ARSENIC INDUCES CYTOTOXICITY AND APOPTOSIS IN ADENOCARCINOMA COLORECTAL CANCER (HT-29) CELLS THROUGH OXIDATIVE STRESS

Jacqueline J. Stevens¹, Alice M. Walker¹ and Paul B. Tchounwou²

¹Molecular and Cellular Biology Research Laboratory and ²Molecular Toxicology Research Laboratory, NIH-Center for Environmental Health, College of Science, Engineering and Technology, Jackson State University, 1400 JR Lynch Street, Box 18540, Jackson, Mississippi, USA.

Abstract: Arsenic is a heavy metal that exhibits a high degree of toxicity especially to organ systems. This compound is known to cause skin and lung cancer, and may cause internal cancers such as liver, bladder, kidney and colon. Arsenic trioxide has been shown to induce apoptosis through oxidative stress in colon cancer cell lines. However, the molecular mechanisms of arsenic trioxide toxicity remain to be elucidated. Hence, the aim of the present study was to investigate the effects of arsenic trioxide (As₂O₃) on adenocarcinoma colorectal cancer (HT-29) cells and to explore the molecular mechanisms of its action. To achieve this goal, HT-29 cells were cultured according to the standard protocols following by exposure to various doses (0, 1.56, 3.125, 6.25, 12.5, 25, and 50 µg/ml) of arsenic trioxide for 18, 24 and 48 hrs, respectively. The 3- (4, 5 dimethyl-thiazoyl-2-yl) 2,5diphenyl-tetrazolium bromide (MTT) assay was performed for cell viability. The thiobarbituric acid test was performed to evaluate the degree of lipid peroxidation in HT-29 cells. In addition, the DNA ladder assay was performed to determine whether arsenic induces apoptosis in HT-29 cells. The results from the MTT assay indicated that arsenic is highly cytotoxic to colon cancer cells showing LD₅₀ values of 7.1, 6.8 and 7.1 µg/ml upon 18, 24 and 48 hrs of exposure. There was a dose-dependent response with regard to As₂O₃ toxicity in HT-29 cells. The results of the DNA ladder assay showed clear evidence that arsenic trioxide induced apoptosis in HT-29 cells. The data from the thiobarbituric acid test are underway. In summary, findings from the present study indicated arsenic trioxide induces cytotoxicity and apoptosis in adenocarcinoma colorectal cancer (HT-29) cells. These cytotoxicity and apoptosis were found to be mediated through oxidative stress.

Keywords: Arsenic trioxide, adenocarcinoma colorectal cancer (HT-29) cells, cytotoxicity, MTT Assay, lipid peroxidation, apoptosis, oxidative stress

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