Membrane Fusion Nerve Repair to Improve Limb Transplant Function

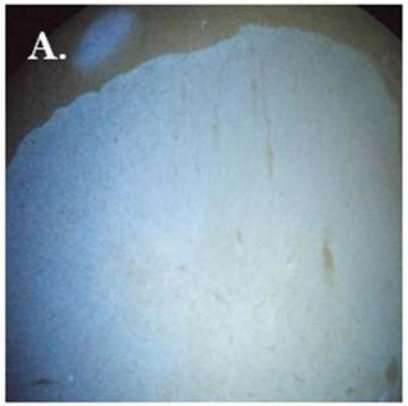
A Mirdad, MBBS, IA Chang, HSDG, V Malek, M Chicco, MBBS, V Guarnizo B.S., DS Cooney, M.D., PhD.

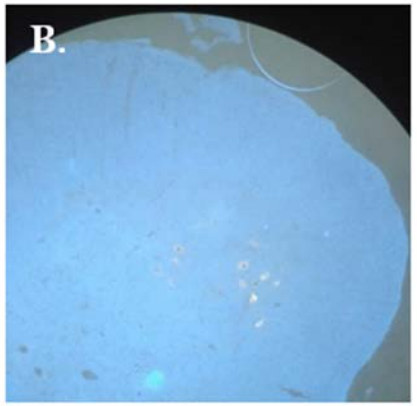
Introduction:

We propose to test whether PEG fusion can be used to improve functional outcomes after extremity transplantation. As the first step we have tested the effectiveness of PEG fusion after a delay simulating the ischemia-reperfusion time necessary for limb transplantation.

Methods:

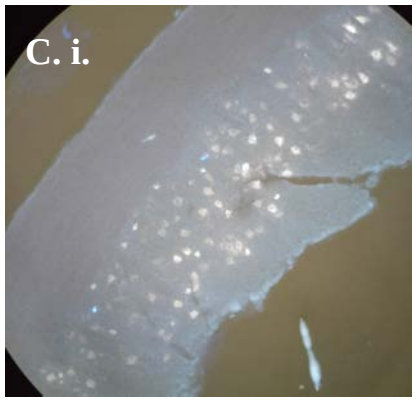
Sciatic nerve cuts and repair, with or without PEG fusion, were performed in rats. PEG fusion was applied either immediately or six hours post-injury. 1 week post-operatively, we performed retrograde labelling using fluorescent tracer, applied distal to the repair site.

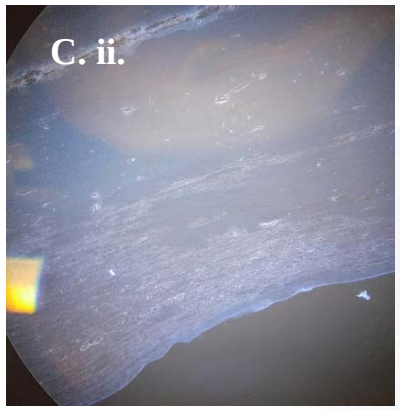




Retrograde labeling of rat sciatic nerve, spinal cord sections:

A. Cross-section; negative control shows no uptake of retrograde label
B. Cross-section; PEG fusion shows uptake representing cell bodies
C. Coronal section; i) retrograde uptake in the PEG fusion side, ii) no uptake in neg
ii) no uptake in negative control side





Results:

One week after Fluorogold application, we were able to visualize cell bodies in the spine and dorsal root ganglia of rats treated with PEG fusion, performed both immediately and six hours after injury, but not in control rats.

Conclusion:

We observed that PEG fusion restores axonal continuity after cut and repair injury both in the immediate setting and after a 6hr delay simulating transplantation. In the next series of experiments, we will verify and quantify nerve fusion using electrophysiology, histomorphometry and retrograde labeling, as well as measure functional outcomes in rat sciatic nerve cut and repair in rat limb transplantation models.

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