

Bladder Cancer and Exposure to Water Disinfection By-Products through Ingestion, Bathing, Showering, and Swimming in Pools

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Received March 27, 2006.

Accepted June 8, 2006.

Abstract

Bladder cancer has been associated with exposure to chlorination by-products in drinking water, and experimental evidence suggests that exposure also occurs through inhalation and dermal absorption. The authors examined whether bladder cancer risk was associated with exposure to trihalomethanes (THMs) through ingestion of water and through inhalation and dermal absorption during showering, bathing, and swimming in pools. Lifetime personal information on water consumption and water-related habits was collected for 1,219 cases and 1,271 controls in a 1998–2001 case-control study in Spain and was linked with THM levels in geographic study areas. Long-term THM exposure was associated with a twofold bladder cancer risk, with an odds ratio of 2.10 (95% confidence interval: 1.09, 4.02) for average household THM levels of >49 versus ≤8 µg/liter. Compared with subjects not drinking chlorinated water, subjects with THM exposure of >35 µg/day through ingestion had an odds ratio of 1.35 (95% confidence interval: 0.92, 1.99). The odds ratio for duration of shower or bath weighted by residential THM level was 1.83 (95% confidence interval: 1.17, 2.87) for the highest compared with the lowest quartile. Swimming in pools was associated with an odds

ratio of 1.57 (95% confidence interval: 1.18, 2.09). Bladder cancer risk was associated with long-term exposure to THMs in chlorinated water at levels regularly occurring in industrialized countries.