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## Cardioversion

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**C**ardioversion refers to the process of restoring the heart's normal rhythm from an abnormal rhythm. Most elective cardioversions are performed to treat atrial fibrillation, a benign heart rhythm disturbance originating in the upper chambers (atria) of the heart.

### Why Do I Need a Cardioversion?

Normally, each heartbeat starts in the upper right chamber (right atrium) of the heart in a region containing specialized "pacemaker" cells. Each time these cells fire (usually 1 to 2 times per second), they send an organized electrical signal through the heart that results in a coordinated, rhythmic heartbeat. In patients with atrial fibrillation, instead of the normal organized electrical activity, the atria fibrillate (or quiver) because of chaotic electrical wavefronts that circulate throughout both atria. This can result in less efficient blood pumping and an irregular or fast heartbeat. Some patients have no symptoms, whereas others may feel rapid heart action, shortness of breath, or fatigue. Depending on your specific medical history and symptoms, your physician may recommend a cardioversion to return your heart to a normal rhythm.

### What Are the Different Types of Cardioversion?

Cardioversion can be chemical or electrical. Chemical cardioversion refers to taking antiarrhythmia medication to restore the heart's rhythm to normal. Such medications work by altering the heart's electrical properties to suppress the abnormal heart rhythms and restore a normal rhythm. Your doctor may elect to treat you with antiarrhythmia medication as an outpatient or may choose to admit you to the hospital to give you intravenous or oral antiarrhythmia medication while your heart rhythm is being continuously monitored. The decision of whether or not you need to be admitted to the hospital is based on your symptoms, the specific medication your doctor chooses, and your underlying heart disease.

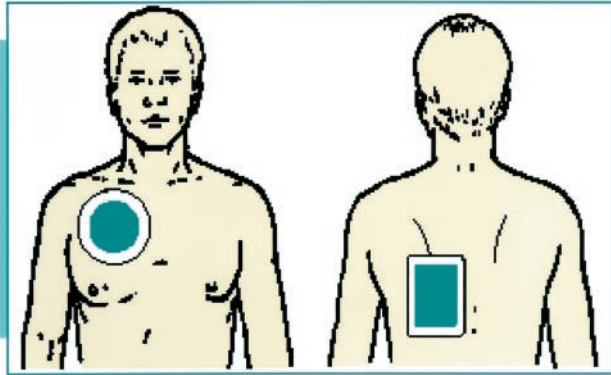
Electrical cardioversion (also known as direct-current or DC cardioversion) is a procedure whereby a synchronized electrical current (shock) is delivered through the chest wall to the heart through special electrodes or paddles that are applied to the skin of the chest and back (Figure 1 and Figure 2). The purpose of the cardioversion is to interrupt the abnormal electrical circuit(s) in the heart and to restore a normal heartbeat. The delivered shock causes all the heart cells to contract simultaneously, thereby interrupting and termi-

nating the abnormal electrical rhythm (typically fibrillation of the atria) without damaging the heart. The heart's electrical system then restores a normal heartbeat.

Electrical cardioversion is performed in a hospital setting such as an intensive care unit, recovery room, or special procedure room. A cardiologist, a nurse, and/or an anesthesiologist are present to monitor your breathing, blood pressure, and heart rhythm. Special cardioversion pads are placed on your chest and back (or alternatively, both pads can be placed on the front of the chest). The pads are connected to an external defibrillator by a cable. The defibrillator allows the medical team to monitor your heart rhythm and apply the necessary energy to restore your heart's rhythm back to normal.

Because the shock may be uncomfortable, sedation is administered intravenously by an anesthesiologist or specially trained nurse. Once you are sedated, the physician delivers the shock. Additional shocks at higher energy levels can be delivered if the first shock does not restore the rhythm back to normal. Rarely, minor skin irritation can occur at the site of the cardioversion pads. Patients generally wake quickly and without any recollection of the shocks because of the amnesic effects of the sedatives. Patients are advised not to drive or make any important

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**Figure 1.** The electrode pad placement for electrical cardioversion is shown. One pad is placed on the chest and a second pad is placed on the back. An electrical current (shock) is delivered between the pads (across the heart) to restore a normal heart rhythm.

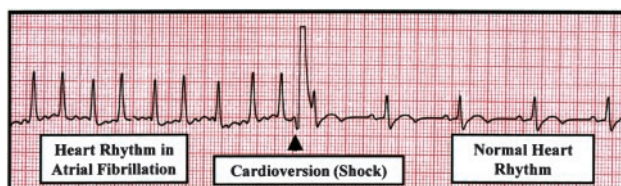
decisions for the rest of the day because of the potential for mild, lingering effects of the anesthesia. Patients should be accompanied by a family member or friend and are usually able to go home an hour after the procedure. A normal heart rhythm can be restored about 90% of the time, although abnormal rhythms recur about 50% of the time within 1 year. Cardioversion can be repeated for those patients who relapse to an abnormal rhythm.

### Are There Any Other Things I Should Know Before My Cardioversion?

Because the upper chambers of the heart are fibrillating (quivering) and do not contract vigorously in patients with atrial fibrillation, there is a possibility that blood clots can form. Restoration of a normal rhythm by cardioversion can dislodge a blood clot from the heart and cause a heart attack or a stroke. Fortunately, most blood clots can be prevented by thinning the blood before cardioversion. This is a process called anticoagulation. Such medica-

tions include aspirin or warfarin (Coumadin, Bristol-Myers Squibb). Warfarin is a pill taken daily and dosed according to blood test results. This test, referred to as the INR or International Normalized Ratio, monitors the “thinness” or “thickness” of the blood, which typically should be in the 2.0 to 3.0 range (a normal INR in someone who is not on warfarin is typically around 1.0). If the INR is too low, there may be an increased risk of forming a blood clot. If the INR is too high, there may be an increased risk for bleeding.

Before performing a cardioversion, your physician will ensure that your risk of blood clot formation and thus of stroke or heart attack is low. This can be done by ensuring that your blood has been adequately thinned for 3 to 4 weeks before the cardioversion. Because it takes many hours for blood clots to form, cardioversion can be safely performed without blood thinning medication in patients who have had their heart rhythm problem for less than 48 hours. Occasionally, your physician may recommend a special ultra-



**Figure 2.** An electrocardiogram (ECG) of a cardioversion is shown. On the left, the heart rhythm is atrial fibrillation characterized by a fast, irregular rhythm. An electric current (shock) delivered across the heart (black arrowhead) restores the heart rhythm to normal (right).

sound of the heart (called a transesophageal echocardiogram or TEE) that can directly visualize the atria to look for a blood clot and make sure it is safe to proceed with the cardioversion.

## WHAT TO EXPECT: PREPARING FOR A CARDIOVERSION

- You should have nothing to eat or drink for at least 8 hours before the procedure.
- Take your regularly scheduled medications the morning of the procedure unless your practitioner has told you otherwise. Your medications should only be taken with enough water to get the tablets down. If you are diabetic, you should discuss your insulin or other diabetes medication dosing with your practitioner.
- Bring a list of all your medications with you.
- Before the cardioversion, do not apply any lotions or ointments to your chest or back, as this may interfere with the adhesiveness of the shocking pads.
- Most medical centers will not let you drive yourself home after receiving sedation/anesthesia; therefore, you should arrange a ride home that day.
- For the remainder of the day, you should not operate a car or heavy machinery or make any important decisions.
- After the cardioversion, you may experience some minor chest discomfort and/or skin irritation. An ointment can be applied to the area to reduce the discomfort.

### Additional Resources

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