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Genotoxicity of treated wastewater disinfected with peracetic acid

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ABSTRACT

Disinfection of treated wastewater and its reuse for breeding, agricultural or recreational purposes is a beneficial solution due to water deficits in the world. The risks associated with treated wastewater disinfection include, among others, possibility of the formation of harmful by-products (DBPs). Unmonitored presence of DBPs in treated wastewater is potentially harmful to organisms in ecosystems and to human health. The aim of the research was to compare the genotoxicity of treated wastewater from full-scale municipal wastewater treatment plant before and after the disinfection process with peracetic acid with parameters ensuring satisfactory inactivation of microorganisms. Genotoxicity to *Escherichia coli* bacteria was tested with SOS Chromotest. The influence on the genetic material of *Daphnia magna* crustaceans was determined by the random amplification of polymorphic DNA – polymerase chain reaction (RAPD-PCR). Treated wastewater before disinfection showed genotoxicity to *E. coli* and *D. magna*. However, although treated wastewater disinfected with peracetic acid turned out to loose genotoxic potential to bacteria, it generated changes in the genetic material of crustaceans exposed to wastewater after the disinfection process. Significant decrease in the genetic stability of DNA in RAPD-PCR was observed, which increased with the extension of the disinfection time and the increasing concentration of the disinfectant. The conducted research confirms the genotoxic potential of treated wastewater before and after disinfection with peracetic acid. Therefore, it may pose a threat to organisms of aquatic ecosystems when discharged into receiving reservoirs and reused in the event of a water shortage.

Keywords: Peracetic acid; Treated wastewater disinfection; Treated wastewater genotoxicity

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