

IN VIVO EVALUATION OF OXIDATIVE STRESS AND GENOTOXICITY INDUCED BY GRAPHENE OXIDE NANOPARTICLES

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Abstract

Previous reports from our laboratory have shown that graphene oxide (GO) nanoparticles in aqueous suspension are able to cross the blood-brain barrier and can therefore be instrumental for brain drug delivery studies. Hence, the evaluation on GO potential toxic effects is of seminal importance. In the present study, oxidative stress and genotoxicity of GO nanoparticles (sized 818nm) have been evaluated in the hippocampus and peripheral blood of six-week-old male Wistar rats at 15 minutes, 1 hour, 3 hours and 7 days after single intravenous injection (7 mL/kg, n=3-5/group). Results indicated increased serum activity of SOD at 1 hour and 7 days ($p<0.001$) and at 7 days in hippocampus ($p<0.05$) and 11% decrease of catalase in the hippocampus at 1 hour ($p<0.05$). Lipid peroxidation was unaltered. There was increases in the micronucleus number just at 15 minutes ($p<0.05$). However, histopathological analyses indicated normal hippocampus morphological parenchyma. The data suggest that GO nanoparticles have potential for drug delivery studies in the central nervous system. Further studies aimed at evaluating the antioxidant enzymes activity and genotoxicity at different periods after nanoparticles administration are in prospect for better characterization of possible GO deleterious effects.

Keywords: Graphene oxide, Central nervous system, Reactive oxygen species, Micronucleus assay

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