Author's response to reviews

Title: Reduced thoracolumbar fascia shear strain in human chronic low back pain

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Author's response to reviews: see over
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Dear Sir/Madam,

Attached please find a revised manuscript entitled: “Reduced thoracolumbar shear strain in human chronic low back pain”. We thank the reviewers for their constructive comments that have helped us clarify several aspects of the paper. Changes to the manuscript are indicated in bold type.

Response to Reviewer 1:

Validity of identification of tissue layers based on ultrasound images: The Reviewer raises a good point regarding the interpretation of ultrasound images, especially the correspondence of echogenic patterns seen with B-scan ultrasound to anatomical structures. This had not been sufficiently explained in our manuscript and has been clarified on Page 8, last Para, Page 9, 1st Para. We also have modified Figure 4 (now Figure 3) to better illustrate the focus of the paper. Our study relies on the identification of one structure: the echolucent plane separating the echogenic sheet closest to the erector spinae muscle (seen in cross section as Band 1 in Figure 3) from the more complex echogenic structure immediately superficial to it (seen in cross section as Band 2 in Figure 3). With B-scan ultrasound, Band 1 is consistently visible in longitudinal images as a thin echogenic line that moves with the underlying muscle and can thus be identified as the aponeurosis of the erector spinae muscle. In contrast, Band 2 is more variable in thickness, and sometimes contains one or more echogenic sub-bands. Although shear plane motion can be seen within Band 2, we did not attempt to quantify this because these echogenic sub-bands are not consistently visible. Thus, in this initial study, we chose to only quantify shear plane motion at the echolucent plane between Band 1 and Band 2. In our revised manuscript, we have included an assessment of the intra-rater reliability of this method.

Page 8, line 4 RO1 was changed to ROI.

Explanation for parameters D, P1 and P2. This was added to the text (Page 9, Para. 2) in addition to the legend of figure 4 (Previously Figure 3).

Level of significance and correction for pairwise comparisons: We have added a statement to our statistical methods section indicating that the type 1 error rate was set at .05 on a comparison wise (as opposed to experiment wise) basis (Page 14, Para. 1).

Page 14 (Now Page 15, Para.2): p<.02 was changed to p=.02 in the text.

Table 2: Explanation for superscripts: We have clarified in Table 2 that superscripts a and b indicate that group means not sharing a common letter are significantly different within each sex.

Response to Reviewer 2:

Use of gender vs. sex. We appreciate the Reviewer’s suggestion. However, we prefer to use the term sex to be consistent with our previous publications and, since we did not test any transgender individuals, we feel it is more appropriate to refer to sex as we do not know if the inference would apply to trans-gender individuals.
Table 2 superscripts: See response to Reviewer 1

Movies: We have reduced the number of movies from 6 to 4. At the Reviewer’s suggestion, we have retained the contrasting movies showing thoracolumbar shear strain in LBP and No-LBP subjects. We also have elected to retain the two movies showing cumulative tissue displacement and shear strain within the region of interest overlaid on the B-scan ultrasound, as we feel that these are useful for the reader to visualize how our images were processed.

Relevance and novelty of the study in relation to previous publications. This was added to the introduction on Page 4 last Para and Page 5 1st Para.

Validity and reliability of testing instrument: Because there are no existing gold standards for measurement of connective tissue mobility, we cannot evaluate construct or content validity. However, the fact that we found differences between LBP and No-LBP groups suggests that our method may have some discriminative validity. Regarding reliability, we have added an assessment of intra-rater reliability of the ultrasound elastography method on Page 9, 1st Para.

Use of motorized table and associated limitation: This was justified in the methods and discussed on Page 6 Last Para and Page 7 1st Para.

Detailed description of ultrasound data processing. Because this is a new method, we feel that that detailed description of the ultrasound processing method is important to include in the paper.

Mention of clinical measures in introduction: This was added on Page 12, 3rd Para.

Number of physical performance tests: The standardized number of repetitions was included in the methods on page 13 last Para. We instructed our participants to avoid excessive fatigue or discomfort because these measures were not used as primary outcomes and, for practical reasons, needed to be performed before ultrasound testing.

Order of testing for functional measures: This was added on Page 11, 3rd Para.

Measures of hip range of motion: This was included in error in the statistical section and was deleted.

Use of Spearman’s rank correlation: In this first report using thoracolumbar shear strain, as a primary outcome measure. We feel that Spearman’s rank correlation is an appropriate statistic to examine its bivariate relationship with more conventional measures of mobility such as trunk range of motion without having to assume any specific distribution (i.e. normality). If our goal had been to characterize differences between LBP and No-LBP on multiple outcome measures simultaneously, logical regression would have been indicated.

Statement on page 15 “In contrast to our previous study…” was moved to the discussion to Page 17 Last Para.

Correlation values: We added qualifiers to indicate the degree of correlation (Page 17 last Para).

MOS and Tampa questionnaires: There were included in the methods on Page 6, 1st Para.
Content of discussion: At the Reviewer’s suggestion, we have restructured the discussion to emphasize discussion of results.

Thank you very much for your consideration of this revised paper.

Sincerely yours,

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