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Magneto-vestibular Stimulation (MVS): effects on behaviour and resting state networks

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Transforming brain research.

Project **Summary**

KNOWLEDGE MOBILIZATION & IMPACT

Magneto-vestibular Stimulation (MVS): effects on behaviour and resting state networks

Background

Magnetic resonance imaging (MRI) has revolutionized cognitive neuroscience, offering unparalleled insights into human brain function in health and disease. It allows us to study the various systems and networks in the brain, such as the visual sensory system and the fronto-parietal network.

Recent results, however, show that the MRI environment can stimulate the balance sensors within the inner ear. This is known as magnetovestibular stimulation (MVS), which occurs within the inner ear. It arises because of biophysical interactions between the fluids within our inner ear, the balance sensors and the magnetic field within an MRI machine.

The Problem

Due to MVS, subjects placed within an MRI in the dark exhibit nystagmus, which are periodic patterns of eye movements similar to what is produced when someone is dizzy. And similar to when one is dizzy, the brain learns to adapt to MVS, with nystagmus decreasing (but never fully disappearing) while the subject is in the magnet, and then re-appearing and reversing when the subject leaves the magnet.

Now that MVS has been recognised, a number of implications have come to light. For example, does MVS influence perception and action while in the MRI? If so, it might be possible to use MVS to compare the vestibular system (responsible for balance and spatial orientation) between healthy individuals and patient groups. This vestibular system usually deteriorates with aging and is commonly dysfunctional in disorders like Parkinson's and Alzheimer's and following concussions and strokes. Different patient populations could be more or less sensitive or adapt differently to MVS. This may impact comparisons of imaging data between these groups and healthy controls.

Funding Program

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Imaging Core

Western Faculty, Group or Institution

Department of Physiology & Pharmacology, Schulich School of Medicine & Dentistry; Robarts Research Institute

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The Project

The broad goals of this grant are to;

1) explore the effects of MVS on eye movement behaviour, and

2) investigate the influence of MVS on functional networks in the brain.

Such data will constitute baseline data for future comparisons to patients suffering from a variety of conditions, many of which impair the brain's ability to learn and adapt.

Western Researchers

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