

# EMERGING DISINFECTION BY PRODUCTS (DBPS): CHLORATE IN ITALIAN DRINKING AND SWIMMING POOL WATERS

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**Background and Aims:** Chlorate is a disinfection by-product (DBP) originating from chlorine dioxide water disinfection, which can be a contaminant of sodium hypochlorite solutions as well. Due to its not yet well investigated genotoxic and carcinogenic potential effects, it is considered, together with other DBPs, an emerging DBP for which further research on occurrence levels and toxicological properties is a prior need.

The aim of this study was to evaluate in some Italian regions the potential exposure to chlorate via drinking water of the general population and of a specific population (swimmers).

**Methods:** Chlorate levels were investigated in drinking water samples collected from 12 waterworks located in Emilia-Romagna, Friuli Venezia Giulia and Lombardia Regions. To investigate spatial and seasonal variability, different water samples (n.194) were collected at different points along the distribution system and over four seasons. In the same period 20 swimming pools in the Emilia-Romagna Region were investigated for the occurrence of chlorate in water pools. Chlorate analysis was performed by ion chromatography (detection limit: 1 µg/l).

**Results:** Chlorate occurred in 97% of the drinking water samples, (median:18, range: 2-399µg/l) and resulted always below the provisional WHO guidelines (700µg/l). Nevertheless, significant differences in levels were observed according to disinfection methods, and the highest levels occurred in water disinfected both with chlorine dioxide and ozone (median:163, range:83-399µg/l). No clear spatial or seasonal trends were observed. Swimming pool waters showed much more higher chlorate levels (median:4347, range: 5-19537µg/l) and significant differences according to disinfectant applied were also observed.

**Conclusions:** In the Italian investigated regions, chlorate appears to be widespread both in drinking and swimming pool waters; in the latter particularly high levels were observed in different settings. Swimmers are therefore a potentially highly exposed population subgroup: to evaluate health implications of this specific exposure pathway, however, further investigation is needed.