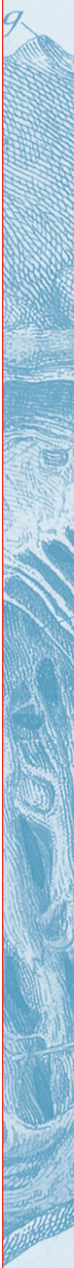
SARCOIDOSIS AND THE HEART



What Is Cardiac Sarcoidosis?

Sarcoidosis is an inflammatory disease that can affect almost any organ in the body. It causes heightened immunity, which means that a person's immune system, which normally protects the body from infection and disease, overreacts and damages the body's own tissues. The classic feature of sarcoidosis is the formation of granulomas, microscopic clumps of inflammatory cells that grow together (and look like granules, hence the name). When too many of these clumps form in an organ they can interfere with how that organ functions.

In people in the United States, sarcoidosis most commonly affects the lungs and lymph nodes, but the disease can also affect the heart, a condition called cardiac sarcoidosis. Researchers who study sarcoidosis estimate that cardiac sarcoidosis affects up to a quarter of sarcoidosis patients in the United States. (See "Who Gets Cardiac Sarcoidosis?" page 2.) For this reason, and because heart problems are serious and should be diagnosed and treated as early as possible, *everyone* who has sarcoidosis should be screened for cardiac sarcoidosis.

What Heart Problems Are Caused by Cardiac Sarcoidosis?

Sarcoidosis can affect any part of the heart – ranging from the heart's electrical signaling system to the heart muscle and valves and the layers of tissue that cover the heart. Although some people with cardiac sarcoidosis might notice symptoms of the condition, many people

will feel nothing, even in late-stage disease, which is why screening is so important.
Some of the symptoms that you might notice include

- *irregular heartbeats*, which can feel like palpitations and/or skipped beats.
- *shortness of breath* (especially when lying down), coughing, chest tightness and/or wheezing, although these can be a sign of lung problems, too
- *swelling in the legs*, which usually occurs only in late-stage sarcoidosis of the heart
- *feeling lightheaded or fainting*

The problems caused by cardiac sarcoidosis can include

- *arrhythmias*, which are abnormal heartbeats or rhythms
- *heart blocks*, which block the electrical impulses that regulate the heart rate, impairing blood flow to the rest of the body
- *heart failure*, which means your heart is unable to pump enough blood through the body, causing blood and fluid to back up in the lungs and elsewhere
- *pericarditis*, which, although rare, can cause inflammation of the covering of the heart, as well as chest pains
- *heart valve problems*, which can prevent your blood from flowing through your heart correctly
- *heart attacks*, which are rare but can occur when a blockage prevents blood and oxygen from reaching part of the heart

Who Gets Cardiac Sarcoidosis?

Sarcoidosis can affect men and women of any age and race. However, the disease usually strikes adults between the ages of 20 and 40, and in the United States, it is most common in African Americans and people of Northern European – particularly Scandinavian – descent. Among African Americans, the most affected U.S. group, the estimated lifetime risk of developing

sarcoidosis might be greater than 2 percent. No one knows what causes the disease, but it is probably due to a combination of factors. Some research suggests that bacteria, viruses or chemicals might trigger the disease. Such triggers, although usually harmless in most people, might provoke the immune system to develop the inflammation associated with sarcoidosis in people with the right genetic predisposition.

Researchers know very little about which sarcoidosis patients tend to develop cardiac sarcoidosis. At one time, doctors thought that the cardiac complications of the disease were rare because less than 5 percent of the people who have the condition have obvious clinical symptoms. However, experts now think that some degree of heart involvement in sarcoidosis is far more common than previously thought. For example, in several autopsy studies conducted since the 1950s, researchers have reported finding evidence of cardiac sarcoidosis in up to 27 percent of U.S. patients with systemic sarcoidosis, most of whom had not been diagnosed with the condition during their lifetimes. In Japan, where cardiac sarcoidosis is far more common than in Western countries, more than 50 percent of people with sarcoidosis have cardiac complications.

How Do Doctors Diagnose Cardiac Sarcoidosis?

Early diagnosis is the key to preventing the potentially devastating effects of cardiac sarcoidosis. Only a few people who have cardiac complications are at risk for the most serious effects, such as heart failure or sudden death, but these are risks. And because cardiac sarcoidosis is hard to notice, being checked for it is important if you already have sarcoidosis.

Your symptoms are the key to a diagnosis. If you have had skipped heart beats, felt your heart racing, have passed out or have evidence of heart failure (such as swollen legs), you probably need to be evaluated for cardiac sarcoidosis.
Some primary care doctors can diagnose and treat sarcoidosis, but it is probably best to work with either a sarcoidosis specialist or a cardiologist to get the screening you need for cardiac complications.

There is no one laboratory test that will diagnose cardiac sarcoidosis for certain and there are no official guidelines for doctors to tell them how to screen their patients for the condition. However, a number of diagnostic tests and sophisticated imaging tools are available today that can detect various heart problems. Most of the ones your doctor might use to screen you for cardiac sarcoidosis are described below. Although these tests are not specific for sarcoidosis, the ones that your doctor recommends for you, taken together, can help give a more complete picture of your risk for cardiac complications.

Electrocardiography: This technology is widely available to most doctors, and it is often used as one of the initial tools to screen for cardiac sarcoidosis. During an electrocardiograph test, a technician places electrodes on various parts of your body to monitor the electrical activity of your heart for a certain period of time. The test produces an electrocardiogram (an ECG, or EKG, for short), which is a graph of your heart rhythm and blood flow pattern over time. The downside of ECGs is that they are not very specific. As many as half of all people with sarcoidosis who are tested will produce an ECG that shows some abnormalities, so further testing might be necessary to determine whether any abnormalities that show up on your ECG are serious.

Holter Monitoring: Much like an electrocardiograph test, a Holter monitor records

your heart's electrical activity, but over a longer period – usually 24 or 48 hours – so your doctor can check for irregular heartbeats. With Holter monitoring, you wear or carry with you a monitor that is attached to electrodes on your chest. The device then produces a report that your doctor can compare against the symptoms and activities you reported over the time period that you wore the monitor. As with ECGs, Holter monitor reports pick up a lot of abnormalities, and it is often unclear which ones are important without further testing.

Electrophysiologic Study: Some doctors might order an electrophysiologic study (EPS) to check for an abnormal heart rhythm. During an EPS, a doctor threads a thin, flexible tube called a catheter through a vein in your groin or neck and guides it to your heart using a fluoroscope. The fluoroscope is a live imaging technology that allows the doctor to see the catheter inside your body. Electrodes on the catheter measure electrical signals in your heart, which can help determine if you have an arrhythmia or heart block. The electrodes can also be used during an EPS to provoke an arrhythmia, which can tell your doctor a lot about the location and extent of damaged heart tissue. An EPS requires a local anesthetic and a mild sedative. It usually is not painful. An EPS provides more detailed data than an ECG or a Holter monitor does.

Echocardiography: This technology uses high-frequency sound waves (also called ultrasound) to produce two-dimensional images of the heart. (It is the same technology that doctors use with pregnant women to look at the developing fetus.) The image can help doctors identify problems with your heart valves and the chambers of your heart, so if the ECG or the Holter monitor report showed an abnormality, your doctor might use an echocardiograph test to learn more about that abnormality. However, echocardiograms might be better at picking up

signs of late-stage cardiac sarcoidosis than early heart complications. Some doctors are beginning to use new, more sensitive ultrasound methods to look at the heart, but these are not yet widely available.

Nuclear Imaging: Some imaging technologies are "nuclear" because you are injected with a small amount of a radioactive compound called a tracer. A special computer and a special camera that detects radioactivity will create a picture of the way your body absorbs the tracer, which allows doctors to see how well blood flows through your heart. Usually, you are first given an exercise test, sometimes called a stress test, which increases your heart rate. This way, the computer can capture images of your heart's blood flow pattern after exercise and again at rest. The tracers used to check for cardiac sarcoidosis include thallium or technetium sestamibi. (Although these compounds are radioactive, you are given a very low dosage. The scans are generally considered safe, and side effects are rare.) Nuclear imaging tests help doctors detect heart blockages and heart injury, and they can be useful for distinguishing between cardiac sarcoidosis and other heart problems, such as coronary artery disease. They might also help doctors predict how well a person with cardiac sarcoidosis will respond to certain medications. However, many sarcoidosis experts think cardiac positron emission tomography (PET) and cardiac magnetic resonance imaging (MRI) may be the most useful tests for evaluating cardiac sarcoidosis. (See below).

Cardiac Positron Emission Tomography (PET): Cardiac PET scanning is an imaging technique that detects changes in the heart's chemical activities. As with the nuclear imaging tests, you are injected with a radioactive tracer, usually a kind of fluoride, before the test. It travels through the bloodstream, accumulating in areas of the heart that show increased chemical activity. Since areas of inflammation often show increased

activity, PET scanning can help doctors see if your heart is healthy and getting enough blood. The images produced by PET scans are very detailed and give your doctor a lot of information. Some experts consider PET scanning to be the best at detecting heart blockages and blood flow abnormalities, better than the nuclear scanning techniques described above. Some experts also think it is one of the better tests available for spotting the early signs of cardiac sarcoidosis. However, it is not yet established whether or not PET scans help doctors distinguish between cardiac sarcoidosis and other heart problems.

Cardiac Magnetic Resonance Imaging (MRI): As with PET scanning, cardiac MRI is a scanning technique that produces highly detailed images of the heart. In this case, the images are produced by a device that uses radio frequencies and a magnetic field rather than radioactivity. If the appropriate MRI technology is available, your doctor might recommend that you get an injection of a non-radioactive chemical, called a contrast agent, that enhances the detail of the scans. Cardiac MRI can help doctors diagnose cardiac sarcoidosis and monitor the progress of treatment, and the contrast-enhanced type of MRI appears to be, along with PET scanning, one of the better tests available for spotting early signs of cardiac sarcoidosis. However, people with pacemakers or automatic implantable defibrillators cannot undergo MRI scanning due to the strong magnetic field involved.

Heart Biopsy: In some cases, a doctor might recommend a heart muscle biopsy to look for cardiac sarcoidosis and to exclude other diseases. However, heart biopsies are invasive, and they are rarely used today to diagnose cardiac sarcoidosis. While a positive biopsy would provide strong evidence of the disease, a negative biopsy – which is likely – doesn't prove anything. Many people with cardiac sarcoidosis have negative biopsies because the granulomas show up only in patches.

Diagnostic Tests for Cardiac Sarcoidosis

- Electrocardiography (ECG or EKG)
- Holter monitoring
- Echocardiography
- Nuclear imaging (with thallium and/or technetium sestamibi)
- Cardiac positron emission tomography (PET)
- Cardiac magnetic resonance imaging (MRI)
- Heart biopsy, rarely
- Electrophysiologic Study (EPS)

How Is Cardiac Sarcoidosis Treated?

Corticosteroids

Most doctors initially treat cardiac sarcoidosis with corticosteroid medications, which are also called glucocorticoids or steroids. These are powerful drugs that can slow, stop or even prevent heart injury by reducing the inflammation caused by sarcoidosis. Commonly prescribed glucocorticoids include cortisone, prednisone and prednisolone. Corticosteroids can be taken alone or in combination with other medicines.

Most doctors will prescribe a moderate to high dosage of corticosteroids initially, but they will try to reduce the dosage gradually as symptoms are brought under control because high dosages of corticosteroids and/or long-term treatment can cause serious side effects. These side effects include mood swings, weight gain, acne, difficulty sleeping at night and, when taken for a long time, problems such as osteoporosis, diabetes, high blood pressure, cataracts, glaucoma and other serious conditions. Most people with cardiac sarcoidosis will need ongoing corticosteroid therapy for a long time, possibly a lifetime, so the lowest dosage that still suppresses cardiac inflammation is desirable.

For people who cannot take corticosteroids, or when a combination drug treatment approach is warranted, doctors might prescribe any of a host of other medications that suppress the immune system and reduce inflammation, such as antimalarial medicines, methotrexate, azathioprine and mycophenylate mofetil.

Heart Medications and Devices

Corticosteroids will reduce the inflammation associated with granulomas, but they might not correct irregular heartbeats or improve the heart's pumping ability once inflammation has already seriously damaged the heart muscle. For these problems, doctors might prescribe one of dozens of different anti-arrhythmia drugs that are available today. If you need anti-arrhythmia medication, your doctor will need to evaluate your specific symptoms and your medical and medication history to determine which drug is right for you.

For people with serious arrhythmias or heart blockages, a pacemaker or an automatic implantable defibrillator might also be recommended. A pacemaker is a battery-operated device that is placed under your skin to regulate your heart's rhythm. An implantable defibrillator is implanted near your heart, and it uses electrical impulses to shock the heart back into a regular rhythm if it starts to beat irregularly. If your heart stops altogether, the defibrillator can shock it into beating again.

Heart Transplantation

Doctors recommend heart transplantation only rarely, in the most severe cases of cardiac sarcoidosis, when the heart is failing and has been damaged irreversibly. Even then, it is usually only recommended for younger patients, and the procedure is very risky because the body might reject the transplant. With early diagnosis and corticosteroid treatment, most people who have cardiac sarcoidosis will never need to consider a transplant.

What Should I Expect?

In the late 1970s, a team of sarcoidosis researchers estimated that most of their patients who had cardiac sarcoidosis lived only about 2 years after the development of their heart problems. Since then, the survival rate – although no one knows exactly what it is today – has improved dramatically due to an arsenal of new heart medicines, sophisticated new heart-imaging technologies, medical devices such as the implantable defibrillator and changing ideas about the aggressive use of corticosteroids and other immune system-suppressing medicines.

Because you might not notice any outward signs of cardiac sarcoidosis and because it is hard for doctors to detect the disease, if you have sarcoidosis, it is important to find a doctor who understands the disease and to be screened for heart problems.

If you are diagnosed with cardiac sarcoidosis, you will need to visit your team of doctors regularly, and you will have frequent laboratory and imaging tests to monitor your treatment's progress. You might be on certain drugs for a long time, even a lifetime, and you might also need to use medical devices that regulate your heart. However, most people who receive an early and accurate diagnosis of cardiac sarcoidosis can lead active lives if they receive aggressive and ongoing treatment to prevent or halt heart injury.

Research is underway to improve the diagnosis and treatment of sarcoidosis and to find new medicines that are as effective as corticosteroids but have fewer side effects. In addition, genetic researchers are trying to find out how people become predisposed to develop sarcoidosis in the first place and why people of different races are affected differently.

Pulmonary Hypertension and the Heart

Sarcoidosis can affect the heart in more ways than one. In addition to cardiac sarcoidosis, which involves the development of granulomas in the heart muscle, another complication of sarcoidosis, pulmonary hypertension, can also affect the heart.

Pulmonary hypertension, which is also known as pulmonary arterial hypertension (or PAH), is continuous high blood pressure in the pulmonary artery, the primary blood vessel of the lungs. Pulmonary arterial hypertension can be a serious complication of fibrosis, or scarring, in the lungs due to sarcoidosis. When scar tissue forms due to sarcoidosis, the small arteries in the lungs narrow and may eventually become blocked. As a result, the heart must work harder to pump blood through them. Over time, the overworked heart muscle becomes weak and loses its ability to pump enough blood to the lungs.

Common symptoms of pulmonary arterial hypertension include difficulty breathing, fatigue, dizziness, fainting spells, swelling in the ankles or legs, bluish lips and skin, chest pain and palpitations.

To diagnose pulmonary arterial hypertension, your doctor might conduct tests to determine the pressure in your pulmonary artery and to find out how well your heart and lungs are working. These tests might include chest x-rays, electrocardiograph tests, echocardiogram tests and/or cardiac catheterization.

In addition to their sarcoidosis treatments, people who have pulmonary arterial hypertension might also require medications, oxygen and, if needed, lung transplantation. Several new medications have become available in recent years to treat pulmonary arterial hypertension, including epoprostenol, bosentan and sildenafil. These drugs have not been well studied in people whose pulmonary hypertension is caused by sarcoidosis, but one study recently concluded that the treatments, given alone or in combination, might improve some symptoms of pulmonary arterial hypertension in people with sarcoidosis, as well as delay the need for lung transplantation.

For More Information

Cardiac Sarcoidosis and Sarcoidosis

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National Heart, Lung, and Blood Institute
301-592-8573
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Heart Health

American Heart Association
800-AHA-USA-1 (242-8721)
www.americanheart.org

Medline Plus
www.medlineplus.gov

Research

Clinical Trials.gov
www.clinicaltrials.gov