Correlation between regenerated motor neurons and graft length in rat cross-face nerve grafts

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Background

• These findings indicate that, despite ample time for complete regeneration, the survival of regenerated motoneurons diminishes along the length of a cross-face nerve graft.

• Although a longer graft may have greater clinical utility in providing more options for end-target innervation, the middle/distal areas of a long nerve graft may not provide adequate axonal regeneration to realize this benefit.

• Percentage of regenerated motoneurons with positive staining for nuclei in the Proximal group (76%) was not significantly different from Control (80%) p=0.433.

• Traveling further to the distal region of the graft, decreased percentage of surviving regenerated motoneurons was observed.

• Middle portion of graft showed 2.2x less % survived motoneurons compared to Control p<0.0001.

• Distal portion of graft showed 8.9x less % survived motoneurons compared to Control p<0.0001.

Research Objectives

Essential question: Does the number of regenerating axons drop off over the distance of a cross-face nerve graft?

Given time for complete regeneration – 12 weeks – we aim to evaluate axonal regeneration from 4 distances along a cross-face nerve graft using retrograde labeling.

Methods

• Sciatic nerve of rats harvested and coapted to main trunk of facial nerve.

• After 12 weeks, graft was sectioned within the Proximal, Middle, or Distal 5mm regions, in addition to the facial nerve trunk (Control).

• When cut, nerve end was immersed in 4% Fluoro-Gold (FG) for 1h, then returned to head.

• After 1 week, brain was harvested, preserved, and frozen sections were taken at 40um.

• Fluoroshield PI was used as nuclear counterstain; % of motoneurons was calculated as ratio of double-positive cells to all motoneurons detected with FG.

Results

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Conclusions

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Future Directions

• Analyzing the nerve tissue itself will allow us to explore how the biological environment that encapsulates the nerve graft impacts its survival.