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The evaluation of NGF/BDNF sustained release system designed for nerve regeneration

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Abstract

Composite conduits were prepared with polylactic acid as the matrix and nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) as the nutritional factors to promote nerve regeneration. The NGF/BDNF composite conduits were prepared by solvent evaporation. Mechanical property and hydrophilic-hydrophobic property study showed that the tensile strength of the conduit was 1.80MPa, the elongation at break of it was 204.17%, and the contact angle was 65.4°. To investigate the sustained-release profile of the conduits, a 90-days release study was carried out *in vitro*. Th e content of NGF or BDNF in release buff er was determined by ELISA at different time within 90d’ s incubation, and the results showed that NGF and BDNF release lasted for at least 90 days. PC12 cell line and SH-SY5Y cells were employed to evaluate the bioactivity of NGF and BDNF during the release period, respectively. For NGF, about 40% of the original bioactivity was kept on the twenty-eighth day and 10% left on the ninetieth day. SH-SY5Y cells also presented that the release of BDNF from the composite conduit were bioactive even after 90-days incubation. *In vivo* study was carried out with the left sciatic nerve of rats. A 10- mm-defect was employed to evaluate the regeneration of nerve. The electrophysiological characteristics, muscle wet weight recovery rate and histological observations were studied three months later. Both NGF and BDNF composite conduits exhibited to promote the nerve regeneration, while the combination of NGF and BDNF did not play better effect.

Biography

Fenghua Xu has completed her Ph.D. from Peking University Health Science Center and once worked as research scientist in department of pharmaceutics in University of Minnesota. She is the director of department of pharmaceutical preparation in PLA General Hospital, and is majored in the development of new drug and novel drug delivery system. She has published more than 50 papers in reputed journals and serving as an editorial board member of “Chinese Journal of Drug Application and Monitoring”. She is also the member of PLA Pharmaceutics Committee.