

MULTI WALLED CARBON NANOTUBES - CYTOTOXICITY AND CELLULAR INTERACTIONS

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Abstract

There has been growing interest in incorporating carbon nanotubes (CNTs) into biology and medicine from drug delivery carriers to tissue scaffolds, implants, biosensors and many others. Enormous attention in nanomedicine have won multi walled CNTs (MWCNTs) due to their one-dimensional, hollow nanostructure and unique physicochemical properties. Very little is known about the toxicity of MWCNTs which can be modified and biofunctionalized with different organic compounds and biomolecules. It is likely that toxicity of MWCNTs will depend not only on concentration but many other factors including diameter, length, type of functionalization and the nature of attached molecules. Therefore, evaluation and characterization of their toxic potential and cellular interactions are necessary. The aim of the study was to assess the cytotoxicity and the impact of MWCNTs (before and after surface functionalization) on cells response. MWCNTs with different amount of iron were synthesised by Chemical Vapor Deposition (CVD) method and then their outermost walls were oxidized and wrapped by polymers. Polyethylene glycol (PEG) with different molecular weight was covalently attached to MWCNTs surface for improving their liquid solubility and biocompatibility. For in vitro investigation of MWCNTs normal human fibroblast and HeLa cells were used. The effect of MWCNTs on the viability of the cells was analysed by WST-1 and MTT assays as well as by In Cell Analyzer. The intracellular distribution of MWCNTs in HeLa cells were observed in confocal microscopy after selected organelles staining. Our research indicated the cytotoxicity increase with the higher MWCNTs concentration. However, the PEG-MWCNT hybrids treated cells investigation has revealed the higher viability and unchanged cell morphology in comparison with non functionalized MWCNT samples.

Keywords: Multi walled carbon nanotubes (MWCNTs), cytotoxicity, cellular interactions

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