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Hydrogen-rich saline promotes motor functional recovery following peripheral nerve autografting in rats

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Abstract

Despite the application of nerve grafts and considerable microsurgical innovations, the functional recovery across a long peripheral nerve gap is generally partial and unsatisfactory. Thus, additional strategies are required to improve nerve regeneration across long nerve gaps. Hydrogen possesses antioxidant and anti-apoptotic properties, which could be neuroprotective in the treatment of peripheral nerve injury; however, such a possibility has not been experimentally tested *in vivo*. The aim of the present study was to investigate the effectiveness of hydrogen-rich saline in promoting nerve regeneration after 10-mm sciatic nerve autografting in rats. The rats were randomly divided into two groups and intraperitoneally administered a daily regimen of 5 ml/kg hydrogen-rich or normal saline. Axonal regeneration and functional recovery were assessed through a combination of behavioral analyses, electrophysiological evaluations, Fluoro-Gold™ retrograde tracings and histomorphological observations. The data showed that rats receiving hydrogen-rich saline achieved better axonal regeneration and functional recovery than those receiving normal saline. These findings indicated that hydrogen-rich saline promotes nerve regeneration across long gaps, suggesting that hydrogen-rich saline could be used as a neuroprotective agent for peripheral nerve injury therapy.

Keywords: functional recovery; hydrogen; nerve gap; sciatic nerve.

Figures

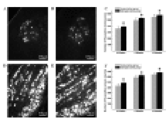

Figure 1. (A and B) Representative images...

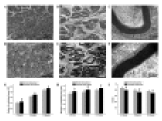

Figure 2. Histomorphological observation of the

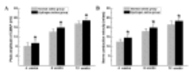

Figure 3. Electrophysiological tests were performed

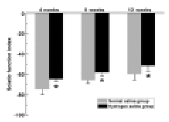

Figure 4. SFI scores in the two...

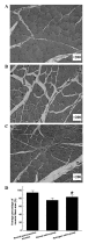

Figure 5. Light micrographs of transverse sections...

$$SFI = -38.3 \times \frac{EPL - NPL}{NPL} + 109.5 \times \frac{ETS - NTS}{NTS} + 13.3 \times \frac{EITS - NITS}{NITS} - 8.8$$

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