

ing the scanning interval, biological decay might contribute to the loss of activity.

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The Usual Dose of I-131 Used to Ablate Thyroid

For the ablation of a thyroid remnant after bilateral subtotal thyroidectomy for differentiated carcinoma, the usual dose of I-131 is 50-100 mCi (1). Since 1973, however, we have failed to ablate thyroid remnants in three of six patients who received 75-100 mCi of I-131. We infer thyroid ablation from the absence of visible uptake in the neck in an Anger-camera scintiphoto, either 24 hr after the oral administration of a 100- μ Ci dose of I-131, or 30 min after intravenous injection of 5 mCi of pertechnetate. The surgical remnants in our patients were not unduly large, and thyroid uptake was maximally stimulated in five patients by the intramuscular injection of bovine thyrotropin* for 3 or 4 consecutive days. Such a failure of ablation is illustrated in Fig. 1.

Of the three patients in whom the thyroid remnant was successfully ablated, two had been treated with a low-iodine diet and furosemide for 3 days before the therapeutic dose of I-131; one of these patients, who had a functional bone metastasis, received 150 mCi of I-131.

In 1969 we determined the 24-hr uptakes of radioactive iodine (RAIU) in 44 euthyroid subjects (2). In contrast to the normal range of 15-45% quoted in the literature, our normal range was 0-24%. The urinary iodine of 351 ± 290 μ g/24 hr (mean \pm s.d.) and iodine kinetic studies in these subjects were compatible with a high intake of dietary iodine. In 1974 the mean RAIU value obtained in nine clinically euthyroid subjects was $9.7 \pm 4\%$. Urinary excretion of iodine determined in 15 euthyroid subjects ranged from 205 to 1,124 μ g/24 hr; the mean value (571 ± 383 μ g/24 hr) was significantly higher than mean values obtained in 1969 ($p < 0.05$). Direct chemical analysis of diets, blenderized without added salt, showed that they contained from 246 to 1,531 μ g of iodine/day (3).

The increasing dietary iodine is not limited to the La Crosse, Wisconsin area. In 1969 the average U.S. diet contained 150 μ g/day. By 1974 the average was estimated to be 450 and 382 μ g/day in males and females, respectively. All available data suggest that the levels of iodine in the American diet have increased since 1970, and with the addition of iodized salt may reach 1,050 μ g/day (4).

The increase in dietary iodine has affected the RAIU in hyperthyroid patients as well as euthyroid subjects. Despite reestablishment of the normal range, the RAIU in our laboratory is currently "normal" in 14% of patients with Graves' disease and in 80% of patients with toxic nodular goiter (5).

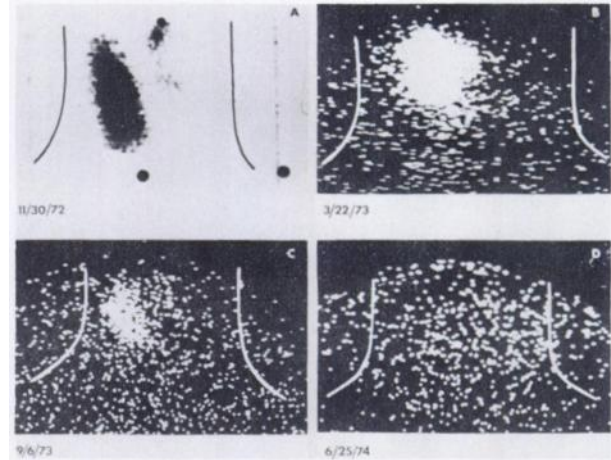


FIG. 1. (A) Scintigram of thyroid 24 hr after oral administration of I-131. Large nonfunctional mass is present in left lobe of thyroid. (B) Scintigram of thyroid 30 min after i.v. administration of [^{99m}Tc] pertechnetate. Two months after surgical removal of left lobe, isthmus, and subtotal removal of right thyroid lobe, only remnant of right lobe remains. Triiodothyronine (Cytomel $^{\text{®}}$) therapy was discontinued 2 weeks prior to scanning to increase endogenous thyrotropin secretion. (C) Thyroid scintigram 8 months after administration of 80 mCi of I-131. Cytomel $^{\text{®}}$ was discontinued 3 weeks prior to scanning. Thyroid remnant remains. (D) Thyroid scintigram 9 months following second therapeutic dose, 150 mCi of I-131. Cytomel $^{\text{®}}$ therapy was discontinued 3 weeks before scanning. Thyroid remnant has disappeared.

In summary, the dietary iodine consumption in the United States is relatively high and continues to increase, with a consequent decrease of the thyroid clearance of iodine and release of inorganic iodine from the thyroid gland. Although the number of cases is small and the evidence is indirect, we believe that the "autoregulatory" mechanisms, which are independent of thyrotropin concentration, decrease the uptake of I-131 by a thyroid remnant and are probably the most important factors in the failure to ablate postsurgical thyroid remnants.

In view of these findings, a low iodine diet and diuretic augmentation of I-131 uptake as recommended by Hamburger (6) deserve further study.

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FOOTNOTE

- * Thyropar $^{\text{®}}$, Armour Pharmaceutical Co., Phoenix, AZ.

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