

Title: A masked, controlled trial of median nerve stimulation for Tourette syndrome

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Abstract

Background: In mid-2020, the Stephen Jackson lab published intriguing results showing that rhythmic—but not arrhythmic—stimulation of the median nerve (MNS) entrained EEG power at the same frequency. Rhythmic MNS reduced tic severity in Tourette syndrome (TS). However, no control condition was tested and stimulation blocks lasted only 1 minute.

Objective: This study tests the hypotheses that tic improvement is specific to rhythmic stimulation, which alone entrained cortical activity, and that it lasts after MNS ends.

Methods: Detailed methods were pre-registered at DOI 10.17605/OSF.IO/8JTEP. People age 15-64 with TS have 2 study visits, one for rhythmic and one for arrhythmic MNS, in random order. Subjects and staff are blind to order, and video raters are additionally blind to block order and to stimulation on versus off.

Results: 30 of a planned 32 participants have completed both visits, and blinded tic counts are available for 15 of these. Enrollment and blinded ratings continue. On 53 of 60 visits, discomfort was rated as none or minimal. 23 participants had at least one visit rated "much" or "very much improved," by self ratings. Investigator ratings had 24 participants with at least one visit rated "much" or "very much improved." Ten of 30 participants rated at least one visit as "complete or nearly complete remission of symptoms" and 17 more rated at least one visit as "decided improvement, partial remission." Urge severity decreased during stimulation blocks, but similarly with rhythmic and arrhythmic stimulation. 7 participants rated R>A, 14 rated A>R. The investigator rated 12 participants as R>A, and 10 as A>R. Masking was effective. In blind-rated participants, tics improved in 10 of 15 with rhythmic and in 11-13 of 15 with arrhythmic stimulation.

Conclusion: MNS was well tolerated, and some participants had remarkable symptom improvement, but in this preliminary analysis, rhythmic stimulation did not outperform arrhythmic stimulation.

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