Determination of Trace Elements in Human Thyroid Glands by Activation Analysis

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Estimations of iodine, bromine, copper and manganese were made in a series of diseased and normal thyroid glands removed surgically and also in sera from the same patients.

A irradiation was performed in TRIGA-II reactor for 1 hour at a neutron flux of about 4×10^{12} n. cm^{-2}. sec^{-1}. For the determination of I and Br in samples, induced ^{128}I and ^{82}Br were extracted with organic solvents and precipitated as $Ag^{128}I$ or $Ag^{82}Br$ with $AgNO_3$ solution. A new organic solvent extraction method for rapid radiochemical separation of ^{64}Cu and ^{56}Mn was proposed. Assay of ^{128}I, ^{82}Br, ^{56}Mn and ^{64}Cu was made by γ-ray spectrometry.

The contents of I and Br in thyroid adenomas were lower than in normal thyroid tissue. The content of Mn in thyroid adenomas did not differ from that of the normal tissue, while Cu content was in a lower level.

The Mn content in adenocarcinomas was raised, while the Cu content slightly decreased.

The content of Mn in thyrotoxicosis increased, but the Cu content appeared to decrease.

For the interpretation of these data, further studies are necessary including nucleic acids determination, protein determination and histopathological observations in various thyroid diseases.

Double antibody method of radioimmunoassay for HTSH and its clinical applications

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Plasma TSH concentration was determined by radioimmunoassay using a highly purified HTSH for labelling with radioiodine (^{131}I or ^{125}I), a potent anti-HTSH serum and Human Thyrotrophin Research Standard A. The antibody-bound ^{131}I or ^{125}I-HTSH was separated from the "free" by double antibody method with the addition of EDTA. The method was sensitive to detect as little as 0.2 μU (1.0 μU/ml) HTSH. The sensitivity was 250 times higher than that of the McKenzie bioassay. No significant effect was observed when HCG, HGH, FSH, ACTH and bovine TSH were assayed. Some effects were observed when more than 100 mg/ml of human γ-globulin was present in the double antibody system, but it was negligible for clinical application. The between assay reproducibility of serum HTSH assays was $\pm 3.5\%$ (S.D. of variation). Recovery of HTSH-R-STD-A added to the