Reviewer's report

Title: Assessment of visual fixation in post-comatose states: use a mirror

Version: 2

Date: 21 April 2014

Reviewer: Yelena Guller

Reviewer's report:

To Whom It May Concern:

Thank you for giving me the opportunity to review the manuscript titled “Assessment of visual fixation in post-comatose states: use a mirror”. The study conducted here provides an important recommendation regarding the methodology of assessing the presence of visual fixation in patients diagnosed with disorders of consciousness. Below are my comments and suggests to the authors.

Major Compulsory Revisions

1. Abstract: Conclusion- The authors conclude that the mirror showed higher “specificity” for assessment of visual fixation compared with other methods, however, a statistical analysis of specificity (i.e. the true positive rate) was not conducted.

2. Background: Six methods of assessing visual fixation are listed (i.e. photo of a baby, ball, flashes of light, person, spontaneous eye contract, mirror), but of these six, only two are tested in the study (ball and mirror). Care should be taken when generalizing the results of the study to the methods of assessing fixation that were not tested.

3. Method paragraph 1: Please provide further detail regarding the circumstances under which the arousal facilitation protocol was utilized.

4. Method paragraph 1: Each of the stimuli requires further description. For example, what was the size/color or the ball? What was the size of the mirror? What kind of a light was used? Was the light flashing as in the Coma/Near Coma Scale? How far away from the patient’s eyes were the stimuli presented?

5. Method paragraph 1: The statement “To avoid scoring of spontaneous eye movements, stimuli were not presented in the same frequency of the pre-existing spontaneous eye-movements” requires clarification. Were spontaneous eye movements recorded for some period of time prior to stimulus presentation? If so, how was this information used to alter the frequency of stimulus presentation? Were stimuli presented at different frequencies for different patients? An example may be helpful here.

6. Method paragraph 1: Some additional information regarding data collection
would be helpful here: Was the examiner blinded to the clinical diagnosis of the patient? Was the same examiner conducting the trials in all patients? If multiple examiners were conducting the trials, was inter-rater reliability calculated? Some of these points may be discussed in the conclusion when addressing study limitations and directions for future research.

7. Results last line: While this is an interesting result, the comparison here is 3 MCS patients versus 17 MCS patients and these N values should be stated in the text. A total CRS-R score is not provided for the 8 patients who showed visual fixation to only 2 of the three stimuli. This information would be helpful to support the suggestion in the Discussion that occurrence of visual fixation is related to the behavioral profile. Please also provide the statistical value associated with the trend of MCS patients responding to all three (or two of three) stimuli showing a higher total CRS-R score compared to MCS patients showing no fixation to any object.

8. Results, General: Was there a relationship between the order or stimulus presentation and the presence of fixation? This will be important in light of the suggestion made in the discussion that one MCS patient did not respond to the mirror (presented third of three stimuli) due to decreased arousal.

9. Discussion paragraph 1: The analogy of the cocktail party phenomenon requires elaboration for those who may not be familiar with its use in this context.

10. Discussion paragraph 2: The first statement regarding the relationship between the occurrence of visual fixation and the patient’s overall behavioral profile is not supported by statistical results. (See 7. above)

11. Discussion paragraph 2: It is suggested that the 2 patients diagnosed as MCS who had intact brainstem reflexes and reproducible but inconsistent command following and no fixation may have had a visual impairment, but this is not supported by data. It is unclear why reproducible but inconsistent command following suggests visual impairment as command following can be assessed using commands that do not depend on the visual system.

12. Discussion paragraph 3: It is suggested that the one patient who fixated on a ball but not a mirror may have had decreased arousal when the mirror was presented because it was presented last. Was there behavioral evidence for decreased arousal in this patient? Is it possible that arousal was also an issue in other cases where the ball or light was presented last and did not elicit fixation? (See 8. Above)

13. Discussion: Please include a discussion of study limitations and directions for future research.

14. Discussion/Conclusion: Care should be taken when generalizing the results of this study to future research as not all stimuli previously used to elicit fixation were tested in this study. For example, it could be that a photo of a baby is also an effective method of eliciting fixation, but this was not addressed here.
Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. Please review the entire manuscript for grammatical and typographical errors (i.e. run-on and incomplete sentences, misuse of words, spelling and capitalization errors, improper use of commas, etc).

2. Reference 5: Missing page numbers

3. Reference 6: Journal title is not capitalized

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests