

Determining the Potential of Fibrin to Facilitate Schwann Cell Transplant to Acellular Nerve Allografts

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Objectives

- Acellular nerve allografts can be used to repair nerve gaps following peripheral nerve injury.
- Supplementing these grafts with cells could further enhance regeneration.
- Techniques to transplant cells to grafts are underdeveloped.
- This study determined whether fibrin could be used to **promote transplanted SC survival** and **facilitate SC transplantation**.

Methods

- Adult Lewis rat sciatic nerves were transected, resulting in a 5mm gap.
- Gaps were repaired using fibrin gels with and without SCs.
- Evaluate axons using β III-tubulin and density within the bridged gap measured.
- Determine SC viability using transgenic GFP-expressing SCs.
- In a pilot study, SCs were injected into acellular nerve grafts, with and without fibrin.

Results

- For fibrin gels without SCs, axons were visualized within the fibrin by 7 days and crossing to the distal nerve by 14 days.
- Transplanted SCs within the fibrin gel enhanced nerve regeneration across the short gap, where axons were visualized crossing the gap by 7 days.
- Acellular nerve grafts supplemented with fibrin containing SCs were able to achieve greater SC survival compared to the nerve grafts supplemented with SCs but no fibrin.

Conclusion

SCs within fibrin gels can **improve nerve regeneration** and **support SC survival** during transplant to injured nerves. Furthermore, fibrin gels can be used to transplant SCs into acellular nerve grafts.

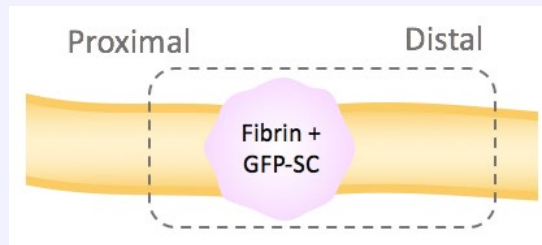


Figure 1 (Above): Rat sciatic nerve transected and repaired using fibrin gel potentially containing Schwann cells (SCs).

Figure 2 (Right): Density of regenerated axons in fibrin gel (potentially containing SCs) 7 days after transplant to injured nerve.

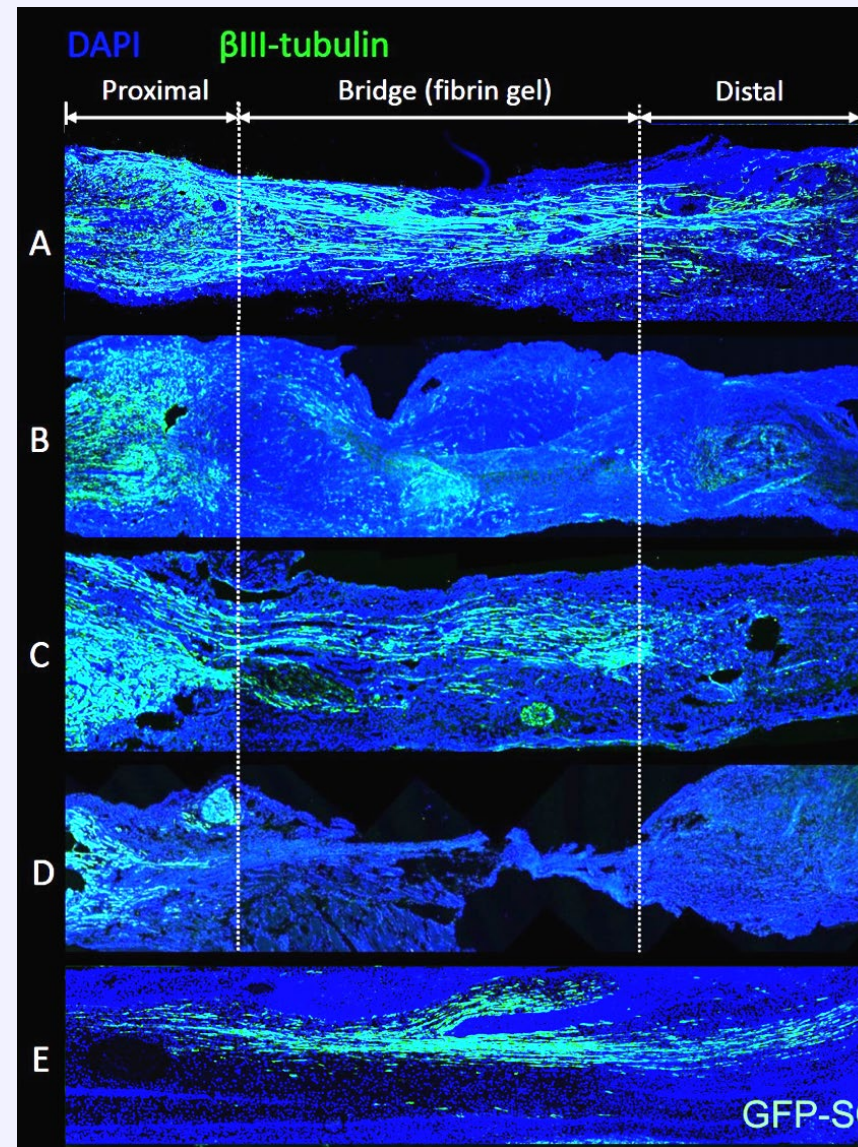
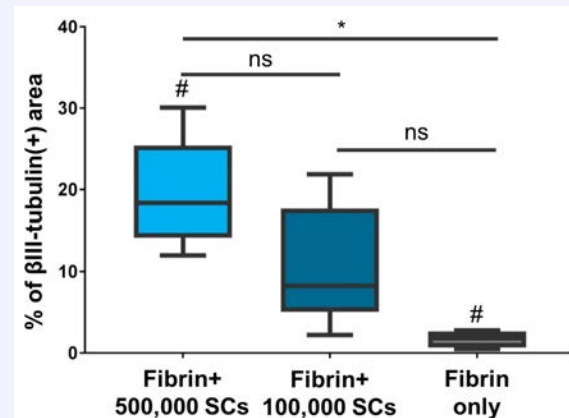


Figure 3: Axon regeneration of (A) 500,000 Schwann Cells transplanted in fibrin by 7 days (B) Fibrin gel without Schwann Cells by 7 days; (C) Fibrin gel without Schwann Cells by 14 days (D) No fibrin gel by 14 days. (E) GFP SCs are evident in acellular nerve grafts after repaired to injured nerves by 7 days.