EDITORIAL

Autologous Schwann cells

Wilson Z. Ray, MD

Department of Neurosurgery, Washington University School of Medicine, St. Louis, Missouri

DR. Levi's group presents a timely and important step forward in the management of long segment defects by using autologous Schwann cells (SCs).¹ Although only 2 cases are presented, this report not only has tremendous implications for lower-extremity sciatic injuries as described by the authors, but also has potential applications to all primary nerve repairs. Augmenting functional outcomes beyond traditional microsurgical repair strategies remains at the forefront of peripheral nerve research.

A significant volume of work has been dedicated to the use of autologous SCs, yet with limited clinical application.⁴ Various nerve growth factors—brain-derived neurotrophic factor, glial cell line–derived neurotrophic factor, and nonphosphorylated neurofilament (BDNF, GDNF, and NNF)—have all been reported to potentially accelerate and improve functional recovery in both animal and human models.⁶ Additional therapeutics such as electrical stimulation and transient immunosuppression with FK506 have also been successful in facilitating improved nerve regeneration and clinical outcomes.^{2,3} Although these various techniques have proven useful, none of them have been widely adopted as standard practice. Furthermore, the increased familiarity of nerve surgeons with an arsenal of different nerve transfer procedures has changed the landscape of brachial plexus and more distal peripheral nerve injuries. Despite this paradigm shift that nerve transfers have provided, there has been limited success with lower-extremity nerve transfers.⁷

Despite the advances in various proregenerative techniques, a persistent surgical challenge is overcoming long segment defects. Several commercially available or processed decellularized guidance tubes can be used to bridge nerve gaps, yet their clinical efficacy has a profound dropoff when used for large-diameter nerves or to bridge a large nerve gap.⁵ Primary repair of the sciatic nerve has historically resulted in poor or suboptimal outcomes—given the large diameter of the nerve, the demand for donor

graft is often rapidly exceeded. The use of autologous SCs in the sciatic repairs described in this paper represents perhaps the ideal first clinical application. The delivery of autologous SCs is a technically demanding endeavor. Despite this hurdle, a more widespread application may further enhance our outcomes for select nerve repair and nerve transfers. The authors should be commended for their work.

<https://thejns.org/doi/abs/10.3171/2016.12.FOCUS16537>

References

1. Gersey ZC, Burks SS, Anderson KD, Dididze M, Khan A, Dietrich WD, et al: First human experience with autologous Schwann cells to supplement sciatic nerve repair: report of 2 cases with long-term follow-up. **Neurosurg Focus** 42(3):E2, 2017
2. Gordon T: Electrical stimulation to enhance axon regeneration after peripheral nerve injuries in animal models and humans. **Neurotherapeutics** 13:295–310, 2016
3. Konofaos P, Terzis JK: FK506 and nerve regeneration: past, present, and future. **J Reconstr Microsurg** 29:141–148, 2013
4. Levi AD, Burks SS, Anderson KD, Dididze M, Khan A, Dietrich WD: The use of autologous Schwann cells to supplement sciatic nerve repair with a large gap: first in human experience. **Cell Transplant** 25:1395–1403, 2016
5. Lin MY, Manzano G, Gupta R: Nerve allografts and conduits in peripheral nerve repair. **Hand Clin** 29:331–348, 2013
6. Lopatina T, Kalinina N, Karagyaur M, Stambolsky D, Rubina K, Revischin A, et al: Adipose-derived stem cells stimulate regeneration of peripheral nerves: BDNF secreted by these cells promotes nerve healing and axon growth de novo. **PLoS One** 6:e17899, 2011
7. Ray WZ, Chang J, Hawasli A, Wilson TJ, Yang L: Motor nerve transfers: a comprehensive review. **Neurosurgery** 78:1–26, 2016

Disclosures

The authors report no conflict of interest.