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Relationship of Drinking Water Disinfectants to Plasma Cholesterol and Thyroid Hormone Levels in Experimental Studies

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Abstract

The effects of drinking water containing 2 or 15 ppm chlorine (pH 6.5 and 8.5), chlorine dioxide, and monochloramine on thyroid function and plasma cholesterol were studied because previous investigators have reported cardiovascular abnormalities in experimental animals exposed to chlorinated water. Plasma thyroxine (T4) levels, as compared to controls, were significantly decreased in pigeons fed a normal or high-cholesterol diet and drinking water containing these drinking water disinfectants at a concentration of 15 ppm (the exception was chlorine at pH 6.5) for 3 months. In most of the treatment groups, T4 levels were significantly lower following the exposure to drinking water containing the 2 ppm dose. Increases in plasma cholesterol were frequently observed in the groups with lower T4 levels. This association was most evident in pigeons fed the high-cholesterol diet and exposed to these disinfectants at a dose of 15 ppm. For example, after 3 months of exposure to deionized water or water containing 15 ppm monochloramine, plasma cholesterol was 1266 +/- 172 and 2049 +/- 212 mg/dl, respectively, a difference of 783 mg/dl. The factor(s) associated with the effect of these disinfectants on plasma T4 and cholesterol is not known. We suggest however that these effects are probably mediated by products formed when these disinfectants react with organic matter in the upper gastrointestinal tract.

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