**Multiwalled carbon nanotube conductive 3D scaffolds for differentiation of Mesenchymal stem cells into Schwann cell-like phenotypes**

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In recent years, carbon nanotube based materials have been widely studied as a promising material to stimulate nerve regeneration. In this study, we integrated a novel carbon nanotubes-gelatin methacrylate composite scaffold with electrical stimulation for improving of mesenchymal stem cell (MSC) differentiation into Schwann cell-like phenotypes. Our results showed that multi- walled carbon nanotubes (MWCNT) incorporated gelatin methacrylate has an improved mechanical strength as well as cell adhesion. Double-stranded DNA facilitated homogeneous dispersion of MWCNT within the hydrogel scaffold, resulting in improved conductivity of the scaffold. More importantly, MSCs cultured on conductive carbon nanotube scaffold with electrical stimulation show increased Schwann cell marker expression. The results demonstrate the potential of the carbon nanotube scaffold coupled with electrical stimulation for promoting neural differentiation of MSCs for nerve regeneration.