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Heart Failure and Cardiomyopathies

CHRONIC AUTONOMIC REGULATION THERAPY MITIGATES ADVERSE REMODELING INDUCED BY PRESSURE OVERLOAD IN THE GUINEA PIG HEART

Poster Contributions
Hall C
Sunday, March 30, 2014, 9:45 a.m.-10:30 a.m.

Session Title: Novels Insights and Approaches to Heart Failure Mechanisms
Abstract Category: 13. Heart Failure and Cardiomyopathies: Basic
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Background: Chronic pressure overload (PO) is associated with adverse remodeling of the cardiac neurohumoral control systems which contributes to the progression of heart failure. We sought to determine whether chronic autonomic regulation therapy (ART) attenuates adverse neural and cardiac functional remodeling.

Methods: Guinea pigs (n=16) were implanted with a vagus nerve stimulation (VNS) system on the right cervical vagus. Two weeks later, PO was produced by chronic aortic constriction (15-20%). The ART treatment group (n=10) was exposed to continuously-cyclic VNS (20 Hz, 1.1 ± 0.1 mA, 14 s ON, 48 s OFF) for 60 days and compared to time-matched, sham ART subjects (PO Control, n=6). Echocardiograms were obtained before PO and at 60 days post PO. At termination, intracellular voltage recordings were obtained in vitro in superfused whole mount cardiac neuronal plexi to determine passive and active neuronal properties, as well as the synaptic efficacy of intrinsic cardiac (IC) neurons.

Results: For PO Controls, left ventricular end diastolic volume (EDV) increased 53% (1.93±0.19 to 2.95±0.46 ml; p=0.03) and end systolic volume (ESV) increased by 2.5 fold (0.36±0.06 to 0.89±0.33; p=0.03) at 60 days post PO. ART abolished PO-induced changes in EDV (1.94±0.13 to 2.02±0.15; p=0.38) and ESV (0.36±0.01 to 0.49±0.08; p=0.23). Resting membrane potentials of IC neurons exposed to PO+ART were 14% lower (-56.7±0.9 mV) than PO Control (-48.7±1.0 mV; p<0.05). Augmentation of IC synaptic efficacy in the PO group was abrogated by ART (p<0.05). ART differentially mitigated the muscarinic-induced enhancement of IC excitability in response to intracellular depolarizing current injections.

Conclusions: Chronic ART enabled by low-intensity, continuously-cyclic, open-loop VNS abolished adverse LV functional remodeling and the PO-induced upregulation of synaptic efficacy and network excitability within the IC nervous system. Such ART-induced changes within IC networks are mediated in part by induced changes in muscarinic-dependent receptor mechanisms.

The Heart Failure and Cardiomyopathies Cardiology Clinical Topic Collection gathers the latest guidelines, news, JACC articles, education, meetings and clinical images pertaining to its cardiovascular topical area â€” all in one place for your convenience.Â July 13, 2021 > 1. Universal Definition and Classification of HF | Expert Analysis. July 06, 2021 > 2. Anemia and Heart Failure: Guidance for Clinicians and Trialists | Expert Analysis. Why does heart failure occur? 1. Progressive deterioration of myocardial function (systolic dysfunction) -Ischemia, pressure/volume overload due to valvular issue -Primary myocardial failure/ischemic heart disease 2. Inability of heart chamber to relax and fill during diastole (diastolic dysfunction) -Hypertrophy, fibrosis, amyloidosis, constrictive pericarditis. Cardiac Hypertrophy Pathophysiology and progression to failure. Myocyte hypertrophy due to increased mechanical work due to pressure or volume overload, or trophic signals beta-adrenergic receptor activation -Increased DNA ploidy, mitochondria, sarcomeres -Left ventricular concentric increase in wall thickness (sarcomere is parallel) and dilation (sarcomeres in series). 5 Cardiomyopathy Clinic and Heart Failure Institute, Leviev Heart Center, Sheba Medical Center and Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel. 6 Department of Cardiology, Rabin Medical Center, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.Â 12 Second Department of Cardiology, Heart Failure and Preventive Cardiology Section, Henry Dunant Hospital, Athens, Greece. 13 Department of Cardiothoracic Sciences, UniversitÃ della Campania 'Luigi VanvitelII', Monaldi Hospital, AORN Colli, Centro di Ricerca Cardiovascolare, Ospedale Monaldi, AORN Colli, Naples, Italy, and UCL Institute of Cardiovascular Science, London, UK. Cardiomyopathy is a major cause of heart failure and one of the most common conditions leading to heart transplantation. There are three types of cardiomyopathy: In dilated cardiomyopathy, the left ventricle becomes enlarged and does not pump as.Â Specialty Acute Care and Trauma Surgery Alzheimer's Disease Center Amyloid Cardiomyopathy Amyloidosis Center Arrhythmia Audiology (Hearing Problems) Boston Medical Center Copley Square Medical Practice Boston University Charles River... Heart failure (HF), also known as congestive heart failure (CHF), (congestive) cardiac failure (CCF), and decompensatio cordis, is when the heart is unable to pump sufficiently to maintain blood flow to meet the body tissues' needs for metabolism. Signs and symptoms of heart failure commonly include shortness of breath, excessive tiredness, and leg swelling. The shortness of breath is usually worse with exercise or while lying down, and may wake the person at night. A limited ability to exercise is...