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Late breaking abstracts

Norepinephrine transporter mRNA is present within sympathetic nerve terminals of the heart

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Neuronal reuptake of norepinephrine (NE) is more efficient in the heart than in other organs, and this process is impaired in heart failure and hypertension. Despite the importance of cardiac NE reuptake, little is known about the distribution of NE transporter (NET) in the heart. Therefore, understanding the expression and regulation of cardiac NET is of importance. The purpose of this study was to examine the distribution of NET in the heart using qPCR for comparison of mRNA levels across heart chambers and to determine the effect of chemical sympathectomy on that distribution. RNA was extracted from each chamber of the heart and from stellate ganglia collected from adult rats. We report for the first time that NET mRNA was present in all chambers of the heart, and was unequally distributed across chambers. The atria contained more NET mRNA than the ventricles (left atrium vs right ventricle and left ventricle, $p < 0.05$, $n = 6–8$). The amount of NET mRNA was significantly greater in the stellate ganglia than in the heart ($p < 0.0001$, $n = 6–8$), consistent with the idea that it was localized in nerve terminals, which comprise a smaller proportion of total RNA present in the myocardium. There was significantly more NET mRNA in the right versus the left stellate ganglion ($p < 0.05$, $n = 8$), even though these ganglia are similar in size and total RNA. Animals were treated with 6-hydroxydopamine (250 mg/kg) to denervate the heart as a means to confirm the nervous origin of the NET mRNA. Denervation was confirmed by significant reduction in NE content in all chambers ($p < 0.001$, $n = 3$), and a reduction of tyrosine hydroxylase-positive nerve fibers. The level of NET mRNA was significantly reduced in all heart chambers of treated animals compared to control ($p < 0.05$, $n = 3–5$); however, the message was not eliminated. There was a 1.56-fold, 2.13-fold, 3.23-fold, and 100-fold reduction in the right atrium, left atrium, right ventricle, and left ventricle,e respectively. Therefore, we conclude that NET mRNA is localized in sympathetic nerve terminals, but there are likely alternative source(s) of NET mRNA, possibly intrinsic cardiac adrenergic cells or sensory fibers, to explain the residual message after sympathetic denervation.

Dynamic T-wave changes during tilt-table testing: correlation with outcomes and possible role of autonomic tone

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Background: Dynamic changes in autonomic tone are hypothesized to play a role in syncope. Autonomic tone has recently been shown to affect cardiac repolarization in the electrocardiogram (ECG). Changes in the T-wave (representing ventricular repolarization) can be seen during head-up tilt-table (HUT) testing in syncope evaluation; the significance is still unknown. This study analyzes the relationship between T-wave changes during HUT-testing and outcomes of the test.

Methods: Twelve-lead ECG's during HUT-testing from 150 patients were reviewed from a prospectively collected registry-database in a study approved by the Institutional Review Board. ECG's during supine Rest, 30-45-70-degree Tilt, and 5-minute supine Recovery were reviewed by an experienced cardiologist. Changes in the T-wave, defined as either decreased amplitude with-or-without becoming negative or flipping from negative-to-positive, were recorded for each stage. Outcomes of the HUT-test, occurring alone or in combination, based on BP and HR changes, include: non-diagnostic, postural orthostatic hypotension (POH), postural tachycardia syndrome (POTS), and Vasovagal response (VVR). Age (Younger: <50 yo; Older: ≥50 yo) and gender were analyzed. Multivariate analysis of variance was used, $p < 0.05$ significant.

Results: Of 150 patients (108 women; 80 Younger), 135 had T-wave changes during HUT; changes resolved in 114 patients with return to supine Recovery. Changes were most frequent in the inferior and anterolateral leads. POH was diagnosed in 114 patients, POTS in 67, and VVR in 30. T-wave changes in V1 inversely correlated with POH ($p = 0.005$). T-wave changes in inferior leads II, III, aVF and in anterolateral leads V3-V6 positively correlated with POTS ($p < 0.05$). Female gender and younger age correlated with POTS independent of the effects of ECG leads ($p < 0.05$). Concomitant T-wave changes in lateral leads V5 and V6 correlated with VVR; T-wave changes in aVF alone also correlated with VVR ($p < 0.05$).

Conclusions: Dynamic T-wave changes during HUT-testing in inferior and anterolateral leads are associated with POTS and VVR independent of age and gender. Changes in autonomic tone may play a role and needs further study.