Muscle-specific Protein MDP77 Specifically Promotes Motor-nerve Regeneration in Rats

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ABSTRACT

The effect of recombinant human MDP77 (rhMDP77) on nerve-tissue regeneration, especially for motor nerves, was examined *in vivo*. Bridge grafting (14 mm) into the sciatic nerve of SD rats was carried out using silicone tubes containing a mixture of type-I collagen and 0, 5, 10, or 20 μg/ml of rhMDP77 or containing phosphate-buffered solution (N = 6 in each group). Electrophysiological and histological evaluations were carried out 12 weeks after implantation.

No significant differences in the mean diameter of the regenerated axons were found, suggesting that MDP77 has a minor effect on the maturation process, including myelination of regenerating axons. The density and percentage of axon area of myelinated axons, though, were increased in a MDP77 dose-dependent manner. It is therefore suggested that MDP77 promotes collateral or terminal sprouting of regenerating nerves. Furthermore, the number of rats in which M-waves were recorded increased together with MDP77 dose, further supporting its role in motor-nerve regeneration. However, there were no significant differences in the terminal latency quotient between experimental groups. Although this negative result may simply be due to the small numbers of samples in the MDP-0 or MDP-5 groups and the accompanying lack of statistical power, it may support our suggestion that MDP77 has only a minor effect on the myelination process of regenerating axons. Although SNAP was recorded in one rat each in the MDP-5 and MDP-20 groups (the SCV quotient was 0.49 and 0.50, respectively), it could not be detected in other experimental groups.

In conclusion, our results suggest that MDP77 may specifically accelerate motor-nerve regeneration.