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TITLE

Invitro evaluation of the physiochemical effects of drug loaded carbon nanotubes on toxicity

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As prepared multiwalled carbon nanotubes (MWCNTs) synthesized by the Catalytic Chemical Vapor Deposition method were initially acid oxidized using strong acids at different temperature and reaction time so as to remove impurities whilst introducing carboxylic groups on to the surface. The drug riluzole was then conjugated to the oxidized MWCNTs via carbodiimide activated amidation. Characterized physiochemical properties i.e. length, surface area, degree of fictionalization and amount of chemical impurities were key determinants of the drug loaded MWCNTs' cytotoxicity. The data from this study supports the hypothesis that physiochemical modifications of MWCNTs that occur due to the functionalization of the drug to its surfaces alter their toxicity in neuronal systems. The riluzole loaded MWCNTs with <15% metallic residue, 500-2000nm length, and high surface area (30-76 m^2/g) were found to cross the cell membrane without causing toxic effects as all the cells were viable compared to the untreated cells control. Covalently linking riluzole to MWCNTs and the consequent changes in the physiochemical properties did not lead to the generation of toxic effects in cells. Furthermore chemically binding riluzole to the MWCNTs did not deactivate the drug and reduce its ability to be antiglutamate. The identification of specific physiochemical properties governing CNT toxicity presents the opportunity for CNT based drug delivery system designs or applications that reduce human and environmental impacts.

Biography

Sunny Iyuke is a professor of Chemical and Process Engineering at the University of the Witwatersrand (Wits), Johannesburg. He has produced several patents in nanotechnology locally and internationally including World Intellectual Property Organization of International Bureau. He collaborates in research with NASA, USA, Schools of Chemistry and Pharmacy at Wits, Institute of Fuel of the National University of Malaysia and other parts of the world. He is a registered Professional Engineer and a Chartered Engineer with UK Engineering Council. He has published more than 160 peer reviewed journal articles, book chapters and conferences.