Purified human thyroglobulin (TG) was iodinated by the method of Hunter and Greenwood, and specific activity of 2 to 4 mCi/mg was achieved. As to the quality of this \(^{131}\)I-TG, more than 95% of radioactivity was found migrated into interalpha globulin region by paper electrophoresis, and hydrolytic products showed less than 10% radioactivity in T\(_3\) and T\(_4\) region by paperchromatography.

Ten to 150 \(\mu\)Ci of the label (2–100 \(\mu\)gTG) was injected i.v. into 5 patients with thyroid diseases, and anti-TG antibodies and a normal control.

They were given 30 mg oral dose of iodide prior to and throughout the examination. Whole body, serum and urinary radioactivity were measured at varying time intervals up to 168 hours.

Whole body radioactivity distribution at 4 and 24 hours after injection of \(^{131}\)I-TG was mainly noted over the region of the liver and kidney, and any significant difference between hypothyroid patient and normal was not observed.

Whole body retained radioactivity was reduced by half at 30 hours in the normal. In patients it tended to decline more rapidly and untreated Hashimoto’s disease, Graves’ disease and Hypothyroidism were found to excrete half of the injected dose by 12, 15 and 24 hours, respectively. The difference was much greater in the serum radioactivity clearance. Even in a hypothyroid patient (BMR-18%), more than half was disappeared within 2 hours but it took 4 hours in normal. Paper electrophoretic analysis also revealed marked differences. Most of serum radioactivity in hypothyroid patient was associated with \(\gamma\)-globulin fraction from the beginning. On the contrary, any significant radioactivity was not observed in the \(\gamma\)-globulin fraction of normal up to 2 hours. On paperchromatography, normal serum was slowly decreased in radioactivity at 24 hours and even at 168 hours 32% was still recovered at the origin. On the other hand in a hypothyroid patient, origin radioactivity was rapidly decreased within 24 hours, and only 10% was recoverable from origin component.

Components of labeled metabolites found in urine was largely iodide (70%) in both normal and hypothyroid patient. Surprisingly quick binding of \(^{131}\)I-TG with \(\gamma\)-globulin (probably anti-TG) was observed in patients with anti-TG and this was considered to be responsible for the rapid clearance from serum.