IN VITRO CYTOTOXIC AND GENOTOXIC EFFECTS OF PERFLUOROOCTANOIC ACID (PFOA) IN HUMAN PROSTATE (RWPE-1) CELLS

Terrence T. Wright, Barbara Graham, Clement Yedjou and Paul Tchounwou

Cellomics and Toxicogenomics Research Laboratory, NIH-Center for Environmental Health, College of Science, Engineering and Technology, Jackson State University, 1400 J. R. Lynch Street, Box 18540, Jackson, Mississippi, USA.

Abstract: Perfluorooctanoic acid (PFOA) is an emerging environmental contaminant that has been used to make products including microwave popcorn bags and nonstick pans. However, published studies have indicated that long-term of human exposure to this compound increases the risk of prostate cancer. Although clinical manifestations associated with PFOA exposure are well documented, its molecular mechanisms of action remain largely unknown. Hence, the aim of the present study was to evaluate the cytotoxic and genotoxic effects of PFOA to human prostate cell line using the MTT and alkaline single gel electrophoresis (Comet) assays, respectively. To achieve our specific goal, RWPE-1 cells were treated with different concentrations of PFOA for 24 h. Data obtained from the MTT assay indicated that PFOA significantly (p < 0.05) reduced the viability of RWPE-1 cells in a dose-dependent manner. Data generated from the comet assay also indicated a significant dose-dependent increase in DNA damage in RWPE-1 cells associated with PFOA exposure. We observed a significant increase (p < 0.05) in comet tail-length, tail arm and tail moment, as well as in percentages of DNA cleavage at all doses tested, showing evidence that PFOA induced genotoxic damage in RPWE-1 cells. This study confirms that the comet assay is a sensitive and effective method to detect DNA damage caused by PFOA. Taken together, our findings suggest that PFOA exposure significantly (p < 0.05) reduces cell viability and induces DNA damage in RWPE-1 cells.

Keywords: Perfluorooctanoic acid, RWPE-1 cells, cytotoxicity, genotoxicity, MTT assay, comet assay

Acknowledgement: This research was financially supported in part by a grant from National Institutes of Health (Grant No. 2G12RR013459-11), through the RCMI-Center for Environmental Health at Jackson State University.