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| **Authors**  | Mohammed Faiad Naief | Yousif H. Khalaf | Ahmed Mishaal Mohammed |  |
| **Title** | Novel photothermal therapy using multi-walled carbon nanotubes and platinum nanocomposite for human prostate cancer PC3 cell line |
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| Abstract | Multi-walled carbon nanotubes (MWCNTs) coated with platinum nanoparticles (Pt-NPs) were prepared as a novel composite nanomaterial by using waste synthetic oil and green chemistry. MWCNT and Pt-NPs were characterised through TEM, FE-SEM, AFM and FT-IR techniques. The diameters of the synthesised MWCNTs and Pt-NPs were 26.80–44.66 and 56.49–89.38 nm, respectively. The formation of MWCNT-COOPt and MWCNT-Pt was confirmed using Raman and EDX techniques. The effect of MWCNT-COO, MWCNT-COOPt and MWCNT-Pt on prostate cancer cell line PC3 was studied by MTT assay at various concentrations following near-infrared (NIR) irradiation (λ=1064 nm, P = 15.3 W) at different time intervals (30, 60, 90 and 120 s). The composite of Pt-NPs upon the MWCNT surface enhanced its ability to absorb NIR radiation, leading to an increase in the temperature of cancer cells due to plasmon phenomenon. The composites were utilised in a novel treatment against human PC3 cell line. The maximum temperatures for MWCNT-COO, MWCNT-COOPt and MWCNT-Pt recorded with 25 µg/mL were 43.4 °C, 45.8 °C and 46.2 °C, respectively, and irradiation time was recorded at 120 s. These compounds exhibited high cytotoxicity towards human PC3 cells (58.6%, 71.6% and 79.6%), respectively. The combination of MWCNTs and Pt-NPs in photothermal therapy has potential to be used in local therapy for prostate cancer in a time- and concentration-dependent manner. |