

Sex Differences in Blocking Thyroid Radioiodine Uptake in Mice

Sex differences in thyroid gland function and thyroid-gonadal relationships are still a subject of interest to clinicians and experimental workers. These questions are of fundamental and clinical importance, since many problems have not yet been solved, e.g. higher incidence of thyroid gland diseases in women.

Amongst euthyroid persons, higher radioiodine uptakes in the thyroid gland of women have been reported^{1,2}, no differences³, and also higher uptakes in men⁴. In female rats an insignificantly higher uptake was found than in males⁵. In female rats, the radioiodine uptake is higher in early estrus and in estrus than in other phases of the cycle⁶. Reports on the effect of estrogen application and of castration are conflicting.

We intend to contribute to this still open question with observation of sex differences in blocking the thyroid radioiodine uptake in mice by desiccated thyroid and thyroxine.

We used white mice of strain H weighing 20–35 g (in 1 experiment the weights did not exceed a difference of 10 g), fed standard laboratory diet (Larsen) and water ad libitum. To estimate the thyroid radioiodine uptake we administered 0.1 μCi ^{131}I (in the form of KI, USSR) in 0.5 ml physiological saline i.p. 4 h later we sacrificed the animals by coal-gas, removed the thyroid glands with the trachea and after homogenization by boiling in 3 ml 10% NaOH measured simultaneously with the ^{131}I standard in a well-type scintillation detector Tesla. The results are expressed in percentages of the dose administered. Mean values of groups were compared using the appropriate form of the *t*-test after evaluation of differences of variation by the *F*-test⁷.

We followed the sex differences in the effect of blocking the thyroid radioiodine uptake in 3 experiments on a total

of 152 mice. The results with statistical evaluation are given in the Figure.

In the first experiment we measured the radioiodine uptake in the thyroid glands of 48 intact control mice (21 males and 27 females) and 46 mice fed desiccated thyroid (7 days, 0.2% in the diet; 24 males, and 22 females). Mean values of radioiodine uptake of the control groups of males and females are nearly identical, whereas the mean values of males and females fed desiccated thyroid differ significantly, being higher in the latter group ($p < 0.01$).

In 2 other experiments we studied the blocking effect of thyroxine in daily doses 25 μg s.c. in 0.1 ml of saline. In the first of these experiments we administered 4 daily doses to 7 males and 7 females, control groups (6 males and 7 females) were given 0.1 ml of saline daily, s.c. There are no significant differences in these series.

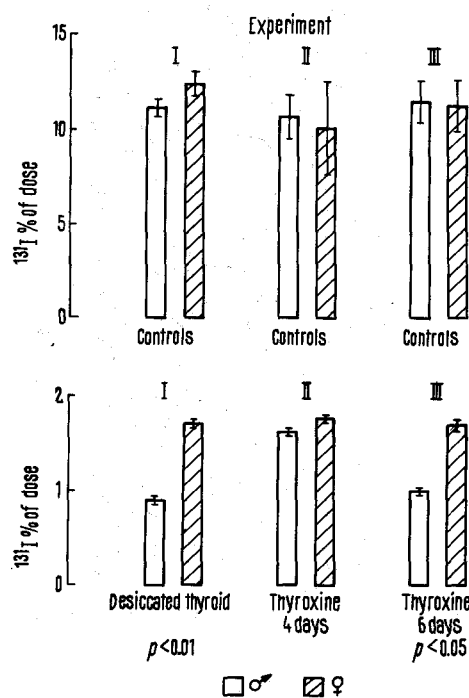
In the third experiment we administered the same dose of thyroxine 6 days before to 8 males and 7 females, control groups (7 males and 9 females) received again the same volume of saline. In this experiment the concentrating ability of the thyroid gland for radioiodine remains higher in females than in males ($p < 0.05$).

It is obvious that sex differences in the thyroid gland function exist. In the material presented, there have been no differences between the control groups of male and female animals demonstrated. However, after 7 days administration of desiccated thyroid and 6 days administration of thyroxine, the thyroid radioiodine uptake in female mice remained significantly higher than was the case of male animals. The relation in the concentrating ability for radioiodine in both sexes is therefore influenced by the administration of thyroid hormone. We have no explanation for this observation. Several possible mechanisms could be involved: (a) different degree of inhibition of TSH secretion, (b) different levels of exogenous thyroid hormone reached, (c) different sensitivity of thyroids to TSH under the respective experimental conditions and (d) some intrinsic differences in iodine concentrating mechanism manifested under these experimental conditions.

Zusammenfassung. Weibliche und männliche Mäuse unterscheiden sich nach Vorbehandlung mit Schilddrüsenhormonen in der Aufnahme von Jod-131.

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Sex differences in blocking the thyroid radioiodine uptake in mice by desiccated thyroid or thyroxine. Mean values of ^{131}I uptake in percentages of dose. Verticals: \pm S.E.M.

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