

**Cardiac Resynchronization  
Therapy  
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Cardiac Resynchronization Therapy is a new technology currently being developed to treat patients with heart failure. Heart failure is the result of damaged heart tissue, which may have been caused by a heart attack, high blood pressure, diabetes, and malfunctioning heart valves. Heart failure may cause damage to the heart's intrinsic conduction system which can cause the heart to beat less efficiently, and/or erratically.

Currently the treatment options for patients suffering from heart failure include a pacemaker or defibrillator or a combination of the two. In a traditional pacemaker, leads carrying electrical pulses are attached to the right atrium and right ventricle. In cardiac resynchronization therapy a third lead is connected to the left ventricle, and both the right and left ventricles are stimulated simultaneously. Simultaneous excitation optimizes ventricular filling (diastole), reduces mitral regurgitation, greatly improving overall cardiac efficiency.

The basic components of Cardiac Resynchronization systems consist of the system controller and three leads which attach to the heart itself. The system controller is placed subcutaneously in the upper

chest area; the same location where normal pacemakers are found. The most complicated portion of the operation is the lead, which must be placed in the left ventricle. First, the cardiac venous anatomy is imaged with a series of venograms, which allows the physician to select the particular vein that will be used for the left ventricle lead, and also the particular path for advancing the lead to its final location.

Currently two companies have developed Cardiac Resynchronization Therapy systems, and both are still undergoing FDA clinical trials. One study was published in the New England Journal of Medicine. In this study the research focused on the CRT system in patients whose QRS interval was greater than 130ms. This is an indication of ventricular dyssynchrony. This study included 453 patients. Parameters researched included distance walked in 6 minutes, time spent on treadmill during exercise testing, required hospitalization, and required intravenous medication. It is important to note that these patients all received conventional medication as well. The results were to show how CRT further improves heart function in addition to medication, and also how it may become a more cost effective treatment for heart failure. Other studies, which focus more on the effect of the devices themselves, also show improvements over conventional treatments.

**Sources:**

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