

4th International Conference on **Nanotek & Expo**

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Toxicity nitrogen-doped and undoped multi-wall carbon nanotubes on NIH-3T3 murine fibroblasts

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Due to their physical, chemistry, electrical and thermal properties, carbon nanotubes (CNTs) have potential use in drug delivery, biosensor, antimicrobial nanocomposite film and cellular scaffold. CNTs are nanoscale carbon nanomaterials made of graphitic sheets grown as hollow cylinders. Researches of cellular response to either non-functionalized or functionalized (addition of functional groups on graphite surface) multi-wall CNTs (MWCNTs) have been extensive. The chemical doping (carbon atoms substitution) with nitrogen of CNTs (CN_x) has been suggested to have more positive effects on cellular biocompatibility than MWCNTs. Cells exhibit variable responses to CNTs depending on different factors such as synthesis method, impurities, length and diameter, type (pristine, functionalized, doped), dispersion/agglomeration degree, dispersant, concentration of CNTs, protein adsorption, exposure time and cellular type. In this study, it is reported the cytotoxic effects of pure MWCNT and CN_x on NIH-3T3 murine fibroblasts. MWCNT and CN_x were separately dispersed in three solvents, and doses response of tubes were tested using different exposure ways. Results showed that 70 $\mu\text{g}/\text{mL}$ CN_x and MWCNT were lethal when they were incubated immediately after cell-liftoff. At 7 $\mu\text{g}/\text{mL}$, both MWCNT and CN_x were toxic, but not lethal. CN_x ethanol-dispersed were less toxic than MWCNT dispersed in the same solvent. It was found that both MWCNT and CN_x have toxic effects on murine cells depending on carbon nanotube-type, concentration, time, and exposure way dependent manner, but the lower concentrations of these nanomaterials may be an effective biomedical material which might have clinical applications in the future.

Biography

Munguía-López J G is a Molecular Biology PhD candidate from Institute for Scientific and Technological Research of San Luis Potosi (IPICYT). He obtained his MS degree in molecular biology at the same institute. He has been participated in national and international congress with different topics as proteomics, biochemistry, molecular biology, carbohydrates.

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