

What's in the Pool? A Comprehensive Identification of Disinfection By-Products and Assessment of Mutagenicity of Chlorinated and Brominated Swimming Pool Water

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Swimming pool disinfectants and disinfection by-products (DBPs) have been linked to human health effects, including asthma and bladder cancer, but no studies have provided a comprehensive identification of DBPs in pool water and related those DBPs to the mutagenicity of pool waters. We performed a comprehensive identification of DBPs using gas chromatography (GC)/mass spectrometry (MS) and disinfectant species in waters from public swimming pools in Barcelona, Spain, that disinfect with either chlorine or bromine, and we determined the mutagenicity (in the Ames assay) of the waters to compare to the analytical results. We identified more than 100 DBPs, including many nitrogen-containing DBPs that were likely formed from nitrogen-containing precursors from human inputs, such as urine, sweat, and skin cells. Many DBPs were new and have not been reported previously in either swimming pool or drinking waters. Bromoform levels were greater in the brominated vs. chlorinated pool waters, but many brominated DBPs were also identified in the chlorinated waters. The pool waters were mutagenic at levels similar to that of drinking water (1000-2000 revertants/L-eq in strain TA100 –S9).