Do postural changes in cardiac autonomic balance predict incident CHD and all-cause mortality?

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The heart rate variability (HRV) response to gravitational stress imposed by postural change is a sensitive non-invasive measure of the shift in autonomic modulation from parasympathetic to sympathetic control that has successfully identified persons with prevalent CVD risk factors. We measured the 10-year risk of incident MI (n=297), fatal CHD (n=63), and all-cause mortality (n=540) using short HRV recordings (4 minutes) with a postural change in the Atherosclerosis Risk in Communities cohort (n=9267).

Supine (2 minutes) and standing (2 minutes) RR intervals were continuously recorded and converted into HRV indices. Differences between standing and supine standard deviations of normal RR intervals (SDNN), high frequency power ($HFms^2$, 0.15-0.40 Hz), normalized HF power (HFnu), and mean RR interval length estimated overall modulation of autonomic tone, parasympathetic withdrawal ($HFms^2$ and HFnu), and heart rate change, respectively. Incident events and mortality were ascertained by standardized methods. Cox proportional hazards models were used to estimate risk.

After adjustment for age, race, gender, heart rate, and heart rhythm control medication use, neither the continuous distribution of HRV change, nor a comparison of each of the upper three quartiles of change to the lowest quartile was associated with the risk of incident MI, fatal CHD, or all-cause mortality. Adjusted relative risks (95% confidence intervals) of MI for the lowest quartile of supine SDNN and RR intervals compared to the upper 3 quartiles (2-4) were 1.64 (1.26-2.12) and 1.57 (1.23-2.02), respectively. Estimates for the lowest quartile of standing SDNN and RR intervals were 1.67 (1.27-2.18) and 1.47 (1.14-1.89), respectively. Risk estimates were comparable for fatal CHD and all-cause mortality in the supine and standing positions.

In this population sample of middle-aged adults, the HRV shift captured from short records with a postural change did not predict incident CHD or all-cause mortality. The postural change maneuver does not provide predictive information beyond HRV captured in the supine or standing position.

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