Author's response to reviews

Title: Similarities and Differences of the Soleus and Gastrocnemius H-reflexes during Varied Body Postures, Foot Positions, and Muscle Function: Multifactor Designs for Repeated Measures.

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Author's response to reviews: see over
We would like to sincerely thank the reviewer for their time and thought to improve our manuscript. Please see our responses in red to your comments, point by point.

Reviewer: Cara Wall-Scheffler

Discretionary Revisions:
1. The introduction needs some further polishing and editing, particularly in the second paragraph. The paragraph is not consistent in tone and moves between function and anatomy unevenly. I suggest rewriting the first sentence; specifying the change in topic in the second sentence (e.g. In terms of structure, the gastroc...); and describing the ramifications of the anatomical differences following the 4th sentence. For example: It may be possible to record differences in the reflex response of the muscles, and these differences may have ramifications because_____________. Re-written

2. The 3rd and 4th paragraphs should be combined. Paragraphs are combined as suggested

3. I don’t have line numbers, but there should be a space between the word ‘to’ and 0.94 in the first paragraph of section 2.2. Re-checked and changes are made as suggested

4. Figure 1 does not need to be cited in the first paragraph of section 2.3 since the figure does not illustrate the adhesive tape which is describe in that paragraph. Citation is removed

5. It is interesting that basic size variables were collected. Were these simply to indicate this was a normal sample? Were there any correlations between the anthropometrics and signal variation? Yes, this was normal sample. In general, variation in the H-reflex latency between the left and right limb of a participant may be due to a limb length discrepancy or due to comparing the H-reflex latency of each limb when the stimulation sites were not equidistant from the spinal cord [Braddom and Johnson, 1974].

6. Is there a reason the p-values were written without a 0 in front of the decimal? APA style dictates reporting the exact p value within the text of a manuscript without a 0 in front of the decimal.

Minor Essential Changes:
1. Hoffmann is spelled with two n’s. (First word of the paper.). Correction was made

2. The introduction/background section does not put the study into context. Is there any reason for this study besides for patients with L5/S1 root impingements which seems to primarily only have ramifications for MG and Sol, and not for LG? Introduction was re-written. Beside patients with L5/S1 pathologies, H-reflex recordings from muscles around the ankle joint are useful in examining the activation and inhibition during normal function.
3. It is not clear what the relationship is between the 4 elicited traces described that the end of section 2.3 and the five traces discussed at the beginning of section 2.4. Re-written. In this study, five traces were elicited and recorded for each participant at each incremented electrical stimulus. Then, the largest four traces were included in the analysis.

4. I believe Figure 1 is missing the Sol electrode description. In addition, in the caption there should be a hyphen between the H and reflexes. Figure was redone.

5. Figures 2 and 3 were not described in this order; 3 was described first, so should be changed to Figure 2. Changes are made as suggested.

6. The current Figure 2 is not legible at all. What are the two lines supposed to be? (This seems to be pretty important based on the text.) If it is possible to label the graphs as well (Neutral, DF, PF; Standing versus Lying), this would be very helpful. Figure was re-done. The two lines are: Horizontal axis which is the stimulus intensity (straight lines) and Vertical axis which is the H-reflex amplitude (parabolic curves). Old figure 2, now 3, is the recruitment curve. Recruitment curve illustrates the changes in the recruitment of spinal motoneurones via H-reflex amplitudes and the activation of muscle fibers via the M-responses. It is useful in testing motoneurone excitability at different levels of electrical stimulation/threshold. Several dependent parameters may be extracted from these curves such as H/M max (Maximum H/Maximum M). For example, the H/M max will be smaller in patients with radiculopathy due to smaller H-reflex amplitude while muscle action potential (M max) continue to be normal.

7. It is not clear why there is only one citation in the clinical relevance paragraph of the discussion (pages 10-11). If this is the purpose of the paper, this should be put into some context. Establishing the normal activation patterns of the muscles around the ankle joint was the major goal. Validation of the clinical diagnosis of L5 vs S1 radiculopathies, requires patients with proven radiculopathies at different levels and it is the topic on ongoing research. Thus the present study reports only data in healthy controls and the clinical application of the test are speculated.

8. The last paragraph of section 5. (page 12) is not clear. Was there or wasn’t there cross talk? Re-written. It is possible that cross talk was there. However, because we used bipolar recording electrodes, kept a distance between the three electrodes and maintained the orientation of the active and reference electrodes, cross talk was reduced.
**Major Essential Change:**

1. If the purpose of this paper is to offer advice to clinicians, why is there no description of how the different postures might aid clinicians in their diagnoses? There are reported differences between the postures, and a reasonable discussion of what may have caused these differences (inhibitory mechanisms during standing, etc), but then no discussion of how this might change clinician measures and interpretations. I believe this is a necessary addition to this paper. Our previous study showed that the sensitivity of the H-reflex for detecting subtle changes increased during standing as compared to lying [Ali and Sabbahi, 2000]. Please refer to discussion under clinical relevance.
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**Reviewer:** Vivian Drory

1. The population examined is very small (ten individuals only) and rather young (mean age 32 years) making a possible comparison to patients with radiculopathies irrelevant. Sample size estimation using statistical power analysis revealed that ten participants are enough. Establishing the normal activation patterns was the goal in this study. In patients, side-to-side comparison is used to establish pathology. It is expected that with aging H-reflex parameters will diminish.

2. The statistical analysis included comparison of over 50 variables, but in spite of this, a very low significance level was set (p<0.05), revealing many weak correlations, probably part of them not clinically important and reproducible. Not a single comparison had a strong degree of significance. In this study, a global alpha level of 0.05 was used and Bonferonni adjustments were performed to accounts for inflation of alpha level.

3. The statement in the last paragraph that the study provides a "reference standard..." is far too ambitious as the study examined only ten individuals. Sample size estimation using statistical power analysis revealed that ten participants are enough. The results of this study suggested the sensitivity of H-reflex procedures to detect subtle changes in physiologic activity of functionally closely related muscles. This should provides more means to differentiate various levels of root involvement in radiculopathy.

4. Most cited literature is more than two decades old, reflecting that during the last years the interest in the technique of H-reflex has faded away in view of the broad use of MR imaging and magnetic stimulation in the evaluation of spinal lesions. More recent articles are cited. We recently published two studies. Please refer to reference numbers 1 and 2.