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HEALT RISK ASSESMENT RELATED TO WATERBORNE PATHOGENS FROM THE RIVER TO THE TAP

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ABSTRACT

A two-year monitoring program of *Cryptosporidium parvum* oocysts, *Giardia duodenalis* cysts, *Escherichia coli*, *Clostridium perfringens* spores and adenovirus was conducted in three large rivers in France used for recreational activities and as a resource for drinking water production. Fifty-liter river water and one thousand-liter tap water samples were concentrated using hollow-fiber ultrafiltration and analyzed by molecular biology or laser-scanning cytometry.

In order to evaluate watershed land use influence on microorganism concentration changes, occurrence and seasonality of microorganisms were studied. The highest concentrations of protozoan parasites and *C. perfringens* were found for one of the three sites, showing a high proportion of agricultural territories, forests and semi-natural environments, which may be partly attributable to soil leaching due to rainfall events. On the contrary, the highest concentrations of adenoviruses were found at the two other sites, probably due to strong urban activities.

Health risk assessment was evaluated for each waterborne pathogen regarding exposure during recreational activities (for a single or five bathing events during the summer). The calculated risk was lower than 0.5% for parasites and varied from 1% to 42% for adenovirus.

A theoretical assessment of microorganism removal during the drinking water treatment process was also performed, and it showed that an absence of microorganisms could be expected in finished drinking water. This hypothesis was confirmed since all tested tap water samples were negative for each studied microorganism, resulting in a risk for drinking water consumption lower than 0.01% for parasites and lower than 0.5% for adenovirus.



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