J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.044

In vitro cyto- and genotoxicology effects of graphene oxide in promyelocytic leukemia (NB4) human cells

I M M Paino, D Nakabayash, F Santos and **V Zucolotto**
University of São Paulo, São Carlos, Brazil

Introduction: Graphene oxide (GO) is a carbon nanomaterial that has been proposed for several important applications in health, such as cancer treatment. Activated cells are sources of reactive oxygen species (ROS) that may induce DNA damage and genomic instability, thus promoting an inflammatory response and cell injury. In this study, we investigated the *in vitro* cyto- and genotoxicology effects of GO in acute promyelocytic leukemia (NB4) human cells and ROS generation induced by GO.

Methods: Cells were incubated at 37°C, 5% CO2 atmosphere in the presence of 0.1, 1.0, 12.0, 50.0 and 100.0 µgmL-1 of GO for 24 h. Cytotoxicity was measured by necrosis (fluorescein diacetate-FDA-test) and apoptosis assay (caspase-3 kit-BD-Biosciences, USA) by flow cytometry (FACSCalibur, BD-Biosciences, USA). Genotoxicity was analyzed by DNA fragmentation assay and ROS generation using the oxidation of 2,7-dichlorodihydrofluorescein diacetate (H2DCFDA-Sigma-Aldrich®, USA). All experiments were performed in triplicate. Data were submitted to one-way analysis of variance (ANOVA) and post-hoc Tukey test ($p<0.05$).

Results: Significant responses to DNA fragmentation, necrosis and ROS generation were induced in NB4 cells at 1.0, 12.0, 50.0 and 100.0 µgmL-1 ($p<0.05$). Apoptosis was induced in all concentrations studied ($p<0.05$), except at 0.1 µgmL-1.

Discussion/Conclusion: This study suggests that the mechanism underlying the toxicity of GO towards leukemia cells is due to elevated ROS generation, DNA damage and apoptosis process. Our results revealed that GO can interact with the cells, which opens the way for further studies on the toxicological effects of GO against human leukemia and cancer cells. A better understanding of the mechanisms related to elevated ROS generation, DNA damage, pro-inflammatory cytokines, inflammation, apoptosis and necrosis will lead to innovative approach for cancer treatment using GO nanomaterial.

iedammp@hotmail.com

Magneto-enrichment of genomic calf thymus DNA onto surface functionalized magnetic nanoparticles

A P Tiwari and **S H Pawar**
D Y Patil University, India

Maximizing DNA adsorption on magnetic nanoparticles (MNPs) is important for their successful utilization in gene transfer, DNA isolation and bio-analytical applications. This enhancement is typically achieved by BSA @ Fe3O4 and chitosan @silica@ Fe3O4. We demonstrate a novel route for DNA enrichment on BSA @ Fe3O4 and chitosan @silica@ Fe3O4 nanoparticles by applying magnetic field over specific period of time. The results suggested that by applying magnetic field in range of 3-4 minutes, the enrichment of almost 100% genomic DNA could be achieved, and hence giving almost 500th fold enhancement of DNA concentration in real samples. The major force involved and responsible is also discussed and an attempt to calculate the possible force acting on DNA-magnetic nanoparticle complex is also done. The proposed method and the in-depth insight of possible forces involved in magnetic enrichment by magnetic nanoparticles can be beneficial in the designing systems for various biomedical applications.

arpitaptiwari@gmail.com