Comparative Studies on the ^{125}I Uptake of the Thyroid and Thymus

The thymus and the thyroid gland derive from the foregut. While the function of the thyroid is highly specialized, the thymic epithelium shows very little specificity[1], which is why its participation in different functions seems to be proved[2,3]. Thus it might take part in the regulation of Ca metabolism as well as in the uptake of iodine, as demostrated in our earlier experiments[2,3].

The thyroid acquires its iodine-accumulating capacity in the course of phylogenesis, while developing from an intestinal area which is capable of non-specific iodine uptake[4,5]. It appears at the same time that the epithelium, which develops from other neighbouring areas, retains also its ability to incorporate iodine, as can be observed not only in the thymus but also e.g. in the salivary gland[6–8]. On the basis of this consideration it appeared reasonable to investigate the question whether the thymus, being an organ of foregut origin, might be able to incorporate larger quantities of iodine in the early phase of ontogenesis, than later in adult age.

Observations were made on 10 adult (200 g) male and 25 newborn Wistar CB rats. The doses of ^{125}I and the

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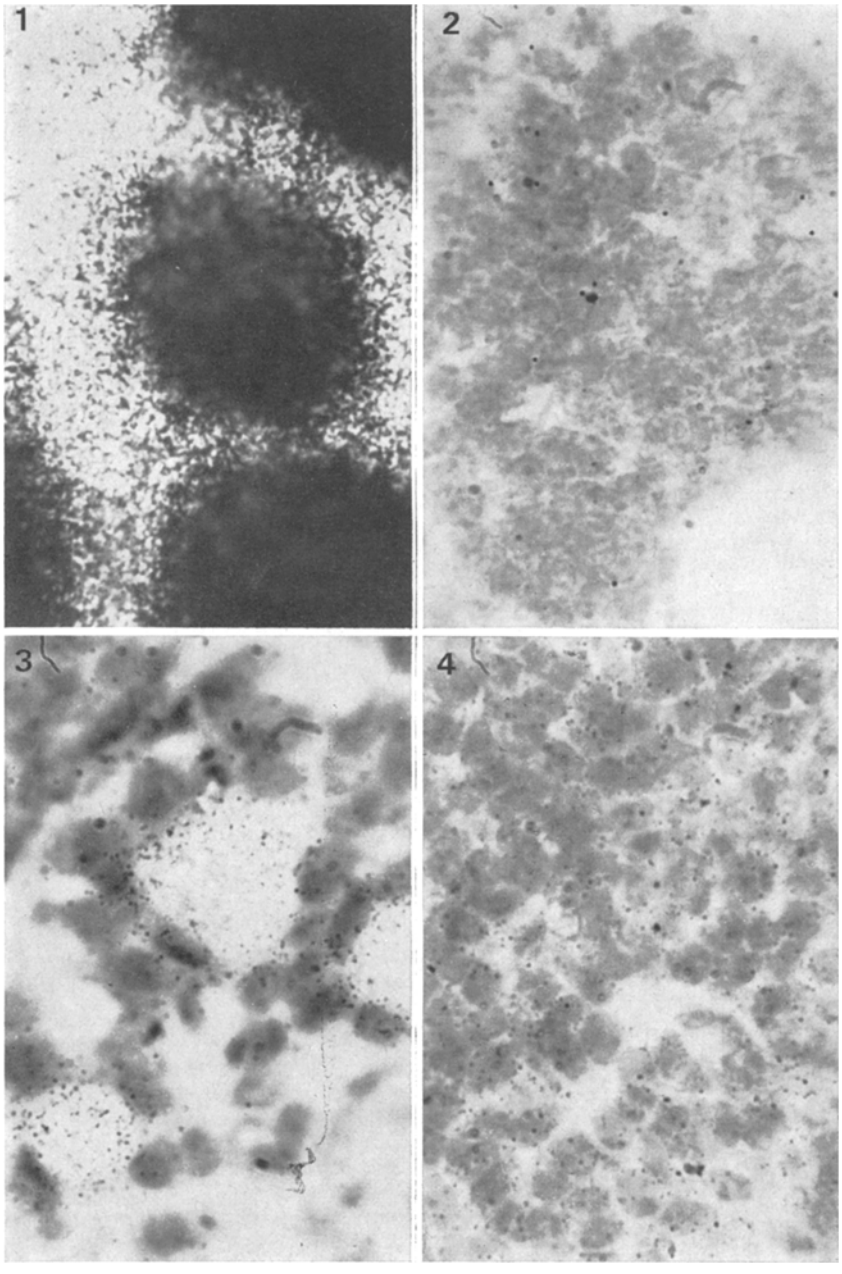

Fig. 1–4. Radioautograms of the thyroid and thymus, 2 h after the administration of ^{125}I. Toluidine blue-Azure A staining, subsequent to development. × 200. 1. Adult thyroid gland. Vast iodine accumulation in the acini. 2. Adult thymus. Iodine uptake in a few cells. 3. Newborn thyroid. Significant iodine accumulation in the acini, large quantity of grains above the follicular cells. 4. Newborn thymus. Large quantity of grains, firstly above the cells of the medulla.

Uptake of ^{125}I by the thyroid and thymus of newborn and adult rats

Group	Age	No. of animals	Dosis (μCi/animal)	Thyroid (cpm/mg)	Thymus (average)	Thymus/thyroid (%)
1	adult	10	20	19,499	17,8	0,09
2	newborn	10	20	92,170	5760	6,2
3	newborn	6	15	84,100	3780	4,5
4	newborn	9	2	14,930	730	4,9

quantitative results of the individual groups are presented in the Table. Organs were removed 2 h after administration of the isotope. Values of cpm are given per mg dry weight. Three different doses of isotope were tested in 3 groups of newborn animals, to ascertain whether or not the dose of isotope, being identical with that of the adult animals, resulted in the high iodine uptake of the thymus. The thymus and thyroid of groups 1. and 4. were fixed in glutaraldehyde and OsO_4 and after Durcupan embedding half-thin sections were prepared and covered with Kodak K_5 stripping film. Results of autoradiography are presented in the Figures 1–4.

Results of the experiments demonstrate clearly that the iodine uptake by newborn thymus is 50 to 60 times that of the adult thymus. Autoradiograms show that there is hardly any difference in the ^{125}I content of thymic and thyroid cells of newborn animals; the significant quantitative difference results from the fact that, while the thyroid gland accumulates the iodine in the lumen of acini, the thymus is unable to do so. Even so the iodine content of the thymus is 5% of the thyroid. Considering the difference between the weights of the two organs, the total incorporation of the thymus comes near to or even surpasses that of the thyroid. All these facts seem to indicate that the iodine uptake is a general capacity of the entoderm, or at least of the foregut, which becomes confined to the thyroid gland and specialized there in the course of ontogeny and differentiation.

Zusammenfassung. Es wird gezeigt, dass an erwachsenen und neugeborenen Ratten die Jodaufnahme des Thymus bei den letzteren viel höher ist als die Jodaufnahme der Thyroidea. Dies unterstützt die These, wonach die Jodspeicherkapazität der Thyroidea das Resultat einer Differenzierung darstellt, indem auf früherer ontogenetischer Stufe für den ganzen Vorderdarm eine Jodspeicherkapazität besteht.

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Temporary Displacement of Plasma Corticoid Circadian Peak Induced by Ablation of Olfactory Bulbs in Dog

Besides in humans and other mammals, circadian variations of plasma corticoids are present in dog[1]. Recently some of us have shown, using a mathematical model, that these variations have an acrophase at 07.00 h 24 min and a basal level of 9.30 ± 0.39 μg/100 ml[2].

Some lesions of nervous central system, as bilateral interruption of optic nerves[3–5], suprapontine brain ablation[6] or hypothalamic lesions[7] seem capable of modifying or abolishing ACTH and corticoids circadian variations in rats and mice. For the importance of the olfactory system to regulate numerous endocrine and vegetative functions, we have studied whether acute anosmia produced by surgical ablation of olfactory bulbs can modify the circadian variations of plasma corticoids in dogs.

Material and methods. Twelve 14–20 kg mongrel dogs, of whom 5 were males, were used in this study. All the animals were housed in individual dog-kennels artificially illuminated from 06.00 h to 21.00 h and kept dark from 21.00 h to 06.00 h. Food and drink were ad libitum. The animals were anesthetized with Nembutal, 30 mg/kg body weight i.p. Olfactory bulbs were removed by suction through a surgical skull window of the frontal sinus. Two mongrel dogs housed in identical periodicitiy dog-kennels were 'sham-operated', that is subjected to the same surgery but without suction of olfactory bulbs to see if skull or meningeal lesions of frontal area could modify adrenocortical activity.

After a period of acclimatization, and few days before surgery, plasma corticoid levels were studied at 4-h intervals, using a fluorometric assay[8]. At 30, 60 and 120 days after surgery, plasma corticoid levels were again studied following the same protocol.

When the experiments were concluded, the skulls were opened to control possible inflammatory or traumatic lesions of the brain and serial histological examinations were performed in all heads fixed in 10% formalin.

Results and discussion. Before surgery, plasma corticoid levels presented a maximum at morning decreasing slowly until evening. At 30 days after surgical ablation of olfactory bulbs, plasma corticoids presented a maximum at 20.00 h and a minimum at 08.00 h (Figure). After

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