

Progress Report

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Date: 20/12/2023

Title of Project:

Evaluation of the safety and efficacy of MRI guided focused ultrasound (MRgFUS) for focal hand dystonia

Summary and Hypotheses

We have designed and commenced an early phase clinical trial to assess the therapeutic effect of MRgFUS Vo-complex thalamotomy in individuals with focal hand dystonia. Our trial uses validated task specific dystonia questionnaires in addition to objective measures of finger and grip strength, as well as functional upper limb task measurement with both pre-and post-treatment and between group comparison to healthy controls. Further, secondary aims of our trial include the assessment of MRgFUS Vo-complex thalamotomy on the abnormal synaptic plasticity, cortical inhibition and basal ganglia/cerebellar network changes that are thought to underlie the pathophysiology of focal hand dystonia.

We hypothesise that disruption of the pallidothalamic tract, via thalamotomy, will lead to improvement in the symptoms of focal dystonia, along with changes in neurophysiological measures with a shift brain plasticity and cortical inhibition toward levels comparable to healthy control participants. As basal ganglia hyperactivation has been implicated in focal hand dystonia, using functional MRI (fMRI) techniques, motor, premotor, supplementary motor and basal ganglia activity will be analysed using resting state fMRI pre- and post treatment, in addition to comparison of these findings with asymptomatic controls with a proposed shift to normalization.

Our trial received funding from the Brain Foundation in October of 2022. At the time of funding reception, the trial had received HREC ethical approval and was progressing towards recruitment, with an aim to recruit 10 individuals with focal hand dystonia. As of December 2023, our trial has successfully recruited 11 individuals with focal hand dystonia and performed the procedure on 9 participants. Current follow-up varies from 1 to 6 months for all participants, with a trial requirement of 12 months follow up (timepoints 1-, 3-, 6- and 12-months review).

Findings

Not applicable pending analysis of trial results

Unanswered Questions

Not applicable pending analysis of trial results

What these research outcomes mean

Due to the small patient cohort, the trial requires 12 month follow up to adequately assess these outcomes. These will be provided once the trial is complete and appropriate analysis has occurred.

The trial protocol was recently published in BMJ Open Neurology and can be found at <https://neurologyopen.bmj.com/content/5/2/e000522.info>

Further, the trial was featured on June 26 2023 on the ABC 730 program. Please see a link to the story at <https://www.abc.net.au/news/2023-06-26/the-magical-cure-of-a-violinist-through-modern/102526766>