

RESEARCH DIRECTIONS

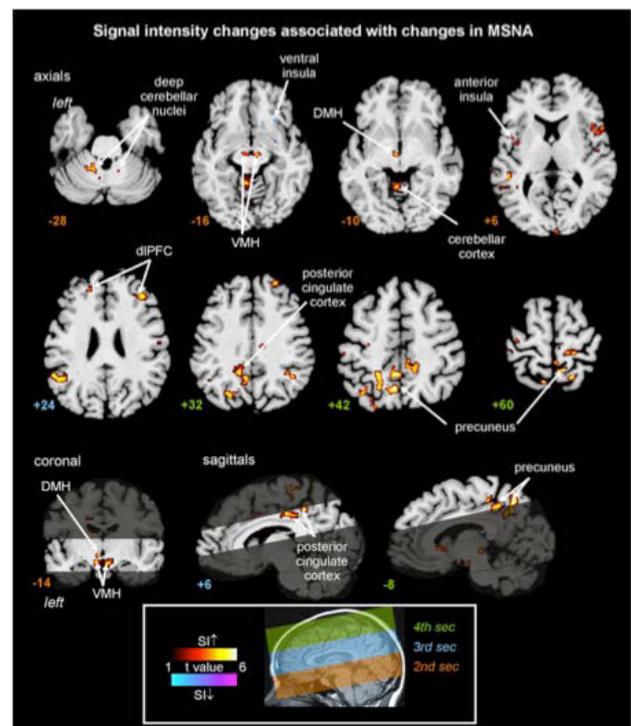
Neural regulation of cardiovascular system

Professor Vaughan Macefield from the School of Medicine and Dr Luke Henderson from the University of Sydney are investigating how the brain regulates the cardiovascular system. This project is funded by the National Health and Medical Research Council.

'Diseases such as congestive heart failure and obstructive sleep apnoea syndrome are debilitating conditions which involve the heart and blood vessels – the cardiovascular system – but are associated with changes in the brain,' explains Professor Macefield. 'Each of these diseases is associated with high cardiovascular risk, and structural changes in the brain that affect cognitive processes such as memory. In this research, we are focusing on the *sympathetic nervous system*, specifically the branch that constricts blood vessels in muscle. The increase in muscle sympathetic nerve activity (MSNA) seen in these conditions is responsible for the high blood pressure in obstructive sleep apnoea and for maintaining blood pressure in heart failure.'

This interdisciplinary research team is using functional Magnetic Resonance Imaging (fMRI) of the brain, coupled with concurrent recording of MSNA - an approach developed by Prof Macefield and Dr Henderson - to identify areas of the brain involved in generating MSNA and to determine whether anatomical changes in the brain can be reversed with treatment. All experiments will be performed in a 3T fMRI scanner. Five different studies will include human participants with a range of health problems and disease states. The findings from these studies will be compared to age-matched "control" participants who are not suffering these diseases.

This project will contribute to what we understand about the brain pathways that are involved in regulating sympathetic nervous system and may



lead to development of novel treatment strategies for people suffering debilitating diseases. If it is possible to reverse some of the damage that occurs with chronic heart failure, obstructive sleep apnoea syndrome and chronic obstructive pulmonary disease, the health of those living with cardiovascular and cardio-respiratory disease will be improved and the economic burden of those diseases in the community will also be reduced.

Project Title: Functional Imaging of the Brainstem and Cortical sites of Blood Pressure Control in Human Subjects in Health and Disease
Funding has been set at: \$382,524
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