

## Prophylactic Catheter Ablation for the Prevention of Defibrillator Therapy

For patients who have a ventricular tachyarrhythmic event, implantable cardioverter-defibrillators (ICDs) are a mainstay of therapy to prevent sudden death. However, ICD shocks are painful, can result in clinical depression, and do not offer complete protection against death from arrhythmia. Investigators designed a randomized trial to examine whether prophylactic radiofrequency catheter ablation of arrhythmogenic ventricular tissue would reduce the incidence of ICD therapy.

Eligible patients with a history of a myocardial infarction underwent defibrillator implantation for spontaneous ventricular tachycardia or fibrillation. The patients did not receive antiarrhythmic drugs. Patients were randomly assigned to defibrillator implantation alone or defibrillator implantation with adjunctive catheter ablation (64 patients in each group). Ablation was performed with the use of a substrate-based approach in which the myocardial scar is mapped and ablated while the heart remains predominantly in sinus rhythm. The primary end point was survival free from any appropriate ICD therapy.

The mortality rate 30 days after ablation was zero, and there were no significant changes in ventricular function or functional class during the mean ( $\pm$  SD) follow-up period of  $22.5 \pm 5.5$  months. Twenty-one patients assigned to defibrillator implantation alone (33%) and eight patients assigned to defibrillator implantation plus ablation (12%) received appropriate ICD therapy (antitachycardia pacing or shocks) (hazard ratio in the ablation group, 0.35; 95% confidence interval, 0.15 to 0.78,  $P = 0.007$ ). Among these patients, 20 in the control group (31%) and 6 in the ablation group (9%) received shocks ( $P = 0.003$ ). Mortality was not increased in the group assigned to ablation as compared with the control group (9% vs 17%,  $P = 0.29$ ).

The study concluded that prophylactic substrate-based catheter ablation reduced the incidence of ICD therapy in patients with a history of myocardial infarction who received ICDs for the secondary prevention of sudden death.

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## Cardiac-Resynchronization Therapy in Heart Failure with Narrow QRS Complexes

Indications for cardiac-resynchronization therapy (CRT) in patients with heart failure include a prolonged QRS interval ( $> 120$  msec), in addition to other functional criteria. Some patients with

narrow QRS complexes have echocardiographic evidence of left ventricular mechanical dyssynchrony and may also benefit from CRT.

Investigators enrolled 172 patients who had a standard indication for an implantable cardioverter-defibrillator. Patients received the CRT device and were randomly assigned to the CRT group or to a control group (no CRT) for 6 months. The primary end point was the proportion of patients with an increase in peak oxygen consumption of at least 1.0 ml per kilogram of body weight per minute during cardiopulmonary exercise testing at 6 months.

At 6 months, the CRT group and the control group did not differ significantly in the proportion of patients with the primary end point (46% and 41%, respectively). In a prespecified subgroup with a QRS interval of 120 msec or more, the peak oxygen consumption increased in the CRT group ( $P=0.02$ ), but it was unchanged in a subgroup with a QRS interval of less than 120 msec ( $P=0.45$ ). There were 24 heart-failure events requiring intravenous therapy in 14 patients in the CRT group (16.1%) and 41 events in 19 patients in the control group (22.3%), but the difference was not significant.

The study concluded that CRT did not improve peak oxygen consumption in patients with moderate-to-severe heart failure, providing evidence that patients with heart failure and narrow QRS intervals may not benefit from CRT.

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## Drug-Eluting Stents vs CABG in Multivessel CAD

Numerous studies have compared the outcomes of two competing interventions for multivessel coronary artery disease: coronary-artery bypass grafting (CABG) and coronary stenting. However, little information has become available since the introduction of drug-eluting stents.

Investigators identified patients with multivessel disease who received drug-eluting stents or underwent CABG in New York State between October 1, 2003, and December 31, 2004, and compared adverse outcomes (death, death or myocardial infarction, or repeat revascularization) through December 31, 2005, after adjustment for differences in baseline risk factors among the patients.

In comparison with treatment with a drug-eluting stent, CABG was associated with lower 18-month rates of death and of death or myocardial infarction both for patients with three-vessel disease and for patients with two-vessel disease. Among patients with three-vessel disease who underwent CABG, as

compared with those who received a stent, he adjusted survival rate was 94.0% versus 92.7% ( $P = 0.03$ ); the adjusted rate of survival free from myocardial infarction was 92.1% versus 89.7% ( $P < 0.001$ ). Among patients with two-vessel disease who underwent CABG, as compared with those who received a stent, the adjusted hazard ratio for death was 0.71 (95% CI, 0.57 to 0.89) and the adjusted survival rate was 96.0% versus 94.6% ( $P = 0.003$ ); the adjusted hazard ratio for death or myocardial infarction was 0.71 (95% CI, 0.59 to 0.87) and the adjusted rate of survival free from myocardial infarction was 94.5% versus 92.5% ( $P < 0.001$ ). Patients undergoing CABG also had lower rates of repeat revascularization.

The study concluded that for patients with multivessel disease, CABG continues to be associated with lower mortality rates than does treatment with drug-eluting stents and is also associated with lower rates of death or myocardial infarction and repeat revascularization.

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### Off-label Use of Drug Eluting Stents Not Associated With Increased Risk of Death or Myocardial Infarction

Recent reports suggest that off-label use of drug-eluting stents is associated with an increased incidence of adverse events. Whether the use of bare-metal stents would yield different results is unknown.

A study was designed to analyze data from 6551 patients in the National Heart, Lung, and Blood Institute Dynamic Registry according to whether they were treated with drug-eluting stents or bare-metal stents and whether use was standard or off-label. Patients were followed for 1 year for the occurrence of cardiovascular events and death. Off-label use was defined as use in restenotic lesions, lesions in a bypass graft, left main coronary artery disease, or ostial, bifurcated, or totally occluded lesions, as well as use in patients with a reference-vessel diameter of less than 2.5 mm or greater than 3.75 mm or a lesion length of more than 30 mm.

Off-label use occurred in 54.7% of all patients with bare-metal stents and 48.7% of patients with drug-eluting stents. As compared with patients with bare-metal stents, patients with drug-eluting stents had a higher prevalence of diabetes, hypertension, renal disease, previous percutaneous coronary intervention and coronary-artery bypass grafting, and multivessel coronary artery disease. One year after intervention, however, there were no significant differences in the adjusted risk of death or myocardial

infarction in patients with drug-eluting stents as compared with those with bare-metal stents, whereas the risk of repeat revascularization was significantly lower among patients with drug-eluting stents.

The analysis concluded that among patients with off-label indications, the use of drug-eluting stents was not associated with an increased risk of death or myocardial infarction but was associated with a lower rate of repeat revascularization at 1 year, as compared with bare-metal stents. These findings support the use of drug-eluting stents for off-label indications.

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### Outcomes in Athletes with Marked ECG Repolarization Abnormalities

Young, trained athletes may have abnormal 12-lead electrocardiograms (ECGs) without evidence of structural cardiac disease. Whether such ECG patterns represent the initial expression of underlying cardiac disease with potential long-term adverse consequences remains unresolved. We assessed long-term clinical outcomes in athletes with ECGs characterized by marked repolarization abnormalities.

From a database of 12,550 trained athletes, investigators identified 81 with diffusely distributed and deeply inverted T waves (2 mm in at least three leads) who had no apparent cardiac disease and who had undergone serial clinical, ECG, and echocardiographic studies for a mean ( $\pm$ SD) of  $9 \pm 7$  years (range, 1 to 27). Comparisons were made with 229 matched control athletes with normal ECGs from the same database.

Of the 81 athletes with abnormal ECGs, 5 (6%) ultimately proved to have cardiomyopathies, including one who died suddenly at the age of 24 years from clinically undetected arrhythmogenic right ventricular cardiomyopathy. Of the 80 surviving athletes, clinical and phenotypic features of hypertrophic cardiomyopathy developed in 3 after  $12 \pm 5$  years (at the ages of 27, 32, and 50 years), including 1 who had an aborted cardiac arrest. The fifth athlete demonstrated dilated cardiomyopathy after 9 years of follow-up. In contrast, none of the 229 athletes with normal ECGs had a cardiac event or received a diagnosis of cardiomyopathy  $9 \pm 3$  years after initial evaluation ( $P = 0.001$ ).

The study concluded that markedly abnormal ECGs in young and apparently healthy athletes may represent the initial expression of underlying cardiomyopathies that may not be evident until many years later and that may ultimately be associated with adverse outcomes. Athletes with such ECG patterns merit continued clinical surveillance.