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Visual pattern responses in migraine with and without motion sickness - A response

Dear Sir This letter is a response to the letter from M. de Marinis titled "Comment on visual pattern responses in migraine with and without motion sickness" (1) concerning our recently published paper (2).

First, visual discomfort in migraine patients is an area still open to investigation in many respects. It is therefore important to clarify the issues raised by Dr de Marinis, and to take this opportunity to discuss the details of our work.

A static evaluation was not performed in our study because, as stated by Dr de Marinis herself, it is widely known that static striped gratings may induce discomfort; the reference cited by Dr de Marinis (3) was cited in our manuscript as seminal work (2). We aimed at spatial and temporal frequencies in the range of previously published parameters associated with either visual discomfort, stronger blood oxygenation level–dependent (BOLD) activity on functional MRIs, or both, and also at frequencies not previously reported to induce discomfort.

If no significant differences in discomfort had been found between patients with migraine and individuals without migraine, bias due to lack of sensitivity of the kind of stimulus chosen in our experimental paradigm would be a possible explanation. On the contrary, however, we found significant differences between the two groups of subjects. In addition, we found significant differences in discomfort between subjects with a history of motion sickness and those without.

We used black-and-white stimuli at a Michelson contrast of 0.4. For those unfamiliar with this concept, Michelson contrast measures the relation between the spread and the sum of two luminances. Wilkins et al. (3), in one of their experiments, used a visual stimulus with a single Michelson contrast of 0.7. The authors did not compare visual discomfort elicited by this level of contrast with that of other levels. In the same manuscript, however, the authors mentioned that the probability of paroxysmal EEG activity increases with the Michelson contrast in the range 5–30%, but thereafter showed little increase with further increase in contrast. In another experiment, in the same manuscript, the authors showed data for mean number of illusions reported by subjects without epilepsy at different levels of Michelson contrast. They reported that the number of illusions increased at contrasts below 0.3, but above this level they increased relatively little with contrast. We did not find specific data about different levels of discomfort at different levels of Michelson contrast (3,4,5). For this reason, we administered two levels of contrast (0.4 and 0.7) at 18 different combinations of duty cycle, spatial frequency and temporal frequency. Based on the results of this pilot study, we chose a Michelson contrast of 0.4 to present moving stimuli at different levels of spatial frequency, temporal frequency and duty cycle.

The purpose of this study was not to investigate effects of different directions of moving stimuli on visual discomfort. Although this may be an interesting question to be addressed in further studies, it would not add to our conclusions explicitly regarding the effects of drifting, horizontal striped patterns.

In regard to the scale used to grade discomfort: as previously discussed, lack of sensitivity of our experimental paradigm would have been a problem if no differences had been found between patients with migraine and subjects without migraine, but the results were exactly the opposite.

In conclusion, our manuscript demonstrated that visual discomfort elicited by drifting striped patterns was greater in migraine patients than in healthy volunteers and in individuals with history of motion sickness than in those without, but the effect of history of migraine was independent of the history of motion sickness.

References

1. de Marinis M, Comment on visual pattern responses in migraine with and without motion sickness. *Cephalalgia* 2010 15 June (doi: 10.1177/0333102410375625).
2. Conforto AB, Lois LA, Amaro E Jr, et al. Migraine and motion sickness independently contribute to visual discomfort. *Cephalalgia* 2010; 30: 161–169.
3. Wilkins A, Nimmo-Smith I, Tait A, et al. A neurological basis for visual discomfort. *Brain* 1984; 107: 989–1017.

4. Wilkins AJ. *Visual stress*. Oxford Psychology series no. 24. New York: Oxford University Press, 1995.
5. Marcus DA, Soso MJ. Migraine and stripe-induced visual discomfort. *Arch Neurol* 1989; 46: 1129–1132.

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