In Response:

In our recent review article, "The Persistent Issue of Simulator Sickness in Naval Aviation Training"³ we set out to describe the myriad unresolved problems related to simulator sickness in military flight simulators, as well as identify potential countermeasures and avenues of future research. Our section on the use of galvanic vestibular stimulation (GVS) in the mitigation of simulator sickness was, due to space limitations and the number of issues addressed, necessarily brief. Cevette et al. responded to our article by noting that our final line on GVS as being "neither... sensitive or specific enough to warrant usage in military flight simulators" may lead readers to dismiss future potentials in this venue of research. They then presented additional research that we had not included in our review, which indeed expanded upon GVS' potential, but are mostly outside the scope of the goals of our review. However, we readily admit that the studies by Cevette et al., 2012² and 2014,¹ and Reed-Jones et al., 2007,⁴ show that GVS can be used to mitigate simulator sickness scores per the Simulator Sickness Questionnaire (SSO).

We agree that GVS technology offers great potential and may indeed someday allow unparalleled simulation of vestibular forces coupled with visual fields. In hindsight, we should have amended our statement to note that GVS technology, though promising, is not yet developed to the point that it can be successfully relied upon to mitigate all instances of simulator sickness in military flight simulators. We should also have included GVS technology as an additional arena of future promise in aviation simulation as a venue to be further explored. As such, we would offer an amended version of the original statement noting that the current state of research regarding GVS and simulator sickness is not mature enough to warrant immediate widespread usage in flight simulators without further research and validation.

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REFERENCES

- Cevette MJ, Pradhan GN, Cocco D, Crowell MD, Galea AM, et al. Electrogastrographic and autonomic responses during oculovestibular recoupling in flight simulation. Aviat Space Environ Med. 2014; 85(1): 15–24.
- Cevette MJ, Stepanek J, Cocco D, Galea AM, Pradhan GN, et al. Oculo-vestibular recoupling using galvanic vestibular stimulation to mitigate simulator sickness. Aviat Space Environ Med. 2012; 83(6): 549–555.
- Geyer DJ, Biggs AT. The persistent issue of simulator sickness in naval aviation training. Aerosp Med Hum Perform. 2018; 89(4):396–405.
- Reed-Jones RJ, Reed-Jones JG, Trick LM, Vallis LA. Can galvanic vestibular stimulation reduce simulator adaptation syndrome? In: Proceedings of the Fourth International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design; July 9–12, 2007; Stevenson, WA. Iowa City (IA): Public Policy Center, University of Iowa; 2007:534–540.