Neurotoxicity of GenX, a Perfluoroalkyl Substance Found in Drinking Water

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GenX, a fluorinated chemical, has been discovered in multiple drinking water supplies around the world. However, studies have found that GenX exhibits high cytotoxicity towards different human tissues and that its existence in drinking water supplies is detrimental to those human tissues. Unfortunately, there have only been limited studies done on the cytotoxicity effects of GenX on human neuronal cells. In order to assess the various impacts of GenX on all kinds of human tissues, this study investigated the cytotoxicity of GenX on human neuronal cells, the possible molecular targets of GenX, and the pathways that GenX activates in the neurons. Concerning the comprehensive goal of this study, two approaches were taken: in silico screening identified receptors that are potential molecular targets of GenX, and in vitro validation evaluated GenX's cytotoxicity and the pathways it activates in neuronal cells. PyRx molecular docking recognized seven receptors with significantly high binding affinity to GenX among 20 receptors that were unstudied in GenX. The MTT Cell Proliferation Assay, Caspase-3 Colorimetric Assay, LDH Assay, and Computer-Assisted Imaging Analysis were conducted on SK-N-SH human neuroblastoma cells, and demonstrated GenX's negative impacts on cell viability, activation of caspase induced apoptosis, lack of induction of necrosis, the morphological changes of the cells, and the decrease in the cell area, respectively. Ultimately, this study presents a novel examination of the cytotoxicity of GenX on human neuronal cells as well as GenX's potential molecular targets.

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