Mutagenicity and disinfection by-products in surface drinking water disinfected with peracetic acid

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Keywords: Drinking water; Disinfection; Peracetic acid; Disinfection by-products; Mutagenicity

Abstract
The aims of this research were to study the influence of peracetic acid (PAA) on the formation of mutagens in surface waters used for human consumption and to assess its potential application for the disinfection of drinking water. The results obtained using PAA were compared to those found with sodium hypochlorite (NaClO) and chlorine dioxide (ClO2). The Ames test, root anaphase aberration assay, and root/micronuclei assay in Allium cepa and Tradescantia/micronuclei test were used to evaluate the mutagenicity of disinfected samples. Microbiological tests were also performed, and disinfection by-products (DBPs) were identified using gas chromatography/mass spectrometry (GC/MS). A slight bacterial mutagenicity was found in raw lake and river water, and similar activity was detected in disinfected samples. A plant test revealed genotoxicity in raw river water, and microbiological analysis showed that PAA has bactericidal activity but lower than that of the other disinfectants. The DBPs produced by PAA were mainly carboxylic acids, which are not recognized as mutagenic, whereas the waters treated with the other disinfectants showed the presence of mutagenic/carcinogenic halogenated DBPs. However, additional experiments should be performed with higher concentrations of PAA and using water with higher organic carbon content to better evaluate this disinfectant.