Parabens from personal care products compromise drinking water disinfection

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Drinking water distribution systems (DWDS) are known to harbor biofilms, even after disinfection treatments, which constitute a source of planktonic bacteria that may remain in DW delivered through a consumer's tap. Nevertheless, the presence of parabens in DW is another problem, that may affect bacterial virulence and the susceptibility to chlorine, compromising DW disinfection. This work is the pioneer in evaluating the effects of methylparaben (MP) at concentrations found in DW on biofilm characteristics (culturability, density, viability, biofilm structure, and extracellular polymeric substances – EPS composition). Biofilm tolerance to chlorine disinfection was also evaluated. From a public health perspective and trying to understand the impact of parabens on the virulence of DW bacteria, bacteria isolated from biofilms were also characterized in terms of bacterial motility and production of virulence factors (protease and siderophores production, lipase and gelatinase activity). Dual-species biofilms formed by bacteria isolated from DW (*Acinetobacter calcoaceticus* and *Stenotrophomonas maltophilia*) were grown for 7 days on polypropylene (PPL) and high-density-polyethylene (HDPE) coupons in the absence and presence of 150 ng/L and 15000 ng/L of MP. After that, biofilms were treated with free chlorine solutions at 5 and 50 mg/L for 30 min. MP (15000 ng/L)-exposed dual-species biofilms formed in PPL were significantly more tolerant to chlorine action than non-exposed counterparts, halving the logarithmic CFU/cm^2 reduction values. Moreover, it was found that exposure to MP potentiated the virulence of *S. maltophilia* through the increase of swimming motility (141%), and gelatinase (41%) and protease production (73%). Therefore, MP is a pollutant of concern, whose presence in DW can

compromise chlorine efficacy and increase the virulence of DW bacteria, especially in systems containing PPL. These results contribute to the prioritization of parabens in DW, anticipating potential microbiological-related public health concerns from the presence of parabens in DW.