Cardiac Resynchronization Therapy

How Does It Work?

Cardiac resynchronization therapy (CRT) is a new treatment for heart failure that uses an implantable device to improve the pumping efficiency of the heart.

In healthy people, the four chambers of the heart contract in synchrony to move blood through the body (people experience this as their heartbeat). However, in many patients who have heart failure, the electrical impulses that coordinate the contractions of the heart’s chambers may be impaired. As a result, in up to 30 percent of people who have advanced heart failure, the two lower chambers, called ventricles, no longer contract at the same time. This may worsen the symptoms of the disease, which include shortness of breath, fatigue, and swelling of the feet and ankles.

In cardiac resynchronization therapy, a device is implanted in the upper chest in an attempt to resynchronize the contractions of the ventricles by sending tiny electrical impulses to the heart muscle. Resynchronizing the contractions of the ventricles can help the heart pump blood throughout the body more efficiently and reduce the symptoms. Cardiac resynchronization therapy, also known as biventricular pacing, is intended to complement standard drug treatment, and dietary and lifestyle modifications.

What is the Medtronic InSync® family of cardiac resynchronization systems?

In the Medtronic InSync family of CRT systems, the systems consist of the implantable devices and specialized leads designed to provide resynchronization therapy for people who have heart failure and problems with electrical conduction in their hearts. They are designed and manufactured by Medtronic, Inc., the world’s leading medical technology company specializing in implantable and interventional therapies.

There are several models of InSync devices commercially released in the United States, Europe, Canada, Latin America and certain Asian countries. The InSync CRT system was approved by the U.S. Food and Drug Administration in August 2001. In June 2002, the FDA approved the InSync ICD® device, a CRT system that also includes a defibrillator for patients at risk of dangerous ventricular arrhythmias. Recently, the InSync III® and InSync Marquis™ systems were approved in the U.S. The InSync III system offers sequential bi-ventricular pacing, which allows a physician to adjust the pacing sequence of the two lower heart chambers to improve cardiac performance. The InSync Marquis system provides cardiac resynchronization and all of the features of the Medtronic Marquis™ defibrillator, the world’s most implanted ICD.
Is surgery required to implant the InSync systems?

Yes. A specially trained cardiologist or cardiovascular surgeon implants the InSync systems. The devices vary in size – slightly larger than three stacked silver dollars for the InSync and InSync III systems, and about the size of a small stopwatch for InSync Marquis – and are implanted under the skin in the chest area. Three very thin insulated wires (leads), with tiny electrodes on their distal ends, are maneuvered through veins from the device to the heart: One lead is placed to touch the inner wall of the right atrium, another to touch the inner wall of the right ventricle and the third lead is threaded through the coronary sinus and placed to touch the outer wall of the left ventricle. The implantation procedure is typically done with local anesthesia, so the patient remains conscious. However, the procedure takes longer than a regular pacemaker implant because of the need to implant the third lead to pace the left ventricle. A typical time, depending on physician experience and patient anatomy, is between 2-3 hours. Patients usually stay in the hospital overnight.

What are the potential benefits of this new therapy?

For those patients with heart failure who have electrical conduction problems of the heart, resynchronization therapy is intended to improve the heart’s efficiency and increase blood flow to the body. Blood ejected from the heart is decreased in people who have heart failure, which is the reason they often experience symptoms such as fatigue, shortness of breath, and swelling (or edema) of the feet and ankles. By improving blood flow, heart resynchronization therapy may reduce heart failure symptoms, improve quality of life and increase patients’ ability to perform the tasks of daily living.