

Balance organs affect brain blood flow

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The organs of the inner ear have a direct effect on brain blood flow, independent of blood pressure and CO₂ levels in the blood. Researchers writing in the open access journal *BMC Neuroscience* used a series of human centrifuge experiments to investigate the effects of stimulation of the otoliths and semi-circular canals on cerebrovascular response.

Dr. Jorge Serrador, from Harvard Medical School, worked with a team of researchers, including NASA scientists, to carry out the tests. He said, "While a role for the vestibular system in the autonomic response to position has been documented, this is the first study to demonstrate a direct effect of otolith stimulation on [cerebral blood flow](#)".

The researchers stimulated the vestibular organs of 25 healthy people by tilting them forwards and backwards, and by translation on a centrifuge. Changes in cerebral flow velocity were dependent on the frequency of vestibular stimulation and were in opposition to changes in [blood pressure](#) and not directly related to changes in end tidal CO₂.

Speaking about the implications of these results, Serrador said, "Standing up places the head above the heart and thus makes it harder to provide blood flow to the brain. Having a connection between the otoliths, which tell us that we are standing, and the cerebrovasculature may be part of the adaption that allows us to maintain our brain blood flow when upright. This connection might explain the reduced cerebral blood flow in some people. For example, aging is associated with vestibular loss that might contribute to reductions in global cerebral blood flow. Similarly, patients with orthostatic intolerance could have

underlying vestibular impairment that exacerbates cerebral hypoperfusion when upright. The knowledge gained from this study might lead to new treatment options for these conditions".

More information: Vestibular effects on cerebral blood flow; Jorge M Serrador, Todd T Schlegel, F Owen Black and Scott J Wood; *BMC Neuroscience* (in press); www.biomedcentral.com/bmcneurosci/

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