CROSSTALK

Rebuttal from David Simpson and Jurgen Claassen

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We have read the point of view presented elegantly by Tzeng and Panerai (2018) with interest. We have to admit there is little hard evidence on which we can base our preference for enhanced blood pressure variability. The arguments against, however, are also not very strong. The argument is perhaps more strongly based on basic principles than solid evidence. We fully agree with Tzeng and Panerai that further work in this area is required in order to gather the hard evidence needed for a rational and well-founded choice. One of the key obstacles in finding this hard evidence is the continuing absence of a gold standard for CA. Without this it is not possible to rigorously assess differences in performance between the two 'schools' – the bumpy road school *versus* the smooth ride school. Quality criteria such as repeatability, outcome prediction in different patient groups, or ability to distinguish between healthy subjects and those with clinical conditions where impairment is expected, need to be used. 'Sensible answers' that show characteristics one might expect based on our concept of how autoregulation functions (e.g. increased phase lead and reduced gain and coherence in low frequencies) may provide further guidance on what might be a good measure.

Tzeng and Panerai rightly state that several methods to induce blood pressure challenges may cause unwanted artefacts or lead to additional confounding physiological responses. For example, recent attempts to use lower-body negative pressure (LBNP) to generate blood pressure oscillations in the MRI have suffered from MRI motion artefacts caused by body displacement due to the strong vacuum in the LBNP box (J. J. van Lieshout, unpublished data). However, very recently Whittaker *et al.* (2017) seem to have succeeded in dealing with these artefacts and were able to study changes in arterial cerebral blood volume during an induced blood pressure change. Our point is that they would not have been able to make the observations they have had they performed MRI during spontaneous fluctuations in blood pressure. This could suggest that methods that induce a blood pressure change are our best bet to make new discoveries and make progress in this field.

Call for comments

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References

Tzeng YC & Panerai RB (2018). CrossTalk proposal: dynamic cerebral autoregulation should be quantified using spontaneous blood pressure fluctuations. *J Physiol* **596**, 3–5.

Whittaker JR, Bright MG, Driver ID, Babic A, Khot S & Murphy K (2017). Changes in arterial cerebral blood volume during lower body negative pressure measured with MRI. *NeuroImage* https://doi.org/10.1016/j.neuroimage.2017.06.041.

Additional information

Competing interests

None declared.

Author contributions

Both authors contributed to the conception or design of the work; acquisition or analysis or interpretation of data for the work; drafting the work or revising it critically for important intellectual content. Both authors have approved the final version of the manuscript and agree to be accountable for all aspects of the work. All persons designated as authors qualify for authorship, and all those who qualify for authorship are listed.

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