

Adipose Derived Stem Cells and Nerve Growth Factor-Incorporated Hydrogel as a Therapeutic Strategy for Post-Prostatectomy Erectile Dysfunction

Introduction and Objective: Post-Prostatectomy erectile dysfunction (ED) is the major problem for patients with clinically localized prostate cancer. Recently, gene and stem cell-based therapy of the corpus cavernosum has been attempted for post-prostatectomy ED, but those therapies are limited by rapid blood flow and disruption of the normal architecture of the corpus cavernosum. In this study, we investigated the effectiveness of human adipose derived stem cell (hADSC) and nerve growth factor-incorporated hyaluronic acid-based hydrogel (NGF-hydrogel) application to regenerate damaged cavernous nerve (CN), which is the main cause of ED.

Materials and Methods: Sprague-Dawley rats inflicted with bilateral cavernous nerve (BCN) crush-injury were used for animal model. Experimental groups were divided 5 groups; normal (Nr), BCN crush-injury (C), hADSC after BCN injury (A), NGF-hydrogel after BCN injury (N), and hADSC and NGF-hydrogel after BCN injury (AN). PKH26-labeled h-ADSCs were applied around the injured cavernous nerve, and then NGF-hydrogel was immediately injected on. Four weeks after operation, erectile function was assessed by detecting the intra-cavernous pressure (ICP)/arterial pressure level by CN electrostimulation. Cavernous nerve and corpus cavernosum were collected for histological examinations.

Results: PKH-26 labeled hADSC co-localized with NGF were shown in CN tissue sections under fluorescent microscopy. In functional study, The ICP was significantly increased by application of hADSC with NGF-hydrogel compared to the other experimental groups. In histologic examination, we confirmed that hADSC/NGF-hydrogel treatment prevented smooth muscle atrophy in the corpus cavernosum by α -SMA staining. Collagen content in corpus cavernosum was increased in group C, but collagen content was minimal in the AN group. In addition, the AN group showed increased the content of eNOS-positive vessels in the corpus cavernosum.

Conclusions: This study suggests that application of hADSCs with NGF-hydrogel on the CN might be a promising treatment for post-prostatectomy ED.