**A role for the otoliths in the mechanics of cochlear homeostasis?**

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The role and function of the otolith organs might well hold continuing interest for those studying cochlear mechanics. The otoliths, utricle, saccule (and lagena in birds) are intriguing, not just because of their role in the evolutionary origins of inner ear function, but because, in mammals, their membranous structures are contained within the bony vestibule, directly in line with the action of the stapes. Intriguingly, they display highly organised morphology (Jaeger, Kondrachuk, and Haslwanter 2008; Uzun-Coruhlu, Curthoys, and Jones 2007) and offer an apparently redundant low-frequency channel (Todd 2001). This duplication is puzzling considering cochlear low-frequency reception is generally less vulnerable than high.

Unexplained is how loud sound induces endolymphatic hydrops (Flock and Flock 2000; LePage and Olofsson 2011) and how pressures within the labyrinth are regulated (E LePage and Avan, Inner Ear Biology, 2015). A hypothesis is developed that the saccule’s low-frequency pressure sensitivity may represent another function entirely, connected with the mechanics of cochlear homeostasis.

A mathematical model is presented to account not just for how the otolith organisation may provide sensing of tilt and acceleration with rotational tuning, but explores novel other mechanical stimuli, such as pressure, to which these complex maculae may be responsive. The literature of unexplained projections from the maculae to the cochlea, direct and indirect, might predictably make use of such sensitivity.