



# Research Week 2023

## Vibration to restore presynaptic inhibition and alleviate start hesitation in people with Parkinson's disease and freezing of gait: a study protocol

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### Keywords

Humans, Neurologic Gait Disorders, Vibration, Parkinson Disease, Feedback, Goals

### Abstract

#### Background:

Freezing of gait (FOG) is one of the most debilitating features of Parkinson's disease (PD). FOG may be due to a lack of central inhibition, as people with PD and FOG (PD+FOG) have difficulty inhibiting postural preparation prior to initiating stepping. We recently demonstrated that presynaptic inhibition (PSI) in the spinal cord, is crucial for coordinating postural preparation with step initiation. PD+FOG have loss of PSI during the preparatory postural phase of step initiation (anticipatory postural adjustments-APAs), whereas those without FOG and healthy controls demonstrate PSI during APAs. The loss of PSI was associated with FOG severity. These findings suggest the importance of PSI for FOG. PSI is responsive to vibration in healthy people. We hypothesize that vibrotactile feedback would restore PSI and compensate for loss of central inhibition to overcome step initiation failure in PD+FOG.

#### Objective

To investigate the feasibility of vibrotactile feedback in restoring PSI and overcome step initiation failure in PD+FOG.

#### Methods

This cross-over study (one visit) will be conducted at the OHSU in the Balance Disorders Laboratory and will enroll 15 eligible PD+FOG who will be tested OFF medication (2 hours). Participants will be asked to perform 20 step-initiation trials without, and 20 with, vibrotactile feedback while quantifying APAs on a force platform. Vibrotactile feedback will consist of 120 Hz vibration to the Achilles tendon when the ipsilateral foot is weight bearing. PSI will be measured by conditioned and test H-reflexes during the step trials. Step initiation failure will be assessed via videos by a trained neurologist. FOG severity will be quantified with inertial sensors on the feet and low back.

#### Impact

These results will determine how well vibrotactile stimulation improves start hesitation via modulation of PSI to advance our long-term goal of developing vibrotactile feedback rehabilitation for PSI and start hesitation in PD+FOG.