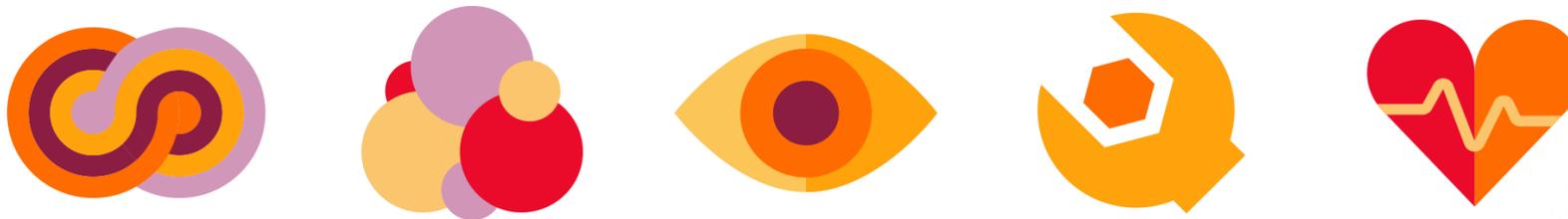


Spasticity as a Predictor of Recovery After Severe Spinal Cord Injury



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~20-40% of patients with motor complete SCI show some degree of motor recovery during inpatient rehabilitation

There is currently no biomarker to easily identify which patients have this potential

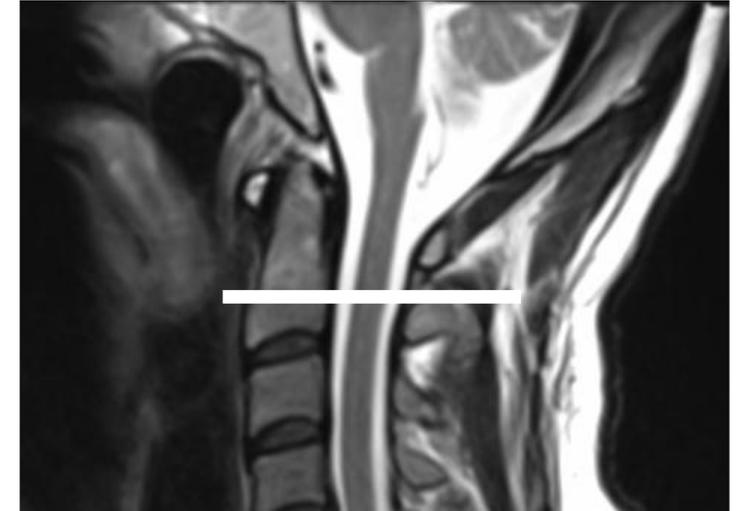
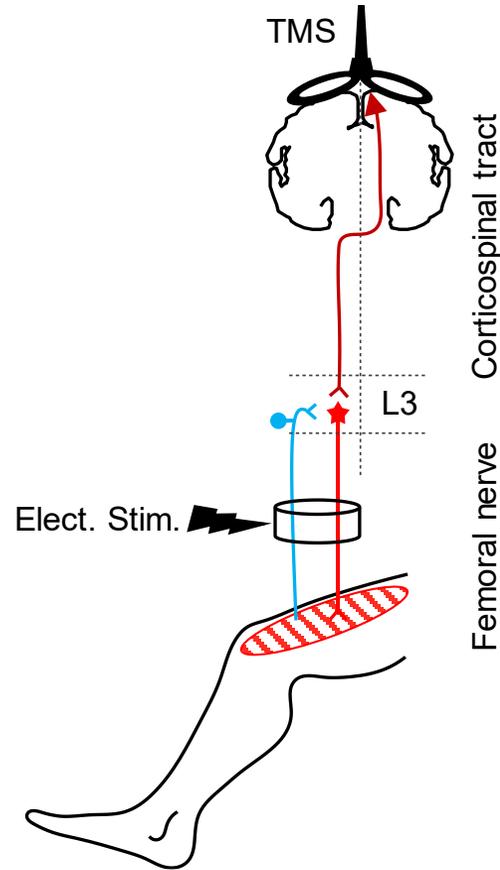
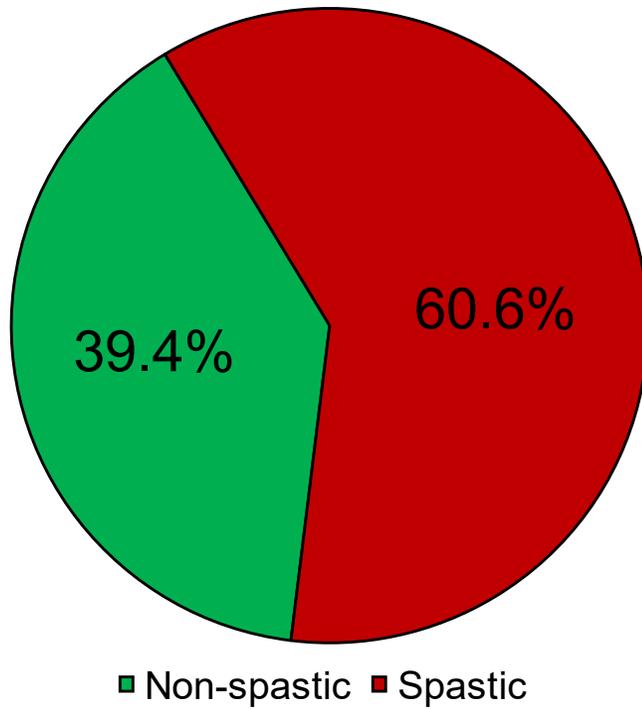
We **hypothesized** that the presence of spasticity predicts motor recovery after subacute motor complete SCI

Spasticity and residual descending motor pathways



Milan R. Dimitrijevic. 1970's.
Spasticity arises in patients with SCI who had evidence of residual and subclinical suprasegmental influence on spinal pathways. In other words, people with discomplete injuries.

Corticospinal responses in people with 'chronic motor complete SCI'

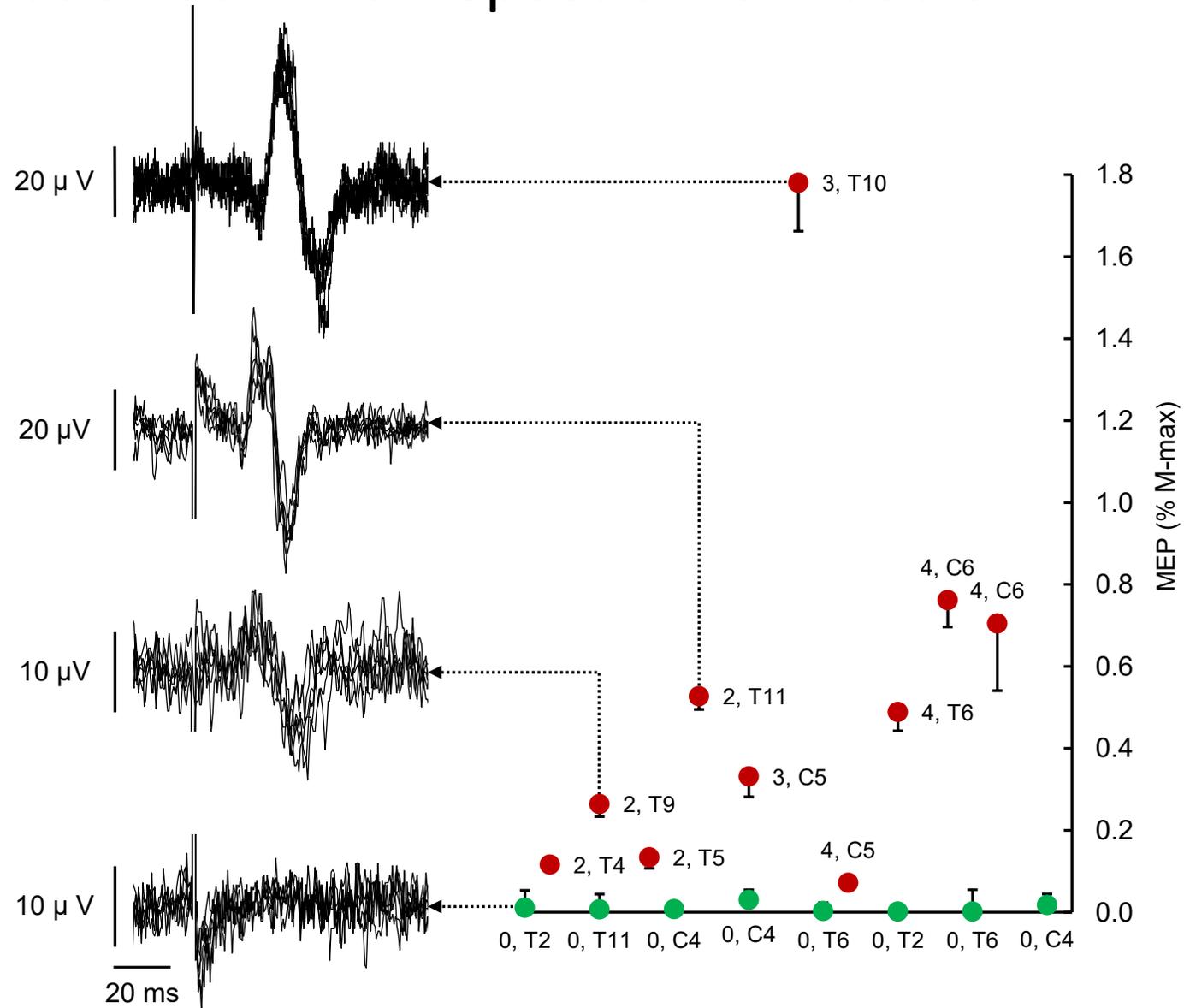


Quantified spasticity using clinical and kinematic outcomes

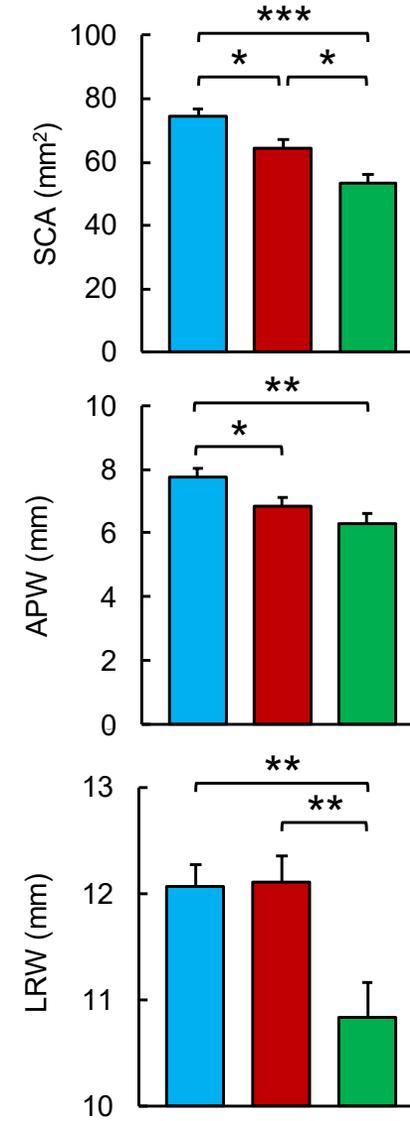
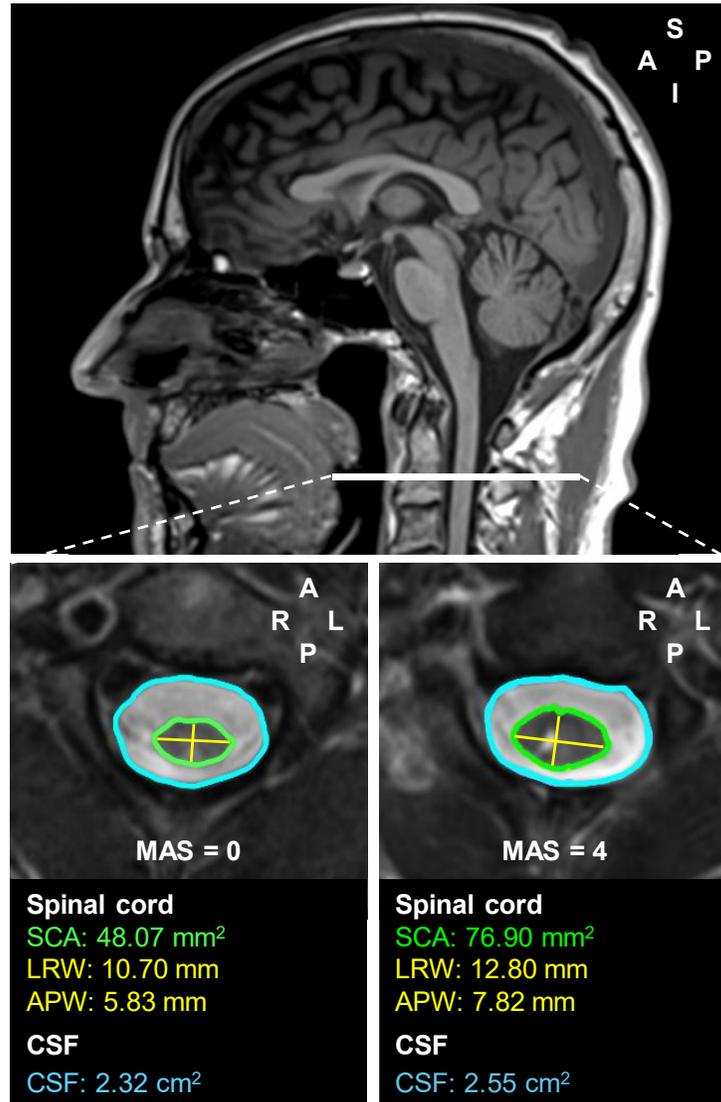
Score	Modified Ashworth Scale
0	No increase in muscle tone
1	Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion (ROM) when the affected part(s) is moved
1+	Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
2	More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
3	Considerable increase in muscle tone, passive movement difficult
4	Affected part(s) rigid



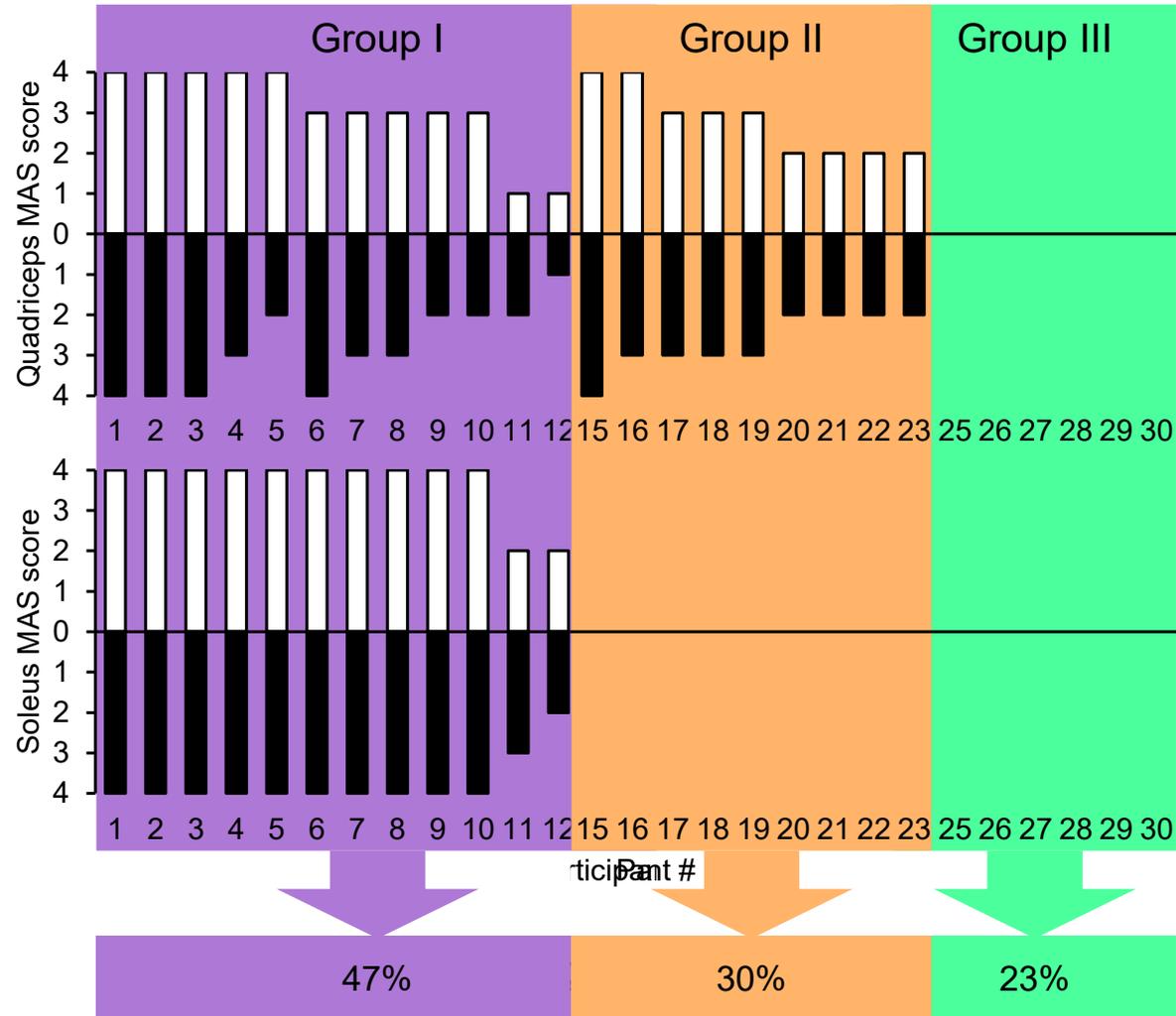
Corticospinal responses were present in spastic but not in non-spastic individuals

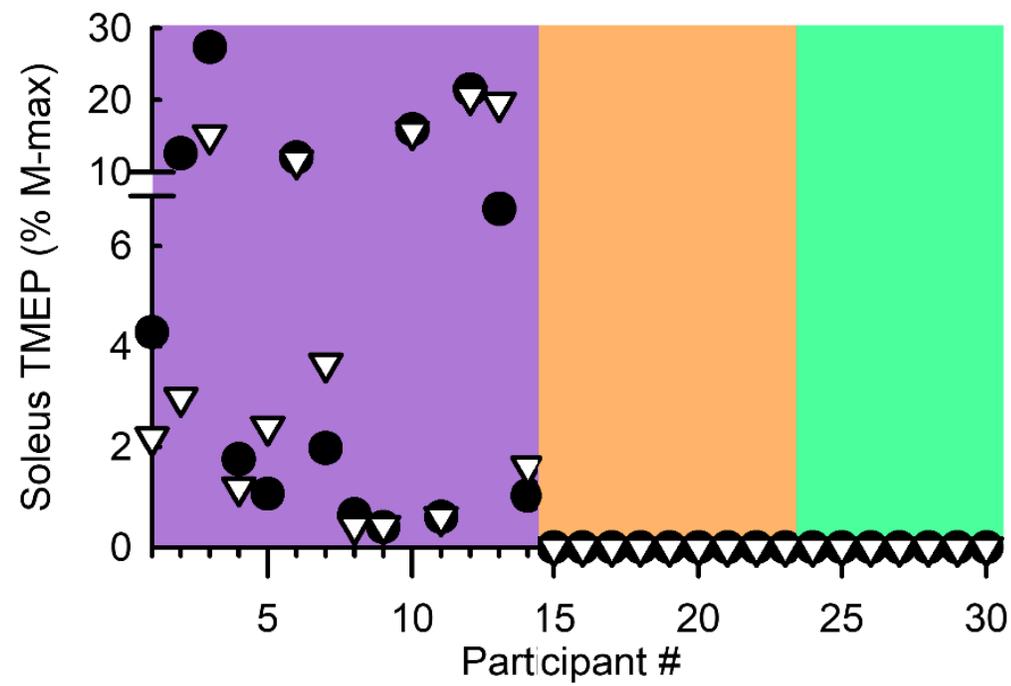
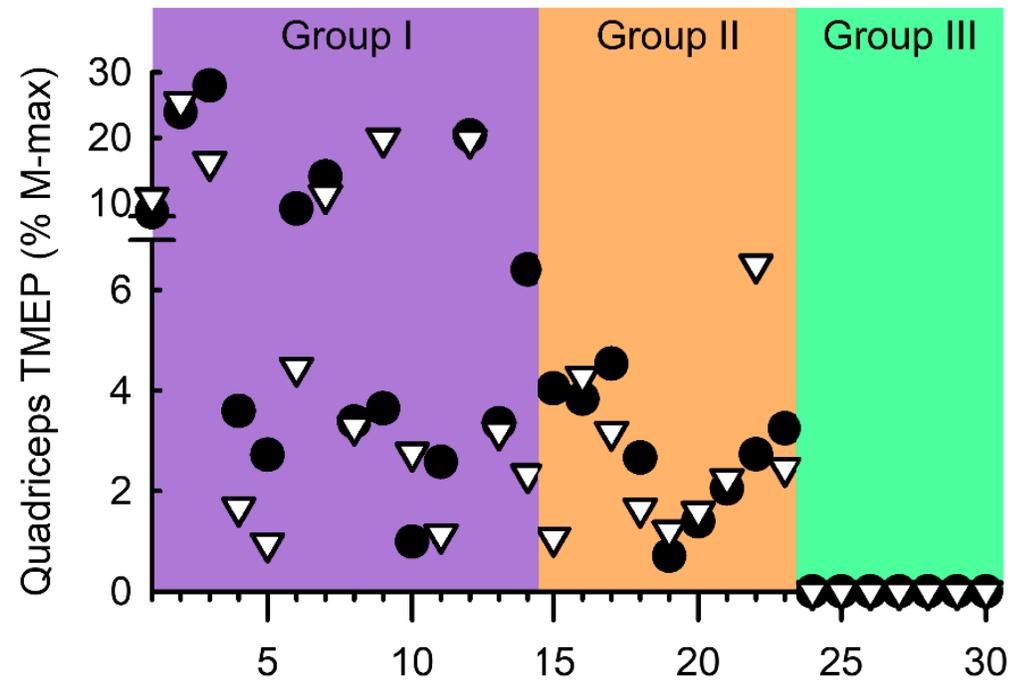


Spinal cord atrophy was greater in non-spastic compared with spastic subjects

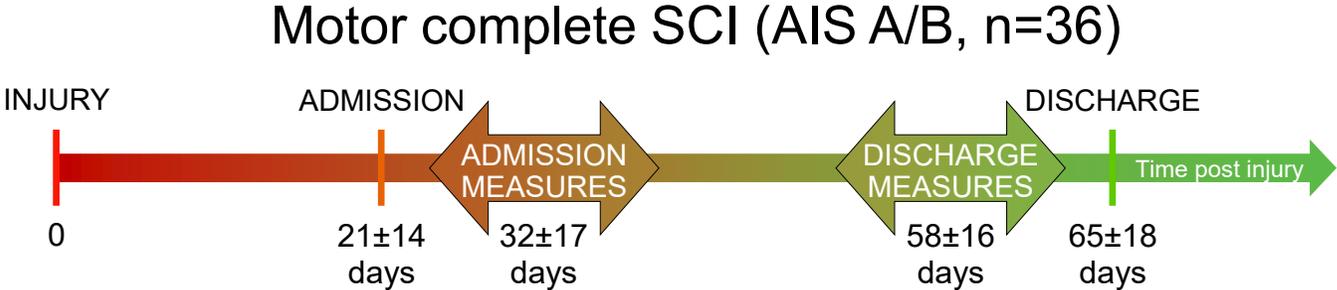


Spasticity and corticospinal connectivity assess injury severity after motor complete SCI



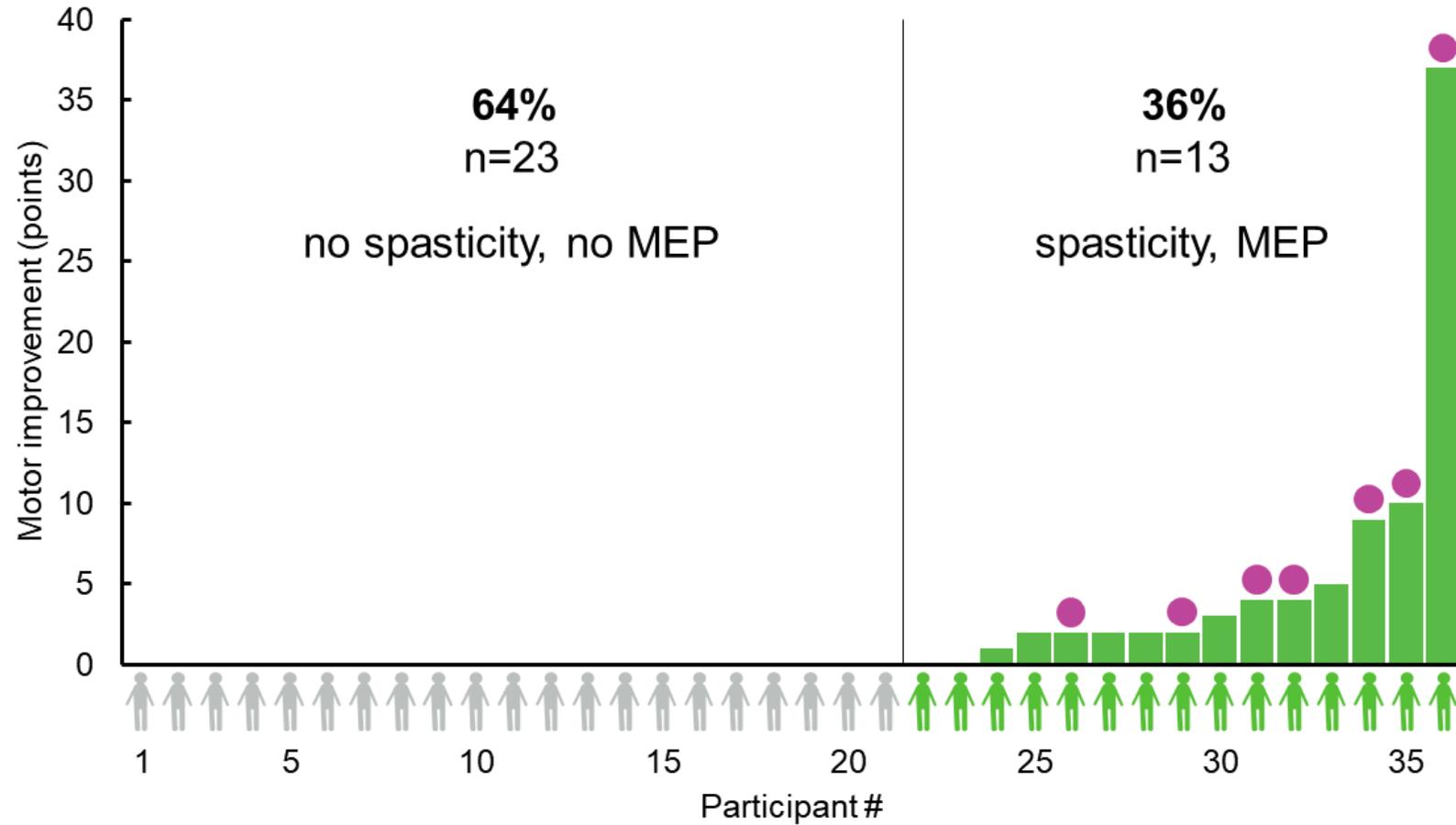


Can spasticity predict recovery after motor complete SCI?



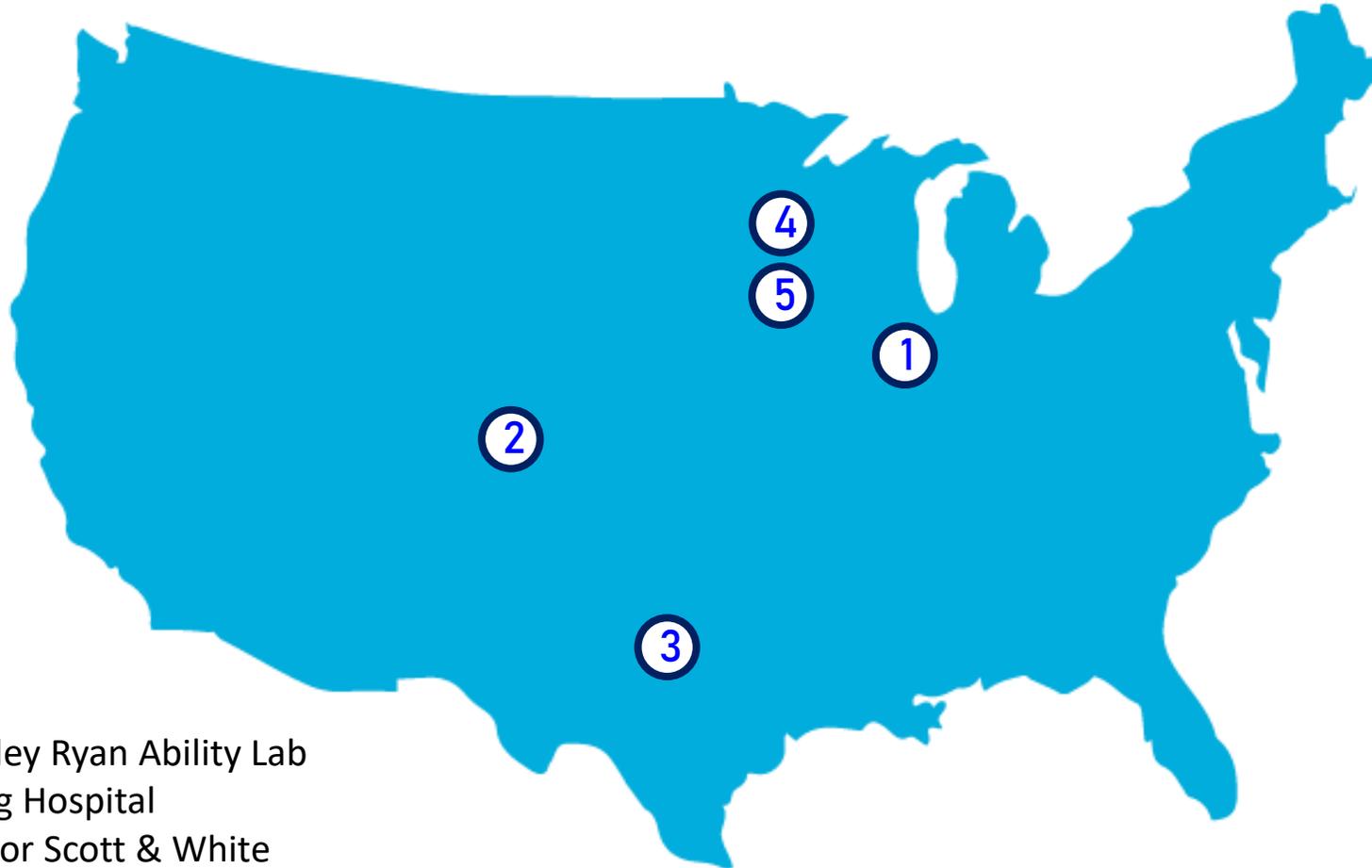
Sangari et al., 2023 Annals of Neurology

Motor complete SCI (AIS A/B)

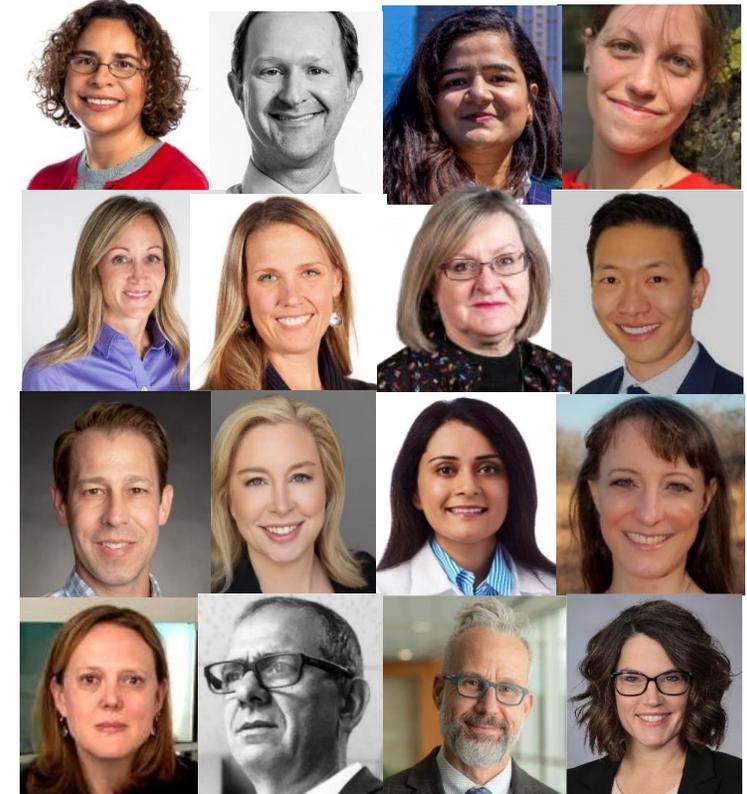


Hypothesis: Patients with motor complete SCI with spasticity achieve greater neurologic and functional recovery during inpatient rehabilitation than patients without spasticity.

SCI MODEL SYSTEMS COLLABORATIVE MODULE



- (1) Shirley Ryan Ability Lab
- (2) Craig Hospital
- (3) Baylor Scott & White
- (4) Univ. of Minnesota/Mayo Clinic
- (5) Courage Kenny



Training materials – Modified Ashworth Scale



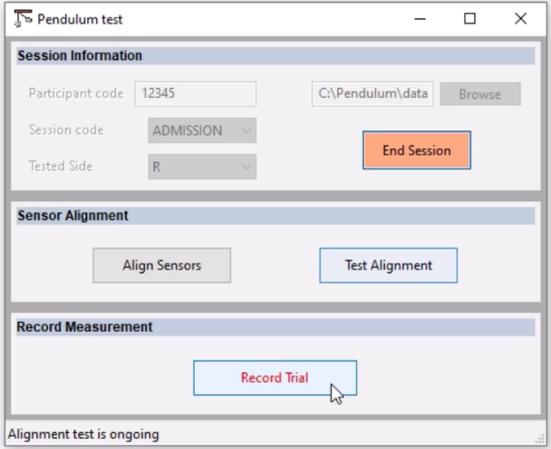
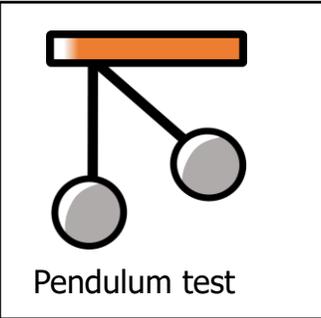
A. Instruments for positioning

- Same as for MAS/SCATS
- Stop Watch

B. Instruments for Assessment

- Wearable sensors (IMU)
- Wireless receiver
- Data Acquisition Software
- Leg Straps

Training materials – Pendulum test



Enrollment Completed



Study Site	Enrolled	ISNCSCI	test	blood
BSW	31	28	24	26
SRAL	53	43	44	47
CRAIG	33	30	30	27
CK	4	4	4	4
MAYO	10	7	9	9
TOTAL	131	112	110	112



(*) only participants with measurements

Patterns of residual corticospinal connectivity and spasticity exist in muscles below the injury after motor complete SCI

This information might help to identify recovery outcomes and stratification of participants on clinical trials