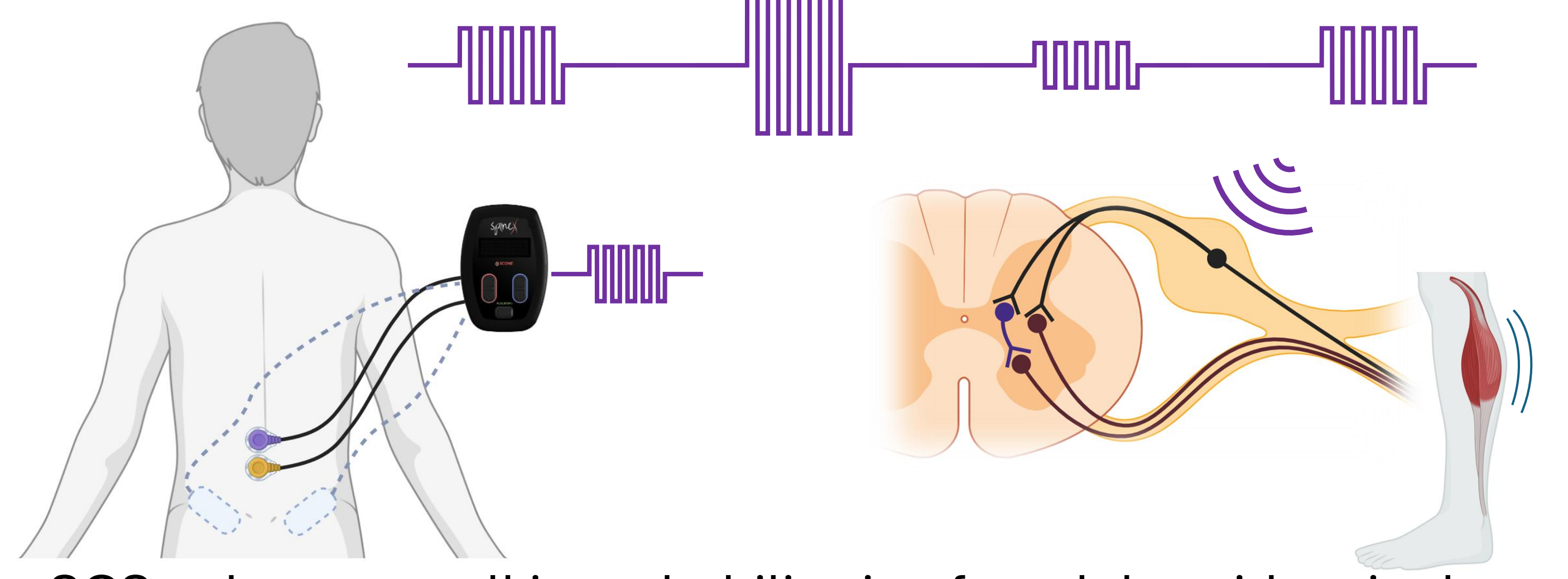


Biomechanical Effects of Varying Transcutaneous Spinal Cord Stimulation (tSCS) Amplitudes during Walking in Individuals With Spinal Cord Injury: A Case Series

Anika Pfister¹, Soshi Samejima², Chet Moritz^{1,2,3}, Kim Ingraham¹

¹Electrical and Computer Engineering; ²Rehabilitation Medicine; ³Neurobiology & Biophysics | University of Washington, Seattle

Tuning tSCS amplitude for walking rehabilitation

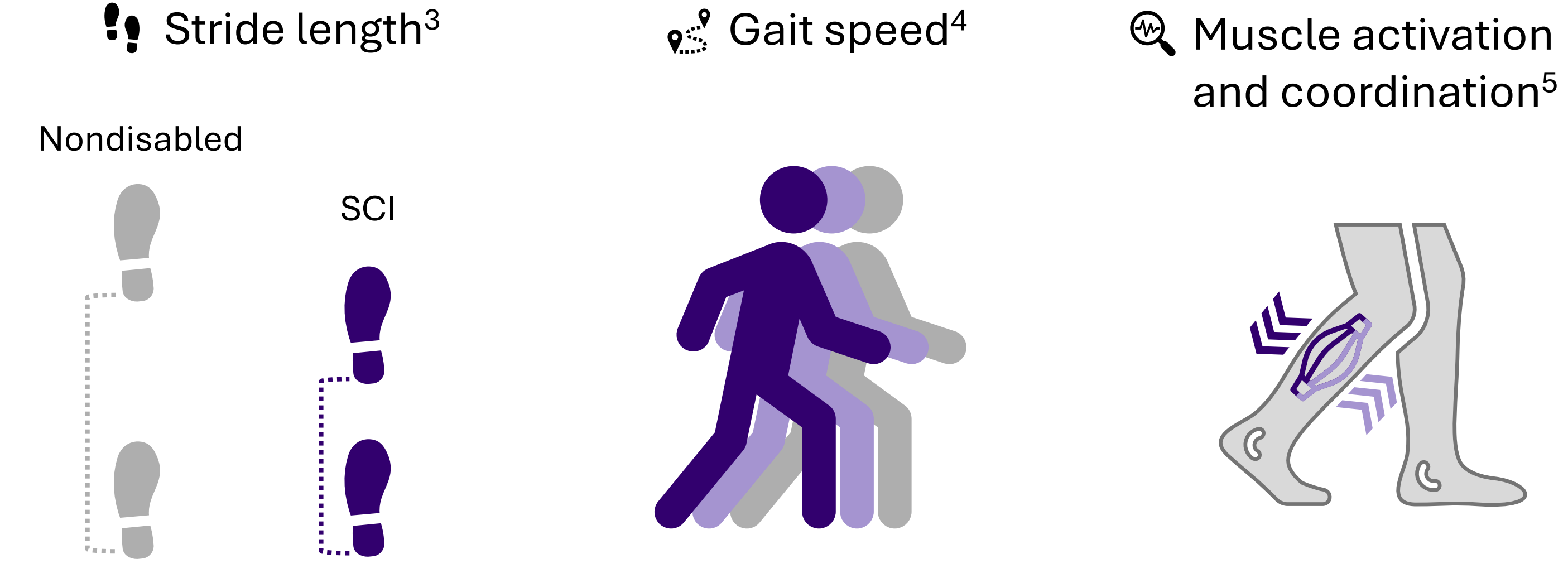


tSCS enhances walking rehabilitation for adults with spinal cord injury (SCI).^{1,2}

Tuning tSCS is difficult and time-consuming: adaptive amplitude modulation could improve treatment efficiency.

Research Question: (How) do biomechanical outcome measures vary across tSCS amplitudes?

Biomechanical rehabilitation targets for adults with SCI:

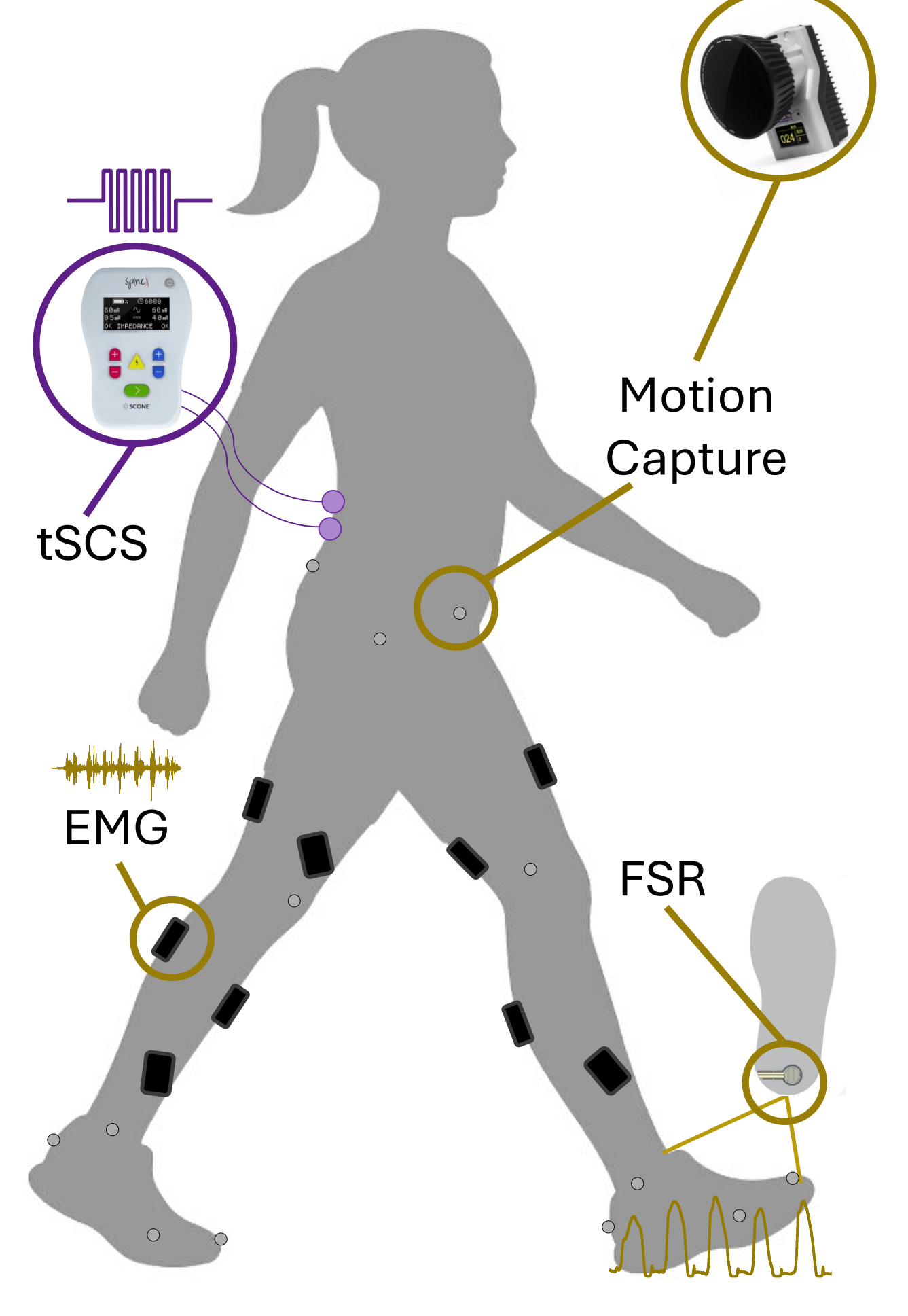
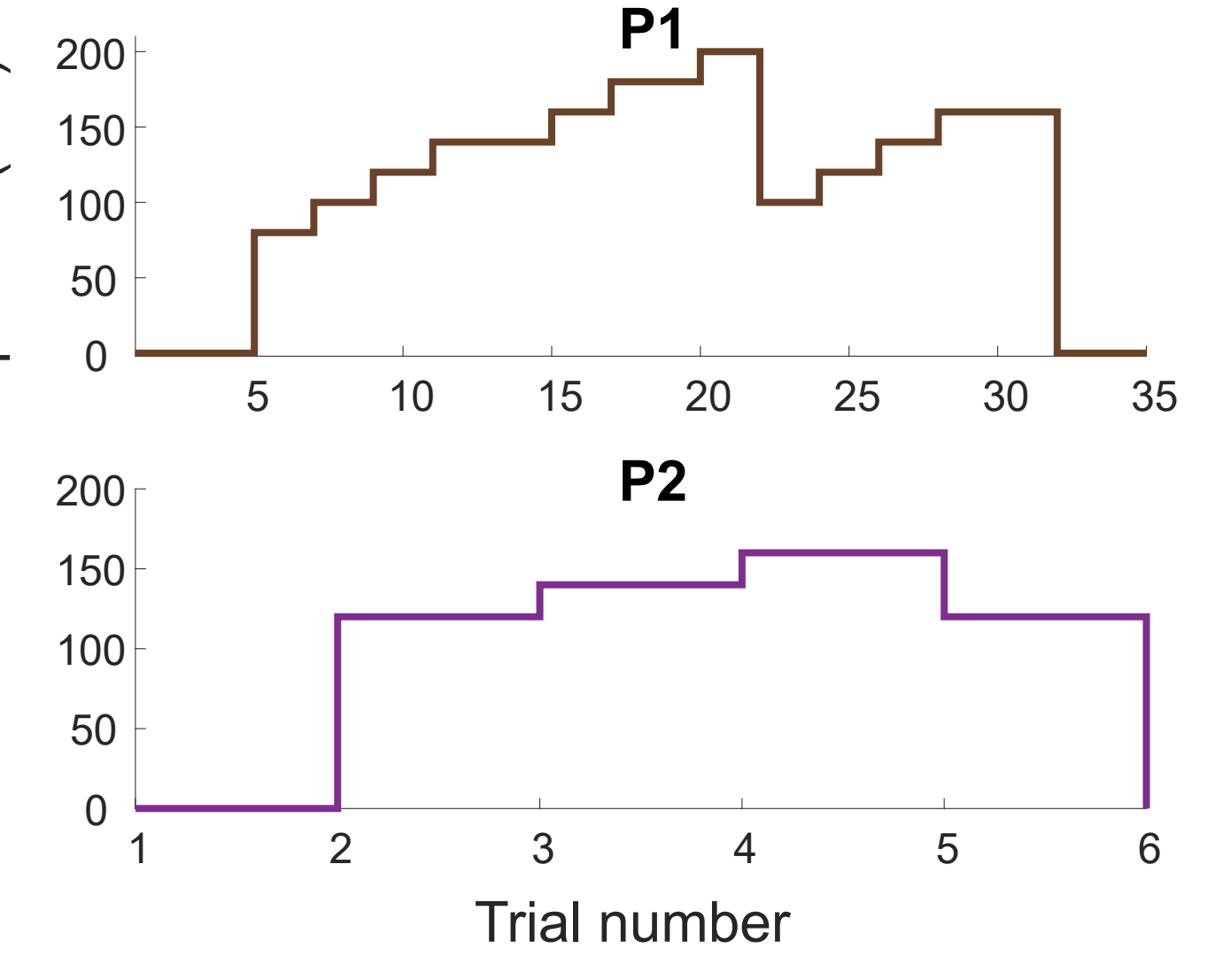


Experimental Study

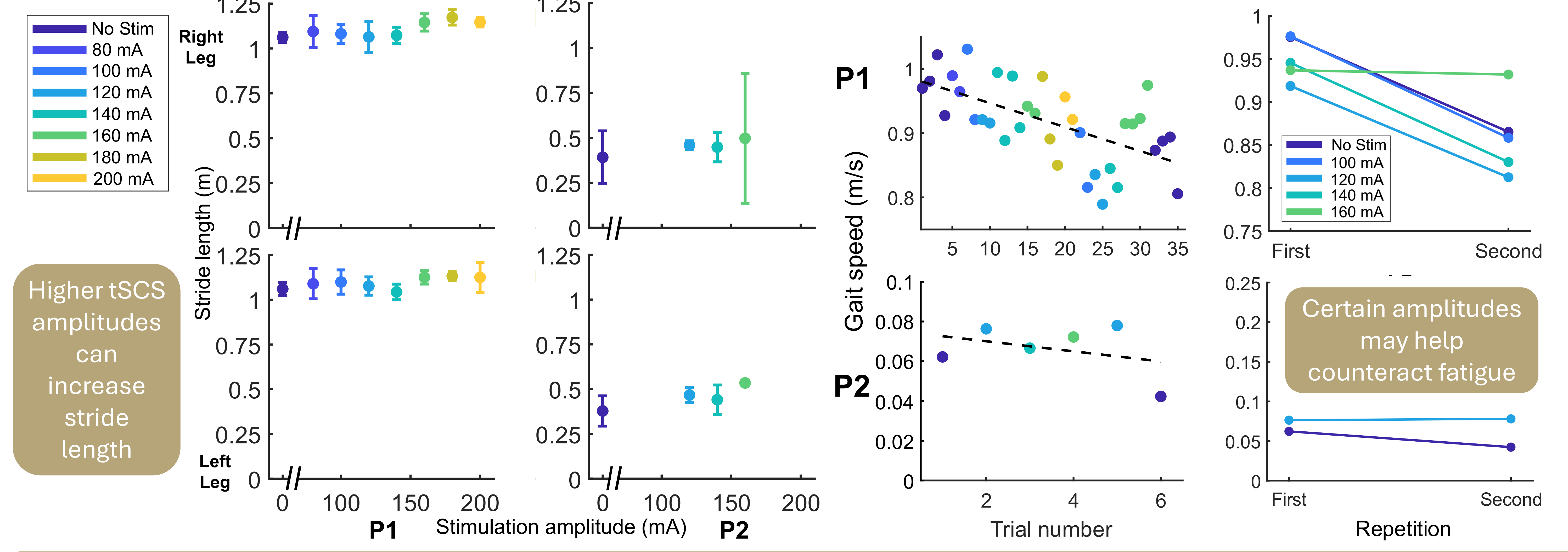
Two participants with motor-incomplete chronic SCI

P1: Female, 59. Injury level C5-6, AIS D
P2: Male, 49. Injury level C5, AIS C

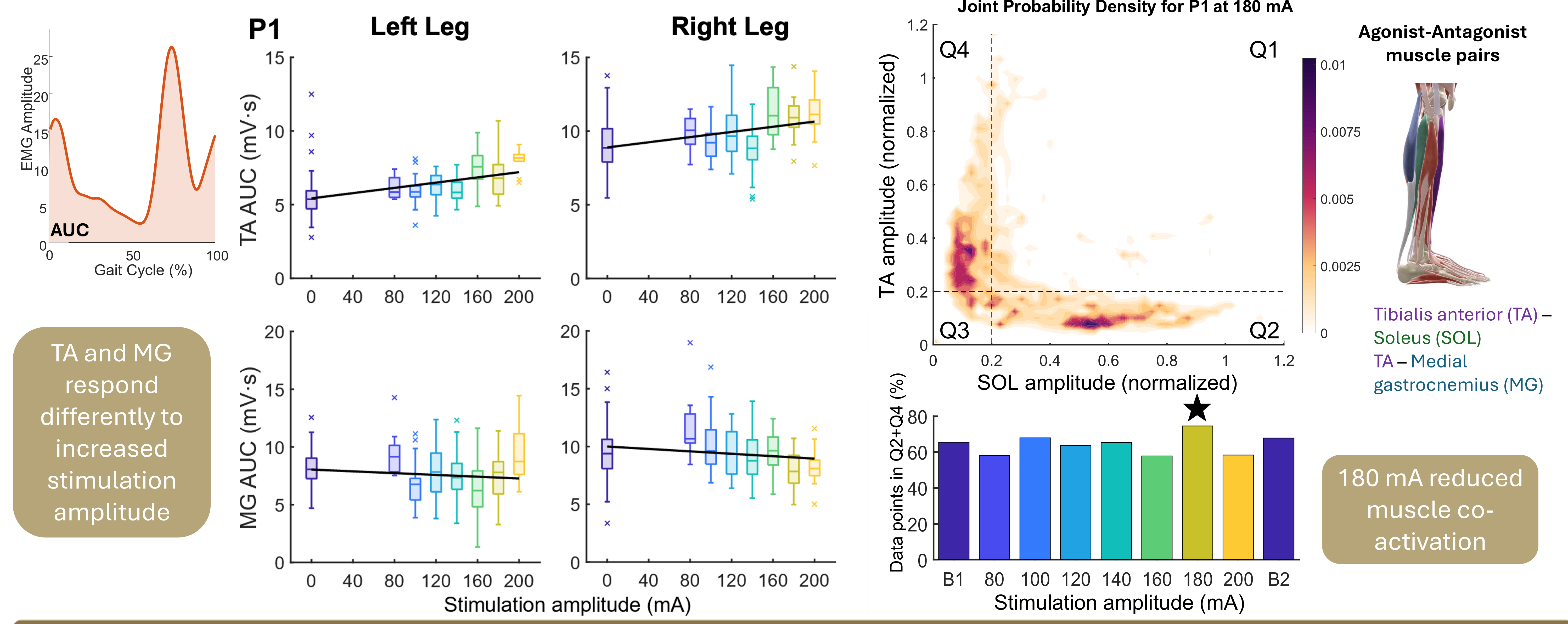
Clinician preferred amplitudes: 140 mA (P1), 120 mA (P2)



Spatiotemporal measures systematically change with tSCS amplitude



P1: Muscle activation responds differently to tSCS amplitude



Significance & Future Directions

Unique stimulation amplitudes may be best to “maximize” certain outcomes. tSCS amplitude could be tuned based on functional goals for a session.

- Multiple participants and sessions
- Investigate trends over time
- Towards real-time adaptive tSCS in activity-based therapy for adults with SCI

References

[1] Samejima S, et al. Phys Ther 102, 1-12, 2022.
[2] Moritz C, et al. Nat Med 30, 1276-1283, 2024.
[3] Krawetz & Nance. Arch Phys Med & Rehab 77, 635-638, 1996.
[4] Hedel H, et al. Neurorehab & Neural Repair 21, 2007.
[5] Balbinot G, et al. J NeuroEng Rehab 18, 105, 2021.

Full Paper: <https://tinyurl.com/tscs-amplitudes>

We thank our research participants for their time and contribution to this research. We thank Rich Henderson, Siddhi Shrivastav, Zijie Jin, and Siena Villancio-Wolter for their assistance. Funding for this work was provided by Wings for Life.