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Title

Autonomic Dysfunction as a Marker of Depression and Coronary Artery Disease

Authors

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Abstract

**Background**: Dysfunction of the autonomic nervous system (ANS) is maybe important in both depression and coronary artery disease (CAD). Comorbid depression and CAD have a 3-fold increase in cardiovascular mortality, but treatment of depression is neither effective for depressive symptoms nor cardiovascular outcomes. A novel heart rate variability (HRV) metric, *Dyx*, may be a be a potentially useful tool to study ANS dysfunction in these diseases. We hypothesize that ANS dysfunction, measured by decreased Dyx, will associate with both depression and obstructive CAD.

**Methods**: We included participants in the Emory Cardiovascular Biobank, a prospective well-characterized cohort of patients undergoing coronary angiography. Depressive symptom burden was collected using the Patient Health Questionnaire-9 (PHQ-9). HRV data were collected continuously on participants before, during, and after catherization. In addition to *Dyx*, the key additional HRV measures are high/low frequency HRV, multiscale entropy, and deceleration capacity. Two-sample t-tests were used to study the difference in HRV (before cardiac catherization) between those with high versus low depressive burden (PHQ-9 ≥ 10), and in those with versus without obstructive CAD.

**Results**: In this pilot study (n=30), when comparing HRV recordings in patients with and without depression (PHQ-9), there was a significant difference (p < 0.05) in population means (mean (SD)) with *Dyx* (2.16 (0.15) vs. 1.84 (0.17)), high frequency HRV (6.03 (1.44) vs 4.44 (1.11)), and deceleration capacity (-10.74 (8.45) vs. -4.17 (2.11)). When HRV in patients with >70% stenosis of any major coronary artery (CASS-70 ≥ 1), the mean in obstructive CAD versus non-obstructive CAD was significantly different with sample entropy (1.49 (0.17) vs. 1.20 (0.16)) and with *Dyx* (2.59 (1.19) vs. 1.69 (0.63)).

**Conclusion**: ANS dysfunction, measured by HRV, associates with both depression and obstructive CAD. This autonomic dysfunction may play an important role in brain-heart pathology, and suggests that non-invasive HRV techniques may serve as a powerful prognostic tool.