.**

- Each time you weigh, make sure your scale is set on a hard surface (not carpet) and adjusted to zero.
- When checking your weight, think about how well you are eating. If you are eating less and losing pounds, you may not notice a gain from fluid.
- If you gain 3–4 lbs in 1 to 2 days of normal eating (or 2 lbs overnight), it is more likely due to fluid rather than food. Call your doctor for advice to get rid of this extra fluid before it weakens your heart more. Often, you need more diuretic (or another drug).
- Always write down your weight and any diuretics taken in a notebook lined off like this:

Date	Weight	Diuretic Taken

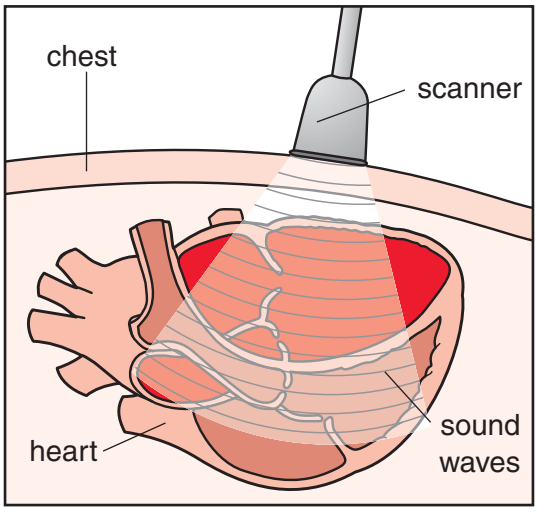
Heart failure testing

Your doctor will order a full 12-lead EKG and one or more of these tests to detect, monitor and/or choose the best treatment for you. Often this leads to fewer heart failure symptoms as well as treatment to improve (or get rid of) your heart problem.

echocardiogram (ECHO)

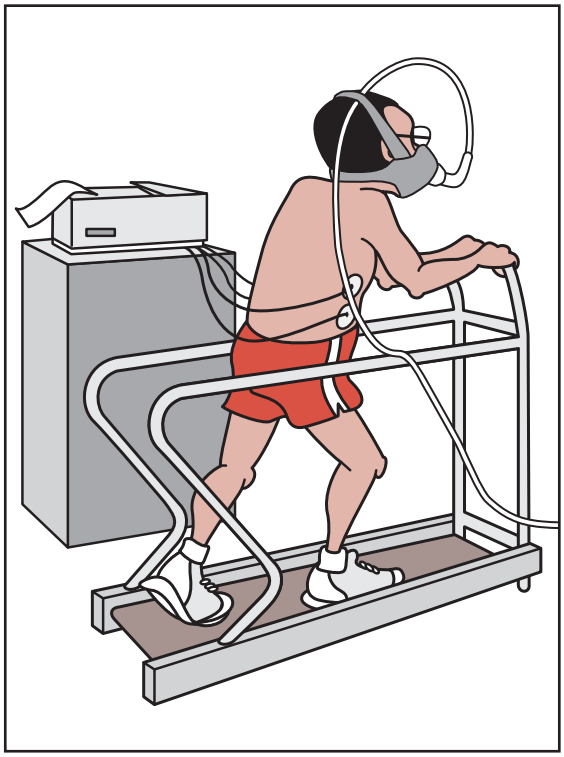
An echocardiogram is an ultrasound of your heart. Sound waves (sonography) are moved over the heart to show:

- problems with the heart muscle
- how well it pumps
- the condition of your heart valves and the sac around the heart



A technician moves a hand-held scanner over your chest, taking pictures and recording them. You may feel some pressure as the scanner is pressed against your chest. Pictures can be made from several angles (two or three dimensional ECHO). Doppler imaging can also be added to show how the blood moves inside your heart and back and forth across your heart valves.

Echocardiograms also measure the ejection fraction ("EF"), an estimate of the heart's pumping strength. A normal EF is 50% or more.



exercise test

This test records your heartbeat and blood pressure at rest, during exercise and just after exercise. You may be asked to walk on a treadmill or ride a stationary bike.

As you exercise, your workload is slowly increased to see how your heart responds. You may also be asked to breathe through a tube or mask to measure how much oxygen your body uses.

other tests are sometimes needed

A **cardiac catheterization** may be done if narrowing in your heart arteries is suspected. **Ultrafast CT scans** can detect build-up of calcium in the heart arteries. **Multi-slice cardiac CT scans** take X-ray pictures of the beating heart, major blood vessels, lungs and the sac around the heart. Sometimes IV contrast is given and pictures are also made of the heart arteries.

Magnetic resonance imaging **(MRI)** is sometimes needed to find the reason for heart failure. MRI offers more detail about the lower heart chambers. In some cases, an MRI is helpful to find out more about how well the heart pumps.

Nuclear scans can be used. Sometimes a positive emission tomography **(PET scan)** or a **thallium scan** is needed to see if bypass surgery will help certain areas of the heart.

treatment overview

These tests will help your doctor treat what's going on in your heart. Each heartbeat involves a squeeze (pumping) and time for relaxation (filling). Although pumping problems are more common*, heart failure often includes some of both of these:

- **weak pumping** (systolic heart failure)
  The ejection fraction (EF) is an estimate of the heart's pumping strength. Normal strength is 50% or higher. Less than 50% means weak heart pumping, also called LVSD (left ventricular systolic dysfunction).

- **poor filling** (diastolic heart failure)
  Stiff lower chambers do not relax for good filling and stretching. If your heart failure is mostly poor filling, your EF may be normal or even high. Diastolic heart failure is common when you have high blood pressure, but can also occur with other heart problems.

When your body doesn't get enough oxygen-rich blood, stress hormones and nerve signals tell the body arteries to tighten. Tight arteries make it harder for your heart to pump. Stress hormones also keep salt and water from going out in your urine. This means fluid can build up in the tight blood vessels, making even more work for the heart. Extra salt and water in the body will cause thirst but drinking too much fluid will make things worse.

Medicines to relax tight arteries (and remove any extra fluid) will make it easier for your heart to fill and pump out the blood. Most heart failure patients also need to eat less salt to avoid fluid-buildup, reduce swelling and breathe easier.

* 2009 update to 2005 ACC/AHA Adult Chronic Heart Failure Guidelines (Sec. 2.1).

Medical treatment

For most, the daily treatment of heart failure includes:

- **taking 3 or more medicines and keeping a weight record to watch for fluid buildup**
- **eating less salt and limiting fluids**
- **balancing low-level exercise and rest**
- **reducing demands on your heart when you can**

Some patients also get a daily benefit from an implanted pacemaker or ICD (see pages 18-19).

take medicines and keep a daily weight record

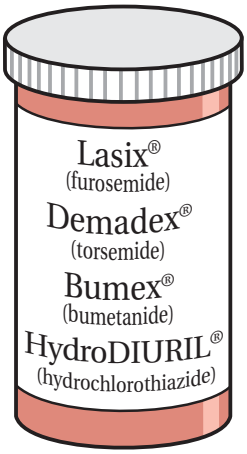
These four types of drugs are common in treating heart failure:

1. **Diuretics** cause you to pass more urine. This helps reduce the amount of blood your heart has to pump. Some diuretics also block aldosterone (a stress hormone) and save potassium.
2. **ACE inhibitors and ARB's** relax your blood vessels and make your heart's workload easier over time.
3. **Beta-** or a **beta-and alpha-blocker** offer many long-term benefits to make your heart's workload easier.
4. **Digoxin** may also be given to help control heart rate during atrial fibrillation or if symptoms of heart failure persist.

Other drugs may be needed to prevent clots. This includes aspirin, an anti-platelet drug or a "blood thinner." Drugs to control heart rhythm (beta-blocker and/or anti-arrhythmic) may also be needed.

diuretics (and potassium supplements)

diuretics



Diuretics (water pills) help the kidneys make more urine and get rid of excess fluid. Diuretics can also decrease fluid in the lungs and help you breathe more easily. But at night, you may need to go to the bathroom more. When you lie down, more blood goes to your kidneys, which causes them to make more urine.

Holding fluid is very common when your heart is weak. Taking diuretics daily and limiting salt help prevent this fluid build-up.

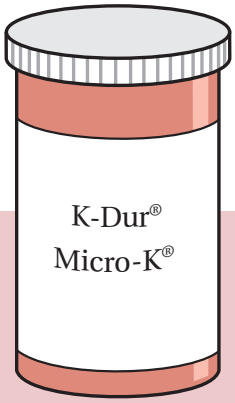
When you have heart failure, weigh daily and watch for fluid build-up (3-4 lb weight gain in 1-2 days or 2 lbs overnight). If you have fluid build-up, take action. Call your doctor right away for advice to reduce your heart's workload.

If you have fluid build-up often, you may be told to take an extra diuretic tablet. This weight chart shows one heart failure patient's success following his doctor's advice to take an extra Lasix® for rapid weight gain:

example:

DATE	WEIGHT	DIURETIC TAKEN
11/6	152 lbs	1 Lasix® (furosemide) tablet
11/7	156 lbs	2 Lasix® (furosemide) tablets
11/8	151 lbs	1 Lasix® (furosemide) tablet

Always follow your doctor's advice about diuretics. Taking too much diuretic on your own can cause serious and even life-threatening problems. If you are urinating a lot, but still holding fluid, eat less salt.



potassium supplements

Your body needs potassium. Your heart needs normal blood potassium (K+) for your heart rhythm. Many diuretics cause a loss of potassium in the urine. Often, food alone can't replace the amount of potassium removed by the diuretic. A blood test is used to see if potassium supplements are needed. Most people who need supplements take them with their meals.

potassium sparing diuretics

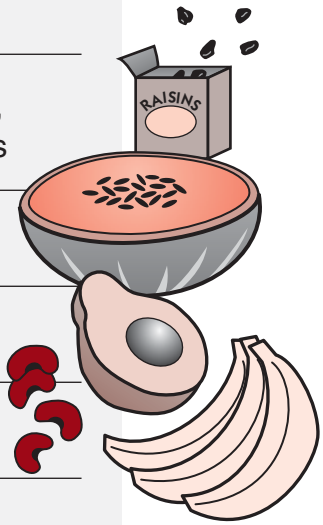
Some diuretics also block a stress hormone called aldosterone. Blocking this hormone helps avoid heart failure getting more severe. Spironolactone (Aldactone®) and eplerenone (Inspra®) are examples of these aldosterone-blocker diuretics*. Unlike most other diuretics, aldosterone-blocker diuretics are 'potassium-sparing'. Taking a potassium-sparing diuretic may mean taking fewer potassium supplements (or none in some cases). Blood tests to monitor potassium are needed, especially after the first 7 days of taking a potassium-sparing diuretic.

Blood tests also show if kidney function changes over time. This can happen with heart failure, causing you to need less potassium. Some people with heart failure **do not** need any extra potassium. They are told to avoid salt substitutes and sodium-free bouillon (Example: Herb Ox® or Wylers®) since both are high in potassium.

* Males who get breast tenderness while taking an aldosterone-blocker diuretic should tell their doctor. Often a different potassium-sparing diuretic can be used without this side effect.

High potassium foods

dried fruits	raisins, prunes, apricots, dates
fresh fruits	bananas, strawberries, watermelon, cantaloupe, oranges, grapefruit, kiwi, nectarines
fresh vegetables	avocados, potatoes, broccoli, greens, spinach, peas, tomatoes, mushrooms
dried vegetables	beans, peas
fresh meats	turkey, fish, beef
fresh juices	orange, grapefruit
canned juices	grapefruit, prune, apricot NOTE: Avoid canned juices, like tomato and V-8®, that contain salt. Read all labels for salt, sodium or sodium compounds (or NaCl, as salt is often written).

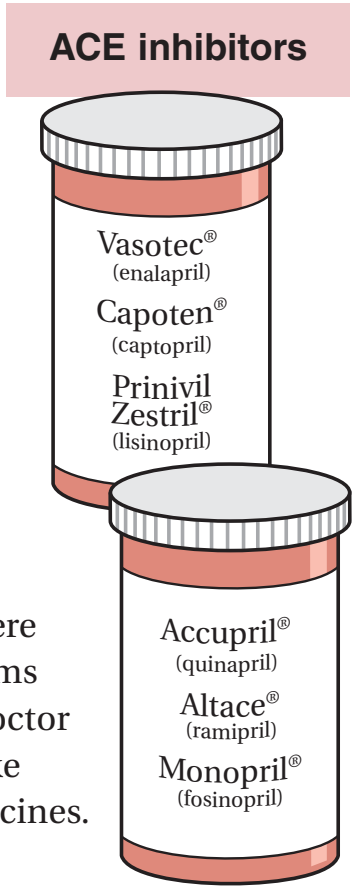


salt substitutes or sodium-free bouillon (often high in potassium)	NOTE: Check with your doctor before using salt substitutes or sodium-free bouillon. Most have a lot of potassium and in some people, too much potassium can be dangerous.

Remember – diuretics send extra body fluid out in the urine, often washing out potassium at the same time. Regular blood tests for potassium are needed to see if you need to eat more high-potassium foods or if you should avoid those foods. Do what your doctor tells you to keep your potassium within healthy levels.

ACE inhibitors (or ARBs)

Angiotensin-converting enzyme (ACE) inhibitors are used to treat heart failure. These drugs limit the amount of angiotensin, a substance your body makes to tighten the arteries. They offer long-term benefits that help improve symptoms, keep heart failure from getting worse and prolong life.



When you begin taking an ACE inhibitor, you may feel weak, dizzy or have a cough that seems to hang on. Tell your doctor about any of these so a dosage or drug change can be made.

Non-steroidal anti-inflammatory drugs (NSAIDs) interfere with the benefits of ACE inhibitors and can worsen symptoms of heart failure by causing fluid retention. Talk with your doctor before you take any NSAIDs, even over-the-counter ones like ibuprofen, Advil®, Motrin®, Aleve® and other arthritis medicines.

Angiotensin II receptor blockers (ARBs) or vasodilators are used to relax blood vessels when someone cannot take an ACE inhibitor. Both help keep heart failure from getting worse. If someone can't take an ACE inhibitor or an ARB, vasodilators may be helpful.

Some ARBs are:

- losartan (Cozaar®)
- valsartan (Diovan®)
- candesartan (Atacand®)

Some vasodilators are:

- hydralazine* (Apresoline®)
- isosorbide* (Isordil®)
- nitroglycerin (Nitro-Dur®)

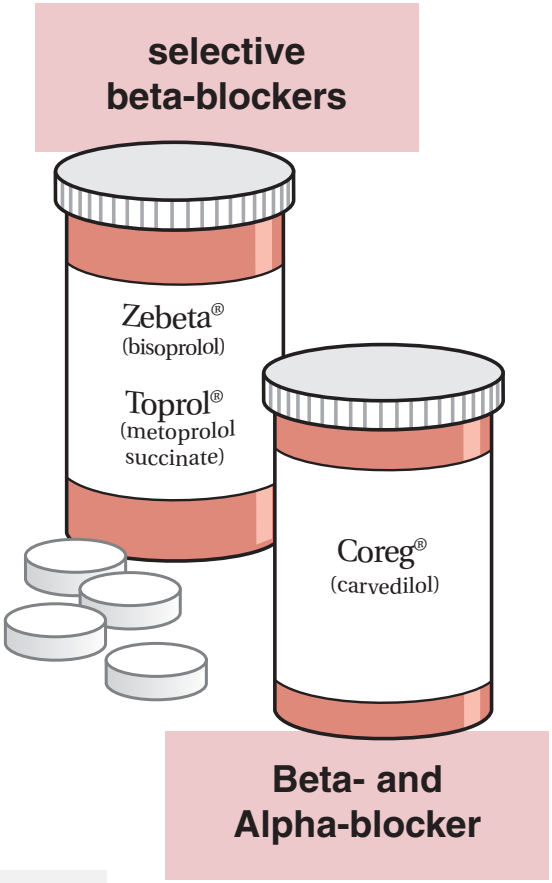
** BiDil® is a combination of these 2 drugs, first proven helpful in African-Americans with a weak heart and now in all races when heart failure doesn't respond to first-line drugs.*

You should not stop taking your ACE inhibitor, ARB or vasodilator drugs without your doctor's advice, no matter how good you feel.

beta-and alpha-blockers

Beta- and alpha-blocker drugs block the effect of certain nerve signals and hormones (adrenaline and norepinephrine). When these are blocked, body arteries relax and your heartbeat slows down. As the heart pumps more blood to your kidneys, sodium and extra fluid are passed in the urine. Heart failure symptoms are likely to improve after 2 to 3 months.

When you first begin to use a beta-blocker, side effects such as holding fluid, feeling more tired, a slower heartbeat or dizziness may occur. These side effects often stop and do not prevent long-term use of a beta-blocker.



Taking an **ACE inhibitor** or **beta-blocker** improves heart failure over time (i.e., months and years).

Studies show that people with a weak heart muscle (ejection fraction <40%) will live longer if they take an ACE inhibitor as well as a beta-blocker.

Low doses are often used at first with slow increases (every 2 to 4 weeks) to get the most benefit with the least side effects.

digoxin

Digoxin (Lanoxin®) may be helpful in some people with weak heart pumping. If you still have symptoms after taking diuretics, an ACE inhibitor (or ARB) and a beta-blocker, digoxin may be used. Digoxin blocks an enzyme in the cardiac cells so the heart muscle may respond by pumping harder. Digoxin can also be used for irregular heart rhythms such as atrial fibrillation.

Sometimes digoxin builds up too much in the body. This can cause one or more of these:

- loss of appetite, distaste for food or a bad taste in the mouth
- nausea or vomiting
- blue or yellow vision
- skipped heartbeats, palpitations or rapid beating

If any of these occur, tell your doctor right away. Too much digoxin can cause other heart rhythm problems. Be sure to take it only as your doctor orders.

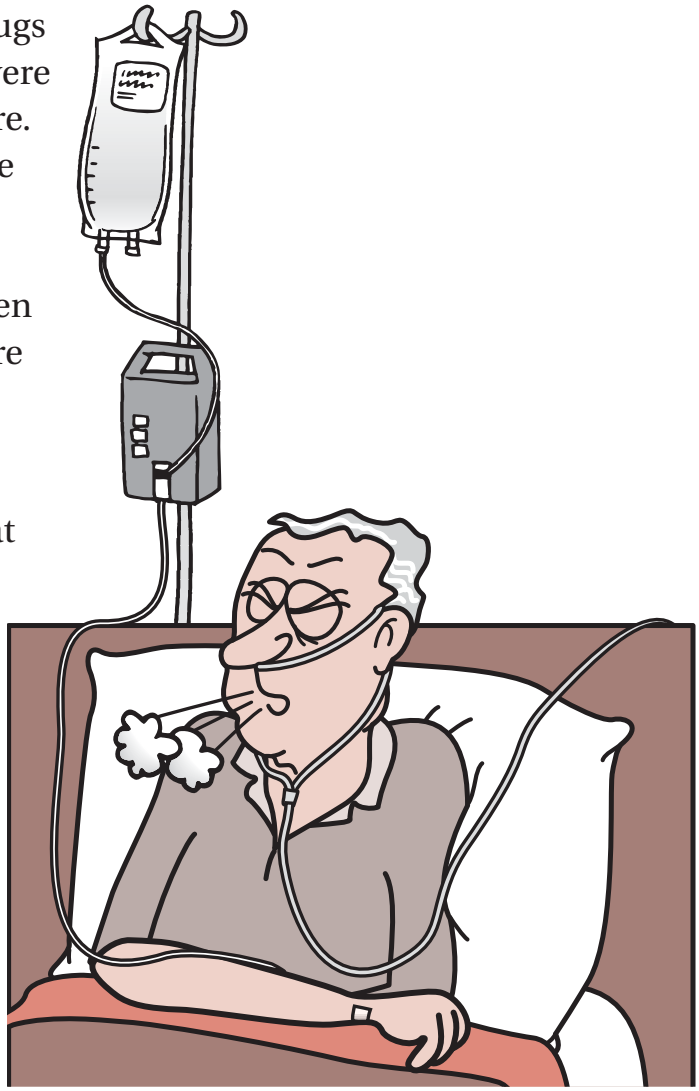
other drugs

Some heart failure patients also need medicine to reduce the risk of blood clots, to control rapid heart rates (often a beta-blocker) or to prevent an abnormal heart rythm (anti-arrhythmic).

in-hospital drugs

IV medicine

Sometimes intravenous (IV) drugs are used for short-term relief of severe or sudden symptoms of heart failure. IV diuretics can be given to help the kidneys quickly remove extra fluid. Drugs to prevent blood clots (example: Heparin) can also be given by IV in the hospital. Blood tests are used to monitor the dose.



IV drugs like dobutamine and milrinone can make your heart beat stronger. IV nesiritide (Natrecor®) can make it easier for your heart to pump by relaxing your arteries and causing your kidneys to remove extra fluid.

These drugs are given through a small tube in your vein. Often a pump controls how much medicine you get. Blood pressure checks are often needed when you get these IV drugs.

Sometimes a procedure called ultrafiltration is used to remove the extra fluid when diuretics and other treatments aren't working. Ultrafiltration involves passing the blood through a special filter so excess salt and fluid can be removed.

Surgery for heart failure

coronary artery bypass graft (CABG)

Sometimes bypass surgery can improve blood flow to the heart when a fatty blockage or clot in a coronary artery is about to cause damage to a large section of the heart. Although more blood flow doesn't help areas of old damage (scar), bypass surgery can help prevent new damage when there is severe narrowing in one or more arteries.

cardiac electrical devices

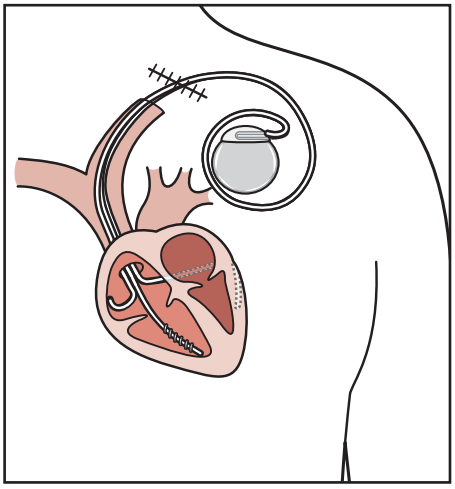
Your doctor will let you know if your heart failure can be improved with a cardiac electrical device. This could include:

- a biventricular pacemaker to correct an electrical delay **and/or**
- an ICD to help stop a life-threatening heart rhythm

Often heart failure patients need a device that works as both a pacemaker and an ICD.

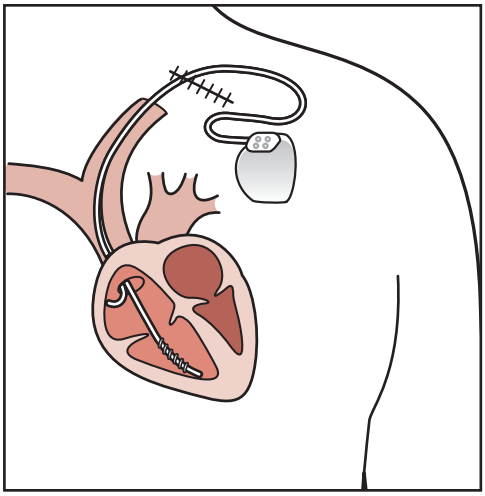
Biventricular pacemaker (CRT*)

Some heart failure patients have an electrical delay in their heart muscle contractions. This delay may mean the heart chambers do not beat when they should. If you have this delay, a biventricular pacemaker can correct it, so the chambers can beat in normal sequence. This may improve your heart failure symptoms and give you more energy.



* Biventricular pacing is also known as cardiac resynchronization therapy (CRT).

Internal Cardioverter Defibrillator (ICD)



An ICD is used to stop life-threatening heart rhythms. The device can tell when these rhythms occur. Within seconds, it can deliver a shock and try to stop the rhythm.

Recent studies have shown that an ICD can help someone with heart failure who is at risk for a life-threatening heart rhythm. Most ICDs can also pace your heart to help keep a normal rhythm.

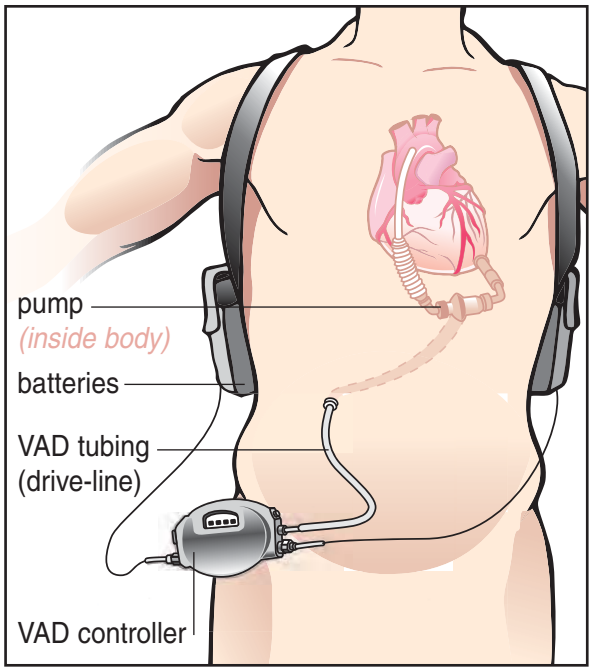
A few precautions are advised if you have a cardiac device. **Large electromagnetic fields must be avoided, especially if you have an ICD.** More information is available on the device maker's website and the Pritchett & Hull booklet, **You Have a Pacemaker and/or ICD.**

All cardiac devices require regular follow-up. Often wireless technology and/or phone lines allow you to send device readings from home to a secure internet server for your doctor or clinic to review. Your doctor is notified right away of important changes. Sometimes weight and blood pressure readings are also sent through the home monitoring system. Your healthcare provider can see changes in your readings and may be able to adjust your medication before you have major symptoms or need a hospital stay.

VAD (ventricular assist device)

A ventricular assist device (VAD) refers to a small pump placed in the chest to boost blood flow from a lower heart chamber to a large body artery. Newer VADS are smaller* and often allow living at home with family support. VAD patients often have more energy, fewer medications and an improved quality of life. A VAD implanted for long-term use is called "destination therapy".

All of today's VAD pumps have a **drive-line tubing** that comes through the skin and connects to an outside VAD controller ("brains"). Cables from the controller lead to either **battery or AC power**. During the day, the batteries and VAD controller are placed in the pockets of a VAD vest worn over clothing. At night, the patient (and family) disconnect the battery cables and plug them into the AC-powered VAD bedside console.



CONTINUOUS-FLOW VAD

The VAD patient or family member do the regular sterile dressing changes needed to prevent infection where the drive-line tubing comes through the skin. Although showers are OK, **swimming and tub bathing contact are not allowed** with a VAD. Prior to a shower, plastic wrap like Glad Press'N'Seal® is placed over the dressing. The batteries and VAD controller go in a 'shower kit' provided by the device company. Many activities are fine for someone with a VAD as long as there is **no tension on the drive-line tubing**. **Contact sports are not OK**.

**HeartMate II® VAD made by Thoratec® is only 3 inches long and weighs 10 ounces.*

heart transplant

Heart transplants replace a failing heart that can no longer meet the body's needs. The stress of heart transplant surgery and the side effects of anti-rejection medicine put a serious strain on certain body functions. So the surgery is limited to those who have severe heart failure, meet transplant criteria and otherwise have healthy body organs. Costly medicines and life-long medical follow-up are needed to prevent the body from rejecting the new heart. The need for heart transplants far exceeds the number of donor organs.

In some cases, a ventricular assist device (VAD) can be used as temporary support for someone who isn't doing well enough to wait for a heart donor. In this case, the VAD is used as a "bridge" to transplantation. Research continues to find ways to:

- help a damaged heart heal itself (gene therapy and/or stem cell injections),
- wrap or reshape heart chambers, and
- perfect a mechanical device that will fully support heart function.

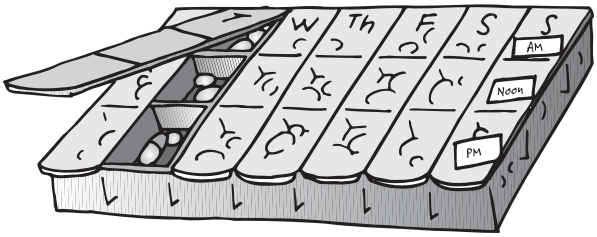
Controlling symptoms and stress of a serious illness can be difficult. If your doctor suggests **palliative care**, you can get help with:

- symptom management (anxiety; constipation, diarrhea or nausea; difficulty breathing, sleeping or eating)
- making difficult health decisions and finding community resources that can help you at home

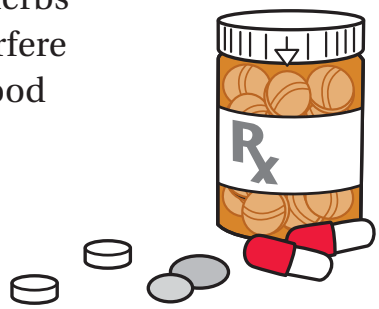
A palliative care team often includes a doctor, nurse, social worker and/or chaplain. All can consult with your primary heart failure doctor as needed.

Your role in heart failure control

step 1: take your medicines exactly as prescribed

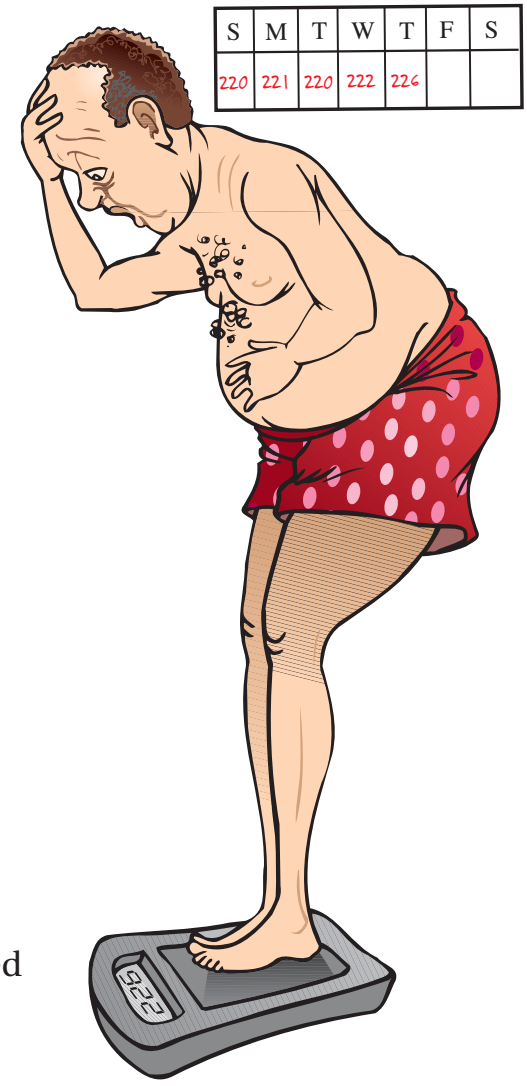


- Have a written schedule and a pill box or another way to remember your medicine.
- Report any side effects to your doctor (dizziness, loss of appetite, nausea or changes in mental or sexual function). **Do not stop taking any of your medicine on your own.**
- Take your diuretic in the morning to limit bathroom trips at night. If you take a diuretic twice a day, ask your doctor about spacing the second dose in the late afternoon.
- If you miss a dose, don't take extra to make up for it. But if you forget your diuretic in the morning, take it later in the day rather than waiting until the next morning.
- **Once you feel better, don't stop any of your medicines!** Many of them work best together for a good long-term effect on the heart and blood vessels.
- Talk to your doctor before taking any herbs or other supplements. Some may interfere with your medicines, especially the blood thinner Coumadin® (warfarin®) or, in a few cases, Pradaxa® (dabigatran).



step 2: weigh daily and watch for rapid fluid buildup

- When home, always use the same scale. Keep it adjusted to zero. Use it on a hard surface (not carpet) each time. When you travel, make sure you have a good scale to weigh on.
- Weigh yourself each morning. Do this after urinating, but before eating or getting dressed. **Keep a written record to take to your doctor**.
- Report any rapid weight gain to your doctor (example: 3–4 pounds in 1–2 days of normal eating or 2 pounds overnight).
- If you have been eating the same amount of food, a quick weight gain is often a sign that fluid is building up and causing more work for your heart.
- Follow your doctor's advice about a sudden weight gain. You may need more diuretic and/or potassium supplements. **Do not take more without your doctor's advice**.

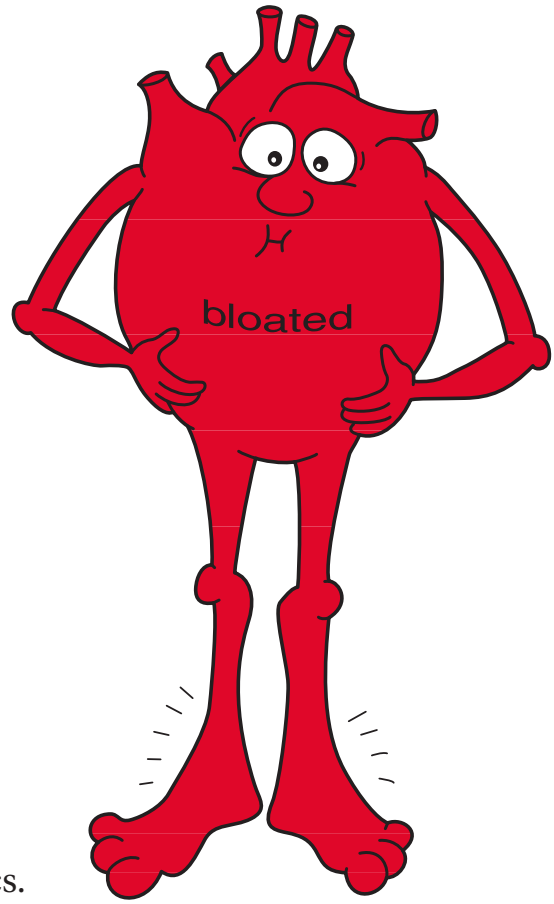


Check the zero point on your scale each time you use it.

step 3: eat less salt and limit fluid intake

Since foods high in sodium (salt) make the body hold fluid, eat less of them. The average American takes in between 4,000–10,000 mg of sodium per day. It's easy to see why, since one teaspoon of table salt has about 2,300 mg of sodium. Learn about packaged foods and certain spices that are high in sodium. Some people with heart failure do well on 2,400–3,000 mg of sodium a day, but most must limit sodium to less than 2,000 mg a day to control it.

Many people with heart failure have trouble with their body holding fluid. Being very thirsty is also common because diuretics take away the extra fluid. **Even if you are thirsty, DO NOT** replace all the fluid that diuretics have helped your body get rid of. Use small amounts of hard sugar-free candy to help with a dry mouth.



Your doctor may tell you to have no more than 2 quarts (64 ounces) of fluid per day (or less in some cases). This includes **all beverages**, high-moisture foods/fruits, Jell-O®, ice cream and ice cubes (see page 28).

Following your doctor's advice about sodium and fluids can help you control heart failure and take lower doses of diuretics.

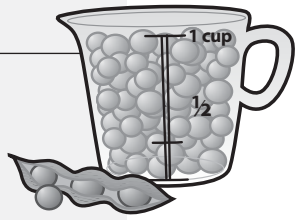
* The 2010 Dietary Guidelines for Americans advise a daily sodium intake of 1,500 mg for all persons who are 51 and older, all persons with hypertension, diabetes or chronic kidney disease as well as all African Americans. This sodium intake of 1,500 mg/day (less than ½ teaspoon) applies to about half of the U.S. population, including children and the majority of adults.

Hints to lower sodium in your diet

- **Do not cook with salt** or add salt to foods at the table.

- **Eat fresh vegetables or unsalted canned or frozen vegetables.** These have less sodium than most processed foods. For example:*

INSTEAD OF:	EAT:
1 cup of regular canned peas: **400 mg of sodium**	1 cup of fresh, cooked peas: **2 mg of sodium**



* Sodium content of foods from USDA Handbook #456.

- **Season with fresh or dried herbs, vegetables or no-salt seasonings.**

- **Bake, broil, boil, steam, roast** or **poach** foods without salt. When you eat out, order foods cooked this way without breading, butter or sauces. Ask that no salt be added. Avoid soups (usually high in sodium). Go easy on the salad dressing. Most are high in salt. Avoid eating out at restaurants that cause you to have a sudden weight gain the next day.

- **Make your own** sauces, salad dressings, vegetable dishes and desserts when you can. Some patients make their own bread to further lower sodium intake.

- **Buy low-sodium tuna or salmon when possible.** If need be, you can use water-packed tuna or salmon if you break it up and soak it for 3 minutes in cold water. Rinse, drain and squeeze out the water.

Keep track of your sodium intake each day. It may surprise you how fast it adds up. Follow your doctor's advice to limit sodium and buy mostly low-sodium foods (see next page).

Low-sodium foods—what you CAN eat

fruits and vegetables

- ✓ fresh or frozen (check for sodium)
- ✓ canned (unsalted)

drinks

- ✓ fruit juices, fresh or frozen
- ✓ canned low-sodium or no salt added tomato and vegetable juice
- ✓ instant breakfast (all flavors but eggnog)—limit to 1 cup/day
- ✓ frozen concentrate or fresh lemonade

dairy choices

- ✓ up to 3 cups a day of liquid or dry milk (1% or skim) or homemade buttermilk (using baking buttermilk powder)
- ✓ no-salt added cottage cheese
- ✓ ricotta—part skim, up to ½ cup a day
- ✓ up to 1 oz a day— hard cheeses like unprocessed Swiss, part-skim Mozzarella, Neufchâtel or string
- ✓ soft margarine or mayonnaise (up to 2 Tbsp a day)
- ✓ non-fat and low-fat sour cream

meats, poultry, fish & meat substitutes

- ✓ fish, fresh or frozen (not breaded); canned tuna and salmon (unsalted or rinsed)
- ✓ chicken or turkey (not processed in salt solution)
- ✓ lean cuts of beef, veal, pork, lamb
- ✓ dried beans, peas, lentils (not canned unless low-sodium)
- ✓ nuts or seeds (unsalted, dry roasted)
- ✓ unsalted peanut butter, up to 2 Tbsp a day
- ✓ tofu (soybean curd)

breads, cereals, grains

- ✓ loaf bread and yeast rolls (3 slices/day)*
- ✓ melba toast, matzo crackers
- ✓ pita bread, taco shells or corn tortillas
- ✓ cooked cereals (avoid instant): corn grits, farina (regular), oatmeal, oat bran, cream of rice or wheat
- ✓ puffed rice or wheat, shredded wheat (or any cereal with 100–150 mg sodium—limit to 1 cup/day)
- ✓ wheat germ
- ✓ popcorn (no salt or fat added)
- ✓ rice (enriched white or brown) or pasta

cooking ingredients, seasonings

- ✓ corn starch, tapioca
- ✓ corn meal or flour (not self-rising)
- ✓ fresh or dried herbs, salt-free herb seasonings
- ✓ lemons, limes, onions, celery, etc.
- ✓ fresh garlic, ginger or vinegar
- ✓ Louisiana-type hot sauce (1 tsp/day)
- ✓ low-sodium baking powder, yeast, onion or garlic powder
- ✓ tomato paste, unsalted tomatoes, unsalted tomato sauce
- ✓ water chestnuts
- ✓ carob powder, cocoa powder
- ✓ low sodium salad dressings

sweets

- ✓ flavored gelatins
- ✓ frozen juice bars, fruit ice, sorbet, sherbet
- ✓ sugar, honey, molasses, syrup
- ✓ jelly, jams, preserves, apple butter
- ✓ graham and animal crackers, fig bars, ginger snaps

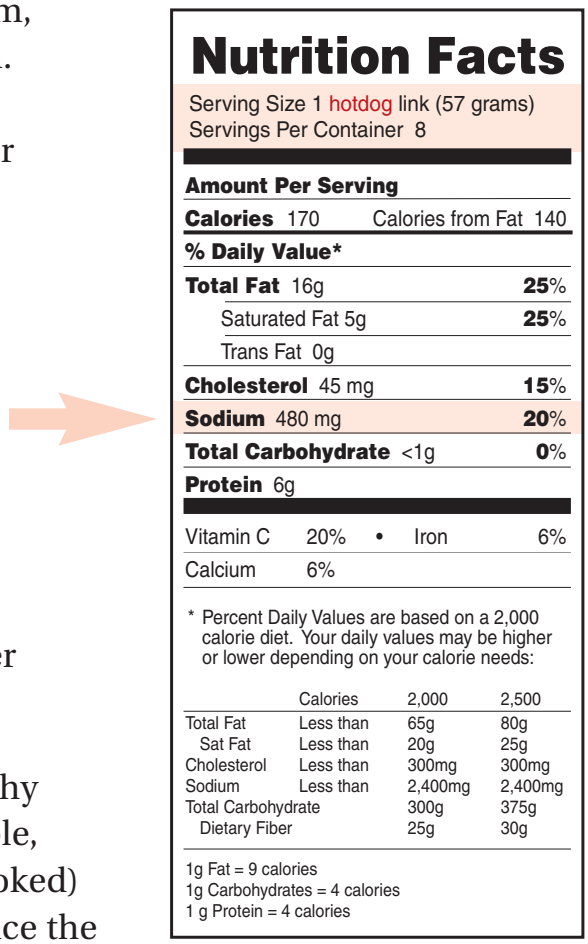
* Using homemade breads (no self-rising flour) can reduce sodium intake further.

Read food labels

Until you learn how to eat a low-sodium diet, add up the sodium content on all the foods and beverages you eat in a day. Be sure it is less than your doctor has advised. Tips to help you:

- Buy products labeled low-sodium, sodium-free, or very low sodium. At present, a "low-sodium" food label means 140 mg of sodium or less per serving size.

- Always figure the sodium content for the amount you plan to eat even if you see "healthy", "reduced sodium", "unsalted", "no salt added" or "without added salt" food labels. Sometimes the food label shows the sodium mg for only a tiny amount of food rather than a common serving size.



Nutrition Facts

Serving Size 1 hotdog link (57 grams)
Servings Per Container 8

Amount Per Serving	
Calories 170	Calories from Fat 140
% Daily Value*	
Total Fat 16g	**25**%
Saturated Fat 5g	**25**%
Trans Fat 0g	
Cholesterol 45 mg	**15**%
Sodium 480 mg	**20**%
Total Carbohydrate <1g	**0**%
Protein 6g	

Vitamin C	20%	• Iron	6%
Calcium	6%		

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

1g Fat = 9 calories
1g Carbohydrates = 4 calories
1 g Protein = 4 calories

- Spread out your sodium in healthy foods that are filling. For example, choose a low-sodium (home-cooked) meat sandwich over a pickle, since the sandwich will keep you feeling full the longest.

- Studies show that 75-80% of our daily sodium intake comes from processed and restaurant foods. When you eat out, ask for help in choosing low-sodium foods. Almost all fast food is high in salt. Don't buy convenience foods like prepared or skillet dinners, deli food, cold cuts, hot dogs, most frozen entrees or canned soups.

High-sodium foods — what NOT to eat

vegetables

- ✘ salted canned vegetables
- ✘ sauerkraut

breads, cereals, grains, starches

- ✘ self-rising flour and corn meal
- ✘ prepared mixes (Ex: waffle, pancake, muffin, cornbread and all frozen waffles)
- ✘ instant cooked cereals

dairy products

- ✘ buttermilk (store-bought)
- ✘ canned milk (unless diluted and used as regular milk)
- ✘ egg substitute (limit to ½ cup/day)
- ✘ eggnog (store-bought)
- ✘ butter and any margarine with trans fat
- ✘ certain cheese (American and other processed cheese, bleu cheese, Parmesan, feta and regular cottage cheese) with more than 200 mg/serving

soups

- ✘ bouillon (all kinds)
- ✘ dry soup mixes
- ✘ canned broth and soups* (with more than 350 mg/serving)

drinks

- ✘ athletic drinks (such as Gatorade®)
- ✘ canned tomato or vegetable juice (unless unsalted)

sweets

- ✘ prepared mixes or store-bought pies, puddings, cakes, muffins, etc.

meats and meat substitutes

- ✘ canned meats and fish (sardines, unrinsed tuna and salmon)
- ✘ cured meats (Ex: dried beef, bacon, corned beef) and any meat product processed with salt (ham, some chicken and pork)
- ✘ all types sausage and hot dogs (Ex: beef, pork, chicken, turkey, Polish sausage, hot dogs, knockwurst)
- ✘ rotisserie chicken
- ✘ sandwich meats (bologna, salami, olive loaf, etc.)
- ✘ regular peanut butter
- ✘ salted nuts

cooking ingredients, seasonings, condiments, snacks

- ✘ fermented miso and cooking wine
- ✘ pre-seasoned mixes for tacos, spaghetti, chili, etc.
- ✘ coating mixes
- ✘ preseasoned convenience foods
- ✘ soy, teriyaki or Asian fish sauce
- ✘ baking soda, baking powder (use low-sodium type)
- ✘ olives, pickles (dill, sour, sweet gherkins)
- ✘ pretzels, chips, skins, etc.
- ✘ light salt, seasoning salt, sea salt, meat tenderizer, garlic salt, monosodium glutamate (MSG), kosher salt, celery salt, onion salt, lemon pepper

Note: Check the label. Use less than 2 Tbsp a day of tomato sauce (unless unsalted), catsup, chili sauce, BBQ sauce, mustard or salad dressings.

* Even reduced sodium canned soups can be quite high in salt. Check the label.

Follow your doctor's advice about limiting salt and fluid intake. Some people with heart failure do well on 2,400 mg of sodium a day, but most must limit daily sodium to less than 2,000 mg to avoid fluid buildup.

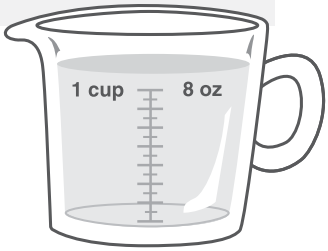
Foods with high liquid content also have to counted. Your doctor may ask you to limit liquids to 2 quarts (64 oz) a day. This includes the foods in Column A, all beverages (even liquid with medicine) and ice cubes. (Ice cubes usually melt to about half their size: 4 oz ice = 2 oz fluid). Some patients also have to include foods in Column B. Ask your doctor or nurse if foods in both Columns must be included.

column A

FOOD	LIQUID
½ cup ice cream or sherbet	2 oz
3 oz popsicle	2 oz
½ cup fruited Jell-O® ½ cup pudding or custard	3 oz 3.5 oz
1 cup low-sodium broth-based soup	7 oz
1 cup yogurt, low-sodium cream soup or can of nutritional supplement	6 oz
medium-size pear	4.5 oz
1 cup watermelon	5 oz

column B

FOOD	LIQUID
15 grapes	1 oz
½ cup cherries or medium-size lemon	2 oz
9 inch banana or medium-size peach	2.5 oz
½ cup applesauce, canned peaches, pears or pineapple	3 oz
½ cup fruit cocktail	3.5 oz
Medium-size apple, nectarine, orange, ½ grapefruit or 1 cup strawberries	4 oz



Even if you are <u>NOT</u> told to restrict fluids, avoid large amounts of high moisture foods.

step 4: find the right balance in exercise and rest for you

- **Rest throughout your day**. Put your feet up for a few minutes throughout your day. Consider a nap after lunch.
- **After talking with your doctor, begin walking or another exercise that you enjoy**. Gradual exercise training often lessens symptoms while increasing your energy and overall quality of life. Walking on a treadmill, bicycling and swimming allow you to use the large muscle groups. Find an exercise that doesn't make you too tired or requires such effort that you can't talk while doing it. Avoid lifting really heavy objects.

step 5: reduce demands on your heart when you can

- **Reduce high blood pressure**. Ask your doctor for your blood pressure goal and how to reach it.
- **Get rid of any excess body fat**. Find healthy ways to lose fat (if needed) and keep a normal body weight. Bodies that are too large put more demand on the heart.
- **Control diabetes by keeping your blood sugar in the range your doctor suggests**. Ask if any of your diabetic drugs are likely to lead to fluid buildup.
- **Stop smoking**!!! All tobacco products tighten body arteries and make more work for your heart. Talk to your doctor if you need help quitting.
- **If you snore or are sleepy throughout the day, tell your doctor**. A sleep study may be needed to see if you have pauses in breathing (apnea) while sleeping.

- **Ask your doctor if you can have alcohol**. Since alcohol weakens the heart, heart failure may improve if you stop drinking.
- **Reduce emotional stress**. You may feel depressed, angry or anxious because you have heart failure. Talk about your feelings with family, friends or a professional. Low-level exercise, meditation and/or medicine may help.
- **Avoid temperature extremes**. The body works harder to keep a normal temperature when you're too hot or cold.
- **Reduce high cholesterol levels** to prevent fatty buildup and damage to your arteries.
- **Stay away from people who have colds or flu**. Ask your doctor to keep you up-to-date with flu and pneumonia vaccines.
- **Avoid blood clots**. Regular walking and not wearing garters or hose with tight tops help improve blood flow in the legs. Your doctor may also prescribe special compression stockings. An irregular heart rhythm (atrial fibrillation) can occur along with heart failure, adding to the risk of a blood clot. Your doctor may ask you to take one of these to reduce the risk of a blood clot: aspirin, an anti-platelet drug, or a "blood thinner" like Coumadin® (warfarin) or dabigatran (Pradaxa®). Regular blood work (protime/INR) is needed to regulate the dosage of Coumadin®. A drug (anti-arrhythmic) may also be needed to prevent the rapid heart rate seen with atrial fibrillation.

In summary

You have the most important role in managing your heart failure. But having a partner who supports you and seeing a cardiologist or nurse practitioner who specializes in heart failure can also be helpful. Write down what you are told for home care in the space provided.

Take your heart failure medicines exactly as prescribed:

Keep a medicine chart. Note any directions on your first prescription bottle for a gradual dose increase.

Name	Dose	How often

Weigh daily:

Use the same scale, clothing and weigh at the same time of day. Keep a written record. Call your doctor if you have rapid weight gain.

_____ 2-3 lbs overnight **or** _____ 3-4 lbs in 1-2 days **or** _____lbs in _____ days

Limit fluid: _____ 2 quarts/day (64 oz) **or** as your MD directs: _____ quarts/day

Limit salt intake: _____ 1500 mg/day _____ 2000 mg/day _____ 2300 mg/day

Other diet advice: _____

Find the right balance in exercise and rest:

Ask your doctor about these:

Examples: __ walking __ swimming __ bicycling __ treadmill or_____

_____

Reduce demands on your heart by:

- **not** smoking
- controlling high blood pressure or diabetes, and
- getting rid of excess weight

Call your doctor if you have new onset or an increase in any of these symptoms:

- Sudden weight gain (2 lbs overnight or 3-4 lbs in 1-2 days)
- Shortness of breath
- Swelling of feet and/or hands
- Bleeding or bruising easily
- Pain in belly (abdomen) or bloating
- Chest pain/pressure
- Constant cough
- Dizziness/fainting

Keep appointments for blood tests and other follow-up:

- ❑ Electrolytes (sodium [Na+] and potassium [K+])
- ❑ Protime (PT) with INR (if on Coumadin® [warfarin])
- ❑ Thyroid blood level and eye, liver and lung exams (if on amiodarone to control heart rhythm)
- ❑ Other testing: _____
- ❑ Next appointment: _____

Tell your doctor about any symptoms that are bothering you during daily activities or keeping you from doing things you'd like to do.

Causes of heart failure

If the cause of heart failure is known, treatment can often be given for this heart problem. This offers the best long-term results. Heart failure can be temporary if the cause can be reversed. Having diabetes with or without heart disease or high blood pressure increases the risk of heart failure, especially in women.

If your doctor has discussed any of these as a possible cause for your heart failure, you may want to refer to that page and read the brief review:

- coronary heart disease 35
- high blood pressure 36
- cardiomyopathy 37
- abnormal heart valves 38
- severe lung disease 38
- severe anemia 39
- overactive thyroid 39
- abnormal heart rhythm 39
- over-use of alcohol 39

Note: Heart failure can also occur in adults who were born with a heart defect including some of those who had a surgical repair. See page 40 and inside back cover.

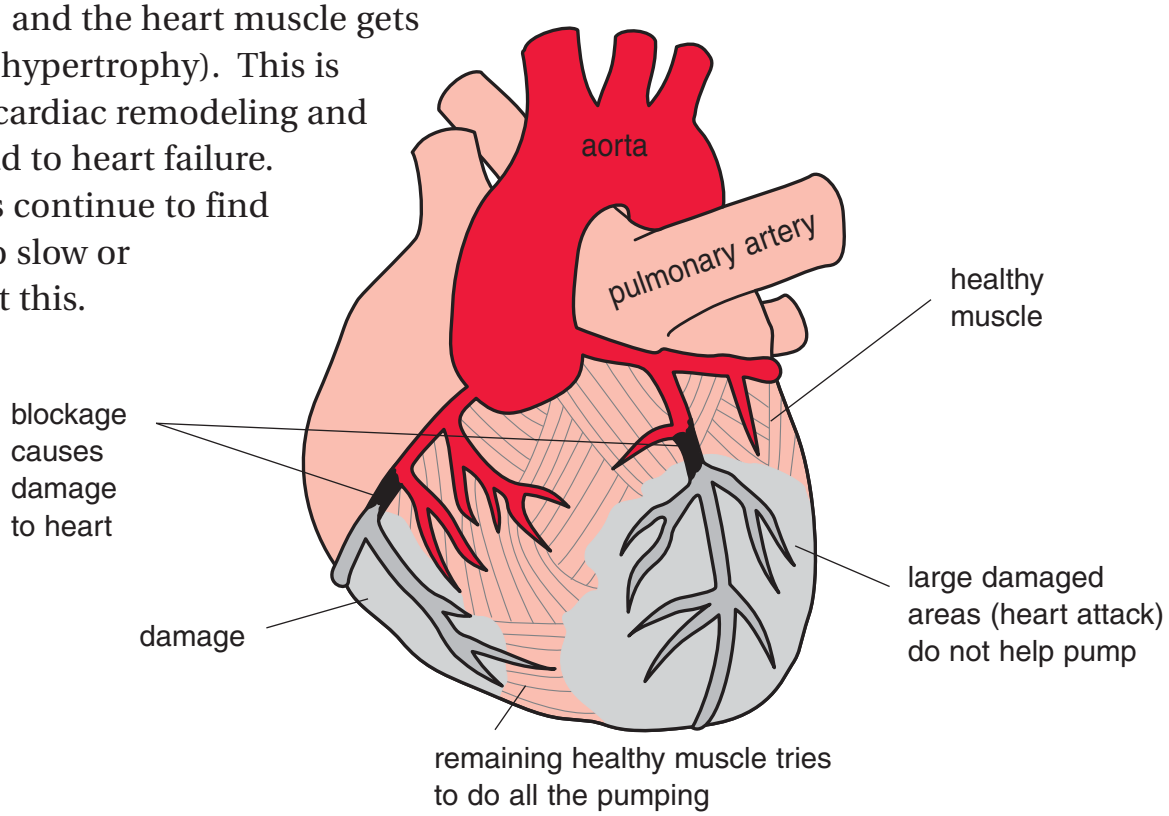
coronary heart disease*

Coronary heart disease (CHD) is a buildup of cholesterol and fatty deposits in the arteries that supply the heart muscle with blood and oxygen. As these arteries become clogged, less blood reaches the heart muscle.

One or more heart attacks can damage the heart muscle. When large areas of the heart are damaged, the heart does not pump like it should. The healthy areas of the heart work harder to try and pump all the blood that is needed. Over time the heart chambers stretch (dilate) and the heart muscle gets larger (hypertrophy). This is called cardiac remodeling and can lead to heart failure. Studies continue to find ways to slow or prevent this.

Ways to prevent CHD:

- Do not smoke
- Control blood cholesterol levels
- Control blood pressure
- Keep a healthy weight
- Exercise regularly
- Control blood sugar (for diabetes)
- Reduce stress levels

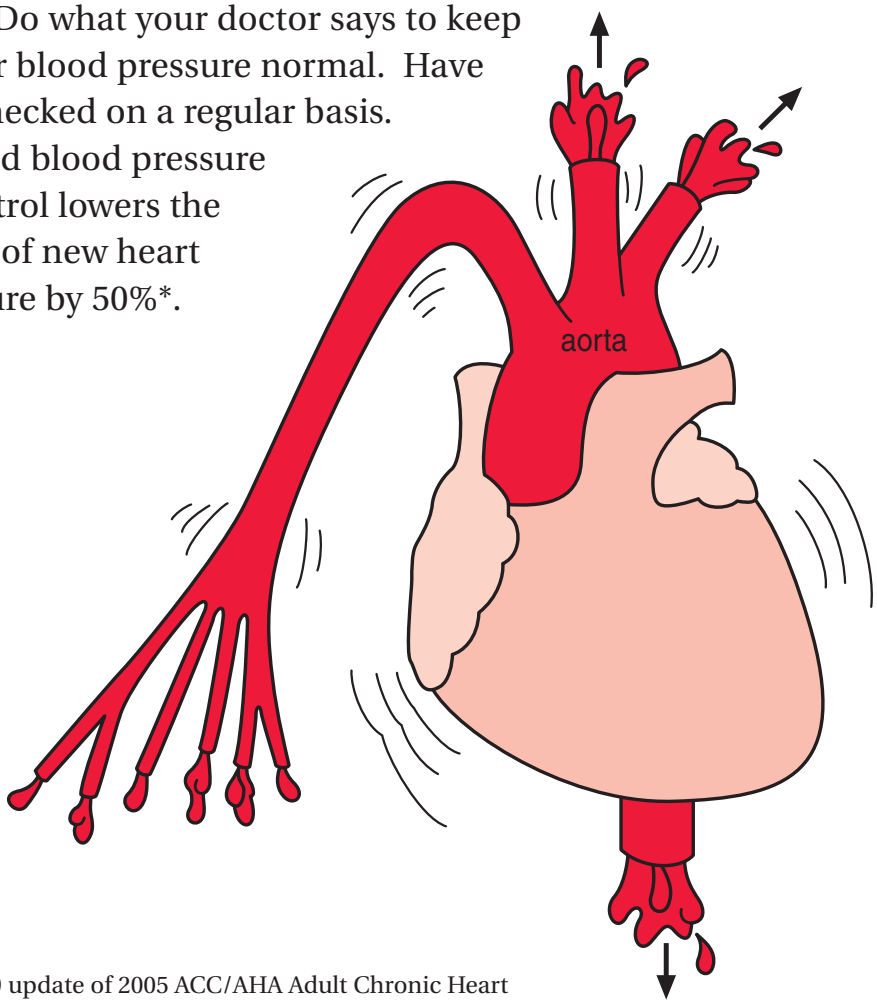


** also known as coronary artery disease or ischemic heart disease.*

high blood pressure

The left lower chamber (ventricle) of the heart pumps blood into the arteries which carry the blood to the body. If pressure in the arteries is normal and they stretch easily, there is no extra strain on the left chamber as it pumps. If pressure in the arteries is high, the heart has to pump harder to force out the blood into the arteries. If blood pressure stays high for a long time, the heart's left pumping chamber can become enlarged and weak. Heart failure can be the result.

Do what your doctor says to keep your blood pressure normal. Have it checked on a regular basis. Good blood pressure control lowers the risk of new heart failure by 50%*.

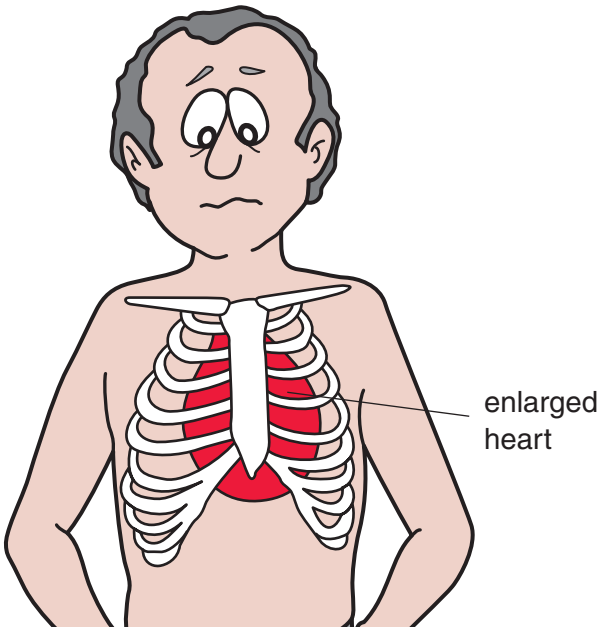


* 2009 update of 2005 ACC/AHA Adult Chronic Heart Failure Guidelines, (sec. 4.1.1.1).

cardiomyopathy

Cardiomyopathy is a general term for a disease of the heart muscle. You may be told that your problem is **idiopathic** (the cause is not known), or your doctor may say you have: **dilated, restrictive or hypertrophic cardiomyopathy**.

Dilated cardiomyopathy is the most common, and refers to the heart stretching or becoming larger. Viruses, the effects of alcohol or other toxic agents* or sometimes pregnancy can cause this.



Studies show that dilated cardiomyopathy tends to run in families. If the heart becomes strained, it will most often appear enlarged on a chest x-ray.

Some things can also get into the heart muscle (example: iron, amyloid [body protein] or a tumor). A stretched heart does not pump as well as it should. It is like a rubber band that has lost its snap.

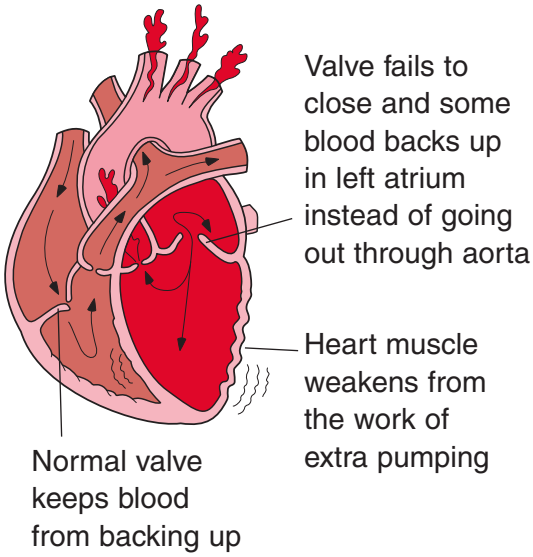
Restrictive and **hypertrophic cardiomyopathy** often begin by making it harder for the heart to fill. A chest x-ray may not show the problem. Other tests may be needed to find out what is going on with the heart and how best to treat it.

* Toxic agents include illicit drugs like cocaine, methamphetamine, as well as anthracycline (Adriamycin®) or cyclophosphamide (Cytoxan) (types of chemo), ephedra (for weight loss), and Herceptin® (antibody for breast cancer).

abnormal heart valves

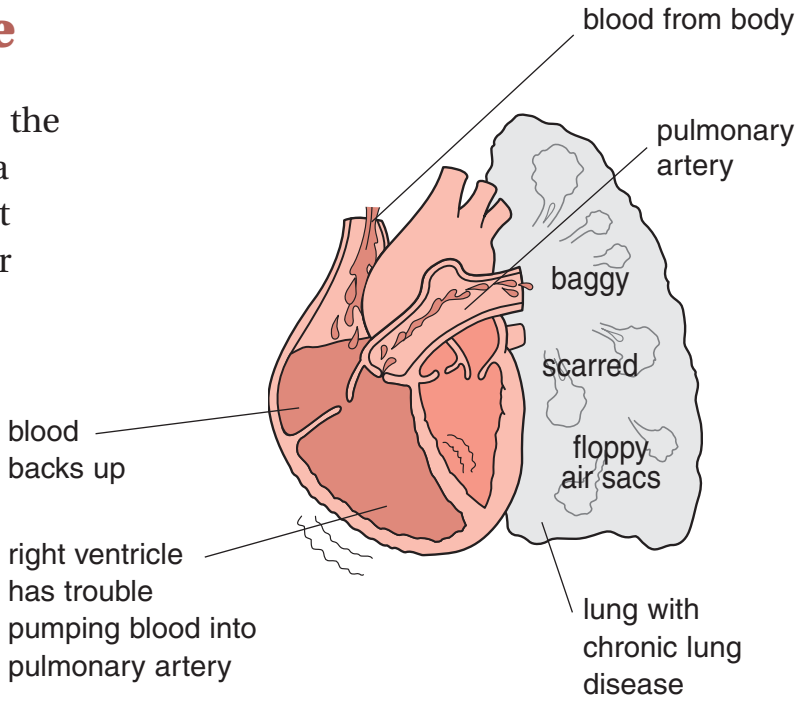
Abnormal heart valves are those that do not fully open or close during each heartbeat. The problem can be present at birth or due to other causes like an infection with rheumatic fever.

Normal heart valves act like doors. They open and close at the right time to move the blood forward and keep it from going backward. If a valve doesn't open or close like it should, the heart muscle has to pump harder. If the work load becomes too great, heart failure results. Sometimes surgery to replace or repair a heart valve is needed. Other times, a catheter procedure is done to help open a tight valve.



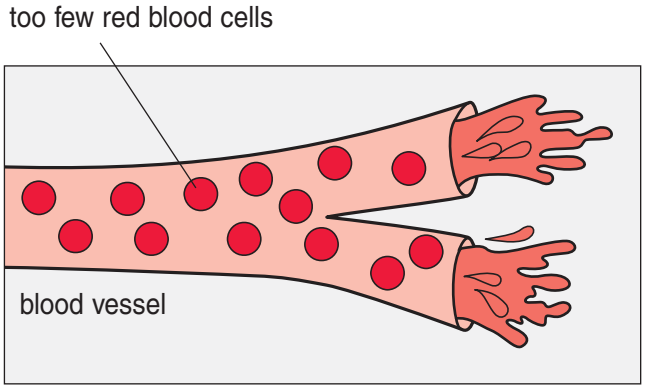
severe lung disease

Severe lung disease adds to the work of the heart. If you have a chronic lung disease, treatment for it is very important. As your breathing improves, it is easier for the heart to pump blood to your lungs and body.



severe anemia

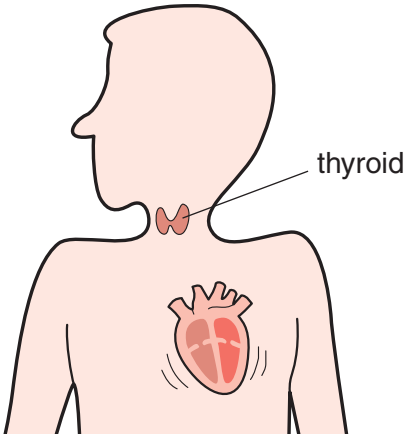
Severe anemia means not having enough red blood cells to carry oxygen. The heart tries to move the small number of red blood cells at a faster rate. It can become very tired from this effort. Taking iron tablets and getting more red blood cells may allow the heart to slow down and return to the normal pumping effort.



ANEMIA

overactive thyroid

An **overactive thyroid** gland causes the body to work at a fast pace. Over time, the heart can have trouble keeping up. Once the thyroid hormone is down to normal levels, the heart is likely to pump at a normal speed.



abnormal heart rhythm

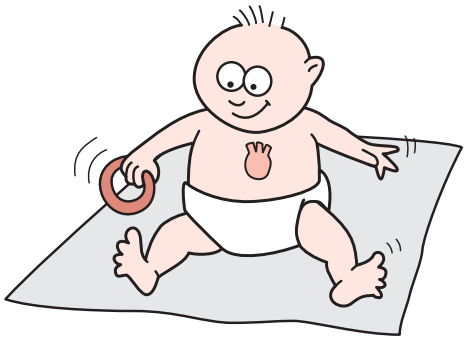
An abnormal heart rhythm (arrhythmia) refers to the heart beating either too fast or too slow. In either case, the heart may not be able to pump enough blood for all of the body. Sometimes strain or heart failure may occur.

over-use of alcohol

Over-use of alcohol can weaken the heart's pumping action. If you stop drinking alcohol early enough, the heart may return to its normal strength.

Congenital heart disease

Congenital heart disease refers to defects that you are born with. Often they increase the work of your heart. One or more surgeries to repair the defect(s) can help, but may not offer a "total correction." Specialized medical care is needed, especially if you have other health problems (such as: high blood pressure, coronary heart disease, lung disease, etc.).



Transposition of the great arteries (TGA)

TGA occurs when the pulmonary artery comes out of the lower left chamber and the aorta comes out of the lower right chamber.

When the aorta and pulmonary artery are in the opposite position, the body doesn't get the oxygen-rich blood that it should. **The right heart** recycles the same blood through the arteries and veins without a way to get more oxygen.

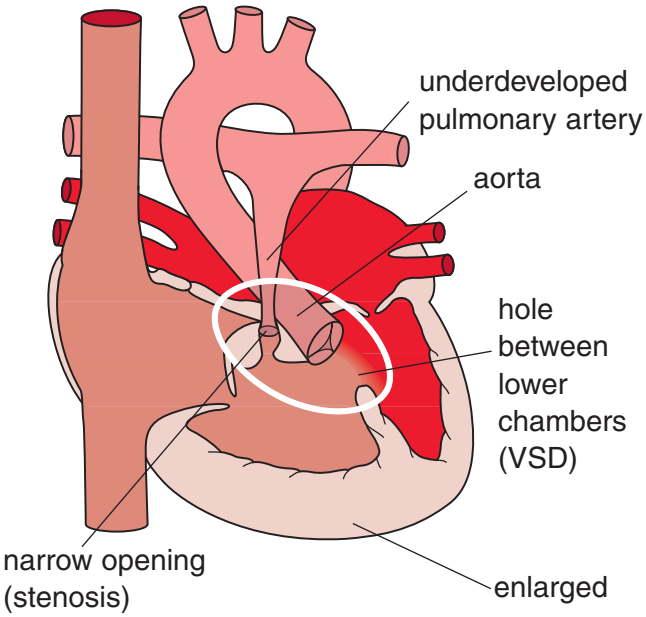
The left side of the heart recycles the same oxygen-rich blood through the lungs. For any of the oxygen-rich blood to get into the aorta and out to the body, there has to be one or more holes between the heart chambers and/or a connecting blood vessel.

For years, TGA was corrected by switching the top 2 heart chambers (atria) in a Mustard or Senning operation. Adults, who had either operation as a child can develop heart failure if the thinner right ventricle gets tired of pumping blood against the high pressures in the aorta.

Tetralogy of Fallot (TOF)

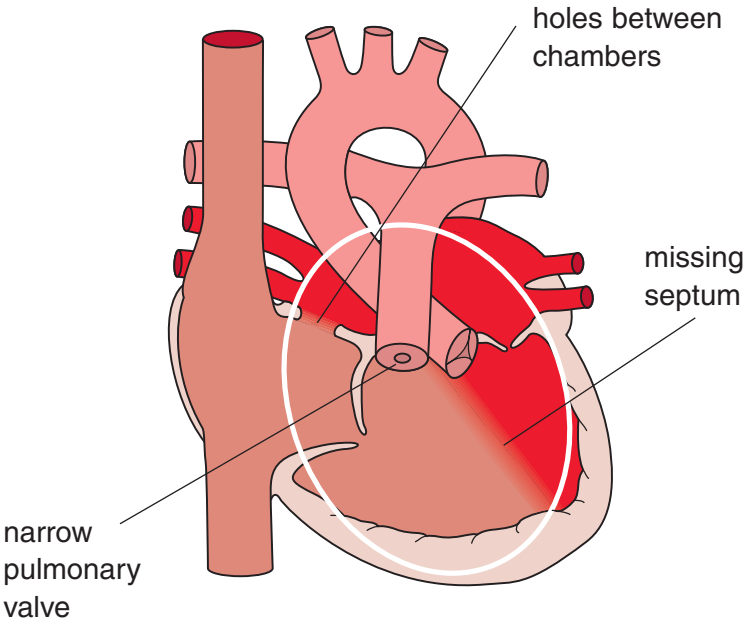
TOF refers to 4 heart defects. The aorta opens to both of the lower heart chambers above a large hole called a ventricular septal defect or VSD.

In addition, there is narrowing under or at the pulmonary valve (pulmonary stenosis) and thickening (enlargement) of the right lower chamber.



Single ventricle (univentricular heart)

Single ventricle means there is **one ventricle** (lower heart chamber) instead of two separate chambers. This means a large amount of blood is pumped into the lungs. This can damage the blood vessels in the lungs, and the heart valves can also be affected.



Penn's experienced team of physicians offer more advanced treatment options than anywhere else in the region. In fact, Penn is recognized amongst the top 10 in the nation for cardiology and heart surgery by *U.S.News and World Report*.

For more information, visit PennMedicine.org/HeartFailure

Hospital of the
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800.789.PENN PennMedicine.org

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