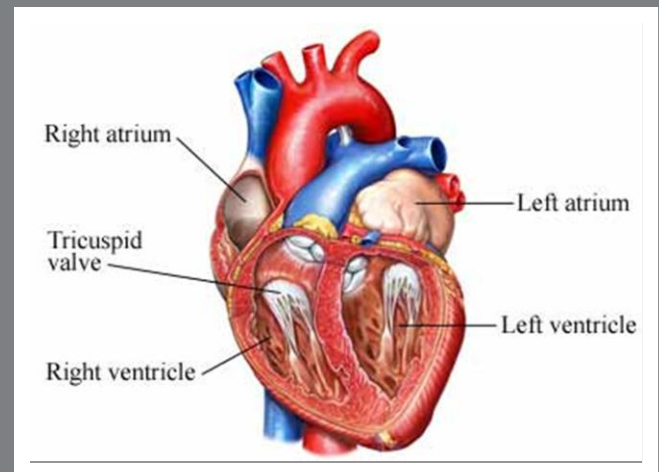


Drinking water chlorination and adverse birth outcomes in Taiwan

Toxicology, Volume 198, Issues 1-3, 20 May 2004, Pages 249
- 254, Chun-Yuh Yang

Chlorination has been the major strategy for the disinfection of drinking water in Taiwan. The use of chlorinated water has been hypothesized to lead to several adverse birth outcomes, including low birth weight and preterm delivery. We have performed a study to examine the relationship between the use of chlorinated water and adverse birth outcomes in Taiwan. The study areas included 113 "chlorinating municipalities" (CHMs) (which were defined as municipalities in which more than 95% of the municipality population was served by chlorinated water) and 15 "non-chlorinating municipalities" (NCHMs) (defined as municipalities in which less than 5% of the municipality population was served by chlorinated water). The study population comprised 182,796 women residing in the 128 municipalities who had a first parity singleton birth between 1 January 1994 and 31 December 1996, and for which complete information on maternal age, education, gestational age, birth weight, and sex of the baby were available. The results of this study suggest that there was an association between the consumption of chlorinated drinking water and the risk of preterm delivery.



Chlorination Byproducts and Nitrate in Drinking Water and Risk for Congenital Cardiac Defects

Environmental Research, Volume 89, Issue 2, June 2002, Pages 124-130, Marie I. Cedergren, Andres J. Selbing, Owe Lofman, Bengt A.J. Kallen

Drinking water disinfection byproducts have been associated with an increased risk for congenital defects including cardiac defects. Using Swedish health registers linked to information on municipal drinking water composition, individual data on drinking water characteristics were obtained for 58,669 women. Among the infants born, 753 had a cardiac defect. The risk for a cardiac defect was determined for ground water versus surface water, for different chlorination procedures, and for trihalomethane and nitrate concentrations. Ground water was associated with an increased risk for cardiac defect when crude rates were analyzed but after suitable adjustments this excess rate was found to be determined by chlorination procedures including chlorine dioxide. Chlorine dioxide appears itself as an independent risk factor for cardiac defects. The risk for cardiac defects increased with increasing trihalomethane concentrations. There was an indicated but statistically non-significant excess risk associated with nitrate concentration. The individual risk for congenital cardiac defect caused by chlorinated dioxide and trihalomethanes is small but as a large population is exposed to public drinking water, the attributable risk for cardiac defects may not be negligible.

Potential health effects of chlorine dioxide as a disinfectant in potable water supplies

Medical Hypotheses, Volume 4, Issue 5, September - October 1978, Pages 481-496, Gary S. Moore, Edward J. Calabrese, Salvatore R. DiNardi, Robert W. Tuthill

Chlorination of potable water supplies high in organics may yield carcinogenic compounds such as trihalomethanes. Chlorine dioxide has been proposed as an alternative disinfectant to chlorine. However, chlorine dioxide is a strong oxidant that forms significant amounts of chlorite when added to potable water supplies, and chlorite is similar to nitrite in its molecular structure and may be similar in its mechanism of methemoglobin production. Nitrites and chlorites are thought to act synergistically to produce MetHb. Neonates and persons with G-6-PD deficiency are likely to be unusually susceptible to MetHb formation from these compounds because their red cells lack the metabolic machinery to adequately protect against oxidant stress. Since male blacks represent the largest population in the U.S. to be G-6-PD deficient, Black male neonates may represent the group at highest risk to the use of chlorine dioxide as a disinfectant in the nation's water supplies.



Multi-route trihalomethane exposure in households using municipal tap water treated with chlorine or ozone-chlorine

Science of The Total Environment, Volume 339, Issues 1-3, 1 March 2005, Pages 143-152, Wan-Kuen Jo, Ki-Dong Kwon, Jong-In Dong, Yong Chung.

Accordingly, the present study was designed to obtain those data by measurements of the trihalomethane (THM) concentrations in the tap water and indoor and outdoor air in the two types of households, along with an estimation of THM exposure from water ingestion, showering, and the inhalation of indoor air. Chloroform was the most abundant THM in all three media, yet no bromoform was detected in any sample. Similar to previous findings, the winter chloroform concentration in tap water treated with chlorine was significantly higher than that in the tap water treated with ozone-chlorine. However, the summer water chloroform concentrations and summer and winter water concentrations of the other two THMs exhibited no significant difference between the chlorine and ozone-chlorine-treated water. It was suggested that the effects of the water parameters including biochemical oxygen demand of raw water entering water treatment plants should be considered when evaluating the advantage of ozone-chlorine disinfection for THM formation over chlorine disinfection. The indoor air THM concentration trend was also consistent with the water concentration trend. The indoor to outdoor air concentration ratios were comparable with previous studies. The THM exposure estimates from water ingestion, showering, and the inhalation of apartment indoor air when not in the shower suggested that, for residents living in the surveyed households, their exposure to THMs in the home was mostly associated with their household water uses. The THM exposure estimates from tap water ingestion were similar to those from showering.