

Investigation of cervical muscle activation in chronic migraine and cervical dystonia with magnetic resonance imaging (MRI)

Research

Migraine is a common headache disorder, affecting 4.9 million Australians, associated with an estimated annual economic loss at \$35.7 billion. Neck pain with muscle tension is a frequent complaint in migraine occurring in more than two-third of patients. Furthermore, there is a correlation between neck pain and migraine frequency. However, the pathophysiological mechanism of this phenomenon is poorly understood, and targeted treatment is lacking. Research in recent years suggest neck pain in migraine is resulted from abnormal activities in certain brain regions rather than a simple muscle tension. This finding is implicated in pathophysiology of another neurological condition named cervical dystonia, characterised by painful involuntary neck muscle contractions, causing abnormal head postures.

Our study aims to determine whether there is a link between the neck muscle spasm in migraine and cervical dystonia by comparing their muscle signal changes on magnetic resonance imaging (MRI). A number of early studies have shown that MRI sequence called T2 relaxation times can distinguish changes in muscles after exercise compared to resting muscles, due to the shift of water into muscles that are have been actively contracting. Moreover, the degree of muscle activation has a positive correlation to the level of signal shift on MRI. Based on these findings, we hypothesise that abnormal muscle contractions in cervical dystonia and migraine should replicate the effect of voluntary exercise on MRI paradigms.

This is the first study that uses MRI T2 relaxation times to examine activated neck muscles in migraine and cervical dystonia. Knowledge gained from the project may provide us with a better understanding of the nature of neck pain in chronic migraine, provide evidence to justify new treatment such as botulinum toxin injection into active neck muscles. It may provide a novel noninvasive tool to identify target muscles for treatment in cervical dystonia.

Outcome

This study has obtained approval by Human Research Ethics Committee (HREC) with Alfred Health and testing for MRI protocol has been completed. There are three target patient groups which are: subjects with cervical dystonia (Group one), subjects with chronic migraine (Group two), subjects with migraine and muscle tension without cervical dystonia (Group three) and one healthy control group. Group one to three will be recruited from two Headache Clinics and one Cervical Dystonia Injection Clinic at The Alfred Hospital. All study participants will undergo physical assessment and a MRI scan following a standard protocol at The Alfred Hospital. We are currently actively recruiting participants, and anticipate to generate preliminary results in mid-2021.

As of Friday, 24th July 2020, the first subject in Group one has completed recruitment.

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