Over two decades of research has established brain aging as a critical component of mobility decline. Studies consistently report that motor slowing predicts cognitive decline and neurodegenerative diseases, but reported associations are often modest. Both mobility and brain aging are complex processes and steady-state assessments are typically used (usual pace gait and structural MRI). We aim to elucidate the complex relations between brain aging and mobility by considering (a) strategies to maintain function such as interlacing periods of activity and rest (fractionation), (b) interventions that target brain and body (motor skill training), (c) multimodal neuroimaging (functional connectivity and cerebral small vessel disease (cSVD)), (d) challenged walking (dual-tasks, uneven surfaces), and (e) reduced resources (hearing loss). This symposium focuses on community-dwelling older adults from observational and intervention studies using state-of-the-art and real-life assessments of gait (quality and fragmentation by tri-axial accelerometry) and brain (near-infrared spectroscopy (fNIRS), resting-state functional MRI). First, we examine activity strategies that modify the relation between slow gait and AD risk (Tian). Second, using fNIRS, we investigate the extent to which motor skill training increases automaticity of gait (Chen). Third, we examine how functional connectivity may compensate for the detrimental effects of cSVD on mild parkinsonian signs (Hengenius). Fourth, we investigate the effects of challenged walking on gait quality and the relation with cognitive function (Suri). Finally, we demonstrate relations of hearing and cognition with mobility (Pupo). We seek to generate discussions on shared pathways underlying motor slowing and the aging brain and future prevention and intervention strategies.

ACTIVITY FRACTIONATION MODERATES THE RELATIONSHIP OF GAIT SPEED WITH ALZHEIMER'S DISEASE RISK

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Older adults with slow gait have a modestly elevated risk of Alzheimer's disease (AD). Whether strategies to maintain function, such as interlacing periods of activity and rest, modify this relationship is unknown. We analyzed 577 initially cognitively normal participants aged 50+(53%women,26%Black) who had baseline data on gait speed and fractionation via ActiHeart. Diagnoses of mild cognitive impairment (MCI)/AD were adjudicated during an average 7.3years follow-up. We examined gait speed, fractionation, and their interaction with MCI/AD risk using Cox proportional-hazards models, adjusted for demographics and APOE-e4. Each 0.2m/sec faster gait speed was associated with 24% lower risk of MCI/AD(p=0.04). Fractionation was not associated with MCI/AD risk(p>0.05). There was a significant gait*fractionation interaction(p=0.013). At high fractionation, gait was not predictive of MCI/AD. Slow gait speed is less predictive of future MCI/AD in individuals who fractionate their activity to maintain function, possibly indicating brain function that drives such compensatory strategy is still conserved.

MILD PARKINSONIAN SIGNS ARE RELATED TO LOWER CORTICO-STRIATAL CONNECTIVITY IN EXECUTIVE NETWORKS

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Mild Parkinsonian signs (MPS) affect up to 24% of community-dwelling older adults. We hypothesize that MPS are associated with Parkinson's-like alterations of functional connectivity (FC) in sensorimotor, executive, and reward cortico-striatal networks. Participants (N=266; mean age=83; 57% female) without Parkinson's completed resting-state fMRI and Unified Parkinsonian Disease Rating Scale (UPDRS). FC between striatum and cortex was measured within each network. Logistic regression tested associations of each network's FC with MPS (UPDRS>0), adjusted for MPS risk factors, then including white matter hyperintensities (WMH). MPS was associated with lower cortical-striatal FC in the left executive cortico-striatal network (OR [95%CI]: 0.188 [0.043,0.824]). Association survived adjusting for risk factors (0.162 [0.030,0.874]) but was attenuated after including WMH (0.209 [0.036, 1.200]). In stratified analyses, left executive cortico-striatal FC was associated with MPS only for those with higher WMH (0.077 [0.010,0.599]). Future work should examine whether higher FC protects against the influence of WMH on MPS.

MOTOR SKILL TRAINING EFFECT ON REAL-TIME PREFRONTAL CORTEX ACTIVATION DURING WALKING

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We aimed to test the effects of motor skill training (MST) on gait automaticity measured by changes in prefrontal cortex (PFC) activation during actual walking. We used data from a 12-week trial of older adults (mean age=75.5, 60.5% women) randomized to standard physical therapy and standard+MST in a 1:1 ratio. Functional near infrared spectroscopy (fNIRS) measured PFC activation during simple and dual task walking. We will apply linear mixed models to assess effects of task, time, and MST on PFC activation. We will compare the PFC activation 1) during dual task walking compared to simple walking; 2) across visits after intervention; and 3) between participants receiving MST compared to standard physical therapy. These results will demonstrate whether gait automaticity, as evidenced by PFC activation during walking, is affected by MST.