CYTOTOXIC AND GENOTOXIC EFFECTS OF PEG COATED AND NON-COATED GOLD NANOPARTICLES ON HUMAN KIDNEY CELLS

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Abstract: The use of gold nanoparticles (AuNPs) for diagnostic applications, drug delivery vehicles and photothermal therapy is currently under intensive investigation. In considering these applications, biocompatibility and the absence of cytotoxicity of AuNPs is essential. Once AuNPs enters the blood it may translocate to the blood causing adverse biological reactions to secondary target organs such as the kidney. The kidney is particularly vulnerable to xenobiotics due to its high blood supply and its ability to concentrate toxins. Comparative studies will be conducted to investigate whether 25 nm PEG coated and non-coated AuNPs are more or less cytotoxic and genotoxic by altering the intracellular oxidative effects leading to cellular and mitochondrial damage. Cytotoxicity and genotoxicity were assessed in HK-2 (epithelial proximal) cell line. Trypan blue exclusion test for cell viability quantification; Chromosome aberration, and comet assay for DNA damage and genotoxic stress. Western blot for Bax and Bcl: cell cycle analysis and annexinV using flow cytometry to determine apoptosis regulation. Preliminary findings have shown a significant difference between noncoated AuNP and PEG coated AuNP in cell viability and DNA damage. At a concentration of 100µM cytotoxicity and genotoxicity was associated with a substantial decrease in viable cells and an increase in comet tail length and tail moment with noncoated AuNP. There were no significant change in PEG coated AuNP cytotoxic or genotoxic response. These findings of cytotoxicity and genotoxicity of PEG coated AuNP compared to noncoated AuNP may have beneficial clinical implications for application in nanobiotechnology and nanomedicine.

Keywords: Biocompatibility, cytotoxicity, genotoxic, PEG coated and non-coated AuNPs

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