<u>**Title**</u>: To Wear or Not to Wear? Eye Tracking in Posture and Gait

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<u>**Purpose**</u>: To introduce and describe eye movements during posture and gait, with a particular focus on the research utility and capacity for clinical measurement and assessment

<u>**Intended Audience**</u>: Anyone interested in understanding the underlying neurobiology of eye movement during posture and gait, and the measurement techniques available to assess its health

<u>**Prerequisite knowledge**</u>: No prior knowledge of gaze tracking and eye movements is required.

<u>**Abstract**</u>: Currently, many options are available to test the function and utility of vision in the clinical setting using eye tracking systems. Different eye tracking systems afford different insights and have specific limitations, based on their design and implementation. It is vital to match the correct eye tracking system and measurement protocol to a given clinical or research question. Vision plays a significant role in posture and gait, providing input for both reflexive and information-based mechanisms that facilitate control of posture and gait allowing bi-directional interactions between the self and the environment (Gibson, 1979; Jeka et al., 1998; Schoner et al., 1998; O'Connor & Kuo, 2009; Patla. 1998; Logan et al., 2010). Postural sway even couples with movements of another individual when engaged in face-to-face conversation (Shockley et al, 2003). Understanding the neurobiology of gaze and its impact on the control of posture and gait is critical for researchers and clinicians working with older adults and individuals with concussion or vestibular disease. The vestibular and oculomotor systems directly control eye movements, stabilizing the eyes during head motion providing a platform that affords stable and reliable visual information (Pozzo et al., 1991; Grossman et al., 1998). Measuring eye movements during posture and gait will facilitate additional insight into postural and gait impairments that result from disease, trauma, or age.

<u>**Learning Objectives**</u>: *At the completion of this presentation, attendees will be able to:*
1) Describe classes of eye movements, including underlying neurobiology and pathology.

2) Explain the difference between eye tracking and gaze tracking.

3) Understand the different types of research questions that can be addressed by wearable and remote-mounted measurement systems.

4) Design their own posture or gait experiments with increased confidence in applications of eye tracking

<u>**Outline**</u>:
1) Brief overview of visual contributions to standing and walking (10 minutes)

2) Introduction to eye anatomy and eye movements (40 minutes)
      a. Anatomy of the eye and extra ocular muscles
      b. Classes of Eye Movements

        i. Fixation vs. Gaze Shift
   c. Neural Systems Controlling Eye Movements
   d. Clinical Examples of Abnormal Eye Movements

3) Break (10 minutes)

4) Eye Tracking Systems (20 minutes)
   a. Gaze Tracking vs. Eye Movement
   b. Wearable vs. Remote Mounted Gaze Tracking/Eye Measurement Systems

5) Looking Froward: Research and Clinical Examples from Posture and Gait (40 minutes)