Effects of cholinergic tone on gait and cognition in Parkinson’s disease
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INTRODUCTION
Recent studies have demonstrated reduced levels of cholinergic tone (measured by short-latency afferent inhibition) in people with Parkinson’s disease (PD), which has also been associated with balance and gait dysfunction (slower gait speed and greater percent of time in double stance) and impaired postural control (increased sway). The aim of the current study is to compare the effects of high and low cholinergic tone (CT) on measures of gait and attention in PD patients.

Hypotheses:
1: Cholinergic tone will be significantly correlated with worse gait and attention performance.
2: Dual task conditions will have stronger correlations with cholinergic tone.

METHODS
Participants
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<th>Idiopathic PD</th>
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Age (y): 75.5 (12.1)
Disease Duration (y): 6.1 (3.1)
H&Y: 3 (1)
UPDRS III: 31.5 (27.6)
Moca: 27.8 (3.9)

Procedures
Double-blind, placebo controlled cross-over randomized clinical trial
Tested in the OFF medication state

Statistical Analyses
Spearman’s Correlation, two-tailed

Attention Network Task (ANT)
Performed while seated at a computer
Flanker task assesses reaction time
Cued and Un-cued Conditions
Congruent and Incongruent Alerting

Balance & Gait Assessment
Stand quietly on firm surface for 60sec Single and Dual Task Conditions
Walked at self-selected pace
6 IMUs used to quantify gait metrics
DT cost = dual task – single task

Wearable inertial sensors (IMUs)

RESULTS

Spearman’s correlation with SAI: Greater cholinergic tone (smaller SAI) was related to better gait performance, particularly in DT gait conditions. Only weak and non-significant correlations were found between SAI and ANT; and SAI and postural sway metrics. Error bars represent SEM; * indicates p < 0.05; filled bars on the correlation plot signify significant relationships (p < 0.05).

DISCUSSION
The current results provide evidence that reduced cholinergic tone in persons with PD is related to impaired gait performance that may not be mediated by attention deficits. However, associations between cholinergic tone and gait performance (velocity and time in double support) were typically stronger during dual task conditions, demonstrating the exaggerated impact of reduced cholinergic tone on mobility when additional cognitive resources are required.

Our ongoing data collection will continue to investigate the potential utility of cholinergic manipulation as a strategy for treating balance and gait dysfunction in PD.

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