

**Learning Objectives:** (1) Summarize patterns of vestibular site-of-lesion test findings; (2) Describe preliminary results of otolith dysfunction on balance, gait and quality of life.

**Title:** Otolith Dysfunction and Postural Stability

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**Background:** Symptoms of dizziness and imbalance are common sequelae following concussion and blast exposures that result in mild traumatic brain injury (mTBI), and these symptoms often last six months or longer. Emerging evidence suggests that otolith organ dysfunction is one of the most common vestibular test finding in individuals with dizziness and imbalance related to mTBI/blast exposure. Because most studies examining the effect of vestibular dysfunction on postural stability have used tests of horizontal semicircular canal function (hSCC) only, it is not clear how dysfunction in other components of the vestibular system contributes to postural stability and quality of life. The objectives of this study are to determine the effect of otolith organ dysfunction and the impact of mTBI/blast on postural stability and quality of life.

**Methods:** We are enrolling three vestibular groups and two control groups in this study. The vestibular groups include individuals with dizziness and/or imbalance with: (1) otolith organ dysfunction only, (2) hSCC and otolith organ dysfunction, and (3) hSCC dysfunction only. The control groups include (1) individuals with dizziness and/or imbalance with normal vestibular function and (2) age- and gender-matched individuals with no complaints of dizziness and/or imbalance and normal vestibular function. Participants are grouped according to patterns of vestibular site-of-lesion test findings. To determine the impact of otolith organ dysfunction on balance and gait, dynamic visual acuity, sensory integration, gait characteristics, and fall risk are compared across groups. To determine the impact of otolith organ dysfunction on quality of life, balance related confidence, self-reported disability, and activity and participation limitations are compared across groups.

**Results:** Preliminary data will be presented. To date, eleven participants have completed testing and are grouped in the following manner: (1) otolith organ dysfunction only, n = 3; (2) hSCC + otolith organ dysfunction, n = 5; (3) hSCC dysfunction only, n = 0; (4) Dizzy control, n = 3; (5) Healthy control, n = 0. Mean age is  $57.6 \pm 16.3$  years (range: 37 – 84 years). Four participants have a diagnosis of mTBI.

**Conclusion:** The findings of this study will have important implications for developing effective clinical protocols for the diagnosis and management of individuals with dizziness. This research effort is part of a long-term goal to establish a unique treatment platform to diagnose, localize, and treat dizziness and imbalance related to mTBI. This project will provide the Department of Defense (DoD) and the Veterans Health Administration (VHA) with important information to improve rehabilitation outcomes of individuals with dizziness and imbalance associated with TBI and blast injuries.