

# Sudden Cardiac Death

Sudden cardiac death (SCD), also called sudden cardiac arrest, is when the heart abruptly and without warning stops pumping.

When SCD occurs, no blood can be pumped to the rest of the body. It is responsible for half of all heart disease deaths.

Sudden cardiac death occurs when the heart's electrical system malfunctions. It is not a heart attack (also known as a myocardial infarction). A heart attack is when a blockage in a blood vessel interrupts the flow of oxygen-rich blood to the heart, causing heart muscle to die. So if the heart can be compared to a house, SCD occurs when there is an electrical problem and a heart attack when there is a plumbing problem.

The most common cause of cardiac arrest is a heart rhythm disorder or arrhythmia called ventricular fibrillation (VF). The heart has a built-in electrical system. In a healthy heart, the sinoatrial node, the heart's natural "pacemaker" triggers the heartbeat, then electrical impulses run along pathways in the heart, causing it to contract in a regular,

rhythmic way. When a contraction happens, blood is pumped.

But in ventricular fibrillation, the electrical signals that control the pumping of the heart suddenly become rapid and chaotic. As a result, the lower chambers of the heart, the ventricles, quiver or fibrillate instead of contracting, and they can no longer pump blood from the heart to the rest of the body. If blood cannot flow to the brain, the brain becomes starved of oxygen, and the person loses consciousness in seconds. Unless an emergency shock is delivered to the heart to restore its regular rhythm using a machine called a defibrillator, death occurs within minutes. It's estimated that more than 70 percent of ventricular fibrillation victims die before reaching the hospital.

#### Who Is At Risk?

SCD often occurs in active, outwardly healthy people with no known heart disease or other health

problems. But the truth is that sudden cardiac death is not a random event. Most victims do have heart diseases or other health problems, although they may not know it.

There are numerous contributors to cardiac arrest, but two of the most important ones are:

**Coronary artery disease.** This is a condition in which the arteries that supply blood to the heart are narrowed or blocked. In fact, 75 percent of people who die of SCD show signs of a previous heart attack.

**A low ejection fraction (EF).** The ejection fraction is a measurement of how much blood is pumped by the left ventricle (the heart's main pumping chamber) with each heart beat. A healthy heart pumps 55 percent or more of its blood out to the body with each beat. People at highest risk for SCD have ejection fractions of less than 35. Doctors frequently recommend implanting

defibrillators for patients with ejection fractions less than 35 percent, to reduce their risk of sudden cardiac death.

### Tests That Predict Risk

There are a number of tests that can be performed to determine if someone is in a group that is at high risk for cardiac arrest. These include:

**Echocardiogram** – a painless test in which ultrasound waves are used to create a moving picture of the heart. The test can measure the strength of the heart's pumping function (ejection fraction) and identify other problems that may increase a person's risk for SCD.

**Electrocardiogram** – A painless test in which electrodes are attached to the patient's chest to record the electrical activity of the heart in order to identify abnormal heart rhythms. Certain arrhythmias could point to an increased risk of SCD.

**Holter monitor** – A cell phone-size recorder that patients attach to their chest for one to two days, recording a longer sampling of their heart rhythm. After the recorder is removed, the tape is analyzed for signs of arrhythmia.

**Event recorder** – a pager-sized device that also records the electrical activity of the heart over a longer period of time. Unlike a holter monitor, it does not operate continuously. Instead, patients activate the device whenever they feel their heart beating too quickly or chaotically.

**Electrophysiology study (EPS)** – This test is performed in a hospital. A local anesthetic is used to numb areas in the groin or neck and thin flexible wires called catheters are

advanced through veins into the heart under x-ray to record its electrical signals. During the study, the electrophysiologist studies the speed and flow of electrical signals through the heart and paces the heart to see if arrhythmias can be induced. The physician can also determine if a patient has had a prior heart attack or evidence of prior heart damage without knowing it. All of this information can help determine whether the patient is in a group at higher risk for SCD.

### Prevention

There are a number of things people can do to decrease the likelihood of becoming a victim of sudden cardiac death. To begin with, living a "heart healthy" life can help reduce the chances of dying of cardiac arrest or other heart conditions. This includes exercising regularly, eating healthful foods, maintaining a reasonable weight, and avoiding smoking.

Treating and monitoring diseases and conditions that can contribute to heart problems, including high blood pressure, high cholesterol, and diabetes, is also important.

Finally, for some patients, preventing sudden cardiac death means controlling or stopping the abnormal heart rhythms that may trigger ventricular fibrillation. Treating arrhythmias is done in three ways:

**Medications** – Medications, including ACE inhibitors, beta blockers, calcium channel blockers, and antiarrhythmics, can control abnormal heart rhythms or treat other conditions that may contribute to heart disease or SCD. But taking medication alone has not proved

## Are You at Risk?

**If you suspect that you are at increased risk for sudden cardiac arrest, consult your physician who can help determine your risk and give you options to reduce the likelihood of becoming a victim.**

to be very effective in reducing cardiac arrest. These medications are sometimes taken by patients who also have an ICD, in order to reduce how often it fires.

**Implantable cardioverter defibrillators (ICDs)** – These devices have been very successful in preventing sudden cardiac death in high-risk patients. Like a pacemaker, ICDs are implanted under the skin. Wires called leads run from the ICD to the heart, and the device monitors the heart to detect any abnormal rhythms. If a dangerous arrhythmia is detected, the ICD delivers an electrical shock to restore the heart's normal rhythm and prevent sudden cardiac death. The ICD can also act like a pacemaker if the heart is beating too slowly.

**Catheter Ablation** – In this technique, radiofrequency energy (heat), cryotherapy (freezing), or other energy forms are used to destroy small areas of heart muscle that cause the dangerous, rapid heart rhythms. The energy is delivered through catheters that are positioned through the veins or arteries to the heart. Catheter ablation is sometimes done in patients who have an ICD to decrease the frequency arrhythmias the number of ICD shocks.