Toxicol Appl Pharmacol. 2002 Oct 1;184(1):19-26.

Percutaneous absorption of trihalomethanes, haloacetic acids, and haloketones. http://www.ncbi.nlm.nih.gov/pubmed/12392965

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Source

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Abstract

Bathing in chlorinated drinking water causes significant exposure to potentially toxic disinfection by-products (DBPs). In the present studies, we measured the permeation coefficients (K(p)) of three important classes of DBPs, trihalomethanes (THMs), haloketones (HKs), and haloacetic acids (HAAs), in aqueous solution across human skin using in vitro diffusion chambers. Linear mixed-effects model was utilized to calculate the steady-state permeability coefficients. The permeability coefficients of THMs ranged from 0.16 to 0.21 cm/h when the donor solution was at 25 degrees C. Bromoform had the highest K(p) value, while chloroform was the least permeable through the skin. THMs were approximately 10 times more permeable than HKs, while the permeability of HAAs through the skin was very low (1 to 3 x 10(-3) cm/h, pH 7). The permeability of HKs tripled as the temperature was increased from room temperature (20 degrees C) to bathing temperature (40 degrees C). A direct relationship was found between the permeability of THMs, but not HKs and HAAs, and their octanol/water partition coefficients. The dermal dose from daily bathing activities was approximated for an average adult using U.S. EPA recommended methods and found to be 40-70% of the daily ingestion dose for the THMs, 10% of the ingestion dose for HKs, and an insignificant percentage of the ingestion dose for the HAAs. In addition to ingestion, dermal absorption is an important route of exposure to THMs and HKs and must be considered in models of risk assessment.

PMID:
12392965
[PubMed - indexed for MEDLINE]