GENOTOXIC EFFECTS AND OXIDATIVE STRESS IN HUMAN LIVER CARCINOMA (HEPG2) CELLS EXPOSED TO ARSENIC TRIOXIDE

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Abstract: Arsenic is a ubiquitous trace element that has been shown to induce both systemic and carcinogenic effects. Epidemiological findings show that exposure to arsenic results in cardiovascular, gastrointestinal, and neurological disorders, as well as, various neoplastic diseases, such as, skin, lung, bladder, liver and kidney cancers. Although the mechanism of arsenic toxicity is not fully understood, we hypothesize that oxidative stress is capable of inducing DNA damage, which may play a role in arsenic-induced toxicity. In this study, we used HepG2 cells as a model to study oxidative stress and genotoxicity associated with exposure to arsenic trioxide at 24 and 48 hrs. We performed the thiobarbituric acid test for lipid peroxidation and the single cell gel electrophoresis (Comet assay) for DNA damage. The results of the thiobarbituric acid test demonstrated that arsenic trioxide treatment resulted in a significant increase (p <0.05) of MDA, indicating that oxidative stress may play a key role in arsenic induced toxicity and cellular damage. We found that the cellular content of reactive oxygen species (ROS) formation increased with increasing arsenic trioxide doses. Preliminary results of the comet assay revealed the genotoxic potential of arsenic trioxide in HepG2 cells. Data generated from the genotoxicity test will be provided later. Our findings indicate that reactive oxygen species (ROS) formation is capable of inducing DNA damage in HepG2 cells in a dose-dependent manner. These findings support our hypothesis that arsenic toxicity is mediated by oxidative stress.

Keywords: arsenic trioxide (As2O3), cytotoxicity, lipid peroxidation, oxidative stress, HepG2 cells

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