

Peripheral and Trigeminal Nerve Electrical Stimulation Improve Functional Outcomes of Nerve Recovery in a Rat Forelimb Gap Repair Model



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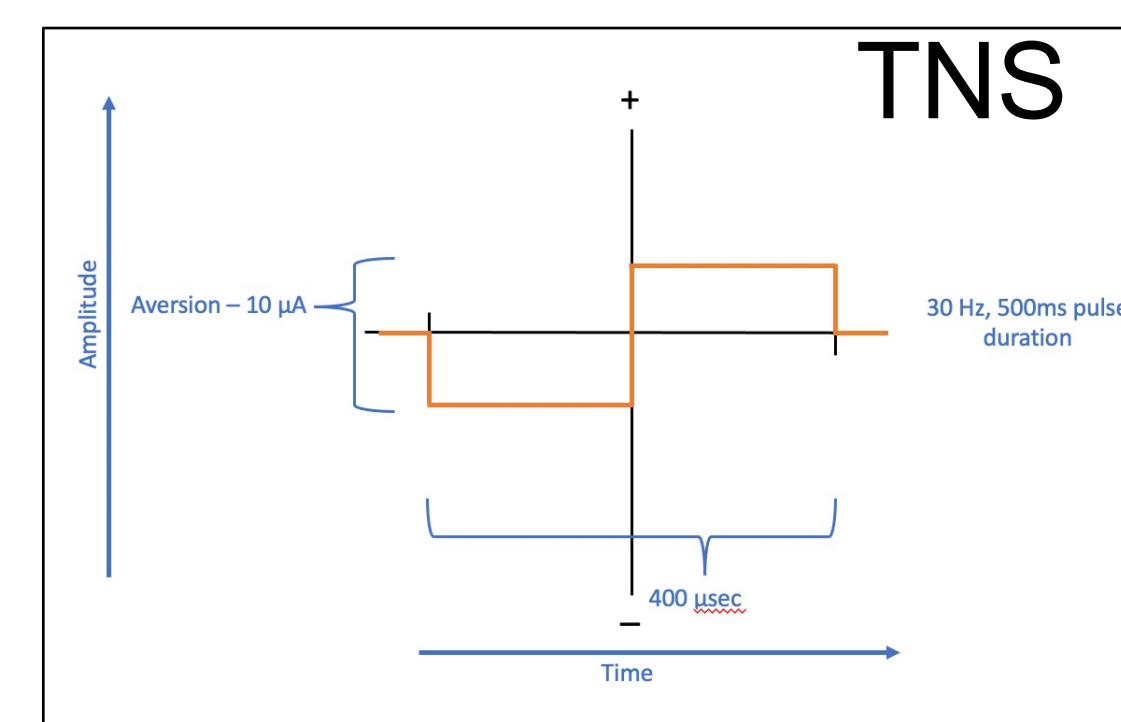
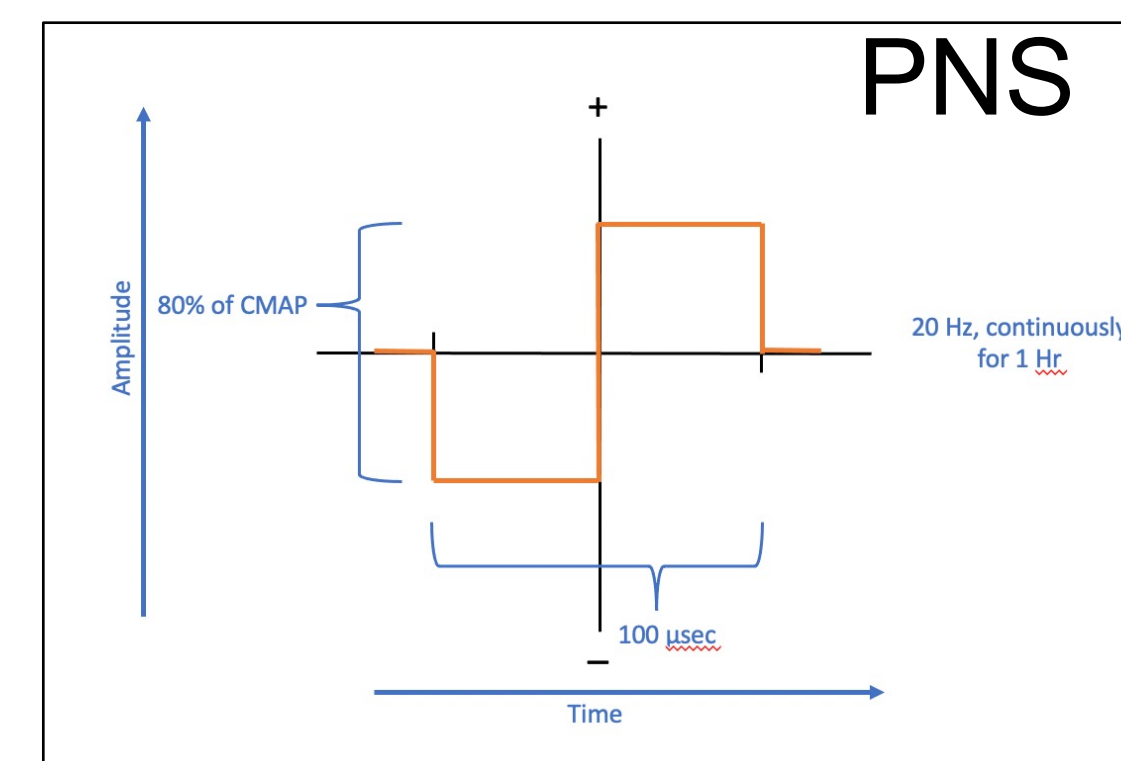
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Introduction

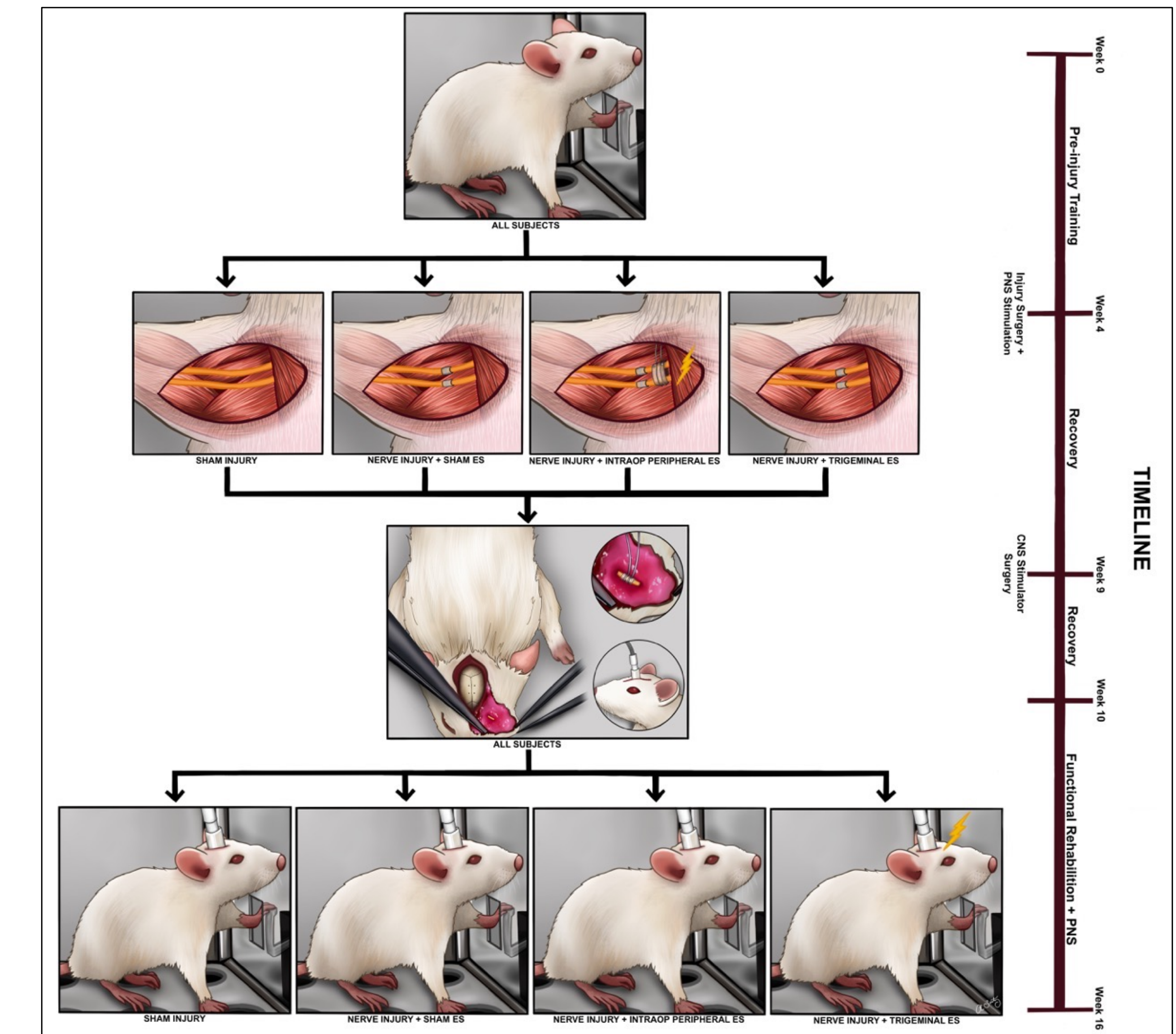
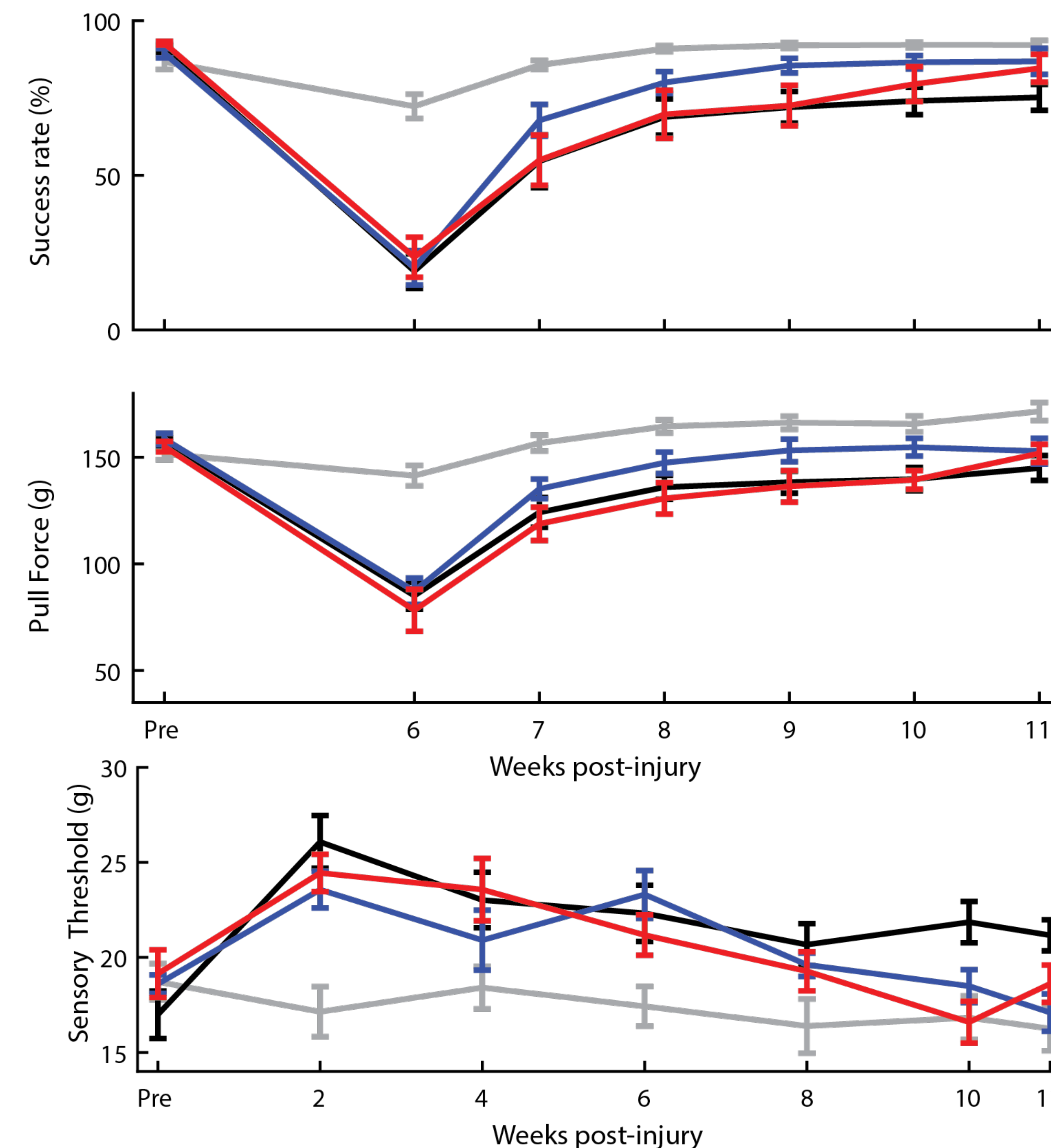
- 50% of peripheral nerve injury (PNI) patients regain premorbid function
- Electrical stimulation (ES) has been shown to improve nerve regeneration
 - Trigeminal nerve stimulation (TNS) repeatedly coupled with a motor task may augment neuroplasticity by increasing neuromodulator release from deep brain nuclei
- Peripheral nerve stimulation (PNS) synchronizes “staggered growth” across the injury repair site and leads to a quicker regain of function
- **Hypothesis: TNS and PNS improve functional motor and sensory recovery from median and ulnar nerve transection and gap repair in a rodent model**

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
- Repeated measures ANOVA conducted to compare groups



Results



Conclusions

- **TNS and PS improve both motor and sensory outcomes of PNI**
- CNV is an attractive target for ES because it can be stimulated non-invasively in humans
- Since these therapies work by different mechanisms, it is possible that in combination, there would be an additive effect for nerve regeneration
- Future directions:
 - Combination therapy of TNS and PNS
 - Mechanism of TNS and optimizing ES specifications

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