Abstract: 80S

Reinstating heart rate variability improves cardiac output in heart failure - novel insights from proteomics

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A variable heart rate is a positive indicator of health and is (in part) linked to respiration, a phenomenon called respiratory sinus arrhythmia (RSA). We have developed a novel cardiac pacemaker that restores the respiratory sinus arrhythmia (RSA) and impressively improves cardiac output by ~1.4 L/min in a large animal model of ischaemic heart failure after only 7 days[1]. How RSA improves cardiac function remains a mystery. Confocal microscopy analysis demonstrates the reversal of cardiomyocyte hypertrophy, and restoration of the t-tubule structure that is essential for force generation. Proteomic analysis of RSA-paced tissue demonstrates improvements in energetic pathways involving citric acid cycle, fatty acid metabolism and respiratory electron transport. All tissue used for analysis was obtained from euthanized animals.

Dr David J Crossman leads the Cardiac Nanobiology Research Group in Auckland. His group uses high-resolution fluorescence microscopy and proteomics methods to understand the structural determinants of heart failure using both human tissue and animal models. He is a Heart Foundation of New Zealand Senior Research Fellow and Director of the Biomedical Research Imaging Unit located at the Faculty of Medical and Health Sciences. Examples of his research can be found in the journals Basic Res. Cardiol., Front. Physiol., Cardiovasc. Res., and J. Mol. Cell. Cardiol.

1 Shanks, J., Abukar, Y., Lever, N. A., Pachen, M., LeGrice, I. J., Crossman, D. J., Nogaret, A., Paton, J. F. R., & Ramchandra, R. (2022). Reverse re-modelling chronic heart failure by reinstating heart rate variability. *Basic Research in Cardiology*. https://doi.org/10.1007/s00395-022-00911