

HEART FAILURE

Heart failure is a condition in which the heart can't pump enough blood throughout the body. Heart failure does not mean that your heart has stopped or is about to stop working. It means that your heart is not able to pump blood the way that it should. The heart can't fill with enough blood or pump with enough force, or both.

Heart failure develops over time as the pumping action of the heart grows weaker. It can affect the left side, the right side, or both sides of the heart. Most cases involve the left side where the heart can't pump enough oxygen-rich blood to the rest of the body. With right-sided failure, the heart can't effectively pump blood to the lungs where the blood picks up oxygen.

The weakening of the heart's pumping ability causes:

- ❑ Blood and fluid to "back up" into the lungs
- ❑ The buildup of fluid in the feet, ankles, and legs
- ❑ Tiredness and shortness of breath

Heart failure is a serious condition. About 5 million people in the United States have heart failure, and the number is growing. Each year, another 550,000 people are diagnosed for the first time. It contributes to or causes about 300,000 deaths each year.

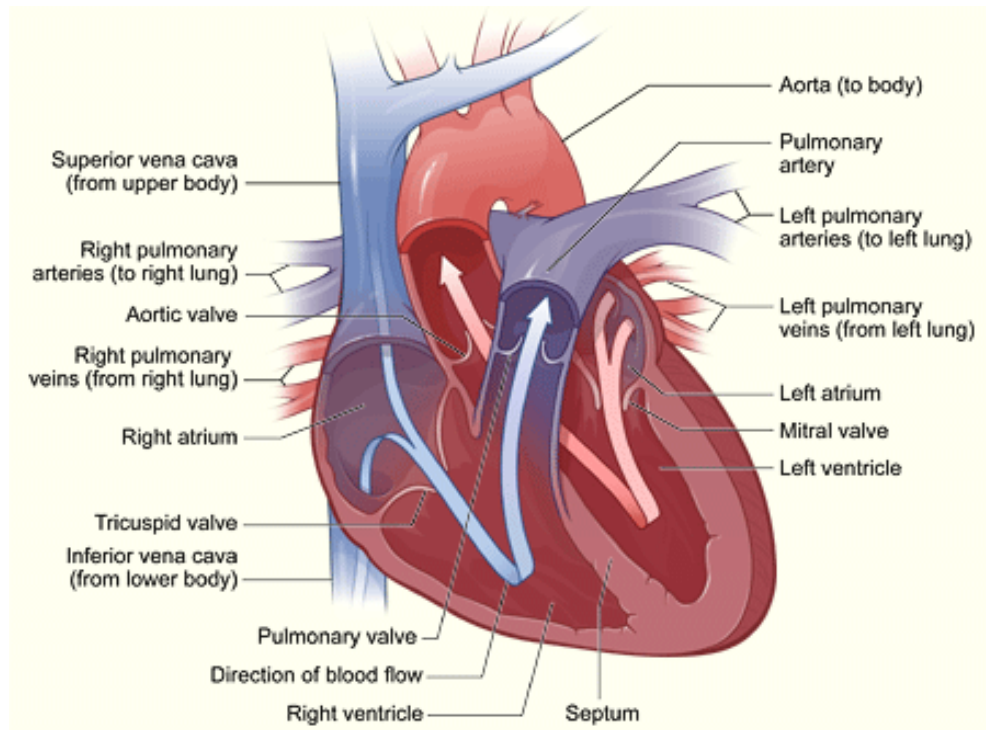
How the Heart Works

The heart is a muscle about the size of your fist. It works like a pump and beats 100,000 times a day.

The heart has two sides, separated by an inner wall called the septum. The right side of the heart pumps blood to the lungs to pick up oxygen. Then, oxygen-rich blood returns from the lungs to the left side of the heart, and the left side pumps it to the body.

The heart has four chambers and four valves and is connected to various blood vessels. Veins are the blood vessels that carry blood from the body to

the heart. Arteries are the blood vessels that carry blood away from the heart to the body.



The illustration shows a cross-section of a healthy heart and its inside structures. The blue arrow shows the direction in which oxygen-poor blood flows from the body to the lungs. The red arrow shows the direction in which oxygen-rich blood flows from the lungs to the rest of the body.

Heart Chambers

The heart has four chambers or "rooms."

- The atria (AY-tree-uh) are the two upper chambers that collect blood as it comes into the heart.
- The ventricles (VEN-trih-kuls) are the two lower chambers that pump blood out of the heart to the lungs or other parts of the body.

Heart Valves

Four valves control the flow of blood from the atria to the ventricles and from the ventricles into the two large arteries connected to the heart.

- The tricuspid (tri-CUSS-pid) valve is in the right side of the heart, between the right atrium and the right ventricle.

- The pulmonary (PULL-mun-ary) valve is in the right side of the heart, between the right ventricle and the entrance to the pulmonary artery, which carries blood to the lungs.
- The mitral (MI-trul) valve is in the left side of the heart, between the left atrium and the left ventricle.
- The aortic (ay-OR-tik) valve is in the left side of the heart, between the left ventricle and the entrance to the aorta, the artery that carries blood to the body.

Valves are like doors that open and close. They open to allow blood to flow through to the next chamber or to one of the arteries, and then they shut to keep blood from flowing backward.

When the heart's valves open and close, they make a "lub-DUB" sound that a doctor can hear using a stethoscope. The first sound—the "lub"—is made by the mitral and tricuspid valves closing at the beginning of systole (SIS-toe-lee). Systole is when the ventricles contract, or squeeze, and pump blood out of the heart. The second sound—the "DUB"—is made by the aortic and pulmonary valves closing at beginning of diastole (di-AS-toe-lee). Diastole is when the ventricles relax and fill with blood pumped into them by the atria.

Arteries

The arteries are major blood vessels connected to your heart.

- The pulmonary artery carries blood pumped from the right side of the heart to the lungs to pick up a fresh supply of oxygen.
- The aorta is the main artery that carries oxygen-rich blood pumped from the left side of the heart out to the body.
- The coronary arteries are the other important arteries attached to the heart. They carry oxygen-rich blood from the aorta to the heart muscle, which must have its own blood supply to function.

Veins

The veins are also major blood vessels connected to your heart.

- The pulmonary veins carry oxygen-rich blood from the lungs to the left side of the heart so it can be pumped out to the body.

- ❑ The vena cava is a large vein that carries oxygen-poor blood from the body back to the heart.

Other Names for Heart Failure

- ❑ Congestive heart failure or CHF (when the poor pumping function results in symptoms)
- ❑ Left-sided heart failure
- ❑ Right-sided heart failure
- ❑ Systolic heart failure
- ❑ Diastolic heart failure

What Causes Heart Failure?

Heart failure is caused by other diseases or conditions that damage or overwork the heart muscle. Over time, the heart muscle weakens and is not able to pump blood as well as it should.

The leading causes of heart failure are:

- ❑ Coronary artery disease (CAD)
- ❑ High blood pressure
- ❑ Diabetes

CAD, including angina (AN-ji-na or an-JI-na) and heart attack is the most common underlying cause of heart failure. People who have a heart attack are at high risk of developing heart failure.

Most people with heart failure also have high blood pressure, and about one in three has diabetes.

Other Causes of Heart Failure

Other heart diseases and conditions that can lead to heart failure are:

- ❑ Cardiomyopathy (a disease of the heart muscle)
- ❑ Diseases of the heart valves
- ❑ Abnormal heartbeats or arrhythmias (a-RITH-me-as)
- ❑ Congenital heart defects (a heart defect or problem you are born with)

Other conditions that may injure the heart muscle and lead to heart failure include:

- ❑ Treatments for cancer, such as radiation and certain chemotherapy drugs
- ❑ Thyroid disorders (having either too much or too little thyroid hormone in the body)
- ❑ Alcohol abuse
- ❑ HIV/AIDS
- ❑ Cocaine and other illegal drug use

Who Is At Risk for Heart Failure?

Heart failure can happen to anyone, but it's more common in:

- ❑ People 65 years of age and older
- ❑ African Americans

Heart failure is very common in people 65 years of age and older. It's the #1 reason for a hospital visit in this age group.

African Americans are more likely to have heart failure and suffer more severely from it. African Americans are more likely to:

- ❑ Develop symptoms at an earlier age
- ❑ Have their heart failure get worse faster
- ❑ Have more hospital visits
- ❑ Die from heart failure

Men have a higher rate of heart failure than women. But in actual numbers, more women have heart failure because many more women live into their seventies and eighties, when heart failure is common.

What Are the Signs and Symptoms of Heart Failure?

The most common signs and symptoms are:

- ❑ Shortness of breath or difficulty breathing
- ❑ Feeling tired
- ❑ Swelling in the ankles, feet, legs, and sometimes the abdomen

Shortness of breath and feeling tired are caused by the buildup of fluid in the lungs and around the lungs (pleural effusions). When symptoms start, you may feel tired and short of breath after routine physical exertion. Climbing two flights of stairs makes you feel winded. As heart failure progresses, the symptoms get worse. You may begin to feel tired and short of breath after simple activities, like getting dressed or walking across the room. Some people have shortness of breath when lying flat.

Fluid buildup in the lungs can also cause a cough. The cough is worse at night and when you are lying down. Excessive fluid in the lungs can cause a life-threatening condition called acute pulmonary edema. This condition requires emergency treatment.

The swelling is from the buildup of fluid in your body (edema). Other signs of fluid buildup are:

- ❑ Weight gain
- ❑ Frequent urination
- ❑ Limitation on Physical Activity

Doctors also classify your symptoms based on how much they limit your daily activity. By class of symptom, your doctor means:

- ❑ Class 1: No limits—ordinary physical activity does not cause undue tiredness or shortness of breath.
- ❑ Class 2: Slight or mild limits—comfortable at rest, but ordinary physical activity results in tiredness or shortness of breath.
- ❑ Class 3: Marked or noticeable limits—comfortable at rest, but less than ordinary physical activity causes tiredness or shortness of breath.
- ❑ Class 4: Severe limits—unable to carry on any physical activity without discomfort. Symptoms are also present at rest. If any physical activity is undertaken, discomfort increases.

How Is Heart Failure Diagnosed?

There is not a specific test to determine if you have heart failure. A clinical diagnosis of heart failure is usually made when symptoms appear. The symptoms—shortness of breath, tiredness, and fluid buildup—are common in other conditions.

Your doctor will determine if you have heart failure by performing a detailed medical history, a physical exam, and several tests. The purpose of these is to:

- ❑ Identify the presence of diseases and conditions that can cause heart failure
- ❑ Rule out other causes of your symptoms
- ❑ Determine the amount of damage to and the pumping capability of your heart

Medical and Family History

Your doctor will ask if you or others in your family have or have had any of the diseases and conditions that can cause heart failure. Your doctor will also ask about your symptoms. This includes the types of symptoms, when they occur, how long you have had them, and their severity. The answers will help your doctor determine the limits on your ability to perform daily activities.

Physical Examination

Your doctor will:

- ❑ Listen to your heart for abnormal sounds
- ❑ Listen to your lungs for the buildup of fluid
- ❑ Look for swelling in your ankles, feet, legs, and abdomen
- ❑ Look for swelling in the veins in the neck

Tests

If you have signs and symptoms of heart failure, your doctor may order the following tests:

- ❑ EKG (electrocardiogram). This test is used to measure the rate and regularity of your heartbeat. It may show if you have had a heart attack or if there is thickening of the walls in your heart's pumping chambers (ventricles).
- ❑ Chest x ray. A chest x ray takes a picture of your heart and lungs. It can show if your heart is enlarged, if you have fluid in your lungs, or if you have lung disease.

- BNP blood test. This new test checks the level of a hormone called BNP (B-type natriuretic peptide) that rises in heart failure.

If your doctor suspects heart failure after asking about your medical and family history and performing a physical exam and initial tests (such as tests of kidney function), he or she may refer you to a cardiologist. A cardiologist is a doctor who specializes in the diagnosis and treatment of heart disease. The cardiologist will perform a physical exam and order additional tests.

An echocardiogram is the most useful test for diagnosing heart failure. This test uses sound waves to create a moving picture of your heart. Echocardiogram provides information about the size and shape of your heart and how well your heart chambers and valves are functioning. The test also can identify areas of poor blood flow to the heart, areas of heart muscle that are not contracting normally, and previous injury to the heart muscle caused by poor blood flow.

There are several different types of echocardiograms, including a stress echocardiogram. During this test, an echocardiogram is done both before and after your heart is stressed either by having you exercise or by injecting a medicine into your bloodstream that makes your heart beat faster and work harder. A stress echocardiogram is usually done to find out if you have decreased blood flow to your heart (coronary artery disease).

The cardiologist may order any of the following tests. These tests can help identify the cause of your heart failure:

- ***Holter monitor (ambulatory electrocardiography, EKG).*** For this test, a small box called a Holter monitor is attached to patches (electrodes) that are placed on your chest. The box may be carried in a pouch around your neck or attached to your belt. The Holter monitor is usually worn for 24 hours and provides a continuous recording of heart rhythm during normal activity.
- ***Nuclear heart scan.*** This test provides your doctor with moving pictures of the blood passing through your heart's chambers and arteries and shows the level of blood flow to the heart muscle. A small amount of a radioactive tracer is injected into your bloodstream

through a vein, usually in your arm. A special camera is placed in front of your chest to show where the tracer lights up in healthy heart muscle and where it doesn't light up (in heart muscle that has been damaged or has a blocked artery).

There are different types of nuclear heart scans. Most scans have two phases—taking pictures of the heart at rest and while it is beating faster (called a stress test), although sometimes only a rest scan is done. Many heart problems show up more clearly when your heart is stressed than when it is at rest. By comparing the nuclear heart scan of your heart at rest to your heart at "stress," your doctor can determine if your heart is functioning normally or not.

- **Cardiac catheterization (KATH-e-ter-i-ZA-shun).** A thin, flexible tube is passed through an artery at the top of the leg (groin) or in the arm to reach the coronary arteries. This allows your doctor to study the inside of your arteries to see if there is any blockage. Your doctor can check the pressure and blood flow in the heart's chambers, collect blood samples from the heart, and examine the arteries of the heart by x ray.
- **Coronary angiography.** This test is usually performed along with cardiac catheterization. A dye that can be seen by x ray is injected into the coronary arteries. Your doctor can see the flow of blood to the heart muscle. Dye can also be injected into the chambers of the heart to evaluate the pumping function of your heart.
- **Stress Test.** Some heart problems are easier to diagnose when your heart is working harder and beating faster than when it's at rest. During stress testing, you exercise (or are given medicine if you are unable to exercise) to make your heart work harder and beat faster while heart tests are performed. During exercise stress testing, your blood pressure and EKG readings are monitored while you walk or run on a treadmill or pedal a bicycle. Other heart tests, such as nuclear heart scanning or echocardiography, also can be done at the same time. These would be ordered if your doctor needs more information than the exercise stress test can provide about how well your heart is working.

If you are unable to exercise, a medicine can be injected through an intravenous line (IV) into your bloodstream to make your heart work harder and beat faster, as if you are exercising on a treadmill or bicycle. Nuclear heart scanning or echocardiography is then usually done.

During nuclear heart scanning, radioactive tracer is injected into your bloodstream, and a special camera shows the flow of blood through your heart and arteries. Echocardiography uses sound waves to show blood flow through the chambers and valves of your heart and to show the strength of your heart muscle.

Your doctor also may order two newer tests along with stress testing if more information is needed about how well your heart works. These new tests are magnetic resonance imaging (MRI) and positron emission tomography (PET) scanning of the heart. MRI shows detailed images of the structures and beating of your heart, which may help your doctor better assess if parts of your heart are weak or damaged. PET scanning shows the level of chemical activity in different areas of your heart. This can help your doctor determine if enough blood is flowing to the areas of your heart. A PET scan can show decreased blood flow caused by disease or damaged muscles that may not be detected by other scanning methods.

- ❑ ***Thyroid functions tests.*** These are common procedures done to find out how well the thyroid is functioning. They include blood tests, various imaging procedures, and stimulating thyroid function. These tests are very important because both an overactive and an underactive thyroid can be the main or a contributing cause of heart failure.

How Is Heart Failure Treated?

The goals of treatment are to:

- ❑ Treat the underlying cause of your heart failure
- ❑ Improve your symptoms and quality of life
- ❑ Stop your heart failure from getting worse
- ❑ Prolong your life span

Your doctor will continue to treat the underlying diseases or conditions (such as coronary artery disease, high blood pressure, or diabetes) that caused heart failure. The treatment for heart failure includes:

- ❑ Lifestyle changes
- ❑ Medicines
- ❑ Specialized care for those in the most advanced stage of heart failure

Lifestyle Changes

There are things that you can do to help with your treatment. Your doctor will recommend that you:

- ❑ Follow a diet low in salt. Salt can cause extra fluid to build up in your body, making your heart failure worse.
- ❑ Limit the amount of fluids that you drink.
- ❑ Weigh yourself every day, and let your doctor know right away if you have a sudden weight gain. This could mean you have extra fluid building up in your body.
- ❑ Exercise as directed to help build your fitness level and ability to be more active.

Your doctor will also tell you to:

- ❑ Lose weight if you are overweight.
- ❑ Quit smoking if you smoke.
- ❑ Limit the amount of alcohol that you drink.

Medicines

Your doctor will prescribe medicines to help improve your heart function and symptoms. The main medicines are:

- ❑ Diuretics (water or fluid pills) to help reduce fluid buildup in your lungs and swelling in your feet and ankles.
- ❑ ACE inhibitors to lower blood pressure and reduce the strain on your heart. These medicines also may reduce the risk of a future heart attack.

- ❑ Beta blockers to slow your heart rate and lower your blood pressure to decrease the workload on your heart.
- ❑ Digoxin to make the heart beat stronger and pump more blood.

Specialized Care for Severe Heart Failure

As heart failure progresses, lifestyle changes and regular medicines may not be enough to control worsening symptoms. Many people with severe heart failure must be treated in the hospital from time to time. In the hospital, your doctor may prescribe new or special medicines. You will continue to take your regular medicines during this treatment.

Your doctor will also order extra oxygen if you continue to have trouble breathing. The extra oxygen can be given in the hospital and at home.

Persons with very severe heart failure may be considered for a:

- ❑ Mechanical heart pump
- ❑ Heart transplant

A mechanical heart pump is a special device placed inside the body to help pump blood to the rest of the body. There are different kinds of mechanical heart pumps. Some stay in the body for a short period of time, while others can stay in the body for a long time. Many people with a mechanical heart pump will also be considered for a heart transplant.

A heart transplant is surgery to replace a heart failure patient's heart with a healthy heart from someone who has recently died. A transplant is indicated in some people when all other treatments fail to control symptoms.

How Can Heart Failure Be Prevented?

The major underlying causes of heart failure are coronary artery disease (including angina and heart attack), high blood pressure, and diabetes. The What Causes Heart Failure section lists the most common causes. Getting treatment and staying in treatment for any underlying condition that you have can greatly reduce your risk.

Other things you can do to reduce your risk include:

- ❑ Eating a heart healthy diet low in salt, saturated fat, and cholesterol.
- ❑ Quitting smoking if you smoke.
- ❑ Losing weight if you are overweight.

Living With Heart Failure

Heart failure usually can't be cured, and you will likely have to take medicine for the rest of your life. It's important that you know that your symptoms may get worse over time. As your symptoms get worse, you may not be able to do many of the things that you did before you had heart failure.

Treatment can relieve your symptoms and make it easier to do some of the things that you like to do. Treatment can also reduce the chance that you'll have to go to the hospital. For these reasons, it's very important that you follow your treatment plan. You must:

- ❑ Take all of your medicines as your doctor prescribed.
- ❑ Make all of the lifestyle changes recommended by your doctor.
- ❑ Keep all of your doctor's appointments.

Common causes that worsen symptoms and can lead to a crisis or even a hospital stay are:

- ❑ Forgetting to take your medicines
- ❑ Not following your diet (such as eating salty foods)
- ❑ Drinking excessive amounts of alcohol
- ❑ If you have trouble following your diet, talk to your doctor. Your doctor can help arrange for a dietitian to work with you on keeping a healthy diet. Alcohol also makes your symptoms worse. If you drink alcohol, don't do so very often, and limit yourself to one drink. If you have severe heart failure, you should not drink alcohol.

People with heart failure often have other serious conditions that require ongoing treatment. If you have other conditions, it's likely that you are taking medicines for those conditions as well as for heart failure. When taking several medicines, there is always a chance for side effects and

interaction between the medicines. Tell your doctor immediately about any problems that you notice with your medicines. Also, talk with your doctor before adding any new medicine. This includes over-the-counter medicines and herbal supplements.

It's also important that you try to avoid respiratory infections like the flu and pneumonia. Ask your doctor or nurse about getting flu and pneumonia shots.

It's helpful to have certain information on hand in case you need to go to the hospital or doctor right away. You should plan now to make sure that you have:

- ❑ Phone numbers for the doctor, hospital, and people who can take you to the hospital or doctor
- ❑ Directions to the hospital and doctor's office
- ❑ A list of medicines you are taking

Key Points

- ❑ Heart failure is a condition in which the heart can't pump enough blood throughout the body.
- ❑ Heart failure does not mean that your heart has stopped or is about to stop working. But it does mean that your heart is not able to pump blood the way that it should.
- ❑ Heart failure is a serious condition that develops over time as the pumping action of the heart grows weaker.
- ❑ Heart failure is caused by other diseases or conditions that damage or overwork the heart muscle.
- ❑ The leading causes of heart failure are coronary artery disease, high blood pressure, and diabetes.
- ❑ About 5 million people in the United States have heart failure. Each year, 550,000 people are diagnosed with heart failure. It causes or contributes to about 300,000 deaths each year.
- ❑ Heart failure can happen to anyone but is more common in people over 65 years of age, among women, and in African Americans.
- ❑ The most common symptoms of heart failure are shortness of breath; feeling tired; and swelling in the ankles, feet, legs, and sometimes the abdomen.
- ❑ An echocardiogram is the most useful test to diagnose heart failure.

- The treatments for heart failure include lifestyle changes, medicines, and specialized care for those with severe disease.
- People with severe heart failure are frequently admitted to the hospital.
- If you have a disease or a condition that makes heart failure more likely, you may be able to prevent it by controlling or treating the disease or condition.
- Heart failure usually can't be cured, and you will likely have to take medicine for the rest of your life. It's important that you know that your symptoms may get worse over time. As your symptoms get worse, you may not be able to do many of the things that you did before you had heart failure.
- If you have severe heart failure and symptoms at rest, you can expect your condition to worsen. It's important that you and your family discuss what you can expect and your final treatment options with your doctor while you are able to do so.

Additional Information

- **Heart Failure Center - <http://heartfailurecenter.com/>**
- **Heart Failure Online - <http://www.heartfailure.org/>**
- **Heart Care at St. Anthony's Medical Center - <http://www.stanthonysmedcenter.com/healthcareServ/heart/index.asp>**

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