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"Evaluating Human Cell Survival and DNA Damage After Exposure to Various Amount of Chlorine Dioxide and Exploring its use as a potential cancer chemotherapy agent; especially for cancer cells which harbor defected DNA repair genes"

By:
Alvarez, Niuska Mariana
Undergraduate Student at University of New Haven
Research Advisor:
Ali Senejani, Ph. D.
Assistant Professor
College: College of Arts and Sciences
Dept: Biology and Environmental Science
Phone: 203-479-4167
Office: Charger Plaza 08

Abstract

Chlorine Dioxide (ClO_2) is a synthetic, green-yellowish gas with a chlorine-like, irritating odor that is used for the treatment of drinking water and food preservation. The aim of this study was to evaluate the genotoxic potential of the chlorine dioxide in mammalian cells and to determine what dose of ClO_2 is tolerable by normal cells and cells with aberrant DNA repair genes. Human and mouse embryonic cells were treated with various ClO_2 dilutions ranging from 2.5 mM to 25 mM. The cell viability and metabolic activity was determined via MTT, a colorimetric assay. Human HEK293 cells exposed to 5mM of chlorine dioxide exhibit rapid cell death. Results from the alkaline comet assay indicate cells treated with a 50 mM ClO_2 carry high levels of DNA breaks. Furthermore, mouse embryonic fibroblast cells lacking a key DNA repair gene, DNA polymerase beta, show an increased level of sensitivity to ClO_2 indicating its use as a potential chemotherapy approach for cancer cells harboring defective DNA repair genes.