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Evidence for Heritability of Abdominal Aortic Calcific Deposits in the Framingham Heart Study

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Background: Atherosclerosis is a systemic disease that underlies clinical cardiovascular disease. The radiographic finding of abdominal aortic calcific deposits is an indicator of the presence of aortic atherosclerosis and an independent predictor of cardiovascular disease events. Little is known about the heritability of aortic calcification.

Methods and Results: Original Framingham Heart Study cohort participants (2151) in 1109 extended pedigrees had a lateral lumbar radiograph. The presence and severity of abdominal aortic calcific (AAC) deposits at the levels of the first through fourth lumbar vertebrae was graded by a previously validated rating scale. Correlation coefficients were calculated in pairs of siblings, parent-offspring, and spouses. Age-, sex-, and multivariable-adjusted correlation coefficients for AAC were 0.52 for parent-offspring pairs and 0.20 for sibling pairs. In contrast, the multivariable- adjusted correlation for AAC in spouse pairs was -0.02. Using variance component methods implemented in SOLAR, the estimated heritability for age-, sex-, and multivariable-adjusted AAC was 0.49 (P<0.001). Thirty-one percent of the overall variance in AAC deposits was due to measured covariates, and 49% to heritable factors.

Conclusions: In our large, population-based sample, heritable factors play a role in the presence and extent of abdominal aortic calcification. Thus, a substantial proportion of the variation in AAC is due to additive effects of genes, which have yet to be characterized. Measures of aortic atherosclerosis may provide heritable quantitative phenotypes for the genetic dissection of the complex condition of atherosclerosis in human populations.

Key-words: Atherosclerosis, calcification, abdominal aorta, genetics, heritability.

Effects of Ventricular Premature Stimulus Coupling Interval on Blood Pressure and Heart Rate Turbulence

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Background: Heart rate turbulence (HRT) is a promising noninvasive risk stratifier for mortality after myocardial infarction. On the basis of a study of ventricular premature complex coupling interval and sympathetic nerve burst amplitude, we hypothesized that measures of HRT would increase with increased prematurity of the coupling interval.

Methods and Results: Twenty-eight patients undergoing programmed electrical stimulation were studied (12 with prior myocardial infarction, aged 60±18 years). An extrastimulus was delivered from the right ventricular apex after 20 sinus beats with a V -S_2 coupling interval decremented by 20 to 30 ms until refractoriness was reached. Turbulence slope (TS), turbulence timing (TT), and turbulence onset were calculated for each extrastimulus, and the linear regressions of these parameters on coupling interval and compensatory pause were calculated. Arterial blood pressure was measured with arterial catheter or a noninvasive continuous blood pressure transducer (Buffington cuff). TS and turbulence onset were abnormal in 4 and 13 patients, respectively. HRT parameters were significantly correlated with coupling interval or compensatory pause in only 2 or 3 patients for a given regression analysis. This absence of correlation was found likely to be due to lack of correlation between compensatory pause and systolic blood pressure after the compensatory pause. Heart rate and TS were correlated: Patients with high heart rate had low TS and late TT (TS= -2.7+0.01 × sinus cycle length, P=0.018*;* TT=8.8 to 0.005 sinus cycle length, P=0.013*).*

Conclusions: HRT can be induced by programmed stimulation. In this setting, heart rate affects HRT but not ventricular premature complex prematurity. Induced HRT seems to be a valid method for measuring HRT parameters in patients with few ventricular premature complexes.

Key-words: Electrophysiology, risk factors, death, sudden.