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Effects of Aluminum on Cerebellar Granule Cells and Thymocytes

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Aluminum (Al) is one of the most prevalent elements in the environment. The scientific literature indicates that the presence of Al in drinking water and food may result in various adverse health effects. Known as neurotoxicant, Al has for years been associated with Alzheimer disease and other neurodegenerative disorders. In this study, we have examined the effects of environmentally relevant concentrations of Al on acutely dissociated cerebellar granule cells and thymocytes of mice, using flow cytometry. Various biomarkers were utilized to evaluate potential cell damage. Fluorescent probes Fluo-3-AM, H2DCFDA (2',7'-dichlorofluoresceine diacetate), and DiBAC4(3) (bis-(1,3-dibutylbarbituric acid)-trimethine oxonol) were used to estimate intracellular calcium concentration, reactive oxygen species (ROS), and membrane potential, respectively. Al-induced death of neuronal cells and thymocytes was monitored by the use of the DNA-binding dye, propidium iodide, in a time- and dose-dependent fashion. Exposure to Al was also accompanied by a decrease in membrane potential and an increase in ROS and intracellular calcium levels. Our results clearly demonstrate the presence of toxic effects of Al on acutely dissociated murine neurons and thymocytes. Data obtained in this study will further assist in understanding the mechanism of Al toxicity and aid future laboratory experiments designed to better reflect environmental exposure.