WEARABLE CARDIOVERTER-DEFIBRILLATOR (LIFEVEST™)

What is the LifeVest?

The LifeVest™ is a personal defibrillator worn by a patient at risk for sudden cardiac arrest (SCA). It monitors the patient’s heart continuously, and if the patient goes into a life-threatening arrhythmia, the LifeVest delivers a shock treatment to restore the patient’s heart to normal rhythm.

How does the LifeVest work?

There are two main components to the LifeVest: a garment and a monitor (see figures below). The lightweight, comfortable garment is worn under clothing and contains electrodes to pick up the patient’s electrocardiogram (ECG). The monitor, about the size of a paperback book, is worn around the waist (like a fanny pack) or from a shoulder strap.

The monitor reads the patient’s ECG continuously. If the patient has ventricular tachycardia (rapid heartbeat) or ventricular fibrillation (rapid, uncontrolled, ineffective heartbeat), the device sounds an alarm to verify that the patient is nonresponsive. If the patient is conscious, the patient has time to respond to the alarms by pressing two buttons to stop the treatment sequence. If the patient does not respond, the device warns bystanders that a shock is about to be delivered. If the arrhythmia continues and the patient still does not respond, a treatment shock is delivered through the garment electrodes. After the shock, if the patient’s heartbeat returns to normal, the alarms stop and the LifeVest returns to its normal monitoring mode. However, if the patient’s heartbeat does not return to normal and the arrhythmia continues, the treatment cycle repeats. Up to five treatment shocks can be delivered.
How is the LifeVest different from an automatic external defibrillator (AED)?

An AED requires a bystander to witness an arrhythmia event (such as ventricular fibrillation), then operate the device and administer treatment to the patient. In order to be effective, the treatment must be delivered with a few minutes after the event. The patient’s chances of survival drop about 10% for each minute after the onset of fibrillation, so it is imperative that a bystander take quick action. In contrast, with the LifeVest no bystander intervention is required. The device continuously monitors the patient’s ECG, and if a lethal arrhythmia occurs, the LifeVest delivers a treatment shock typically within one minute. The LifeVest protects the patient even when the patient is alone or sleeping. This kind of protection cannot be provided by an AED.

How is the LifeVest different from an implantable cardioverter defibrillator (ICD)?

The ICD, as well as the LifeVest, provides continuous protection to the patient. The device may provide protection as a bridge to implantable defibrillator (ICD) implantation or cardiac transplantation. It can be useful in higher risk patients who are being considered for ICD implantation but who may not meet criteria yet for implantation. For example, patients who have had large myocardial infarctions or undergone coronary revascularization with decreased left ventricular function (LVEF ≤ 30%) may be candidates for ICD implantation if their ventricular function does not improve after 1 or 3 months, respectively (MADIT-2 criteria). The LifeVest can provide protection during these periods. Patients who have an infection or malfunction of their ICD awaiting re-implantation could also use the LifeVest during the waiting period while their infection clears or until the ICD procedure is performed. Also, it can be potentially used in place of hospitalization for patients undergoing antiarrhythmic drug loading for other arrhythmias, such as atrial fibrillation, to protect against worsening of ventricular arrhythmias during the early drug initiation phase.

How does a doctor view patient data?

Patients transmit information from their devices by connecting them to a normal telephone line. The LifeVest then sends the data over the phone line to a secure, password protected database that is part of a Web site called LifeVest Network. Physicians can access LifeVest Network at any time and view patient information, including ECG recordings (both automatic and manual), compliance data (how long patients are wearing the device), noise data, and other device-related information.