Separation of products. Thyroxine: The reaction mixture was diluted with 7-8 ml of distilled water to precipitate the labeled thyroxine, which was separated by centrifugation and washed several times with water and finally dissolved in diluted alkali. Triiodothyronine: After treated as well as thyroxine, the final purification of it was paperchromatographically to separate labeled thyroxine which was contained in the reaction mixture.

The band of triiodothyronine of filter paper was detected by an autoradiography and triiodothyronine was eluted from this band with 0.04N NaOH. Diiodotyrosine, Monoiodotyrosine: Purifications were done by paperchromatographies.

The identifications of labeled products took place by paperchromatographies in three different solvents and high voltage paper-electrophoresis. In addition to these, thyroxine and triiodothyronine were also confirmed by recristalization.

The specific activity of labeled product was 3-3.5 mCi/mg in thyroxine or triiodothyronine, 4-4.5 mCi/mg in diiodotyrosine or monoiodotyrosine, when 5 mCi of ^{125}I or ^{131}I and 1 mg of substrate compound were used for the starting material.

This labeling method has benefits to previous methods in the following respects; good yield, stability, facility and needlessness of any particular apparatus. This method may be applicable to the preparation of not only thyroxine and its derivatives but also many other radioactive iodinated compounds.

Clinical Use of ^{99m}Tc Pertechnetate for Diagnostic Studies of the Thyroid Function

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The applicability of ^{99m}Tc pertechnetate as an agent for thyroid scanning and its metabolic behaviour were studied.

The ^{99m}Tc pertechnetate was obtained by the elution with hydrochloric acid from ^{99}Mo absorbed on an alumina column.

In 30 minutes after intravenous administration of 1 mC of ^{99m}Tc pertechnetate the thyroid uptake reached maximum, while in the case of oral administration it reached maximum after 3 hours.

A clear distinction between hyperthyroidism and euthyroidism or hypothyroidism was observed 30 minutes after intravenous administration and 3 hours after oral administration, respectively.

Good correlations between thyroid uptake of ^{99m}Tc after 30 minutes of its intravenous administration and those of ^{131}I after 30 minutes and 24 hours of its intravenous administration were found.

Thyroid 30-minutes uptake of ^{99m}Tc was well correlated to ^{131}I Triiodothyronine Resin Sponge Uptake (Triosorb test).

These uptake tests, therefore, are considered to be convenient for a quick diagnosis of hyper- and hypo- or euthyroidism.

Premedication of triiodothyronine supressed the trapping of ^{99m}Tc pertechnetate significantly; and oral administration of potassium thiocyanate revealed the instant depletion of trapped ^{99m}Tc from the thyroid.

Throid 24-hours uptake of ^{131}I depended upon the amount of iodine intake, that is, it was decreased in the case of daily iodine intake over 500 μg.

On the other hand, 30-minutes (intravenous) or 3-hours (oral) uptake of ^{99m}Tc was almost indifferent to the amount of iodine intake which was shown by determination of urinary iodine excretion.

The ^{99m}Tc pertechnetate produced significantly better thyroid scans with excellent resolution than ^{131}I after 30 minutes of its intravenous administration and after 3 hours of its oral administration.

The advantage of the ^{99m}Tc pertechnetate appeared to be due to its physical characteristics, that is, short half life of 6 hours and pure gamma emission of 140 KeV.