Digital Measures for Clinical Trial Endpoints in Huntington's Disease (MEND-HD)

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Background

- Huntington's disease (HD) is a neurodegenerative disease that results in motor, cognitive, and psychiatric symptoms including gait changes and chorea, which can present in early disease.
- Measures of daily-living gait and chorea through **passive monitoring may be able to detect early motor impairments.**

Outcome Measures

- **Primary Outcomes:** Measures of gait and chorea
- **Secondary Outcomes:** Activity level, daily steps, gait bouts, heart rate variability and sleep staging.

Methods

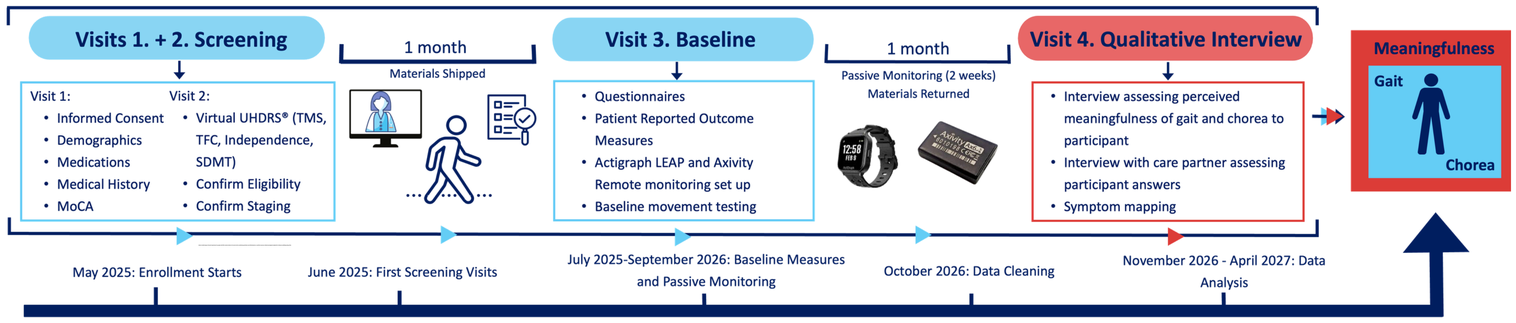
- Participants with and without a diagnosis of HD (HD-ISS stages 2 and early stage 3; late premanifest/early manifest) will **wear the Actigraph LEAP for 2 weeks**, including during sleep, as well as a lumbar sensor for validation.
- Future analysis will evaluate convergent validity between wrist worn metrics and clinician assessments via telehealth, and evaluate between group differences.
- Raw accelerometer data will be used in the creation of an automated algorithm to detect gait and chorea in HD.

Results

- We have **enrolled 11 participants as of January 2026** (8 HD, 3 Controls),
- 6 HD Participants have completed passive monitoring (data representing these participants is shown here)
  - HDISS Stage 2 (n = 4) - 42.6 years (± 9.3), 1M:3F
  - HDISS Stage 3 (n = 2) - 48.4 years (± 16.8), 0M:2F
- Current visualizations show good compliance for weartime throughout passive monitoring period
- Activity bouts based on accelerometry show low levels of intensity

Research Objectives

1) Demonstrate **construct validity** (convergent, divergent, known groups) and **test-retest reliability of daily-living gait and chorea, and daily-living physical activity, heart rate variability, and sleep quality** across early to mid-stage HD, based on novel HD-ISS staging methodology.
2) Evaluate the technical ability of wrist-worn sensors to **automatically detect gait abnormalities and chorea** in HD using deep-learning models.
3) Evaluate the **relationship between digital measures and patient-reported outcome measures.**



Results

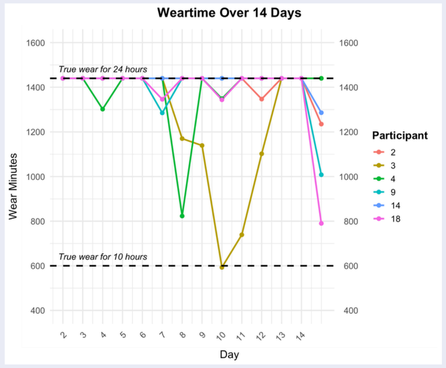


Figure 1. Graph showing **weartime** of individual participants over 14 day monitoring period.

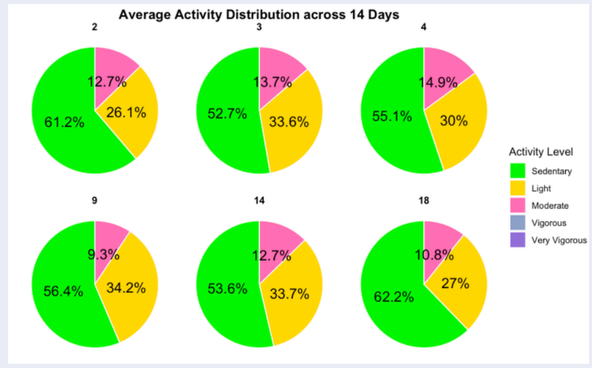


Figure 2. Visualization showing the average distribution of **accelerometry-based** activity bouts at varying levels of intensity for individual participants over a 14-day monitoring period.

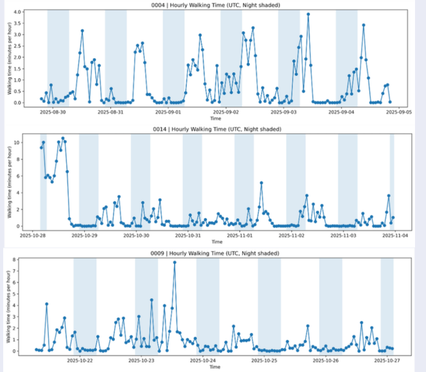


Figure 3. Graphs showing daily living gait of individual participants (n =3) over 7 days, using **wrist-based deep learning** model.

Conclusions

Passive monitoring may be able to **detect earliest signs of motor impairment** in people with HD, **reduce burden** of current active monitoring methods, and ultimately be a **sensitive measure of pharmacological endpoints** in disease modifying drug-trials. We predict that passive monitoring with the Actigraph LEAP will be a valid tool to assess daily-living gait and chorea.

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