Pacemaker Therapy in Patients With Neurally Mediated Syncope and Documented Asystole: Third International Study on Syncope of Uncertain Etiology (ISSUE-3): A Randomized Trial

We evaluated a treatment strategy based on early application of the implantable loop recorder in patients ≥40 years with a certain or highly likely diagnosis of neurally mediated syncope based on clinical evaluation. In our patients, therapy was delayed until documentation of a spontaneous prolonged (mean, 11 s) asystolic event was obtained by implantable loop recorder. In this highly selected population, which we estimated to be 9% of neurally mediated syncope patients referred for evaluation, cardiac-pacing therapy is effective in reducing syncopal recurrences. We found that ~1 of 3 pacemaker patients will benefit from pacing therapy within the subsequent 2 years. See p 2566.

Prevalence and Prognostic Significance of T-Wave Inversions in Right Precordial Leads of a 12-Lead Electrocardiogram in the Middle-Aged Subjects

T-wave inversion in right precordial leads V1 to V3 is a common finding in a 12-lead ECG of children and adolescents, and is sometimes present in healthy adults, as well. However, right precordial T-wave inversion can also be the first manifestation of a structural heart disease such as arrhythmogenic right ventricular cardiomyopathy. In the present study, we assessed the prevalence and prognostic significance of T-wave inversions in a large Finnish middle-aged general population cohort with a long follow-up. Inverted T waves in right precordial leads V1 to V3 were present in 0.5% of the subjects, but deeply inverted T waves (5 mm or more) or additional features suggestive of arrhythmogenic right ventricular cardiomyopathy were extremely rare. The prognosis associated with right precordial T-wave inversion was good and did not differ from the rest of the population. However, T-wave inversions in leads other than V1 to V3 were associated with a significantly increased risk of cardiac and arrhythmic death. Thus, although inverted T waves in V1 to V3 can raise a suspicion of a cardiomyopathy, in the absence of deeply inverted T waves or other features suggestive of a heart disease, this ECG pattern does not predict adverse outcome. In contrast, T-wave inversions in other than right precordial leads may reflect the presence of an underlying cardiac pathology and are associated with increased mortality. See p 2572.

Right or Left Ventricular Pacing in Young Minipigs With Chronic Atrioventricular Block: Long-Term In Vivo Cardiac Performance, Morphology, Electrophysiology, and Cellular Biology

In inborn or acquired atrioventricular block in small children, pacemaker electrodes traditionally were implanted into or sutured onto the right ventricle. This was suspected to cause dyssynchrony and heart failure. To determine optimal pacing electrode position, we performed a prospective study in minipigs with induced atrioventricular block comparing the effects of right ventricular free wall or left ventricular (LV) apex pacing (120 bpm) on LV hemodynamics, ultrastructure, and molecular remodeling. Right ventricular free wall pacing led to dyssynchrony and to more pronounced alterations in LV performance than LV apex pacing, whereas changes in calcium handling proteins, plasma catecholamines, and ultrastructure were unrelated to the location of ventricular pacing. LV stroke work, dP/dtmax, and dP/dtmin were reduced only in right ventricular free wall pacing. These data underline the importance of dyssynchrony for the development of LV dysfunction. Moreover, this study suggests LV apex pacing as the more suitable (better) pacing location and that avoidance of dyssynchrony is important in pacemaker implantation. See p 2578.

Duration of QRS Complex in Resting Electrocardiogram Is a Predictor of Sudden Cardiac Death in Men

Sudden cardiac arrest accounts for one half of all deaths related to coronary heart disease and presents as the first manifestation of coronary heart disease in ~20% to 30% of the deaths. Large epidemiological studies have not been able to identify specific ECG markers for sudden cardiac death (SCD), and little is known about the relationship between the duration of the QRS complex and the risk of SCD among the general population. Our study showed that prolonged QRS duration is an independent predictor of SCD, with risk levels comparable to those for established clinical risk factors such as smoking, lipids, hypertension, history of myocardial infarction or coronary heart disease, and type 2 diabetes mellitus. Each 10-ms increment in QRS duration was associated with a 27% higher SCD risk. Thus, the measurement of QRS duration may have utility in evaluation of SCD risk in the general population. See p 2588.

Cardiovascular Health Behavior and Health Factor Changes (1988–2008) and Projections to 2020: Results From the National Health and Nutrition Examination Surveys

The American Heart Association’s Strategic Planning Task Force set forth the goal of improving the cardiovascular health of all Americans by 20% by 2020. To assess progress toward this goal, 7 health metrics were defined: smoking, diet, physical activity, body weight, blood glucose, blood pressure, and cholesterol. In this investigation, we asked, “If current trends in these metrics continue, will this goal be reached?” We evaluated past trends by using data from the 1998–2008 National Health and Nutrition Examination Survey (NHANES) examination cycles and created best-fit linear regression models and linear forward projections to 2020. We also created a national-level Cardiovascular Health Score to evaluate individual-level changes in cardiovascular health amid larger population trends. Our results suggest that if current trends continue, changes in the individual-level Cardiovascular Health Score will be minimal and that the overall cardiovascular health of the US population will improve by only 6% by 2020; this progress is far short of the American Heart Association’s target of 20% improvement. This projection reflects modest further declines in tobacco use and improved control of high cholesterol and high blood pressure that are offset by increases in obesity and dysglycemia prevalence. In conclusion, continued individual-level primary and secondary preventive measures should be complemented by an increased national commitment to policies promoting prevention of the development of abnormal risk factor levels from childhood onward. If the American Heart Association target of 20% improvement in overall cardiovascular health are achieved, the potential reductions in cardiovascular disease burden could be substantial, rapid, and associated with substantial cost savings. See p 2595.
Noninvasive Assessment of Myocardial Inflammation by Cardiovascular Magnetic Resonance in a Rat Model of Experimental Autoimmune Myocarditis

Myocarditis is defined as inflammation of myocardial tissue with characteristic inflammatory cellular infiltration into the myocardium. To date, reliable tools to noninvasively diagnose cellular inflammation in myocarditis are lacking. Here we demonstrate that the application of long-circulating magneto-fluorescent nanoparticles combined with cardiac magnetic resonance imaging permit noninvasive and robust imaging of myocardial inflammatory cellular infiltrates, enabling spatial mapping, quantification, and assessment of inflammation in experimental autoimmune myocarditis. Compared with clinically conventional cardiac magnetic resonance, magneto-fluorescent nanoparticle cardiac magnetic resonance more accurately detected scattered foci of inflammation and provided better conspicuity of small and less severe myocardial inflammation. Early and prompt diagnosis may lead to a paradigm shift in the therapeutic strategy of myocarditis. In addition, this magneto-fluorescent nanoparticle cardiac magnetic resonance approach could be an effective clinical application in monitoring the evolution of inflammation and response to antiinflammatory therapy in myocarditis. See p 2603.

Impact of the Presence and Extent of Incomplete Angiographic Revascularization After Percutaneous Coronary Intervention in Acute Coronary Syndromes: The Acute Catheterization and Urgent Intervention Triage Strategy (ACUITY) Trial

The prevalence and clinical significance of incomplete coronary revascularization (ICR) in patients with acute coronary syndromes treated with percutaneous coronary intervention (PCI) are unknown. Prior studies have reported conflicting data owing to the lack of randomized clinical trial data, varying definitions of ICR, and substantial baseline differences between patients in whom complete revascularization is versus is not achieved. In the present study, using the large-scale Acute Catheterization and Urgent Intervention Triage Strategy (ACUITY) trial database, ICR after PCI was variably defined if any lesion with diameter stenosis cutoffs ranging from ≥30% to ≥70% with reference vessel diameter ≥2.0 mm (assessed at an independent angiographic core laboratory) remained after PCI. The prevalence of ICR after PCI varied widely from 17% to 75% of patients, depending on the threshold of angiographic percent diameter stenosis used to define ICR. Regardless of the threshold percent diameter stenosis used to define ICR, the presence of ICR after PCI was strongly associated with 1-year major adverse cardiovascular events, driven by increased rates of myocardial infarction and ischemic MR remains controversial. European practice guidelines emphasize the importance of longitudinal follow-up of this unique cohort. See p 2630.

Costs and Benefits of Targeted Screening for Causes of Sudden Cardiac Death in Children and Adolescents

This article examines the cost-effectiveness of ECG screening in 2 asymptomatic pediatric populations for whom it has been recommended: school-aged children with attention-deficit/hyperactivity disorder for whom stimulants are being considered and adolescents participating in sports. The risk of sudden cardiac death in these pediatric patients is very low, even compared with groups of young adults themselves only several years out of their own childhood. However, several cardiac disorders are capable of presenting as sudden cardiac death in the pediatric community. If these disorders were diagnosed while the patient is asymptomatic, it is assumed that appropriate treatments and avoidance of stimulant medication and/or stressful athletic activity may mitigate that risk. Only a handful of the several disorders that have been linked to pediatric SCD are (1) typically asymptomatic in the school-aged child and adolescent, (2) identifiable on ECG, and (3) sufficiently prevalent to warrant targeted screening compared with rarer disorders. We developed decision analyses models for ECG screening for 3 disorders that meet these criteria and hence are considered potentially appropriate targets for ECG screening programs: hypertrophic cardiomyopathy, Wolff-Parkinson-White syndrome, and long-QT syndrome. However, our findings indicate that, even under the conditions that might be expected to favor screening used in our base case, estimates of the cost-effectiveness of screening for these diseases are relatively unfavorable, ranging from $91 000 (adolescent participating in sports) to $204 000 per life-year (child with attention-deficit/hyperactivity disorder). See p 2621.

Does Initial Shunt Type for the Norwood Procedure Affect Echocardiographic Measures of Cardiac Size and Function During Infancy? The Single Ventricle Reconstruction Trial

Hypoplastic left heart syndrome is a common form of functional single-ventricle congenital heart disease and is associated with significant morbidity/mortality. A National Heart, Lung, and Blood Institute Pediatric Heart Network study, the Single Ventricle Reconstruction trial, randomized initial surgical Norwood palliation in 549 infants with hypoplastic left heart syndrome to either a right ventricle–pulmonary artery shunt or a modified Blalock-Taussig shunt to determine the optimal surgical approach. The primary result of the trial found better 1-year transplant-free survival in subjects who received a right ventricle–pulmonary artery shunt compared with those who had a modified Blalock-Taussig shunt. This study compared 2-dimensional echocardiographic indices to assess the effect of initial shunt type at 4 stages during the trial (at baseline preoperatively, early after the Norwood procedure, immediately before the second-stage surgical procedure, and at 14 months of age). We found that differences in neoaortic annular size and flow patterns between shunt types when the shunts are in place can likely be explained by the different physiologies created rather than by intrinsic differences in cardiac function. After the shunt was removed at the second-stage surgery, echocardiographic indices were similar between the 2 groups, including measures of right ventricular function, cardiac and vascular dimensions, neoaortic and tricuspid dimensions and valve function, and neoaortic flow patterns. This lack of shunt-related differences in echocardiographic indices of cardiac and vascular function in survivors of the Norwood procedure at 14 months suggests that the best initial surgical pathway for infants with hypoplastic left heart syndrome remains unclear and emphasizes the importance of longitudinal follow-up of this unique cohort. See p 2630.

Influence of Mitral Regurgitation Repair on Survival in the Surgical Treatment for Ischemic Heart Failure Trial

Chronic ischemic mitral regurgitation (MR) is associated with heart failure and increased mortality. The optimal treatment strategy for ischemic MR remains controversial. European practice guidelines recommend mitral valve repair in patients with severe or even
moderate ischemic MR and an ejection fraction >30% who are undergoing coronary artery bypass grafting (CABG), even though retrospective analyses using propensity score matching showed no survival benefit of adding mitral valve repair to CABG. The need to add mitral valve repair in patients with an indication for CABG becomes even less clear when left ventricular dysfunction is more severe. The Surgical Treatment for Ischemic Heart Failure (STICH) trial randomized 1212 patients with severe left ventricular dysfunction (ejection fraction <35%) and coronary artery disease amenable to CABG to intensive medical therapy alone or in association with CABG. The decision to repair the mitral valve was left to the operating surgeon. Survival in the medically treated cohort depended strongly on MR grade at baseline, with mortality hazard being increased twice in patients with moderate to severe MR compared with patients with no MR. In patients with mild MR, CABG was associated with improved survival. In patients with moderate to severe MR, adding mitral valve repair to CABG tended to improve survival compared with CABG alone or medical therapy alone. Unfortunately, the decision to repair the valve was not randomized; therefore, even though risk adjustment actually accentuated the difference of survival in favor of adding mitral valve repair, a randomized trial is required to confirm our findings. See p 2639.