13 | O r a l

HEPATOTOXICITY AND OXIDATIVE STRESS INDUCED BY GRAPHENE OXIDE IN SPRAGUE-DAWLEY RATS

Anita K. Patlolla[1], Jonathan Rondalph[2] and Paul Tchounwou[1]

[1]NIH-RCMI Center for Environmental Health, & Department of Biology, CSET, Jackson State University, Jackson, MS, USA
[2]Jackson Public School Teacher, Jackson, MS, USA

Abstract: Graphene oxide (GO) has been extensively explored as a promising nanomaterial for applications in biology because of its unique properties. Therefore, systematic investigation of GO toxicity is essential to determine its fate in the environment and potential adverse health effect. The aim of this study was to investigate the effect of graphene oxide on the induction of reactive oxygen species (ROS), the activity of certain liver enzymes (Alanine ALT, Aspartate AST, alkaline phosphatases ALP), and concentration of lipid hydroperoxide (LHP) in serum and histopathological evaluation of liver tissue in Sprague-Dawley rats. Four groups of five male rats were orally administered GOs, once a day for five days, with doses of 0, 10, 20 and 40 mg/Kg GO. A control group was also made of five rats. Blood and liver were collected 24 h after the last treatment following standard protocols. GO's exposure increased the induction of ROS, the activities of the liver enzymes (ALT, AST, ALP), concentration of lipid hydroperoxide (LHP) and morphological alterations of the liver tissue in exposed groups compared to control. The highest two doses, 20 and 40 mg/kg, showed statistically significant ($p < 0.05$) increases in the induction of ROS, activities of ALT, ALP , LHP concentration, and morphological alterations of liver tissue compared to control. However, AST activity showed no effect. Taken together, the results of this study demonstrate that GO is hepatotoxic, and its toxicity may be mediated through oxidative stress.

Keywords: graphene oxide, alanine aminotransferases, aspartate aminotransferases, reactive oxygen species, Sprague-Dawley rats.

Acknowledgement: This research was made possible by funding from the CESTEME Grant (**Proposal # 58775-RT-REP**) provided by the Department of Defense to Jackson State University.