Covalent Functionalization for mult-Walled Carbon Nanotube (f-MWCNT) -Folic Acid bound bioconjugate

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ABSTRACT

In the current concept, we covalently functionalized multi- walled carbon nanotube (MWCNT) as a bioconjugate to folic acid (FA); an essential, bioavailable water soluble B-complex vitamin which is usually expressed on the surfaces of most tumoral cells. This was rendered possible through the design of a bioreversible binding water-soluble and biocompatible functionalized multi-walled carbon nanotubes (*f-MWCNTs*). The MWCNT was synthesized through the chemical vapor deposition (VCD). The MWCNTs were covalently functionalized with sulphuric and nitric acids (3:1) at room temperature (RT), 50ºC and 100ºC to generate the phenol and carboxyl groups. Furthermore, aspartic acid at 230 ºC was used to generate the carboxyl *f-MWCNTs* groups. The *f-MWCNTs* were both characterized with the aid of a transmission electron microscopy (TEM). The results showed a decreased in mol ratio (COOH/OH) of the *f-CNTs* from 80 to 20nm as the temperature increases from RT to 100ºC. The *f-CNTs* carboxyl were attached to 3-(N, N–dimethylamino) propylamine (DMP) and FA through 2-(1H-benzotrial-1-yl)-1, 1,3,3-tetramethylurium hexafluorophosphate (HBTU) to generate *f-CNTs*-FA conjugates. The results of the high resolution nuclear magnetic resonance (H^1NMR) and infrared (IR) spectra showed CONH peak shifts bond bioreversible conjugation of FA at 94% and 101.3% and sizes 50nm and 170nm respectively. The *f-MWNTs*-FA moieties thereby have a greater versatility and can be used for the treatment and restoration of neoplasma cells.

Key Words: CNT, *f*-CNT, *f*-CNT-FA, Conjugates.