## **Carrie Hoppes - Abstract**

## Use of Near-Infrared Spectroscopy to Examine Cerebral Activation during Optic Flow in Subjects with and without Complaints of Visual Vertigo

Background: Individuals with visual vertigo describe symptoms of dizziness, disorientation, and/or impaired balance in environments with conflicting visual and vestibular information or complex visual stimuli. Physical therapists often prescribe habituation exercises using optic flow as part of a rehabilitation regimen to treat these symptoms, but there are no evidence-based guidelines for delivering optic flow. While beneficial and often prescribed, it is unclear how the brain processes such stimuli.

Objective: The purposes of this study were to use functional near-infrared spectroscopy (fNIRS) to explore cerebral activation during optic flow, and determine if the support surface had a modulating effect on brain activity. Design: Cross-sectional

Methods: Thirty participants (15 patients and 15 age- and gender-matched healthy controls) stood on a force plate in a virtual reality environment and viewed anterior-posterior optic flow while standing on a fixed or sway-referenced surface. Changes in cerebral activation were recorded from the bilateral fronto-temporo-parietal and occipital lobes using fNIRS.

Results: Cerebral activation was reduced in patients in the bilateral anterior fronto-temporal regions with visual motion when standing on a fixed floor. Cerebral activation was also reduced in patients in the right anterior fronto-temporal region with visual motion when standing on a sway-referenced floor. Conclusions: Patients with complaints of visual vertigo show less cerebral activation in regions associated with multi-sensory integration in comparison to healthy controls. This deactivation may represent an altered ability to perform sensory re-weighting of visual and vestibular information, leading to symptoms of dizziness and imbalance.