

Inhalation exposure to haloacetic acids and haloketones during showering.

<http://www.ncbi.nlm.nih.gov/pubmed/12630474>

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Source

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Abstract

Inhalation exposure to haloacetic acids (HAAs) and haloketones (HKs) in contaminated drinking water occurs during showering. The size distribution of the aerosols generated by a shower was determined using an eight size-range particle counter, which measured particles from 0.1 to >2 microm. An exponential increase in aerosol numbers was observed while the shower water was on, while the aerosol numbers declined exponentially once the water was turned off. The half-lives of the shower aerosols were longer than 5 min after the shower water was turned off. Although the majority of the shower-generated aerosols were smaller than 0.3 microm, these aerosols only contributed approximately 2% to the measured total aerosol mass. The total shower-generated particulate HAA and HK concentrations collected on an open face filter were approximately 6.3 and 0.13 microg/m³, respectively, for shower water HAA and HK concentrations of 250 and 25 microg/L, respectively. The vapor-phase HK concentrations were 25-50 microg/m³. The estimate of the dose from inhalation exposure of disinfection byproducts (DBPs) in the particulate phase indicate that they represent less than 1% of the ingestion dose, so inhalation is not expected to be an important exposure route to nonvolatile water contaminants or the portion of volatile DBPs that stay in the particulate phase, unless the lung is the target organ. The vapor-phase levels of volatile HKs, though, are significantly higher and can contribute greater than 10% of the ingestion dose during a shower. Thus, risk assessment to these DBPs needs to consider the inhalation route.

PMID:

12630474

[PubMed - indexed for MEDLINE]