

## Vestibulo-Ocular Responses to Vertical Translation using a Hand-operated Chair as a Field Measure of Otolith Function

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The translational Vestibulo-Ocular Reflex (tVOR) is an important otolith-mediated response to stabilize gaze during natural locomotion. One goal of this study was to develop a measure of the tVOR using a simple hand-operated chair that provided passive vertical motion. Binocular eye movements were recorded with a tight-fitting video mask in ten healthy subjects. Vertical motion was provided by a modified spring-powered chair (swopper.com) at  $\sim 2$  Hz ( $\pm 2$  cm displacement) to approximate the head motion during walking. Linear acceleration was measured with wireless inertial sensors (Xsens) mounted on the head and torso. Eye movements were recorded while subjects viewed near (0.5m) and far ( $\sim 4$ m) targets, and then imagined these targets in darkness. Subjects also provided perceptual estimates of target distances. Consistent with the kinematic properties shown in previous studies, the tVOR gain was greater with near targets, and greater with vision than in darkness. We conclude that this portable chair system can provide a field measure of otolith-ocular function at frequencies sufficient to elicit a robust tVOR.