LEAD-INDUCED CYTOTOXICITY AND OXIDATIVE STRESS IN HUMAN LEUKEMIA (HL-60) CELLS

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Abstract: Lead poisoning has been extensively studied over the years. Many adverse physiological and behavioral impacts on the human body have been reported due to the entry of this heavy metal. It especially causes the hematological effects to people of all ages. However, the molecular mechanisms of toxicity are still largely unknown. In this research, we hypothesized that oxidative stress plays a key role in lead nitrate-induced toxicity in human leukemia (HL-60) cells. To test this hypothesis, we performed the MTT and the trypan blue exclusion test for cell viability, and lipid hydroperoxide assay for assessing the levels of the degradation products of polyunsaturated fatty acid (PUFA) hydroperoxide in HL-60 cells exposed to lead. The results obtained from the MTT assay indicated that lead nitrate significantly decreases the viability of HL-60 cells in a dose-dependent manner. Similar result was obtained with the trypan blue exclusion test. Data generated from lipid hydroperoxide assay resulted in a significant increase (p < 0.05) in the production of hydroperoxides (degradation products of lipid peroxidation) with increasing doses of lead nitrate. Upon 24 h of exposure, the hydroperoxide concentrations in the sample [uM] (mean ±SE, n = 3) compared to untreated control were 6.7 ± 2%, 7.1 ± 1%, 14.7 ± 2%, 15.7 ± 6%, 16.2 ± 4%, and 15.2 ± 1% in 0, 10, 20, 30, 40, and 50. ug/mL of lead nitrate, respectively. In summary, findings from this study demonstrated that lead nitrate is cytotoxic to HL-60 cells. This cytotoxicity is found to be associated with oxidative stress.

Keywords: Lead nitrate, lipid hydroperoxide, cytotoxicity, HL-60 cells

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