EFFECT OF TRANSPLANTED TUMORS ON THE THYROTROPIC FUNCTION OF THE PITUITARY

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Several investigators have found that tumor development in experimental animals and in patients is most frequently accompanied by inhibition of the functional activity of the thyroid [1-8]. Among the systems regulating thyroid function, the principal role belongs to the adenhypophysis, yet insufficient attention has been paid to the study of its participation in the depression of thyroid function in malignant disease. Only one paper concerned with this problem is known [1].

The object of the present investigation was to study the thyrotropic function of the pituitary in animals with transplanted tumors.

EXPERIMENTAL METHOD

Experiments were conducted on male albino rats and rabbits. The various series of rats were inoculated subcutaneously with Jensen's arcoma or sarcoma M-1. The rabbits were inoculated intratesticularly with a Brown–Pierce tumor. The thyrotropic function of the pituitary and the thyroid function of the animals were investigated.

The state of the thyrotropic function of the pituitary was assessed from the degree of the response reaction of the thyroid of sexually immature guinea pigs weighing 160-180 g. For this purpose the pituitary was removed from the rats and rabbits immediately after slaughter of the animals, fixed in anhydrous acetone for 3-4 days, dried in an exsiccator over anhydrous calcium chloride, and then homogenized in physiological saline. The pituitary suspension for investigation was injected in equal portions over a period of 3 days subcutaneously into recipient guinea pigs in a dose of 3 rats' pituitaries or 1 rabbit's pituitary per guinea pig. The receipient guinea pigs were sacrificed 100 h after the start of the test and their thyroids were fixed in Zenker formol. The material was embedded in celloidin-paraffin and sections were stained with azan. To analyze the structural reaction of the thyroids the height of the thyroid epithelium (250 cells) was measured with an ocular micrometer. The height index of the cells [9] was determined.

The state of the thyroid function in the control animals and the animals inoculated with the tumor was estimated from the absorption of radioactive iodine by the gland. For this purpose the solution of radioactive iodine was injected intraperitoneally in a dose of 1-2 μCi. The radioactivity of the thyroid was determined 4 h after injection of the isotope by means of a PS-5M "Volna" scintillation dosimeter and expressed as a percentage of the injected dose.

The numerical results were subjected to statistical analysis.

EXPERIMENTAL RESULTS

The dynamics of the state of the thyrotropic function of the pituitaries and of the iodine absorption by the thyroids of the control and experimental animals may be seen in the table.

The table shows that growth of the M-1 sarcoma was accompanied by depression of the uptake of radioactive iodine by the thyroid of the rats after the 5th day of the experiment. The thyrotropic function of the pituitary, however, remained at a high intensity during the first 10 days, but was weaker when tested on the 20th and 30th days of the experiment.

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State of Thyrotropic Function of the Pituitary and of the Thyroid Function in the Control and Experimental Animals

Group of animals, type of tumor, and days after inoculation	Number of animals	Thyrotropic function of pituitary		Thyroid function	
		height index of follicular epithelium (in μ)	P	uptake of I^{131} by thyroid (in % of dose)	P
Intact rats	25	8.708±0.114		51.4±2.7	
sarcoma M-1 5 days	22	9.498±0.143	<0.01	9.1±0.6	<0.01
10 "	20	9.265±0.153	<0.01	29.5±2.1	<0.01
20 "	18	6.955±0.118	<0.01	25.1±3.6	<0.01
30 "	15	7.375±0.090	<0.01	Not investigated	
Intact rats	21	8.708±0.114		32.4±2.61	
Jensen's sarcoma 10 days	18	8.412±0.120	<0.05	12.1±0.7	<0.01
Jensen's sarcoma 20 days	18	7.790±0.122	<0.01	12.1±1.23	<0.01
Jensen's sarcoma 30 days	16	6.920±0.101	<0.01	Not investigated	
Intact rabbits	18	8.520±0.138		28.1±2.5	
Brown–Pierce tumor 10 days	18	8.852±0.106	>0.05	14.4±1.2	<0.01
Brown–Pierce tumor 20 days	11	6.716±0.091	<0.01	13.2±2.2	<0.01

In the rats with a Jensen's sarcoma marked depression of the thyroid function also was observed starting from the 5th day after transplanation, although the thyrotropic function of the pituitary remained at the control level for 10 days, becoming weaker when tested 20 and 30 days after inoculation with Jensen's sarcoma.

The experimental results given in the table demonstrate that the depression of thyroid function observed on the 10th day of the experiment in the rabbits with a Brown-Pierce tumor took place despite the adequately high thyrotropic activity of the pituitary. Not until the 20th day was depression of the thyroid function accompanied by considerable weakening of the thyrotropic function of the pituitary.

It may thus be concluded from these results that depression of the thyroid function in animals with transplanted tumors develops against the background maintenance, or even of intensification, of the thyrotropic function of the pituitary. Consequently, the inhibition of thyroid function in the tumor-bearing animals was not due to a primary disturbance of the thyrotropic function of the pituitary. The weakening of the thyrotropic function of the pituitary in the late stage of growth of the transplanted tumors was not, evidently, of any definite importance in the reaction of the tyroid to the presence of the tumors.

Finially, in contrast to reports in the literature [1], the results of the present experiments revealed depression of the thyrotropic function of the pituitary in the late periods after transplantation of a tumor.

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