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Title

Decoding cortical activity: how the motor cortex encodes postural perturbations after spinal cord injury

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Authors

Disse, Gregory
Dougherty, Jaimie
Bridges, Nathaniel
et al.

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Gregory D. Disse, BS¹; Jaimie B. Dougherty, PhD²; Nathaniel R. Bridges, PhD²; Karen A. Moxon, PhD^{1,2}

¹Biomedical Engineering & Center for Neuroscience, University of California, Davis; ²Biomedical Engineering, Drexel University

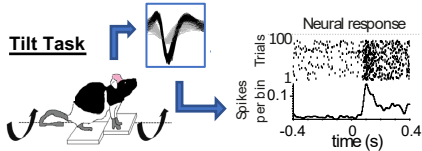
Background

- The role of supraspinal circuits in the control posture after spinal cord injury (SCI) is poorly understood.
- Understanding how the brain encodes such information before and after SCI can inform the design a motor brain-machine interface for restoration of motor function.

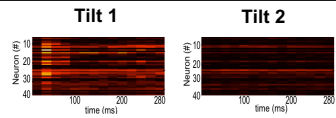
Methods

- Animal:** Adult Sprague-Dawley rats
- SCI Model:** T8/T9 transection
- Electrodes:** Hindlimb Motor Cortex

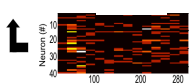
Tilt Task



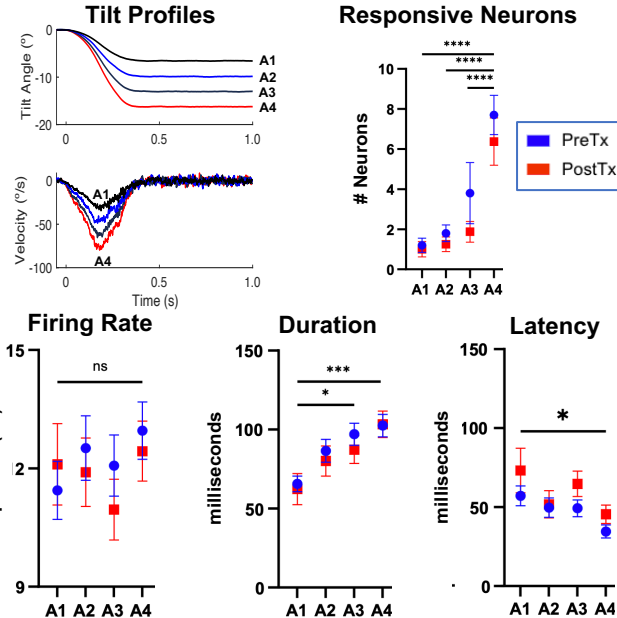
Peristimulus Time Histogram-Based Classifier



New Trial



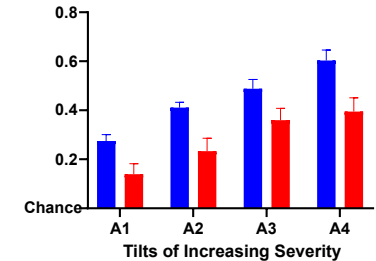
Neural responses are delayed, but not attenuated, after SCI.



Neurons convey information about tilt type even after SCI.

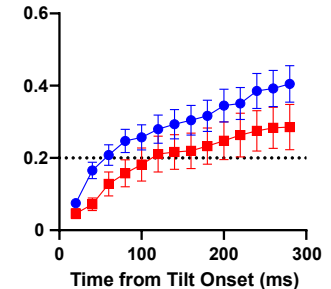
A. Tilt Detection

Did a tilt occur?
Distinguishing tilt events from stance based on neural activity



B. Tilt Discrimination

Which tilt occurred?
Distinguishing tilt types based on neural activity



Conclusions

- While deafferented, the hindlimb motor cortex in injured animals encodes information about tilts similarly to uninjured animals – simply with a delay.
- This can be exploited for the development of neuro-prosthetics and other brain-machine interface technologies.