COMPARISON OF TOXICITY INDUCED BY IODINE AND IODIDE IN MALE AND FEMALE RATS

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In risk assessments the various forms of iodine have been treated as if they were toxicologically equivalent. While iodide (I^-) and iodate (IO_3^-) have been studied, no studies concerned with the subchronic toxicity of iodine (I_2) have been conducted in experimental animals. This study examined toxicities associated with iodine. Rats were treated with 0, 1, 3, 10, and 100 mg/l of either iodine or iodide (as NaI) in the drinking water for 100 d. Treatment had no effect on body, brain, or heart weights in either sex, or on testes weights in male rats. Although differences in kidney and liver weights were noted, they did not appear to be treatment related. Thyroid weight in male rats was significantly increased with an increasing concentration of iodide in the water, but not iodine. In contrast, thyroid weight decreased at the highest dose of iodide in female rats. Hematocrit, hemoglobin, and blood urea nitrogen (BUN) values were relatively constant and did not vary with treatment. There were no significant differences in AST, ALT, cholesterol, and triglyceride values. After 10 d on treatment a dose-related trend in increased plasma T_4 concentrations was observed in both sexes treated with iodine. Statistically significant increases in the T_4/T_3 ratio in both sexes was also noted with iodine treatment. This increase was maintained for 100 d of treatment. Iodide did not produce this effect at 10 d. Although there was a significant increase in T_4/T_3 ratios in female rats after 100 d of treatment with iodide, the magnitude of the changes was smaller than that observed with iodine treatments. The results of this study indicate that iodine and iodide affect thyroid hormone status in substantially different ways.

INTRODUCTION

Iodine is an essential element that is necessary for normal thyroid function. Iodine from dietary sources is used in the synthesis of thyroxine (T_4) and triiodothyronine (T_3) within the thyroid gland (Vagenakis and Braverman, 1975). The ingestion of iodine in foods, drugs, and water can have profound effects on the thyroid status of individuals.

The use of iodine as a drinking water disinfectant for short periods of time is well established. It is frequently used by backpackers and other recreationists where potable water is not immediately available (Zemlyn et al., 1981). U.S. Army troops have used iodine as a disinfectant in the past by adding purification tablets to water from various sources (Mor-

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