

Histologic Analysis Of Rodent Upper Limb Nerves Treated With Peripheral And Trigeminal Nerve Stimulation



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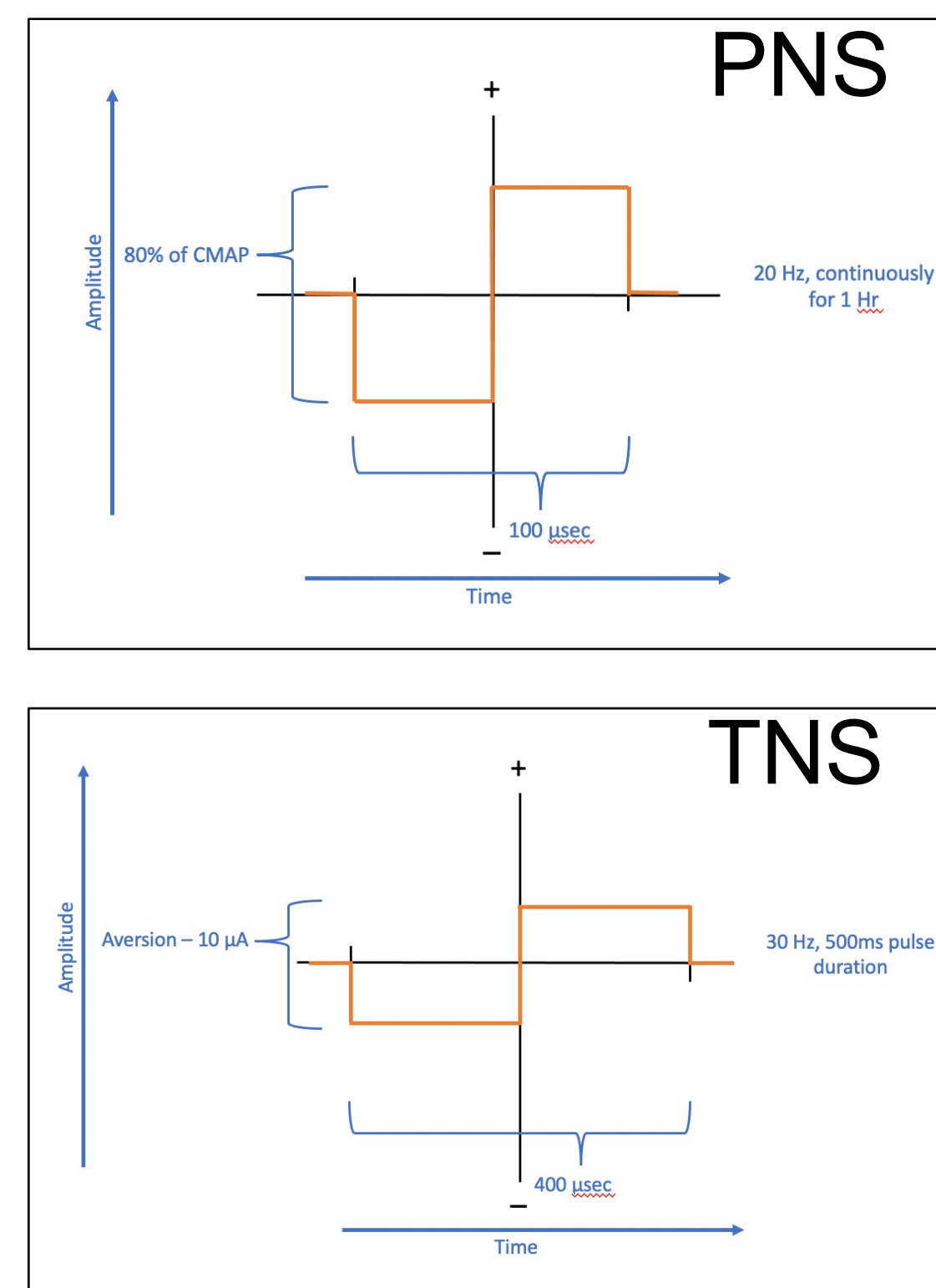
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Introduction

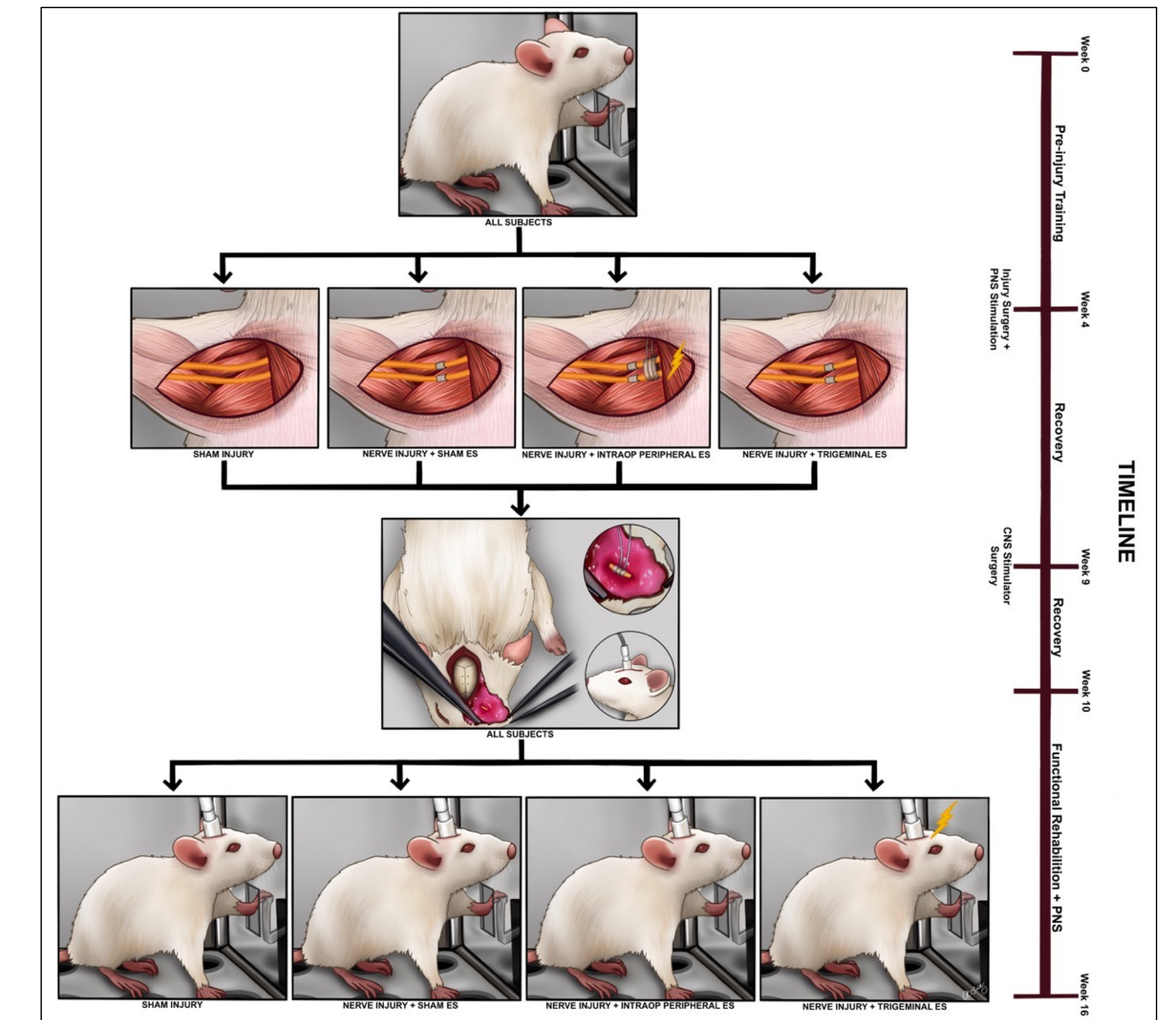
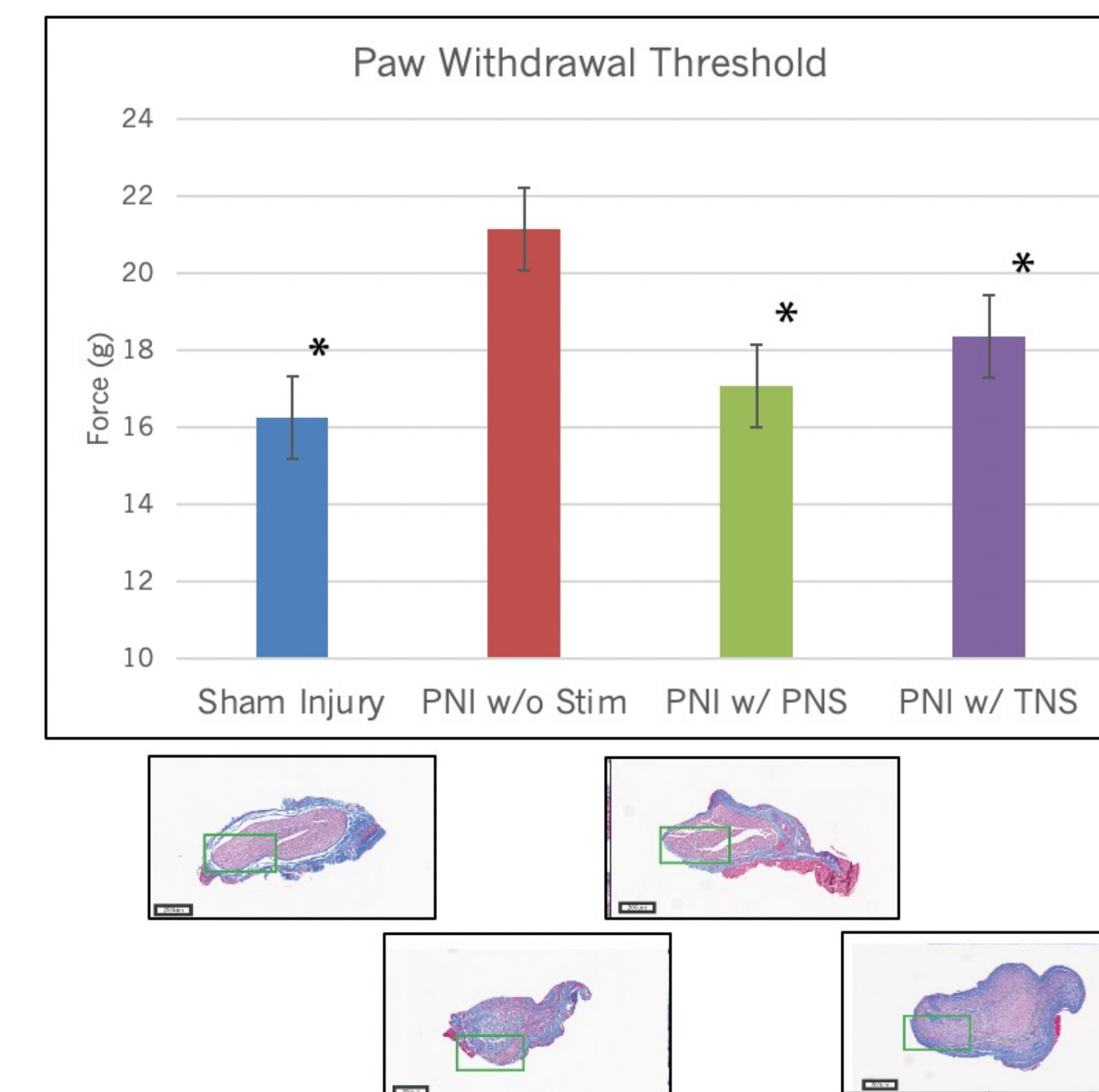
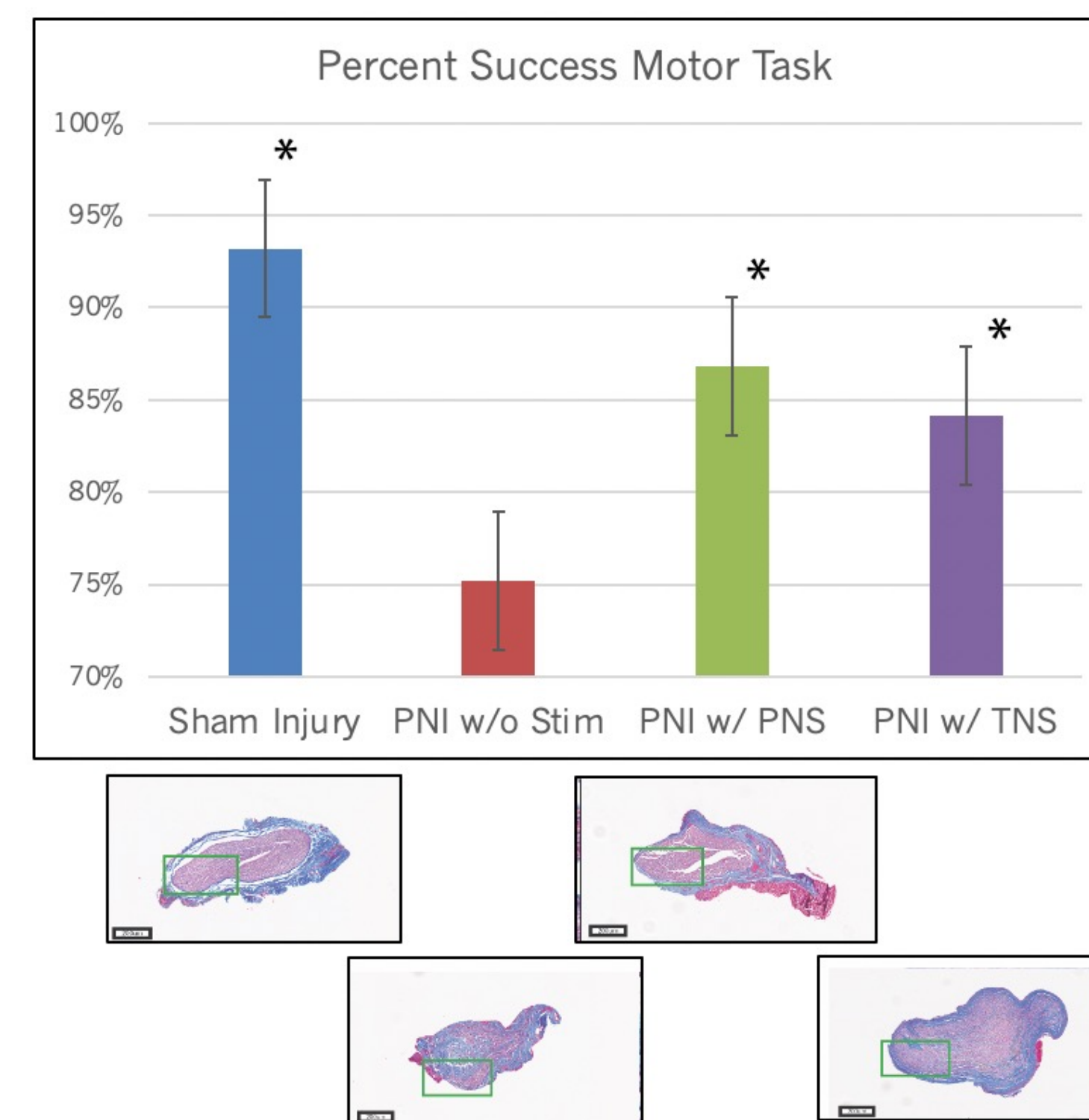
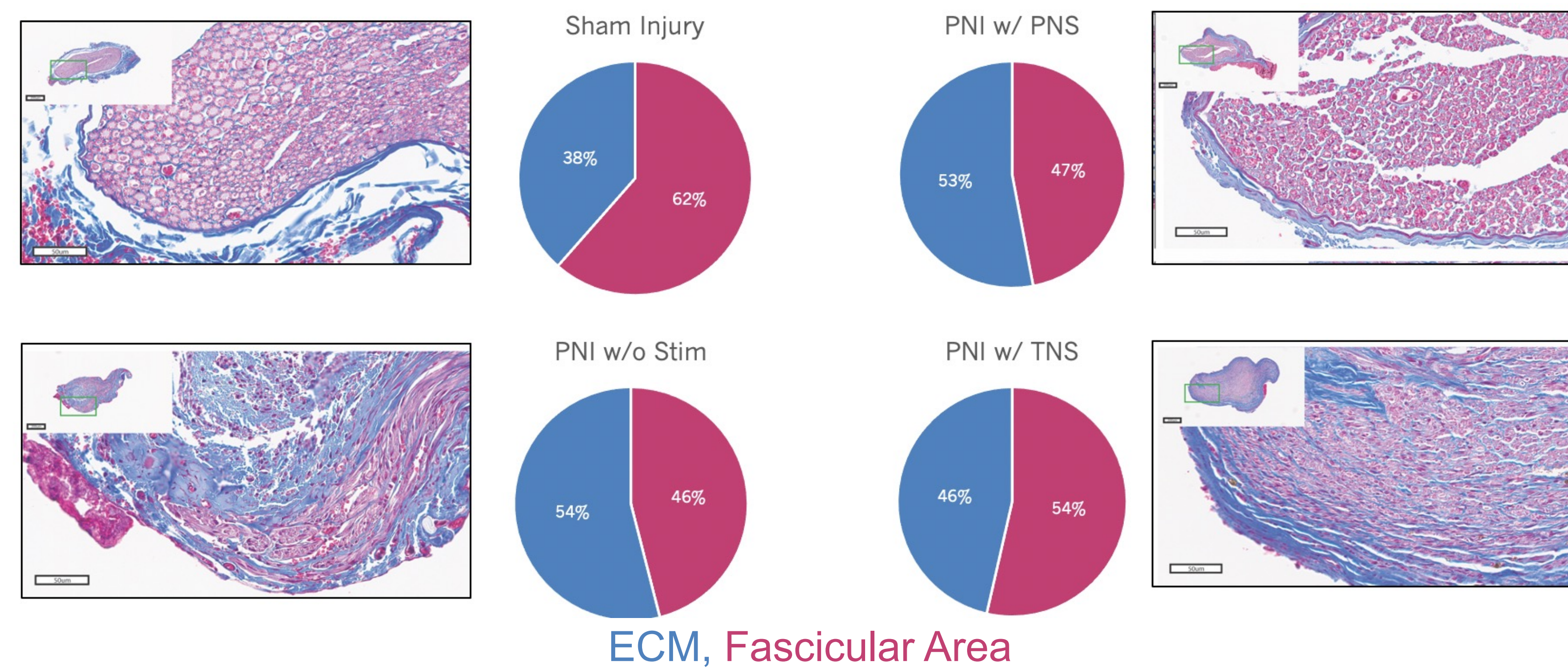
- Trigeminal nerve stimulation (TNS) improves functional outcomes after peripheral nerve injury (PNI)
- The proposed mechanism of TNS is that it induces a targeted neuroplasticity in the primary motor cortex to compensate for errors in staggered growth without directly affecting the recovering nerve
- Nerves treated with TNS have never been examined histologically
- Hypotheses:
 - Nerves treated with TNS will appear similar to unstimulated nerves
 - Nerves treated with PNS will appear similar to uninjured nerves
 - Ratio of fascicular area will be greater in nerves treated with PNS

Methods

- 45 adult male Lewis rats (~250g) trained in an isometric pull task
- Randomized into 4 groups:
 - Sham injury**
 - PNI with sham PNS and TNS**
 - PNI with active PNS and sham TNS**
 - PNI with sham PNS and active TNS**
- PNI: transection and 2mm gap repair of median and ulnar nerve
- PNS: 1 hour during injury surgery, post repair
- Rehabilitated on motor task and data recorded in weekly epochs for 6 weeks
- TNS: 500ms train with each successful pull
- Paw withdrawal thresholds recorded biweekly with Von Frey filament device
- Nerves sectioned and stained with Gomori's Trichrome



Results



Conclusions

- TNS and PS improve both motor and sensory outcomes of PNI**
- TNS improves functional outcomes without improving the histology of the regenerating nerve**
- These findings offer more evidence to support a central mechanism of TNS for PNI
- Possible clinical applications:
 - Tendon/nerve transfers
 - Pollicization
 - High/mixed nerve injuries

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