

Motor plasticity and recovery in spinal cord injury

Martinez Laboratory

Research aims:

1. The neural basis of sensorimotor recovery after spinal cord injury.
2. How recovery-related mechanisms can be promoted after spinal cord injury.
3. Translating basic research findings into novel therapeutic approaches.



Marina Martinez
Principle investigator



Andrew Brown
Post doctoral fellow



Maxime Delcour
Post doctoral fellow

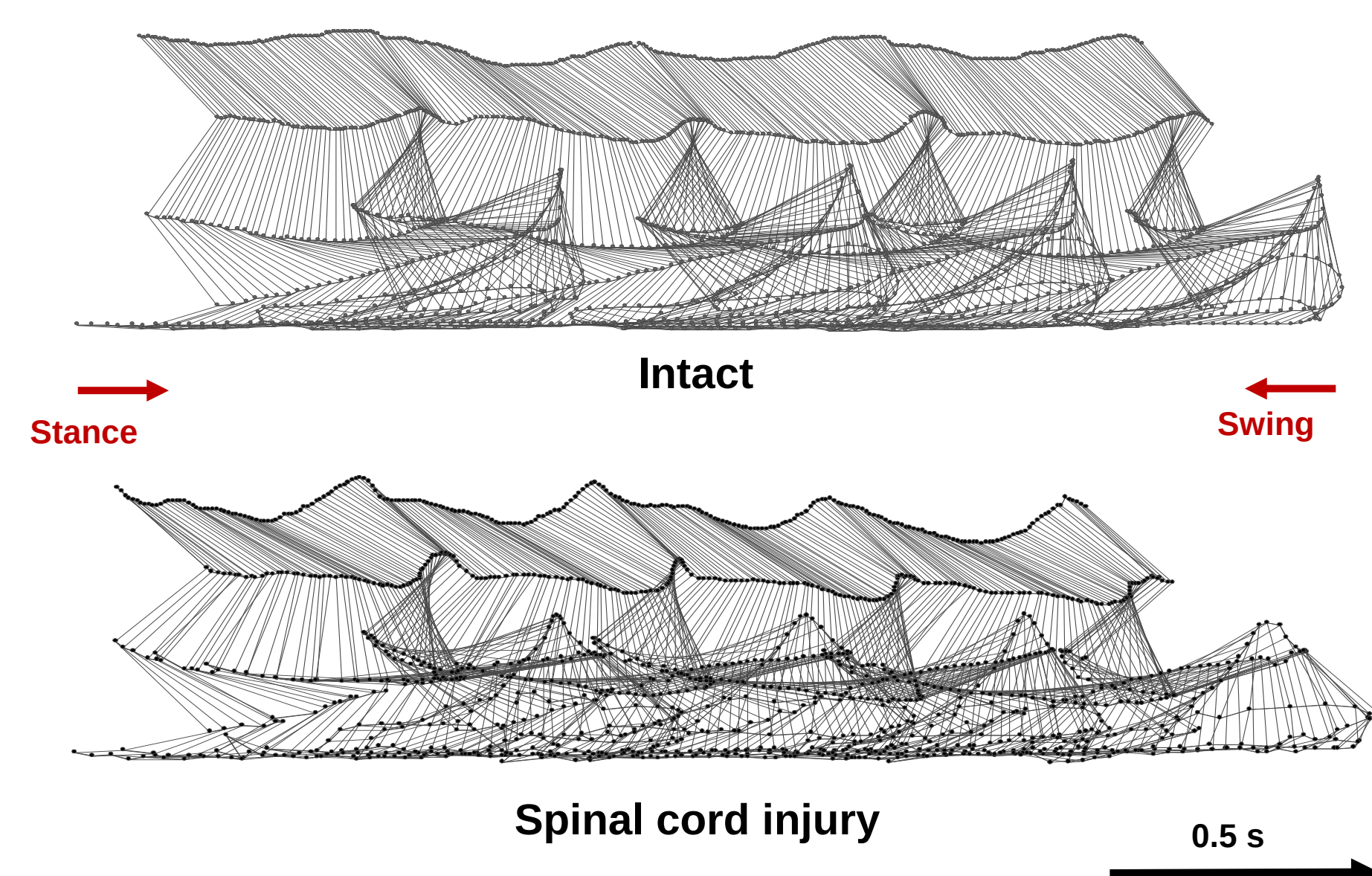
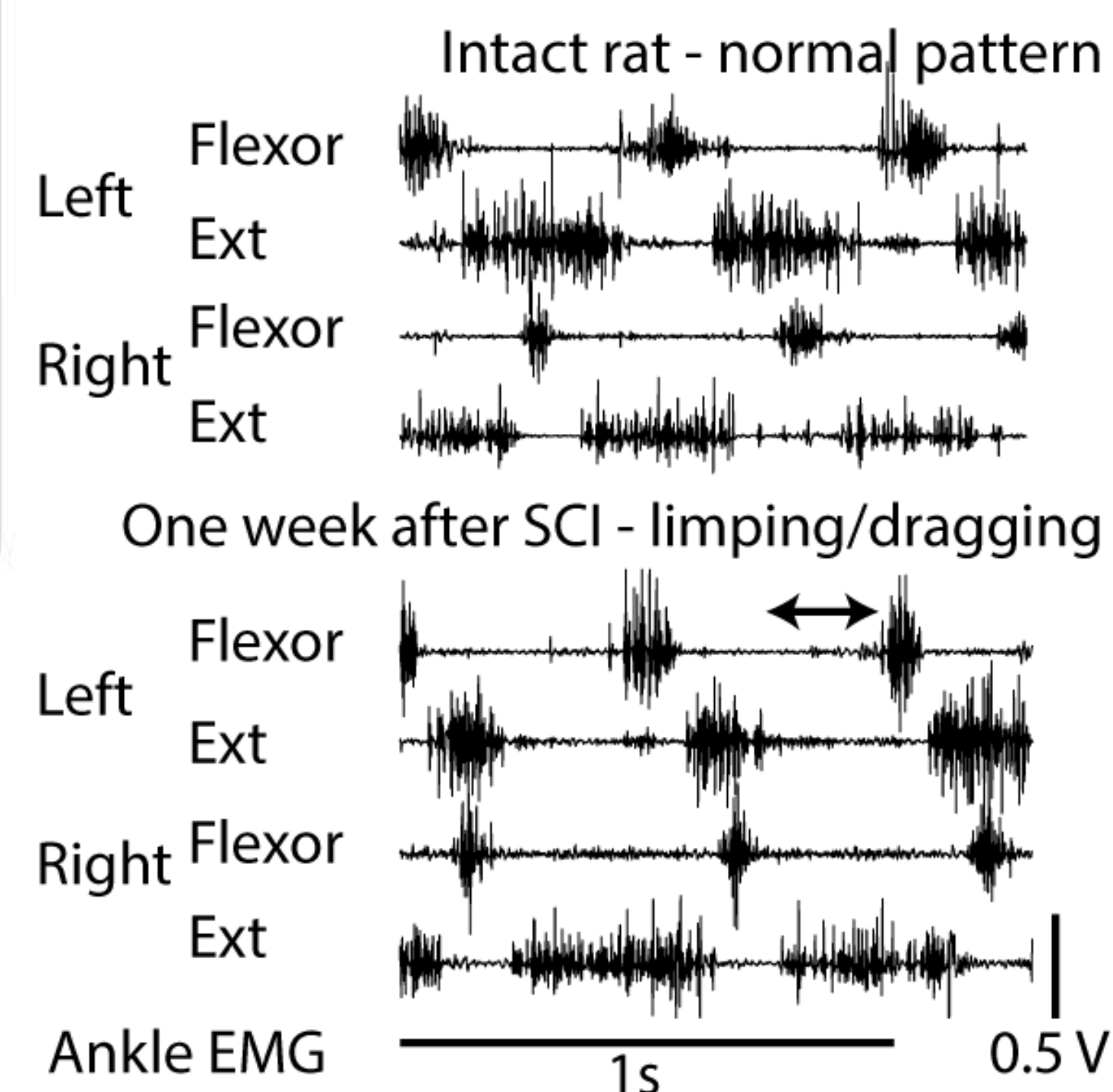
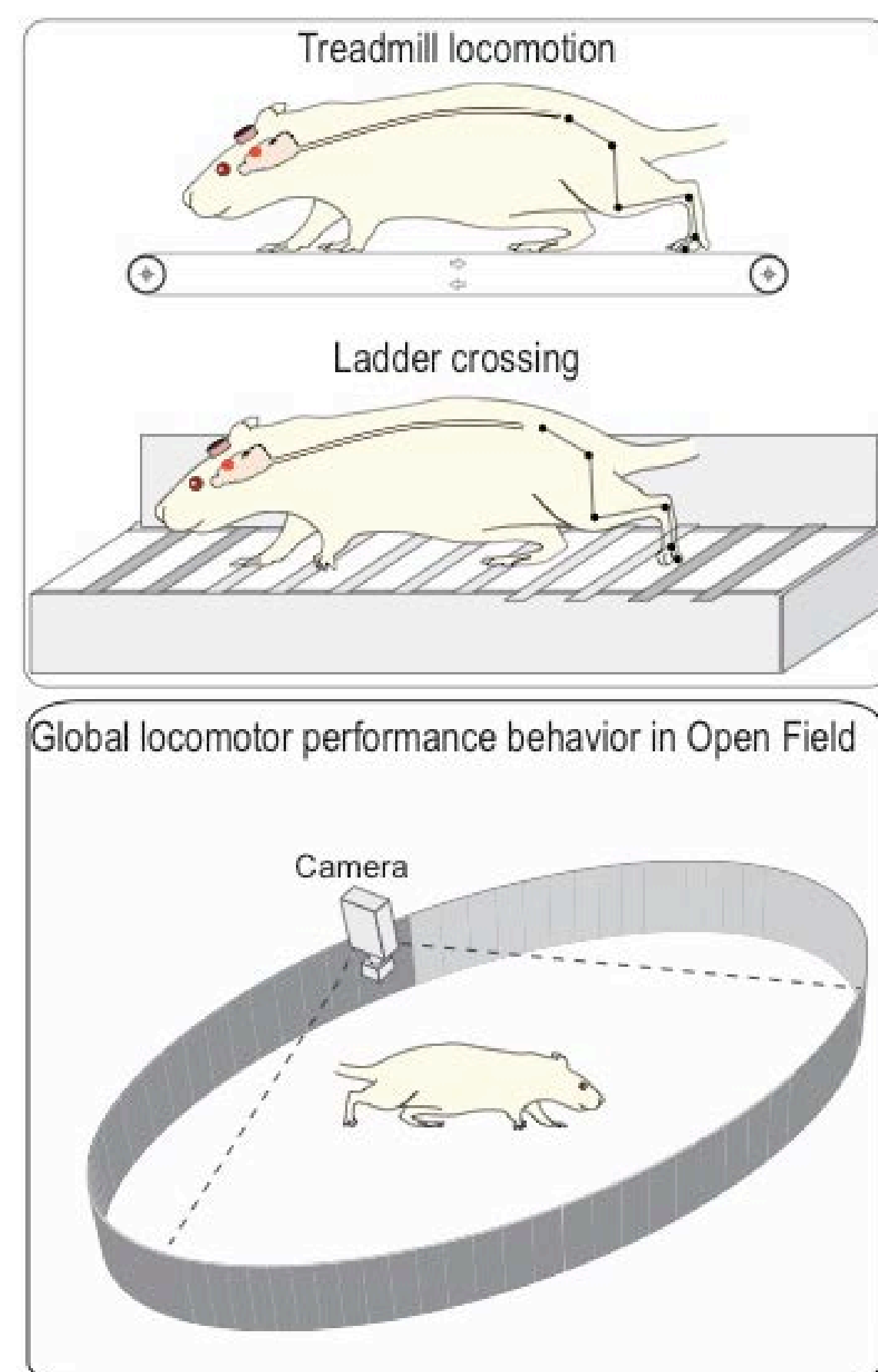
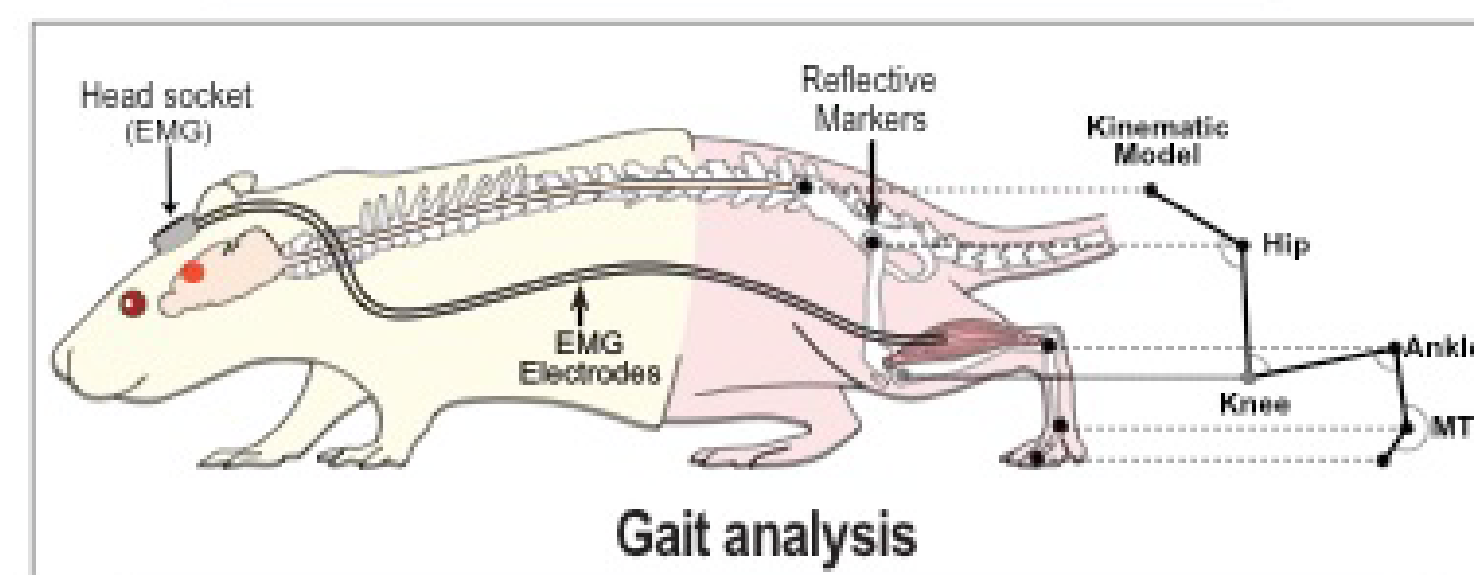


Marco Bonizzato
Post doctoral fellow



Morgane Regniez
PhD Student

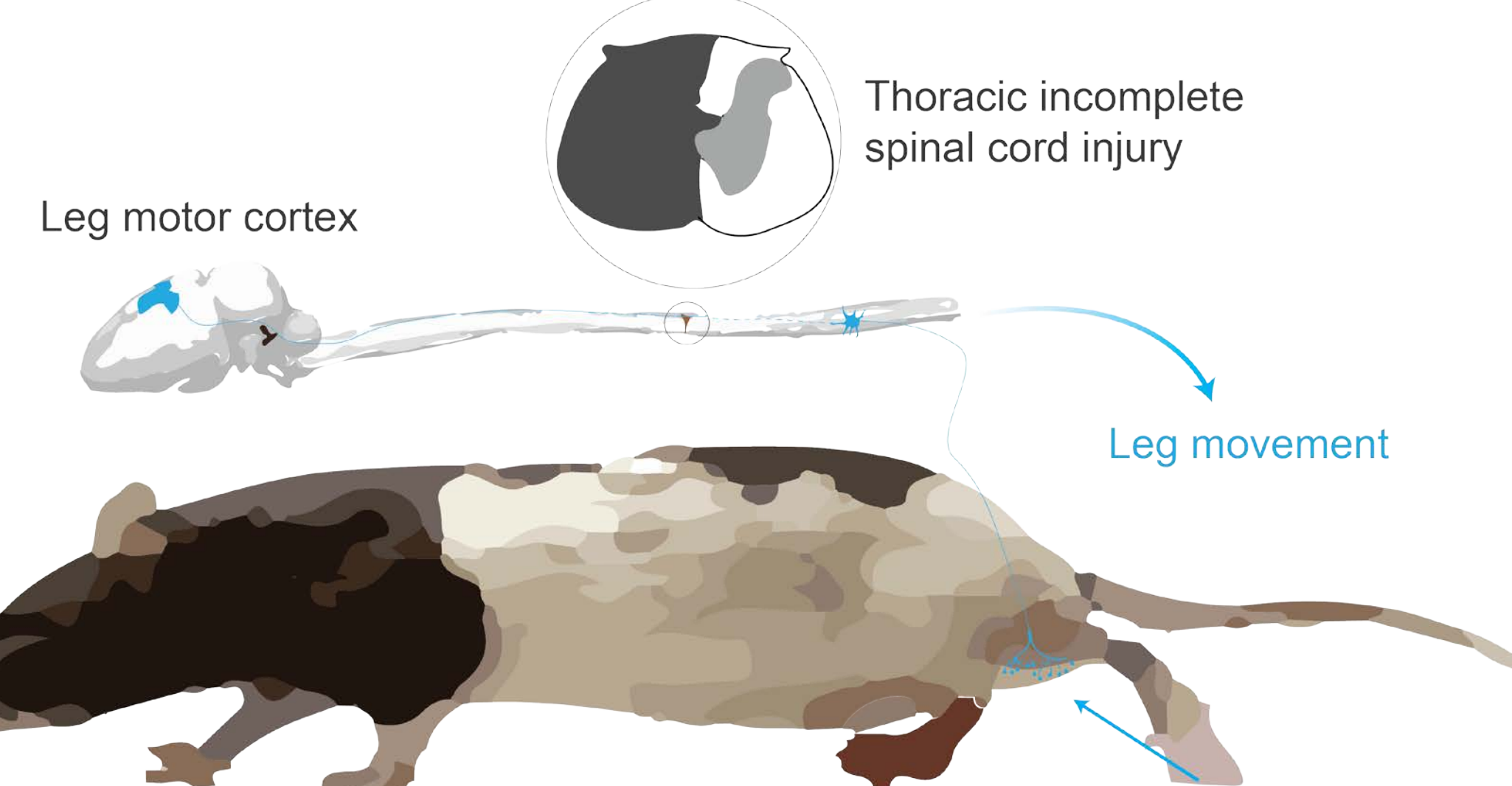
Assessing locomotor performance after injury and therapeutic intervention



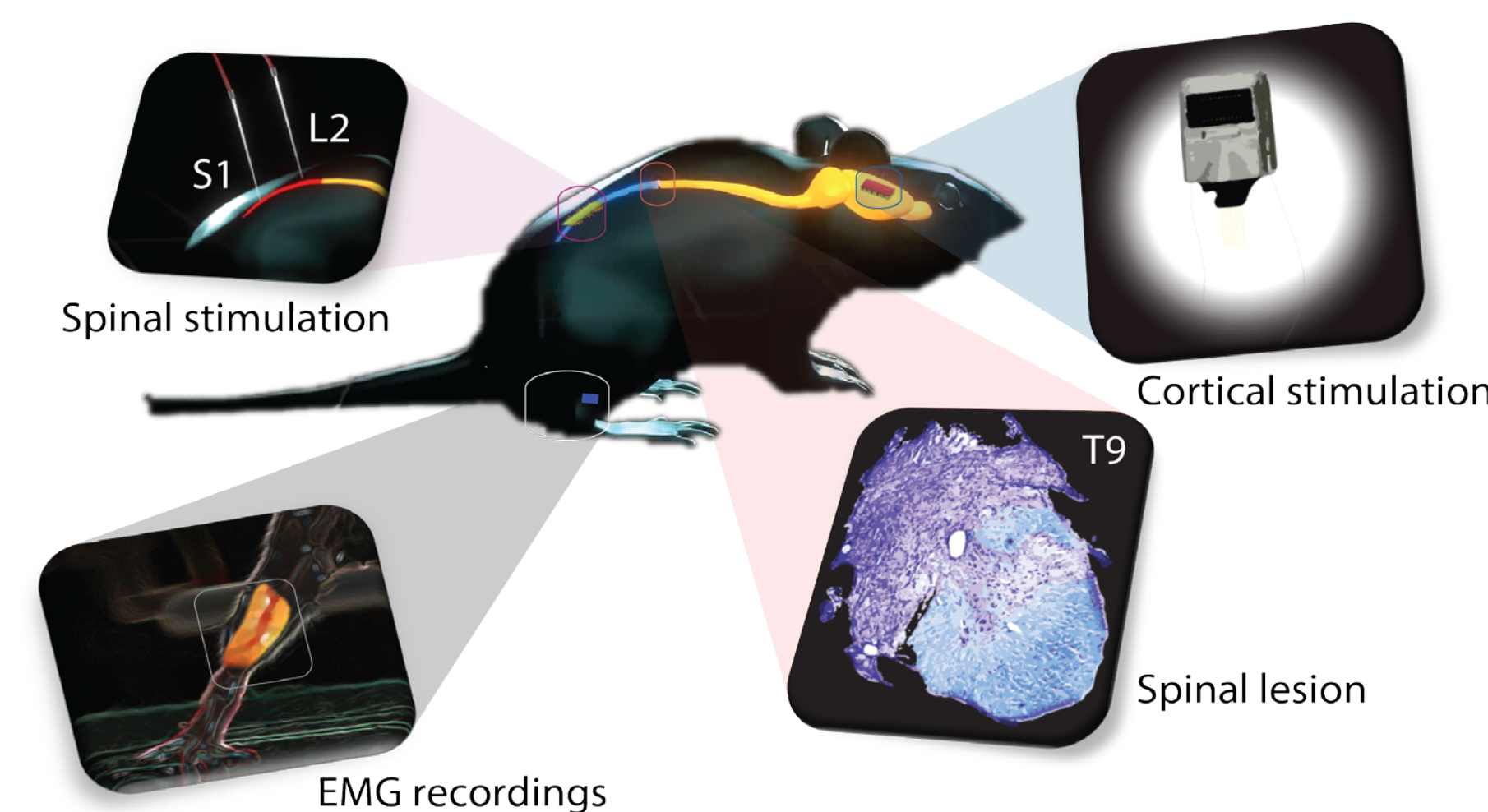
We assess locomotor performance using gait reconstruction and kinematic analyses of treadmill locomotion in addition to a wide variety of sensorimotor tests.



Investigating sensorimotor function at the systems level



Developing neuroprosthetics to foster plasticity and recovery

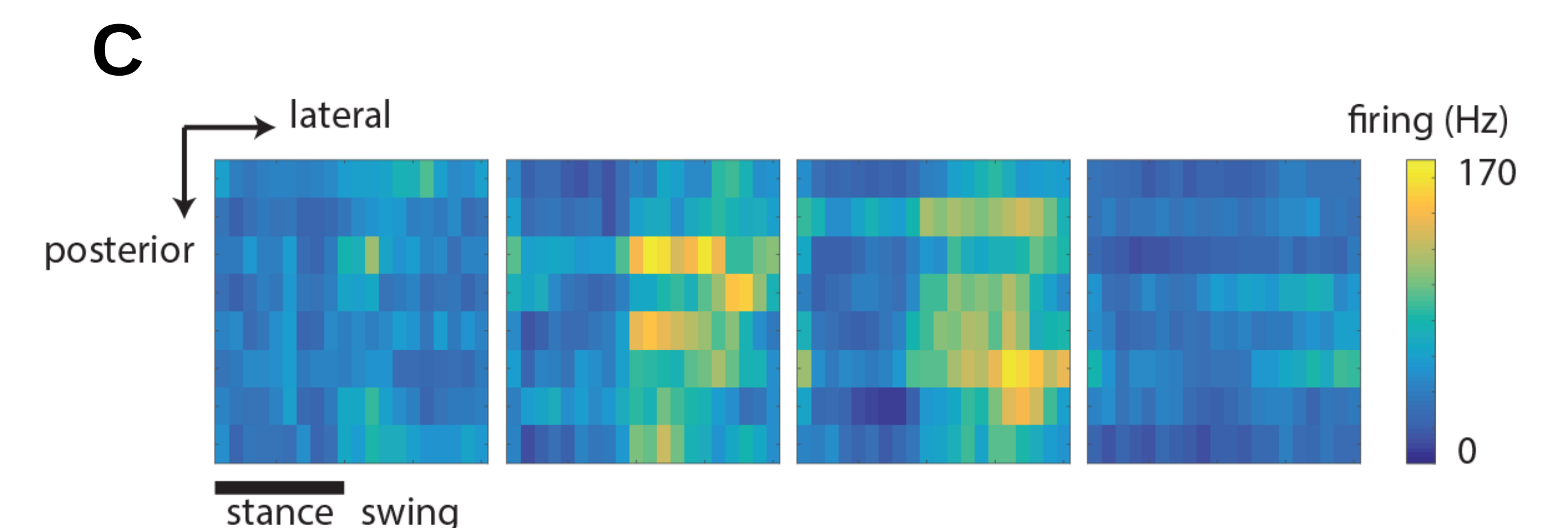
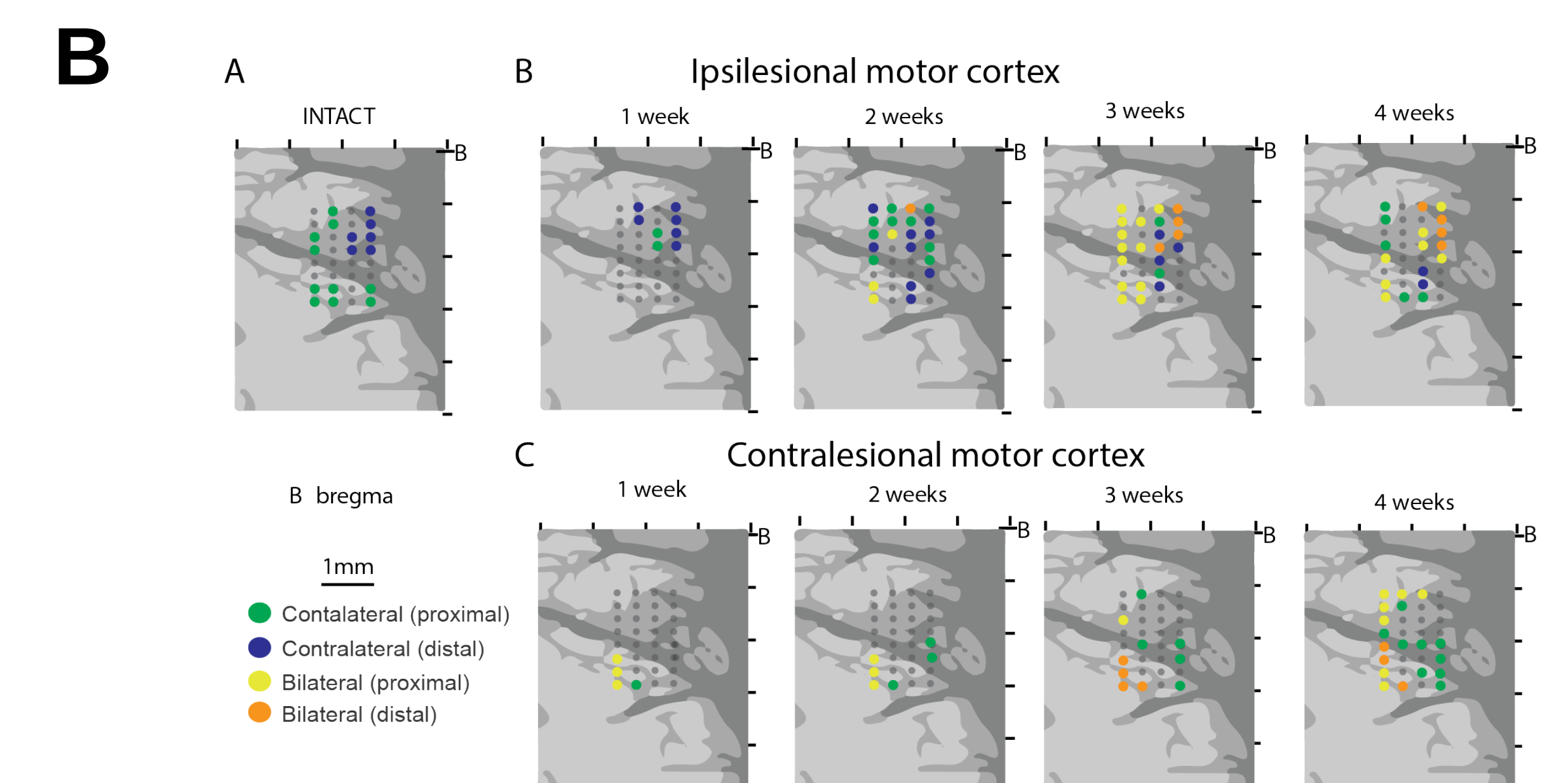
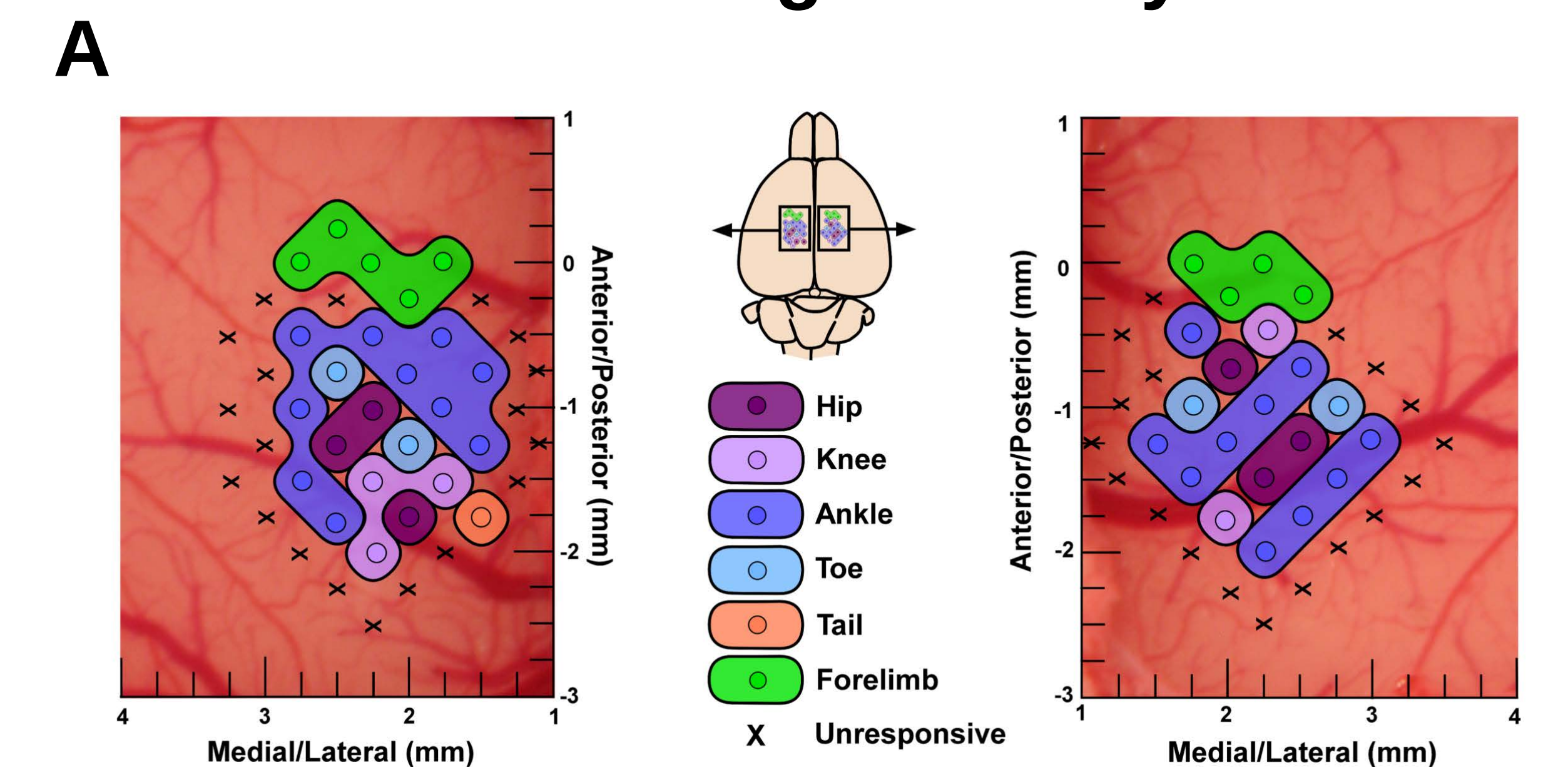


Methods:

- Long-term cortical stimulation
- Spinal epidural stimulation
- Electromyography

- Neuroprosthetic amelioration of leg movement.
- Long-term plasticity driven by neurostimulation.
- Combining supra- and sub-lesional interventions.
- Translational approaches.
- Brain-machine interfaces to control movement.
- Machine learning applied to neurostimulation.
- Dynamical systems approach to cortical control of movement after spinal cord injury.

Discovering recovery-related plasticity of descending motor systems



We investigate the organization of the motor cortex and movement representations (motor maps) in the intact state and after spinal cord injury using intracortical microstimulation (ICMS) in anesthetized (A) and awake (B) rats with implanted microarrays. Changes in cortical discharge patterns are recorded during walking with microarrays (C).