Modified MWCNT carpets as potential scaffolds for tissue engineering

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Multi Walled Carbon Nanotubes (MWCNTs) due to their unique physical properties have been successfully applied in biomedicine e.g in drug delivery systems, as contrast agents and for gene therapies. The novel approach is to use MWCNTs as scaffolds for tissue engineering and regenerative medicine. The modification of MWCNT based systems can improve the cell adhesion and growth.

In our studies, several MWCNT based nanosystems were verified as potential scaffolds in tissue engineering. The first group of investigated systems were the as prepared MWCNT based carpets as well as purified ones. Moreover, the oxidised and non-covalently coated with methyl cellulose MWCNT based carpets were investigated. The quality of MWCNT based nanosystems were characterised by means of Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM) and Thermogravimetric analysis as well as Raman spectroscopy.

The analysis of cell interaction with MWCNT based scaffolds was studied by means of SEM. The cancer cell lines (U2OS and HeLa) and normal fibroblasts (Detroit 551) were used. In our research we investigated the cell adhesion as well as cell morphology.

The physical structure of MWCNTs was compatible for adhesion of cells and no cytotoxic effect was observed in all MWCNT based nanosystems. The important difference between cell adhesion with MWCNT carpets and the type of used cell line was indicated. Moreover, the type of MWCNT based scaffold surface modification, increases the efficiency of interaction between them. Therefore, the MWCNTs can be a suitable scaffold in tissue engineering and for cell culturing.

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