Studies on the Effects of Antithyroid Drugs on ^{131}I Metabolism in Human Body Using a Whole Body Counter

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It is important to study the distribution of ^{131}I in human body and the effects of several antithyroid drugs on it for the purpose of the protection against radiation hazards in accidental exposures of radioiodine.

At the beginning of the present study, a tracer dose of ^{131}I was orally administered to each of a normal male subject and a female hyperthyroid patient. Then, profile scannings were daily carried out for periods of 7 to 10 days by a whole body counter which is composed of two 8 in. $\phi \times 4$ in. NaI (Tl) crystals and 3mm lead lined 20cm iron shield. The thyroidal uptake of ^{131}I was measured by an usual method simultaneously with the profile scanning.

Each antithyroid drugs such as NaI, Methylmercaptoimidazole (Mercazol) and KCNS was orally administered with ^{131}I at intervals of a month in same subjects and the above procedures were repeated.

The results can be summarized as follows:

(1) Each of the drugs investigated was found to inhibit the thyroidal uptake of ^{131}I in the normal subject. However, there was no evident inhibition in the hyperthyroid patient.

(2) When NaI or Mercazol was given, the activity of ^{131}I in the abdominal region of the normal subject was higher than that of normal control, whereas it was lower in the treatments in the hyporthyroid patient.

These findings suggest that NaI or Mercazol yield the increase of extrathyroidal iodine by such mechanism as secretion to saliva and gastric juice and absorption from the intestine, and that KCNS accelerate the renal excretion of extrathyroidal iodine. It may be useful to give KCNS with NaI or Mercazol to the subjects accidentally contaminated by radioiodine to reduce the radiation to the thyroid gland and to the total body.

IX. Metabolism

Autoradiographical Studies on Amino Acid Metabolism in Dermatological Field (Report 1)

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The patterns of amino acid incorporation of the normal, hyperkeratotic and parakeratotic skins were studied autoradiographically, using ^{3}H-methionine, ^{3}H-glycine, ^{3}H-valine.

The specimens from the normal skin, the skin of ichthyosis (hyperkeratotic) and that of psoriasis vulgaris (parakeratotic) were incubated in the Eagle's solution added with

one of the labeled amino acid at 37°C for one to six hours. Then they were examined autoradiographically by the stripping method. The labeling by the labeled amino acids was observed over all layers of the skin. However, the labeling by ^{3}H-Methionine or ^{3}H-glycine in the normal skin was more dense in the upper spinous layer than in the other layers. While the labeling by ^{3}H-valine was more dense in the lower spinous layer. The skins of ichthyosis and psoriasis vulgaris showed, on the contrary, more dense distribution of the silver grains in the upper spinous layer by all labeled amino acids used in this study. The labeling of the skin of Ichthyosis by ^{3}H-glycine was particularly dense directly under the cornified layer. From our results it was concluded that the incorporation of amino acids was different in each layer. Accordingly it was postulated that the synthesis of proteins were also different in each layer.

Autoradiographic Studies on Metabolism of Amino Acids in Dermatology (Report 2)

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Fragments of human fetal skins (12-16 weeks) were maintained in vitro under the similar technique to Leighton's, in order to study the keratinization. Both kinds of nutrient media were used, namely YLH sol. (10% horse serum) and Eagle's medium (25% cow serum, 10% chick embryo extract). The explants were fixed and investigated, morphologically and autoradiographically by stripping film technique, periodically after cultivation.

1) The explants cultured in YLH, showed mitotic figures in basal layer, even in 4 week's maitenance, but no signs of keratinization.

2) On the other hand, the explants in Eagle's medium exhibited successful epidermal growth and keratinization. The growth of epidermal cells had the highest peak in thickness, in five days, when keratohyaline granules and intercellular bridges appeared.

3) At 7th day in vitro (in Eagle's medium), the incorporation of ^{3}H-thymidine restricted on nuclei of the basal layer and those of cells in the supra-basal layer. If synchronization of cell cycle, caused by physical effects e.g. lower temperature or cell injury, could be avoided, the labeling index (L.I.) was calculated about 30%. On the assumption that synthesising time (T) is about 7 hr., the generation time (G) was considered to be determined as following,

$$G_t = \frac{100}{L.I.} \times T_s = 23\text{hr}$$

4) As 5th day of cultivation, the labeling of ^{35}S-cystine and ^{3}H-glycine which were applied on each explants for 8 hr. were seen over the granular, prickle and basal layers, especially with a greater intensity over the upper layer. The autoradiograms of ^{3}H-tyrosine and ^{3}H-methionine showed the similar results, but somewhat scanter than mentioned above. The labeling of radioactive amino acids, such as ^{3}H-valine and ^{3}H-leucine were diffusely observed in all three layers.