Reviewer’s report

Title: Effect of tendon vibration during wide-pulse neuromuscular electrical stimulation (NMES) on muscle force production in people with spinal cord injury

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Reviewer: John Malone

Reviewer's report:

General Comments

Traditionally, the main problem of imposing tetanic "strengthening" parameters using NMES, especially in clinical populations, is both user tolerability and muscle fatigue. NMES techniques are becoming more sophisticated, but these challenges are still considerable, especially given the large interindividual user variability regarding tolerability. Therefore, this study is both relevant and warranted, and the authors must be commended for performing a well conducted study. The findings do however highlight the challenges faced by researchers, which is the large interindividual variability of using NMES, which makes forming consensus on optimal parameters very difficult.

The manuscript is well written generally, and the findings of "responders" and "non-responders" is in line with previous research, again highlighting the problem.

Overall, the introduction needs to be structured a bit better, and lacks clarity and depth in places, especially in relation to previous study details (see specific comments below).

The methods are well described generally and detailed. That said, some of the sections are a bit confusing, and more clarity is needed in the description of some of the procedures (again, see specific comments below).

The results section is generally well reported and the Figs used are effective and clear.

Given the results found, the authors make a very good attempt to explain their findings regarding the underlying physiological mechanisms. That said, would definitely have liked to have seen more critical analysis of the findings in relation to findings of previous research and maybe some more suggestions for future research.

Specific Comments

Abstract:
Clinical recommendations for NMES suggest the use of short pulse widths (100-200 μs) and low-to-moderate pulse frequencies (30-50 Hz)… This is a bit vague, as NMES is used in many different clinical settings. Need to state that you are referring specifically to SCI populations.

Moreover, superimposing patella tendon vibration onto the wide-pulse width NMES is speculated to elicit further increases in impulse…. As you refer to on Pg 4, (L16-18 & 34-40), research has already shown this in other populations, so would suggest adding something like… as been shown in healthy able-bodied…… but unknown in SCI etc.

Introduction:

The structure of this section needs attention. The information contained is generally fine, but it reads a bit disjointed.

Throughout the introduction, you constantly refer to "clinical populations", however, this is a very broad term and could refer to a vast array of different populations. You need to be more specific, and give examples.

There needs to be a more specific information regarding previous research findings of studies that have used NMES with SCI…. You state that "However, such interventions cannot optimally stimulate muscular strength and mass improvements…." You need better clarity here and be more specific.

There is no hypothesis forwarded for the study.

Methods:

Subjects: more detail regarding inclusion/exclusion criteria, e.g., can we assume that they were they otherwise healthy (e.g., no cardio/metabolic conditions etc.). Successfully completing the PAR-Q would suggest so, but needs to be mentioned all the same.

Did they complete and replicate food and activity logs prior to sessions to ensure test, re-test reliability?

Was testing completed at the same time of day on each testing day?

Procedures: pg 5, L33-36, this needs to be reworded as it is confusing. Maybe I am reading this wrong, but my interpretation is that participants were firstly asked to produce a vol knee ext of 50% perceived max, which does not appear to make sense. How could they produce exactly
50% unless they had a reference value to work from? Were they asked to produce approximately 50%. Apologies if I am misinterpreting this incorrectly.

Pg 6: you state "...approximately at their motor points..." were these determined using a pen-electrode or just estimated using motor point maps? If so, there can be large interindividual differences in MP locations, see: Gobbo et al. (2014). Muscle motor point identification is essential for optimizing neuromuscular electrical stimulation use. J Neuroeng Rehabil. 2014 Feb 25;11:17. doi: 10.1186/1743-0003-11-17.

L11-16: "...every 20 s while the stimulation current was increased from 30 to 99 mA in 10-mA increments until a plateau in the maximum peak twitch torque was observed..." This needs better clarity, as there surely would have been considerable interindividual variability between participants to the imposed current?

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

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