Study of Histological Changes in the Soleus Muscle Post Hemorrhagic Stroke

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INTRODUCTION

▪ Normal nuclei in skeletal muscle are peripherally located.
▪ Centralized nuclei indicate muscular injury¹
▪ Centrally located nuclei are a common feature in stroke²
▪ Little is known about the muscle physiology principles that specifically address limb muscle weakness after stroke.

OBJECTIVE

▪ Research Question: Does soleus muscle show signs of mechanical injury with or without signs of repair after a hemorrhagic stroke?
▪ Hypothesis: Soleus muscle on the limb opposite the side of the brain’s stroke lesion will have increased signs of injury compared to controls at 2 weeks post-stroke.

METHODOLOGY

Figure 1: Organizational Chart Digital images were obtained at 200x magnification. The stroke (STR) data was then compared to the control (CTL) group. Two sample t-tests were used to compare the means of the two randomly assigned, independent groups as noted below. Significance level set at \( p<0.05 \).

RESULTS

Figure 2: Soleus muscle in a rat 2 weeks after stroke. a,b- H&E; a-normal tissue sample b- markings applied to identify and number the centralized nucleus.

Figure 3. central nuclei, STR-L vs CTL-L # Trend

STR-L 0.28+/-0.06 vs CTL-L 0.61+/-0.03; \( p=0.07 \).

Figure 5. central nuclei, STR-R vs STR-L No difference STR-L vs STR-R (STR-L 0.28+/-0.06 vs STR-R 0.22+/-0.05; \( p=0.5 \)).

Similar results were found comparing CTL-L vs CTL-R (CTL-L 0.16 +/-0.03 vs CTL-R 0.14 +/-0.01; \( p=0.5 \)).

Figure 4. Graph of STR-R vs CTL-R # Trend STR-R vs CTL-R (STR-R 0.22+/-0.05 vs CTL-R 0.14+/-0.01; \( p=0.09 \)).

CONCLUSION

▪ STR soleus shows more centralized nuclei than CTL soleus bilaterally
▪ May indicate increase in mechanical damage on stroke muscle compared to controls
▪ Provides clinicians and researchers with more information on plasticity of muscle after stroke
▪ New knowledge may influence ability to provide optimal rehabilitation treatment to persons who post-stroke

The translational information obtained using rat samples in this undergraduate research opportunity has added to the understanding of the physiology of muscle post-stroke.

LITERATURE CITED


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