**Daily Living Alterations in Gait and Mobility among SCA3 population: Exploratory Study**

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**Objectives and relevance:**

Cerebellar ataxia (CA) impairs balance and gait. Previous work has begun to evaluate daily living gait, suggesting large within-bout, step-to-step variability in CA, compared to health controls (HC). In this pilot study, we aimed to examine step counts and daily living physical activity, confirm findings regarding gait variability, explore changes in nighttime mobility, and examine associations with disease severity as potential biomarkers and therapeutic candidates.

**Methods:**

11 individuals with SCA3 (age: 51.1±11.7 yrs; 72% F) and 11 age and sex-matched HC (age: 51.9±12.0 yrs; 72% F) wore a 3D accelerometer on the lower back for up to 7 days. Previously established methods assessed daytime gait quality and nighttime movement and mobility. The Scale for Assessment and Rating of Ataxia (SARA, range 0-40) rated disease severity.

**Results:**

SARA scores ranged from 1-12 (mean: 6±3). Daily step count, total physical activity, time spent awake at night, and time spent in bed at night did not differ in CA and HC. In unadjusted analyses, CA had fewer long (>120 sec) walking bouts (HC: 6.6±4.1; CA: 2.3±2.4; p=0.007) and higher measures of step-to-step variability (see figure). CA also had fewer and slower axial rotations of the trunk during the night (presumably during sleep). It took CA about 3x longer to transition from lying position to walking at night and longer to transition from sitting to standing during the day. Measures of gait variability and transition times were correlated with SARA scores (Spearman’s rho: 0.66-0.81, p<0.05).

**Conclusions:**

These pilot results suggest that overall physical activity, walking time, and sleep time are similar in CA and HC. In contrast, several aspects of the quality of daily living movement and mobility appear to be markedly altered in CA, during day and night, including during sleep. For example, a high degree of step-to-step variability was observed in CA. These initial findings can be used to guide larger studies and to inform bio-marker and intervention research.