MORPHOLOGY AND FUNCTION OF THE PITUITARY AND THYROID IN MICE WITH LOW AND HIGH SUSCEPTIBILITY TO CANCER

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The number of basophils in the central zone of the adenohypophysis and the height of the follicular epithelium of the thyroid gland are reduced in high-cancer lines A and DBA, just as in mice of the high-cancer line C3H. It is postulated that hypothyroidism plays an important role in the genesis of mammary gland carcinoma in all the high-cancer lines of mice investigated.

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Data concerning the role of hormones in the genesis of mammary gland carcinoma are few in number and conflicting in nature [1-4, 7, 8].

Investigations conducted in the Laboratory of Cytology have shown that the number of basophils of the thyrotropic series, and also the height of the follicular epithelium of the thyroid gland are considerably reduced by comparison with these parameters in mice of the low-cancer line C57BL [5, 6]. It is postulated that hypothyroidism plays an important role in the genesis of mammary gland carcinoma in C3H mice [6].

The object of this investigation was to study the morphology and function of the pituitary and thyroid gland of other mouse lines with a high incidence of spontaneous mammary gland carcinoma.

EXPERIMENTAL METHOD

Multiparous mice weighing about 30 g of the following lines were used in the experiments: C57BL (control), A, DBA, and noninbred females. The mice were used in the experiments only in diestrus. The pituitary glands were fixed with mercuric chloride-formol and embedded in paraffin wax. Sections 5 μ in thickness were stained by the McManus and Hotchkiss methods [1, 14] with slight modification. Cells were counted only in the central zone of the anterior lobe of the pituitary, 2000 cells being counted in each gland. Thyroids were fixed in Carnoy's fluid. Paraffin sections 5μ in thickness were stained with hematoxylin-eosin. The diameter of the follicles in central sections of the thyroid was determined by means of an ocular micrometer (mean of 60 follicles) and the mean height of the follicular epithelium (200 cells) was obtained.

EXPERIMENTAL RESULTS

The results (Table 1) show that the follicular epithelium of the thyroid was highest in C57BL mice (7.5 ± 0.41), and the highest percentage of thyrotropic basophils was also found in the central zone of the anterior lobe of the pituitary in these animals (9.0 ± 0.59). In both high-cancer lines of mice the height of the follicular epithelium and the number of thyrotropic basophils were significantly lower than in C57BL mice. The height of the follicular epithelium in the noninbred mice was lower than in mice of low-cancer lines

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TABLE 1. Height of Follicular Epithelium of Thyroid and Number of Basophils in Central Zone of Anterior Lobe of Pituitary in Mice of Different Lines

Line of mice	No. of animals	Height of follicular epithelium	P_1	No. of animals	No. of basophils in central zone of anterior lobe of pituitary (in ‰)	P
C57Bl (control)	7	7,5±0,41	—	7	9,0±0,59	—
A	8	6,6±0,31	<0,003	8	6,0±0,54	<0,0001
DBA	5	6,5±0,24	<0,007	4	7,5±0,19	<0,005
Noninbred	8	7,1±0,50	>0,3	8	6,5±0,97	<0,0001

* P denotes significance of difference between investigated line and control (C57BL).

but higher than in mice of high-cancer lines, i.e., it bore the same relationship as the incidence of spontaneous mammary gland carcinoma in these mice.

The simultaneous decrease in the height of the follicular epithelium and in the percentage of basophils in the central zone of the anterior lobe of the pituitary in mice of lines A and DBA suggests that the decrease in thyroid activity is due to changes in the hypothalamus and not in the pituitary.

Changes in the pituitary and thyroid detected in mice of lines A and DBA, similar to those previously found in C3H mice [5, 6], suggest identical mechanisms of genesis of mammary gland carcinoma in all three lines of mice. The pathogenetic role of the hypothyroidism demonstrated in these experiments in the genesis of mammary gland carcinoma is supported by clinical observations, showing that the incidence of carcinoma of the breast in patients with hypothyroidism is significantly higher than in patients with thyrotoxicosis [12, 13]. A number of investigations have shown that thryoidectomy stimulates the gonadotropic activity of the pituitary and increases the sensitivity of the reproductive organs to estrogens [9, 10, 15].

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