

# CRT Beneficial in Mild Heart Failure

BY BRUCE JANCIN

ORLANDO — Cardiac resynchronization therapy improves key clinical outcomes in patients with mild heart failure, a randomized trial has shown.

In the European cohort of the Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction (REVERSE) trial, patients with cardiac resynchronization therapy switched on had a 62% relative risk reduction in the combined end point of heart failure hospitalization or death, compared with those assigned to CRT-off, at 24 months' follow-up, Dr. Cecilia Linde said at the annual meeting of the American College of Cardiology.

Patients with the CRT device turned on also had significantly improved left ventricular function, as reflected in their ejection fraction and end-diastolic and end-systolic volumes. (See box.) All these outcomes combined suggest that reverse ventricular remodeling had occurred, added Dr. Linde, professor of cardiology at Karolinska Hospital, Stockholm.

The follow-up analysis involved 262 patients who underwent implantation of a biventricular pacemaker and were then randomized 2:1 to have CRT switched on or off.

All subjects had New York Heart Association class II or previously symptomatic class I heart failure, a left ventricular ejection fraction of 40% or less, and a wide QRS interval of at least 120 ms. All were on optimal guideline-recommended medical therapy.

The goal of REVERSE was to learn whether heart failure patients who improved with potent medications to the point of being asymptomatic or mildly symptomatic could maintain that status with CRT. The answer, Dr. Linde said, is clearly yes.

There was a 10% major complication rate related to the CRT devices in REVERSE. Lead dislocation, perforation of the coronary sinus, and other complications were concentrated in the left ventricular lead during the first year and the right lead in year 2.

The 12-month REVERSE results, presented last year, showed only a nonsignificant trend favoring better outcomes in the CRT-on group. Why the difference a year later? "It takes time to have an effect in patients with asymptomatic or mildly symptomatic heart failure, so of course when you follow patients for 24 months you're going to find more than if you follow them for 12 months," she observed.

Today CRT is indicated in clinical practice for patients with class III or ambulatory class IV heart failure. Dr. Linde predicted that if the new REVERSE findings are confirmed in the much larger ongoing Automatic Defibrillator Implantation With Cardiac Resynchronization Therapy (MADIT-CRT) trial and Rythmol SR Atrial Fibrillation Trial (RAFT), as she expects, the indications for CRT will broaden to incorporate the large population of patients with class I and II heart failure.

Dr. Jean-Claude Daubert of the REVERSE steering committee noted that since most patients were asymptomatic or mildly symptomatic at entry, there was little room for functional or symptomatic improvement.

"We suspect that to show functional benefit we'll need a much longer follow-up," said Dr. Daubert, professor of cardiology at Central University Hospital, Rennes, France.

REVERSE was sponsored by Medtronic Inc. Dr. Linde and Dr. Daubert serve as consultants to, and are on the speakers bureaus for, Medtronic and St. Jude Medical. ■

## Two-Year Outcomes in REVERSE Subanalysis

Outcome	CRT On	CRT Off
First heart failure hospitalization or death	12%	24%
Clinical worsening	19%	34%
LV ejection fraction (baseline 28%)	35%	30%
LV end-systolic volume (baseline 95 mL/m <sup>2</sup> )	69.7	94.5
LV end-diastolic volume (baseline 131 mL/m <sup>2</sup> )	103	132

Note: Based on a European cohort of 262 patients. All differences between groups are statistically significant.

Source: Dr. Linde

## THE EFFECTIVE PHYSICIAN

### Heart Failure: Hospital Management 2009

BY WILLIAM E. GOLDEN, M.D., AND ROBERT H. HOPKINS, M.D.

#### Background

The American College of Cardiology recently published a focused update of their 2005 guideline for the diagnosis and management of heart failure in adults. One of the major changes incorporated in this guideline was a review of inpatient care for adults with heart failure.

#### Conclusions

Patients with heart failure (HF) most commonly present for care with one of three patterns: with exercise intolerance, with leg (or abdominal) swelling, or with no symptoms directly referable to left ventricular dysfunction (these patients are then found to have HF upon evaluation of their presenting complaints).

In conjunction with a complete history and physical examination, two-dimensional echocardiography with Doppler flow assessment is the most useful diagnostic test for heart failure at initial presentation.

Patients with heart failure with preserved left ventricular function (LVF) are as likely to be admitted to the hospital with exacerbations as are those with reduced LVF.

Acute coronary events necessitating specific intervention may be present in up to 20% of heart failure admissions.

Heart failure hospitalization is an important negative predictor of heart failure morbidity and mortality; there is a 50% risk of rehospitalization within 6 months and a 25%-35% incidence of death at 12 months.

#### Implementation

The diagnosis of heart failure at admission is principally based on history and examination. The initial clinical evaluation should also rapidly assess volume status, the adequacy of organ perfusion, the presence of comorbidities, whether this is an initial or a recurrent episode of HF, and whether LVF is preserved.

A majority of patients with chronic HF admitted to the hospital should have their oral therapies continued through the hospitalization. Continuation of beta-blockade is usually well tolerated and may improve outcomes; exceptions might include patients with marked hypervolemia or the onset of HF symptoms immediately following the initiation of beta-blockade.

Acute coronary syndromes, severe hypertension, arrhythmias, infection, pulmonary emboli, renal failure, and medical/dietary noncompliance are common causes of acute heart failure, and the identification and treatment of these conditions are key to appropriately directed treatment and patient education.

In patients with dyspnea in whom a causal role of HF cannot be determined clinically, B-type natriuretic peptide (BNP) or N-terminal pro-BNP should be measured. BNP results must be interpreted in the context of all of the patient's clinical data.

Oxygen should be administered to relieve symptomatic hypoxemia.

Patients who have evidence of symptomatic fluid overload should be treated with intravenous loop diuretics. The initial dose should be administered as soon as possible in the clinic or emergency department and should equal or exceed the patient's chronic

oral dose. The dose of diuretics should be adjusted based on the patient's clinical response and laboratory parameters, which should be reassessed frequently.

Neither serial BNP measurement nor invasive hemodynamic monitoring has been demonstrated to improve outcomes from heart failure hospitalization; however, the latter may be useful in selected patients in whom the adequacy of cardiac filling cannot be sufficiently determined clinically.

Inadequate diuretic response may indicate the need to increase the dose of the loop diuretic, to add a second diuretic (such as metolazone, chlorothiazide, or spironolactone) to the loop diuretic, or to consider continuous infusion of the loop diuretic. Nephrology consultation and renal replacement may be needed in selected patients with worsening renal insufficiency and/or lack of effective diuresis.

The need for inotropic agents to support blood pressure or organ perfusion bodes a poor prognosis, and their use is not recommended routinely. Inotropic medications may be useful in selected patients with hypotension who do not respond to vasodilators and diuretics.

Prior to discharge and after stabilization (which should include successful discontinuation of intravenous diuretics, vasodilators, and inotropic agents), patients hospitalized with heart failure should be transitioned to (or resume) a regimen including ACE inhibitors (or angiotensin II receptor blockers if ACE-inhibitor intolerant) and beta-blockers. Beta-blockers should be begun at low dose and titrated slowly, particularly in patients who have required inotropic medications.

Discharge instruction, medication reconciliation, transition-of-care coordination, and postdischarge care require close attention and systematic implementation in patients with heart failure due to their high risk of short-term morbidity and mortality. These points are covered in detail in the full text of the guideline.

#### Reference

Jessup M., et al. 2009 Focused Update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J. Am. Coll. Cardiol.* 2009;53:1343-82.



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