

Abstract

Purpose: To investigate whether single or multiwall carbon nanotubes (SWCNTs, MWCNT) prepared in chitosan hydrogel could enhance the healing of wounds in-vivo and in-vitro.

Methods: Two concentrations of SWCNT and MWCNT were prepared in chitosan hydrogel. Standard skin wounds were induced on either sides of the dorsal surface of mice, so that one wound was treated daily over 9 days with a test preparation while the other wound was left untreated (internal negative control). The effect of SWCNT/MWCNT on the deposition of collagen by 3T3 cells was investigated in-vitro.

Results: The histopathological investigations for samples stained with masson-trichrome stain demonstrated that most of the wounds treated with 1% and 5% of SWCNT or 5% MWCNT had better fibrosis in comparison to the internal control for each animal, in most of the cases this was associated with an increase in the extend of inflammation. In addition, 5% SWCNT, 1% SWCNT and 5% MWCNT, could also enhance the healing of the epidermis. In vitro studies demonstrated a concentration-dependent enhancement of collage deposition by 3T3 fibroblast cell line by both SWCNT and MWCNT.

Conclusion: SWCNT and MWCNT might enhance wound healing by inducing collagen deposition be fibroblasts and probably by provoking inflammatory reactions.