Reviewer's report

**Title:** Identification and adjustment of experimental occlusal interference using functional magnetic resonance imaging

**Version:** 1  **Date:** 25 September 2014

**Reviewer:** Geoffrey Gerstner

Reviewers's report:

This is a revision of the manuscript previously reviewed during July 2014 by this reviewer. As stated then, this study continues important work using the modern neuroimaging method, functional magnetic resonance imaging (fMRI) to provide further insight into sensorimotor functions of the oral complex.

The manuscript has been substantially re-written to incorporate all of the reviewers recommendations. The manuscript remains well-written and understandable. I have a few suggested (discretionary) comments for the authors' consideration.

1. As before, I am not convinced that the changes observed are specific to occlusal interferences per se (see Page 13). Some of the effects could be non-specific, i.e., due to novelty, and might be expected even with sham changes to tooth morphology. Certainly the unique activations that are observed up to 60 min post-removal of the interference is indicative that brain activation patterns may vary as the conditions in the oral cavity change over the short term. The authors may wish to address this in the Discussion as a limitation. The reason I say this is that placement of a restoration in hypo-occlusion or for that matter simply placement of a new restoration that changes buccal, lingual morphology or interproximal contact pressure could result in the same types of activations as seen in the hyperocclusion state. This suggests important future tests to rule these non-specificities out. Also, order effects could be important limitations.

2. Discussion (Page 14) I'm intrigued by the deactivations in areas approximating Brodmann's areas 43 and 44 (seen in Figure 2) that seem to occur during hyperocclusion but are present both before and after hyperocclusion task is done. The authors may wish to address this.

3. Page 15, the authors discuss the role of Brodmann's area 46 as controlling higher brain functions including the stress-sensitive neuromodulatory systems, which, in turn, control sympathoadrenal and hypothalamic-pituitary-adrenal activity [24, 25, 26]. But this is much more the role of insula. The authors may wish to discuss the changes seen in the insula in relation to this issue.

4. Page 16, sentence "The present result suggests that a patient's adjustment for occlusal interference should make a better result for some time i.e. one day, one week etc. after the adjustment of the occlusal interference in dental offices." Not sure what this means. Do the authors mean that a patient's best assessment
of occlusal adjustments may occur after they have lived with the occlusal adjustment for at least 1 hour?

(5) Also Page 16, sentence “Based on our results and previous reports, our task would be quite appropriately done.” Do the authors mean that their task is justifiable based upon previous work?

(6) Page 18, sentence “However, we expect that this method of adjusting occlusal interference, combined with fMRI and the tapping task, could be applied clinically in the future. In particular, it may be useful for patients who cannot judge their exact occlusion themselves.” I would suggest that, for future work, the authors consider NIRS methods, as this is less prone to movement artifact, allows subjects to be in a sitting position, like fMRI looks at the HR (so is physiological related to the signal acquired with fMRI), is less expensive and therefore more likely to be the method of choice in a dental setting.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests