**PREVENTION OF SUDDEN CARDIAC DEATH: CHALLENGES AND OPPORTUNITIES**

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Strategies for prevention of sudden cardiac death (SCD) in the setting of coronary artery disease (CAD) rely on implantable cardiac defibrillators (ICD) in a subset of patients with left ventricular ejection fractions (LVEF) <35%. Many ICDs are implanted needlessly. Moreover, many patients who suffer SCD have more preserved LVEFs. Novel strategies to improve risk stratification are needed. Given the modest odds associated with use of individual risk factors, combining multiple risk markers shows promise for more accurate predictions. Noninvasive methodologies would be ideal. Data from the Oregon Sudden Unexpected Death Study recently reported by Reiner and colleagues that were acquired from patients with CAD with no prior history of SCD showed combining selected ECG measures with LVEF improved risk prediction. In adjusted analysis, higher resting heart rate (odds ratio 2.6), QRS duration (odds ratio 1.5), and JTc (odds ratio 2.3) were independently associated with SCD during follow-up. When combined, SCD odds progressively increased with 1 (odds ratio 3.4) and 2 or more elevated markers (odds ratio 6.3). Addition of ECG markers to an adjusted model with LVEF improved net reclassification by 22.7% (p<0.0001). Recently, we used PET imaging to quantify myocardial sympathetic denervation, perfusion, and viability in patients with CAD eligible for a primary prevention ICD. The end-point was sudden cardiac arrest (SCA) defined as arrhythmic death or appropriate ICD therapy. Volumes of total denervated (p=0.001) and viable denervated myocardium (p=0.03) predicted SCA, while hibernating and infarcted myocardium did not. Multivariate analysis identified denervated myocardium >37.6% LV, LV end-diastolic volume >98 ml/m2, creatinine >1.49 mg/dl, and no ACE- inhibition therapy as independent predictors of SCA. Absence of all four factors predicted low risk (SCA <1%/year) while two or more identified subjects at high-risk (SCA 12%/year). Noninvasively obtained markers when used in combination improve SCD risk prediction in patients with CAD.