

The effect of Mannose-6-Phosphate on recovery after sciatic nerve repair

Abstract

We have determined the effect of applying Mannose-6-Phosphate (M6P), a scar reducing agent, to a site of sciatic nerve repair. In anaesthetised C57-Black-6 mice, the left sciatic nerve was sectioned and repaired using 4 epineurial sutures. Either 100 μ l of 600 mM Mannose-6-Phosphate (29 animals), or 100 μ l of phosphate buffered saline as a placebo control (29 animals), was injected into and around the nerve repair site. A further group acted as sham-operated controls. After 6 or 12 weeks of recovery the extent of regeneration was assessed electrophysiologically and the percentage area of collagen staining at the repair site was analysed using picrosirius red and image analysis. Gait analysis was undertaken pre-operatively and at 1, 3, 6, 9 and 12 weeks postoperatively, to assess functional recovery. At 6 weeks the compound action potentials recorded from the regenerated nerves in the M6P group were significantly larger than in the placebo controls ($P=0.015$), and the conduction velocities were significantly faster ($P=0.005$), but there were no significant differences between these groups at 12 weeks. Gait analysis suggested better early functional recovery in the M6P group. In both repair groups there was a significant reduction in collagen staining between 6 and 12 weeks, suggestive of scar remodelling. We conclude that the normal scar remodelling process aids long term recovery in repaired nerves. Administration of 600 mM M6P to the nerve repair site enhances nerve regeneration and functional recovery in the early stages, and may lead to improved outcomes. (C) 2011 Elsevier B.V. All rights reserved.

Authors:	Ngeow, W. C.; Atkins, S.; Morgan, C. R.; Metcalfe, A. D.; Boissonade, F. M.; Loescher, A. R.; Robinson, P. P.
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