A METHOD OF OBTAINING ANIMALS WITH INCREASED BRAIN MASS

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The mass of the brain is one of the most important parameters characterizing the level of development of the nervous system and its functional capacity, and reflecting the position of the species on the evolutionary scale. Meanwhile, there is evidence that factors to which the animal is exposed throughout life may affect this parameter. It has been shown, for instance, that removal of the adrenals in rats leads to accelerated growth of their brain [3]. An "enriched" environment may act in the same way [1]. There is also evidence that growth of the brain may be delayed by blinding animals, by keeping them in darkness, or starving them [1, 2, 4]. If animals with an altered brain mass could be obtained this would provide a model with which to study many problems and, in particular, dependence of the functional capacity of the brain on its mass. Animals in which the mass of the brain is changed in the early postnatal period are evidently of particular interest, because it is in such animals that differences in learning ability and the development of different brain functions can be most conveniently studied, and these parameters compared with the growth dynamics of the brain.

We have developed a method of obtaining animals with increased brain mass (patent for invention awarded October 15, 1990, with priority from January 18, 1990; claim No. 4797549/14/009379), which is as follows. Under ether anesthesia the right ovary of rats aged 3-4 months is removed. Another 1.5-2 months later the unilaterally ovariectomized females are mated with intact males. Their 5-day-old offspring (studied in 12 litters, 111 young rats) differed from the control (studied in nine litters, 81 young rats) in a greater absolute brain mass (Table 1). The relative brain mass did not differ significantly in animals of the groups compared, for the rats of the experimental group had a greater body weight. The absence of significant differences in the relative brain mass, in our opinion, does not detract from the value of the model, for an increase in absolute mass of the brain also is interesting. A description of the model reveals yet another of its advantages: it can be used as a tool to analyze factors controlling brain growth in the early stages of ontogenetic development.

TABLE 1. Effect of Unilateral Ovariectomy in Female Rats on Brain Mass of their Offspring

Parameter	Males		Females	
	control (n = 39)	experiment (n = 58)	control (n = 42)	experiment (n = 53)
Body mass, g	9,2±0,2	11,3±0,14*	8,8±0,2	10,4±0,2*
Brain mass, absolute, mg	441±8,4	526±3,4*	407±7,7	505±4,8*
Relative, mg/g	48,8±0,69	47,3±0,46	47,9±0,71	49,5±0,76

Legend. *) Differences statistically significant.

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STRUCTURE AND FUNCTION OF THE THYROID GLAND AFTER THYMECTOMY

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The opinion has frequently been expressed in the literature that the thymus has a pathogenetic role in the development of diseases of the thyroid gland [1, 4]. At the beginning of this century satisfactory results of treatment of Basedow's disease by thymectomy were described [11]. However, experimental data on the effect of thymectomy on thyroid function are sporadic, in some cases the experiments were conducted by methods that are difficult to compare, and on animals of different species and age, besides which the times elapsing after the operation differed. These investigations confirm the view that it is unacceptable to describe interaction between the thymus and thyroid gland in terms of an "increase" and "decrease," for the processes concerned run a phasic course [2, 7, 9].

The aim of this investigation was to detect structural and functional changes in the thyroid gland after thymectomy on mature rats and to examine their time course.

EXPERIMENTAL METHOD

Experiments were carried out on 110 noninbred male albino rats weighing 120-130 g. Thymectomy was performed by the usual method [10]. The radical nature of the operation was confirmed visually and histologically. Intact animals and rats undergoing a mock operation served as the control. The mock operation included all the steps of thymectomy except the last stage, namely removal of the thymus. The animals for investigation were killed by decapitation in the winter period, at the same time of day, and 1, 2, 3, 6, and 12 months after thymectomy. Total concentrations of thyroxine (T_4) and tri-iodothyronine (T_3) in the blood serum were determined by the use of kits from "Byk-Mallinckrodt" (Germany) and kits of USSR/CIS origin for radioimmunoassay (Institute of Bioorganic Chemistry, Academy of Sciences of the Belorussian SSR – now Belarus' – Minsk). For morphologic investigation the thyroid gland was fixed in a 12% solution of neutral formalin and in Carnoy's fluid. Dewaxed sections were stained

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