

Ankle proprioception in people with Multiple Sclerosis

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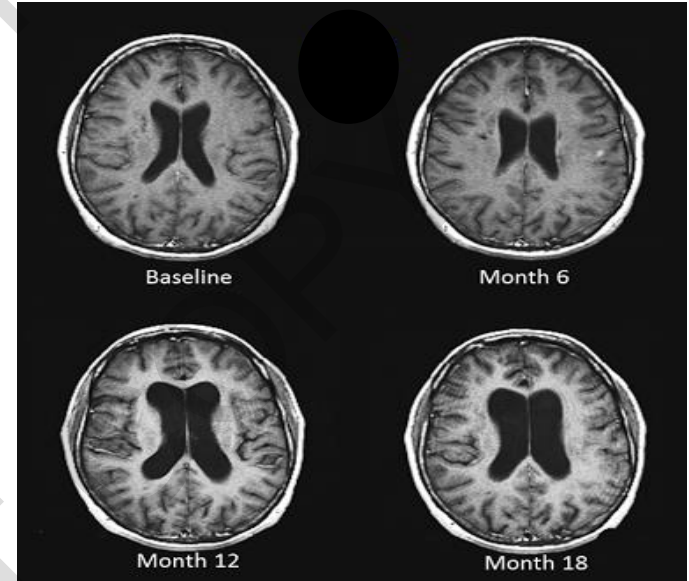
Background

Ankle Proprioception

- The sense of position and movement of the ankle, relative to the whole body, in the absence of vision.

Multiple Sclerosis (MS)

- Autoimmune, demyelinating central nervous system disorder which results in inflammation and atrophy.
- Gradual loss of functions and cognition across lifetime.



Progressive atrophy in an MS brain

Why does this research matter?



50% of people with MS fall once a month (Nilsagard, 2015)

- MS studies focus on whole gait analysis and balance, but research targeted to impairment in proprioception is lacking.
- Poor ankle proprioception leads to impaired balance and gait in elderly people (Ko, 2016)

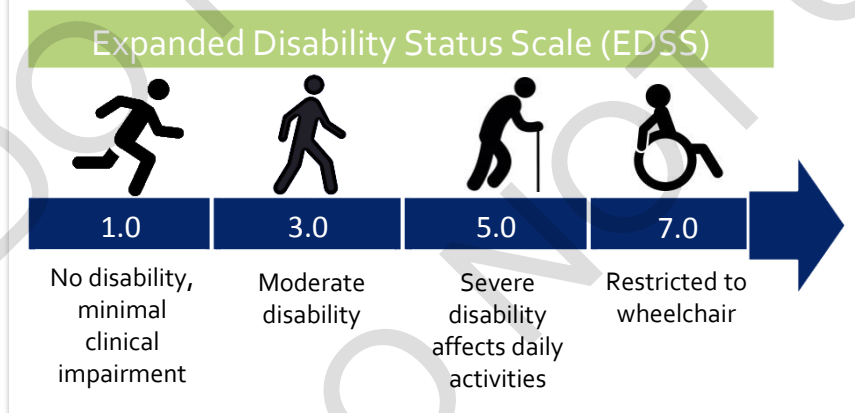
Aim:

Compare ankle proprioception in people with MS and healthy controls to determine if and how proprioceptive ability is impaired in MS.

Methods

Participant Demographics

	Healthy Controls	People with MS
Number	30	30
Age (range)	35 – 76 years	34 – 78 years
F:M	22:8	22:8
MS type	-	RRMS, PPMS, SPMS
EDSS (mobility score)	-	
Mild		11
Moderate		15
Severe		4



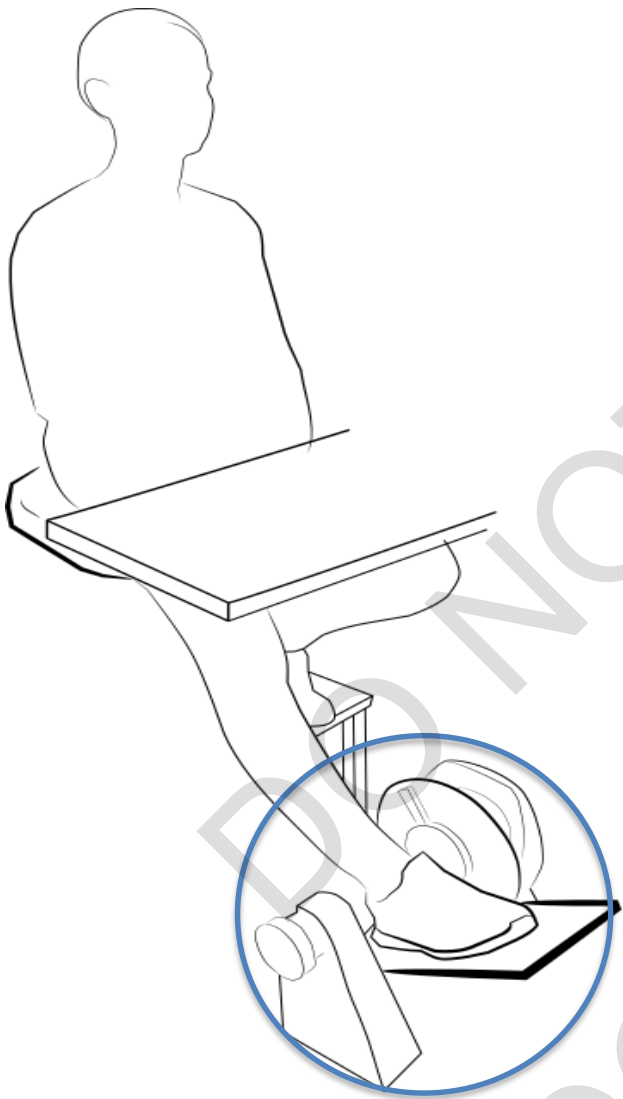
Proprioception Tasks

1) Threshold of detection to passive movement

- Smallest movement detected
- Footplate moved up or down, participant response; “up”, “down” or “I don’t know”
- Table obscured vision of foot

2) Plantar flexor reaction time

- Plantar flexion in response to footplate movement



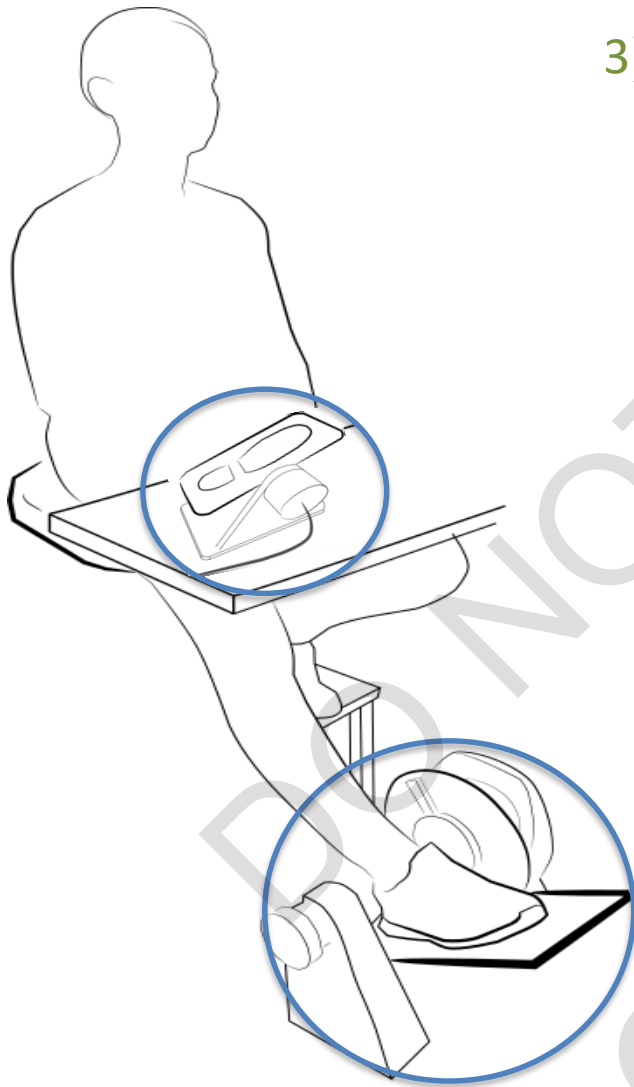
3) Joint position sense

- Participants position a hand-operated, miniature, footplate to match different foot positions.
- **Outcome:** Absolute mean error between foot and hand position.

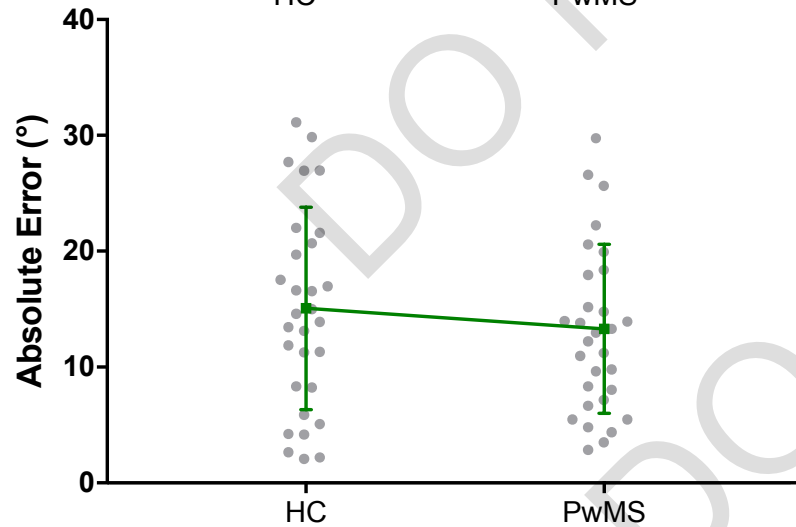
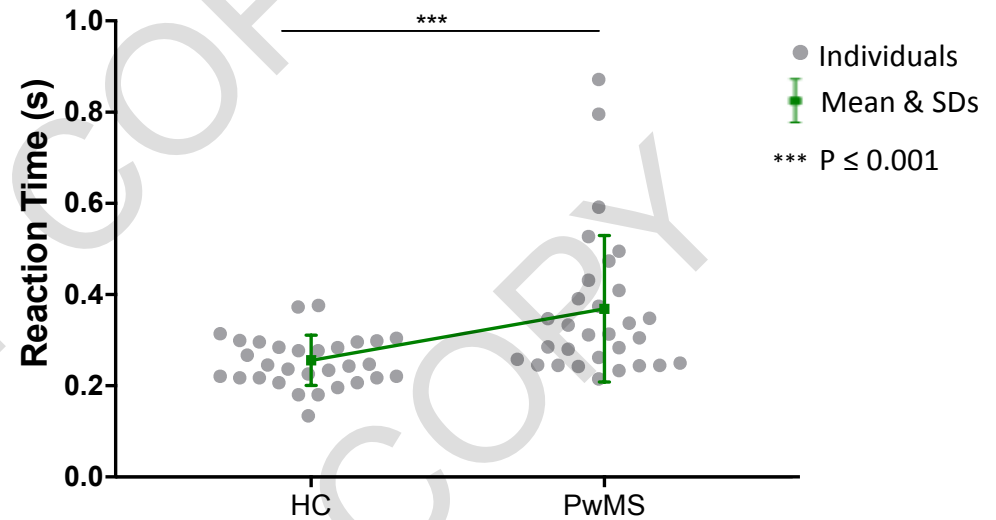
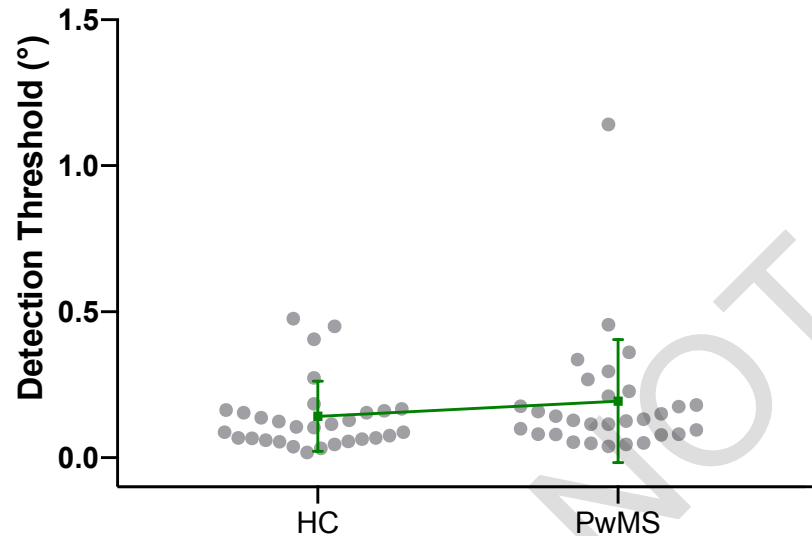
Statistical Analysis

Paired t-test between HCs and PwMS for each task.

$P \leq 0.05$



Results



	Mean Difference	CI	Significance (P value)
Detection Threshold (°)	0.05	-0.05 – 0.15	0.29
Reaction Time (s)	0.11	0.05 – 0.17	<0.001
Absolute error – joint position sense (°)	1.77	-5.67 – 2.13	0.36

Conclusion

- Ability to detect small movements at the ankle and sense of joint position are not impaired.
- Reaction time is impaired, this may indicate a motor deficit rather than a sensory deficit.
- Slow reaction time to a perturbation under the foot may increase the risk of falling in people with MS, even if other aspects of ankle proprioception are intact.

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