OBTAINING OF CVD NANODIAMONDS AND EVALUATION OF THE CYTOTOXICITY IN B16F10 CELLS FOR TREATMENT OF MELANOMA

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Recent studies have shown the potential use of nanodiamonds (NDs) as drug carriers for the therapy of cancer due to their high stability and small size. With the aim of obtaining a new system to be applied as drug delivery platform for the therapy of metastatic melanoma, a new technique of obtaining NDs from CVD diamond thin film was developed. The synthetic CVD-diamond film has similar physical and chemical properties to natural diamond: extreme hardness, excellent thermal conductivity, biological compatibility and chemical stability at temperatures below 800°C. Herein, CVD NDs were prepared by using laser ablation. The NDs were characterized by X-ray (XRD), (MEV-FEG), (TEM), energy dispersion spectroscopy (EDS), (XPS), Raman spectroscopy and dynamic light scattering. Furthermore, since cytocompatibility is one of the main features required for a drug delivery platform, the cytotoxicity of NDs was evaluated in B16-F10-Nex2 cells by MTT assay. The results showed that the laser ablation process reduced CVD particle size. The mean hydrodynamic diameter in aqueous suspension after the centrifugation changed from 54 nm. The high stability of aqueous suspension of CVD NDs was indicated by the low polidispersity index (0,2) and a small increase in the mean value of hydrodynamic diameter during the observed period (D = 215 nm). The high stability was provided by the high charge density on NDs surface as suggested by the high value of Zeta-potential (-36.39 and -30.94 mV). EDS analysis showed that NDs were composed of carbon (77.2%) and oxygen (22.2%). By X-ray diffraction analysis, it could be observed the characteristic peak of NDs at 43^0. Raman spectrum of CVD NDs showed three peaks at: 1332, 1500 and 1600 cm^{-1}, corresponding to D and G bands of diamond. Cytotoxicity assay showed 60% and 80% of cell viability after 24h, 48h, 72h and 96h of incubation with NDs. The high value of cell viability is an indicative of the cytocompatibility of NDs, indicating the potential use of NDs in biomedical applications such as drug delivery platforms.

Keywords: Nanodiamonds, cytotoxicity, CVD.