A Rodent Model of Partial Muscle Re-innervation

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Introduction

-suboptimal motor recovery following nerve repair is not uncommon
-partial reinnervation is a particularly challenging scenerio
-options include revision surgery, "supercharging", pharmaceutical augmentation
-difficult to study since no good animal model exists
-rodents have superior neural healing potential
-purposefully compromising nerve repair mimics poor recovery
-but not reproducible
-**Need a reproducible and predictable animal model of partial re-innervation**

Materials/Methods

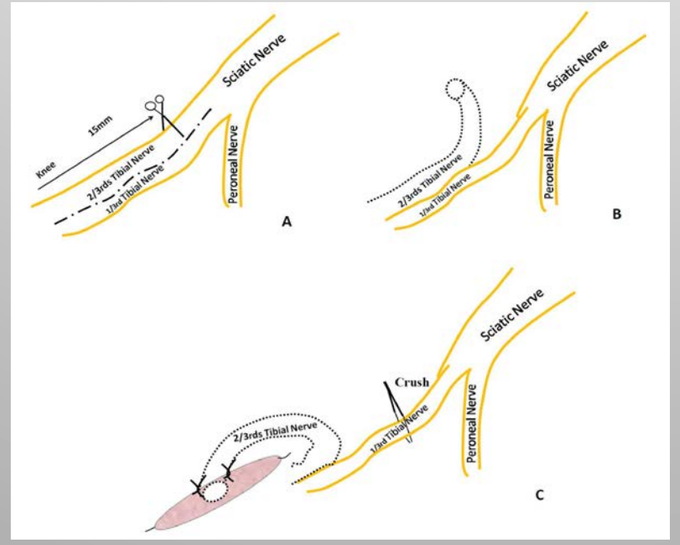
(12 female Sprague-Dawley rats)

Manipulation:

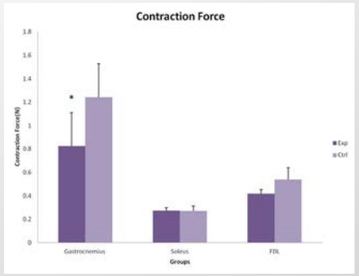
-Sciatic nerve (and branches) exposed
-15mm above knee, Tibial nerve partially transected (leaving 1/3rd closest to Peroneal nerve intact
-intact 1/3rd subjected to 5 second crush

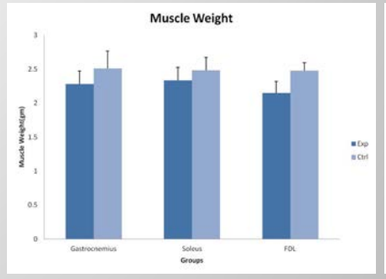
Testing:

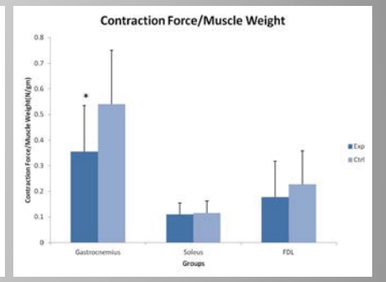
-2 mos post manipulation
-Sciatic nerve exposed
-Gastrocnemius, Soleus, Flexor Digitorum Longus Muscles and tendons isolated
-Optimal length maintained (Blix curve)
-Supramaximal stimulations (5v, 2ms)
-contraction force and muscle weights recorded



Results







Discussion

-Model designed to be technically easy, reproducible, economical
-three muscles tested (not clear which would be consistently weakened)
-need 80% decrease in axons (b/c compensatory sprouting results in enlarged motor units)(Tam et al. 2001)
-delay in testing to ensure that compensatory sprouting would have occurred

-Gastrocnemius muscle is consistently weakened following the described tibial nerve manipulation and can be the target of future study
-Muscle weight is not consistently altered

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