Reviewer’s report

Title: With axial loading during MRI diurnal T2-value changes in lumbar discs are neglectable: a cross sectional study

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Reviewer: Tue Secher Jensen

Reviewer’s report:

The authors present results from a study aiming to investigate the diurnal variation of T2-values in lumbar discs in six asymptomatic volunteers when doing unloaded and loaded supine MRI. This is a scientifically sound research question and, as the authors state, may be of importance for the planning of clinical and research MRI.

The manuscript is well-written and concise. However, there are a number of significant methodological/study design and interpretive limitations that should be considered prior to publication as outlined below:

Major issues:

1. There is a low number of participants (discs) included in this study and therefore a risk of underpowered analyses and type 2 error. Visually (Figs 2 & 3) there is a decrease in T2 values over time, especially in the central disc (ROI3). However, it is likely that the reason for not reaching statistically significance is due to the small sample size.

   Please provide sample size calculations for the study to ensure that the study is sufficiently powered for the required analyses.

2. As I read the manuscript, the number of discs included in the pair-wise analyses in the analysis for reproducibility is five (one volunteer). This seems to be a very low number for an analysis of reproducibility. For a study of this kind, it is important that the precision of the method used is available to the reader.

   Please provide a sample size calculation [Watson, 2010] and redo the analysis if necessary. It may be sufficient to do use the existing material (six volunteers = 30 discs) for this purpose. Also, please include 95% confidence intervals for the ICCs.


Minor issues:
1. Please add reference for this sentence: "Quantitative T2-values are known to correlate to hydration grade with an inverse correlation to degeneration grade of the IVD.", Page 3, para 2, line 7-8. Reference #13 may be useful.

2. Results, Table 1: Please provide means and SD for all ROIs/timepoints in Table 1.

3. Results, Figure 2-4: Adding error bars (SD) for each data point would increase the reader's ability to assess the variability in the dataset visually. This is probably not possible for Fig. 4 due to the number of data points.

4. Discussion, p. 8, para 2: The divergent results are most likely not due to the small sample size and under-powered analysis.

5. Discussion, Limitations: Could the use of both unloaded an axial loading in the same day have influenced the results? Would the authors expect different results if loaded and unloaded scans were performed on different days?

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

No

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

No

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

No

**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 am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

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