

# 275.7 Can Regenerating Neurons Improve the BBB Score If They Don't Reach the CPG?



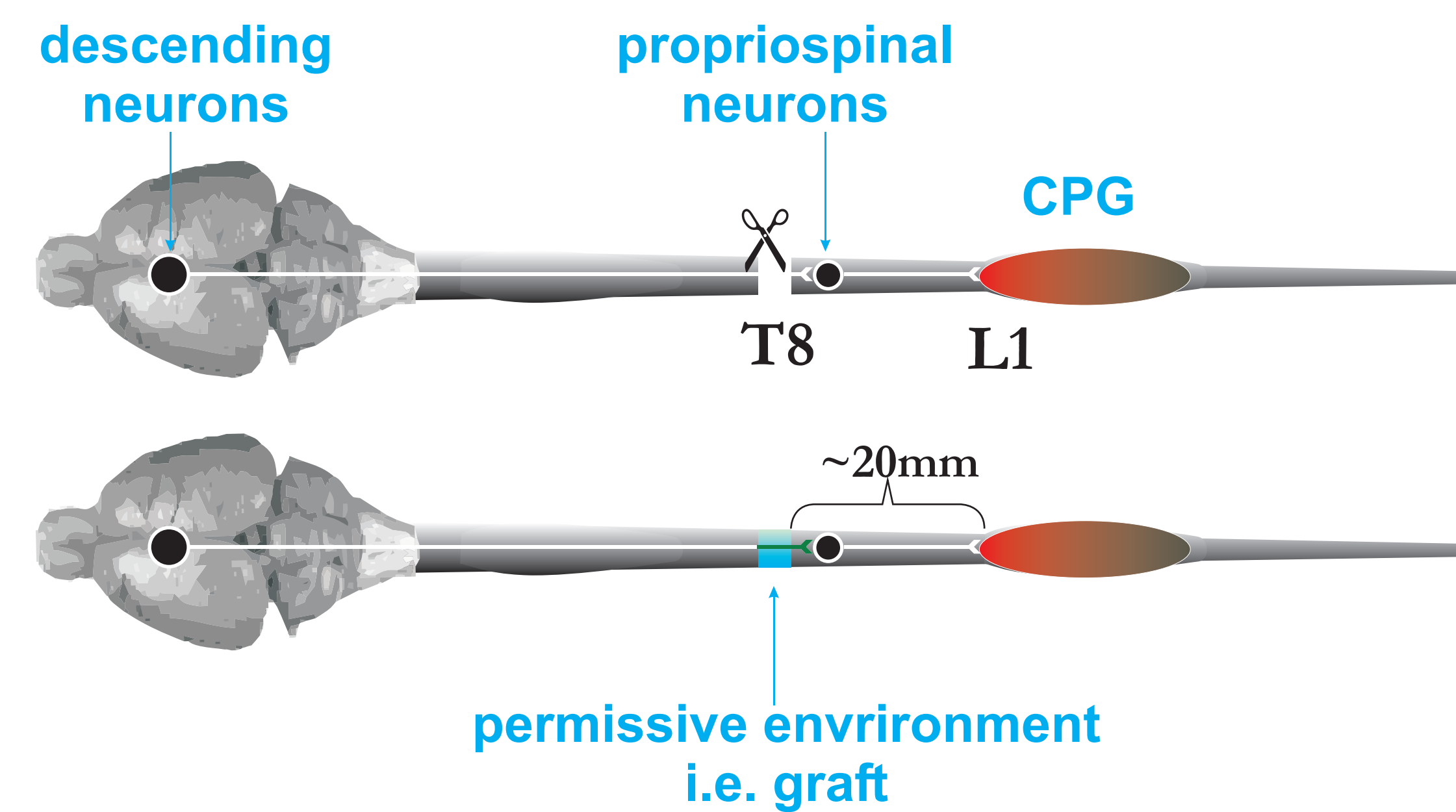
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## Introduction

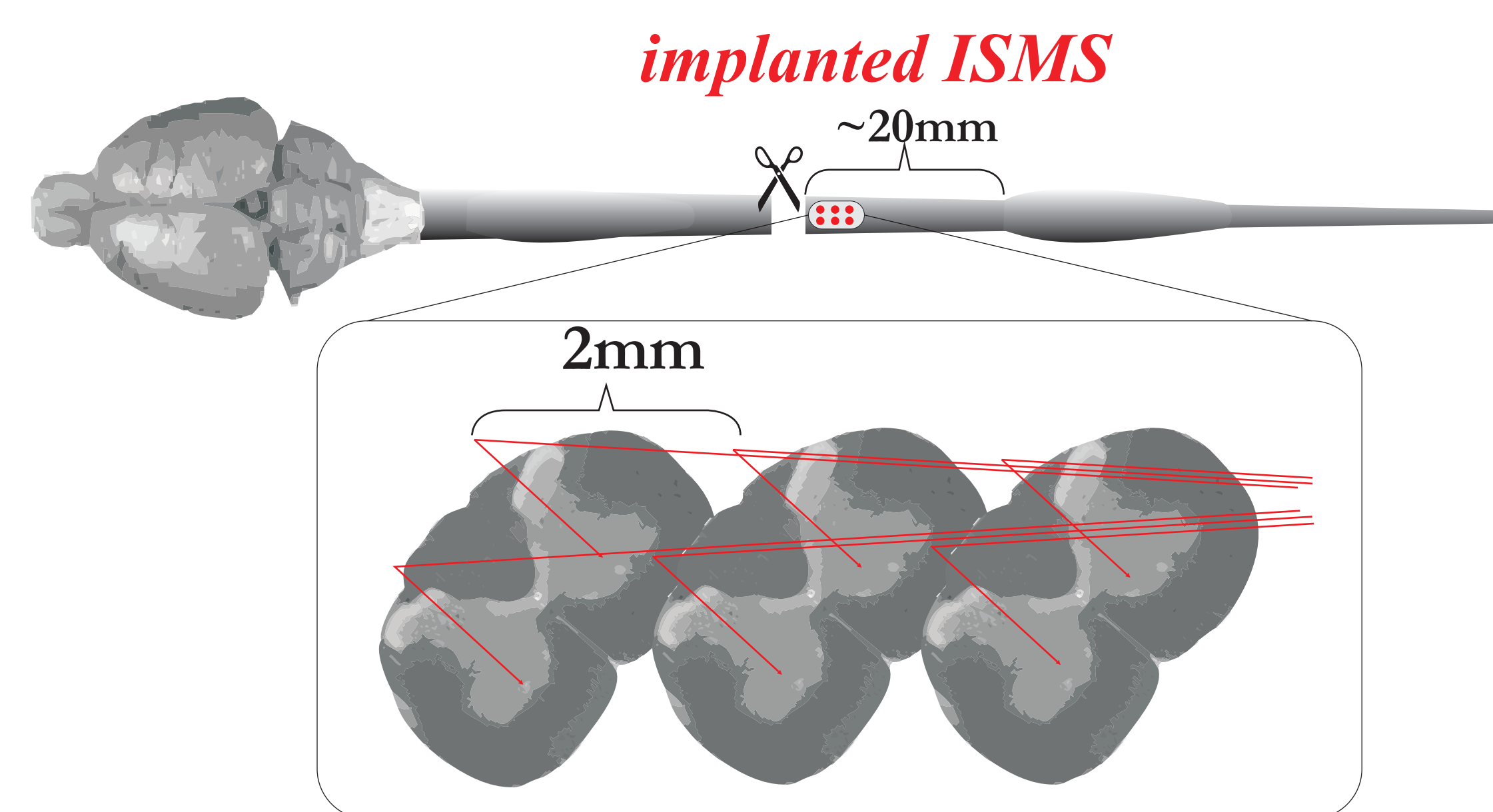
Many laboratories have reported the successful regeneration of neurons across damaged portions of the spinal cord. Functional connections have been inferred from improvements in locomotor movements. But neurons generally only extend about 10mm beyond the lesion site, about 20mm short of the lumbosacral locomotor region (Ramon-Cueto et al., 1998, J Neurosci 18: 3803-15; McDonald et al., 1999, Nat Med 5: 1410-2). The motor improvements have been explained by positing excitation of propriospinal neurons that relay excitation to the locomotor CPG.

### propriospinal hypothesis



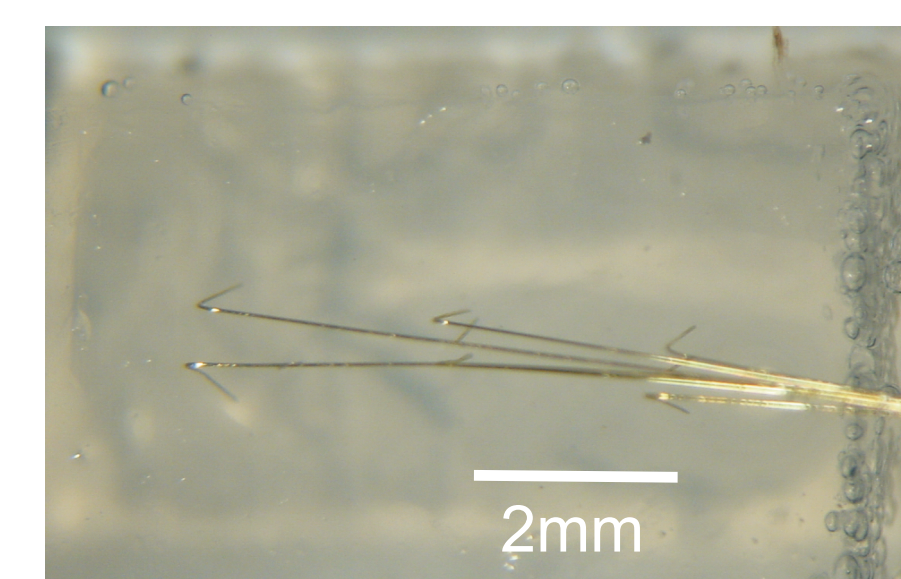
We tested this hypothesis by using intraspinal stimulation of thoracic spinal cord to activate descending propriospinal neurons.

### test

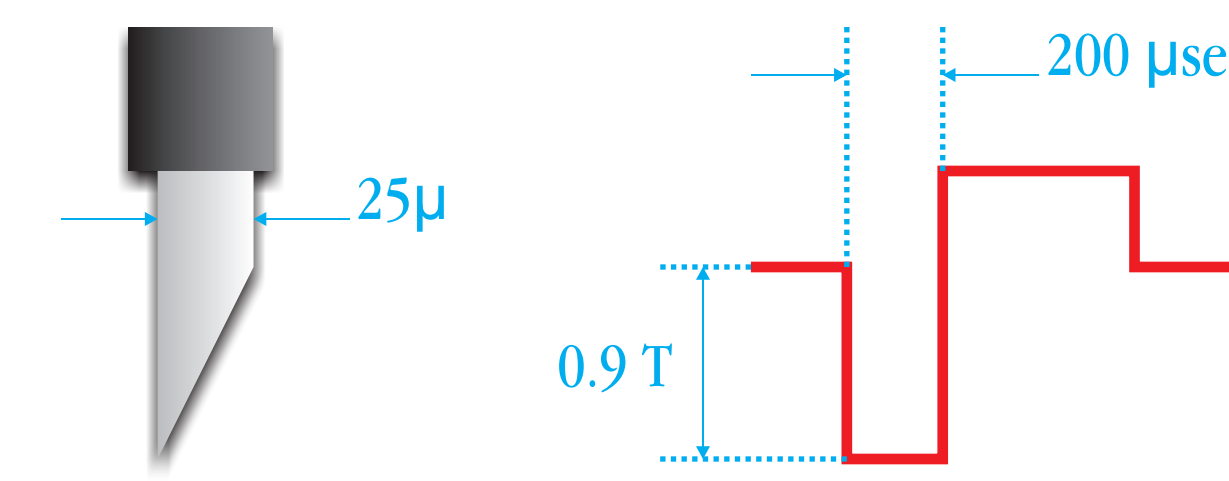


## Methods

Adult Sprague-Dawley female rats weighing 200-250g were used in this study with approval from the local animal welfare committee. Complete spinal cord transections 2-3mm wide were produced under anaesthesia with a vacuum suction at T8-T9 spinal segments. Approximately 2-3 weeks after complete spinal cord transection, when bladder and bowel functions recovered, an array of 6 platinum-iridium electrodes (25 μm) was implanted chronically to stimulate intermediate and ventral grey matter at T10-T12 spinal cord segments. Stimulus pulses (biphasic, 200 μsec, 50Hz) with amplitudes of 0.8-0.9 times threshold for activation of trunk and abdominal muscles (20-200 A) were delivered through the intraspinal microstimulation (ISMS) array.

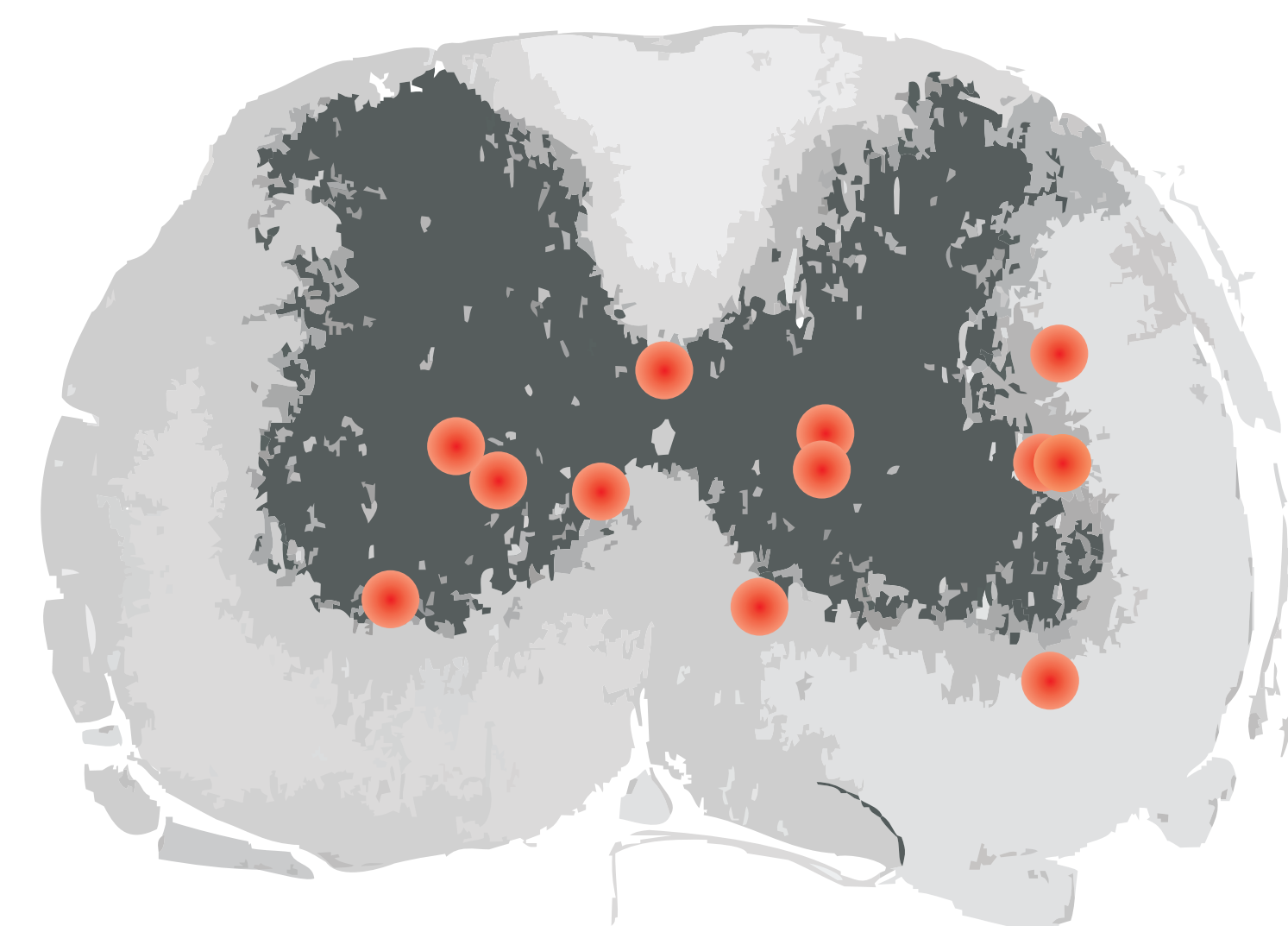


array of platinum-iridium electrodes, 25 μm



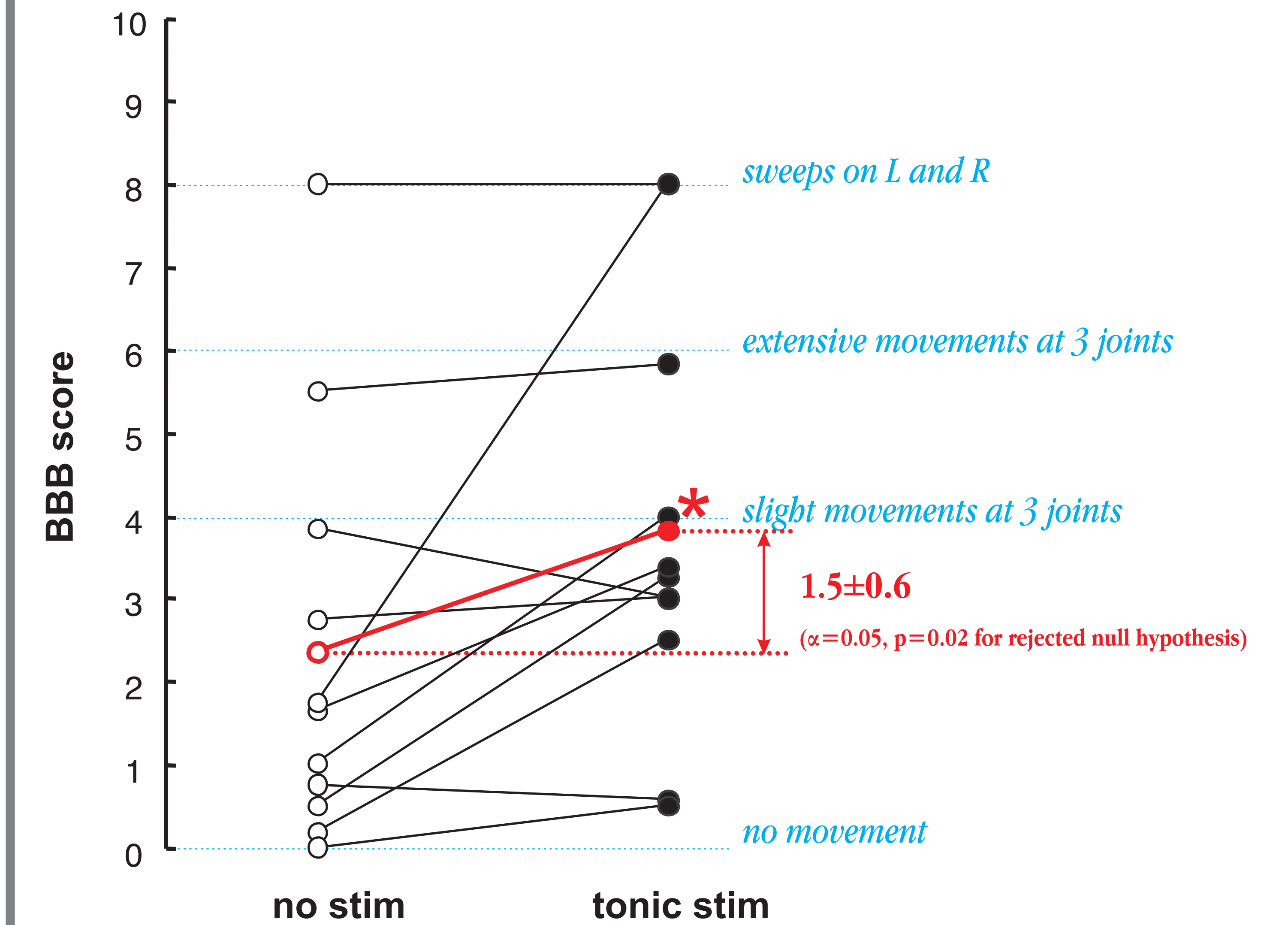
electrode dimensions and stimulation parameters

We filmed and rated locomotion before and during intraspinal stimulation using a standard open field locomotor rating scale (Basso et al., 1995, J Neurotrauma 12: 1-21).



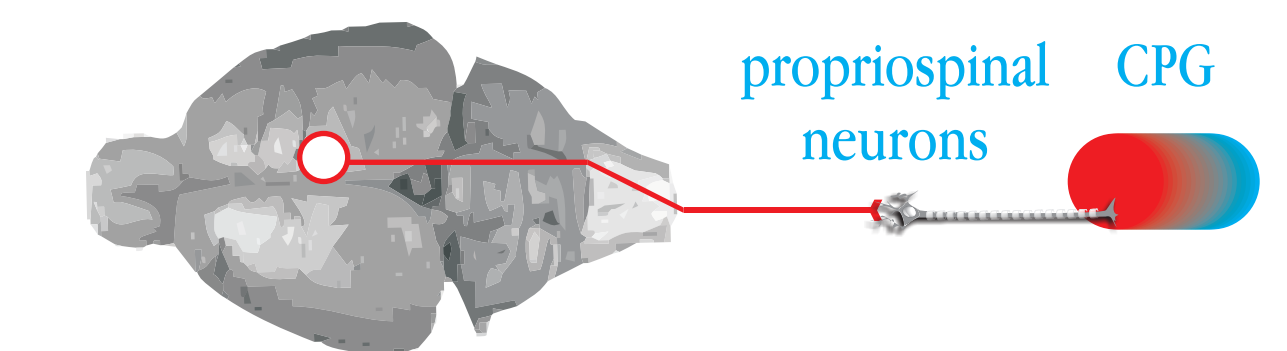
Electrodes were implanted in intermediate and ventral gray matter below the lesion.

## Results



## Conclusions

ISMS of thoracic spinal cord below a complete transection significantly increases locomotor performance as assessed by BBB score. This result supports the "propriospinal hypothesis".



However, the mechanism of action of ISMS is not clear (recent results from Mushahwar, Prochazka, Ellaway, Guevremont, & Gaunt Poster 276.6 Presentation Sunday, Nov. 9, 2:00 PM - 3:00 PM).

## Acknowledgements

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Reference Schematic: Topographic relations of spinal cord, dorsal roots and ventral column.

