

# TESTICULAR HYPERTROPHY AFTER AMPUTATION OF THE LOWER INCISORS IN RATS

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Repeated amputation of the lower incisors in rats during early postnatal development induces enlargement of the salivary glands and hypertrophy of the testes, accompanied by their more rapid differentiation. Testicular hypertrophy following this procedure is much more marked (76%) than after unilateral castration at the same age. Although repeated amputation of the lower incisors in adult animals is followed by hypertrophy of the salivary glands, it does not cause hypertrophy of the testes.

**KEY WORDS:** amputation of lower incisors; hypertrophy of the salivary glands; hypertrophy of the testes.

Repeated amputation of the lower incisors in rats is known to lead to hypertrophy of the submandibular salivary glands [1, 2, 5, 9, 10]. Results indicating that the processes of sexual maturation depend on the functional state of the salivary glands have recently been published [6-8]. In particular, removal of the salivary glands causes severe disturbances of spermatogenesis [8]. The effect of increased functional activity of the salivary glands on the testes, however, remains to be studied.

It was therefore decided to study the state of the testes during and after repeated amputation of the lower incisors, which induces not only hypertrophy but also hyperfunction of the submandibular salivary glands [9, 10].



Fig. 1. Enlarged testes of experimental rats (top row) compared with controls (bottom row).

## EXPERIMENTAL METHOD

In experiments on 104 noninbred male albino rats of different age groups the lower incisors were amputated five times, under ether anesthesia, at the level of the border of the gum at intervals of 1-2 days.

The animals were killed with ether vapor on the day after the last amputation, 9-10 days after the beginning of the experiment.

The testes and salivary glands were weighed on torsion scales, fixed in Carnoy's mixture, and treated by the usual histological methods. The weight of one gland in the control series was taken as 100%.

The dimensions of the tubules were measured with a drawing apparatus. The numerical results were subjected to statistical analysis by the Fisher-Student method.

## EXPERIMENTAL RESULTS

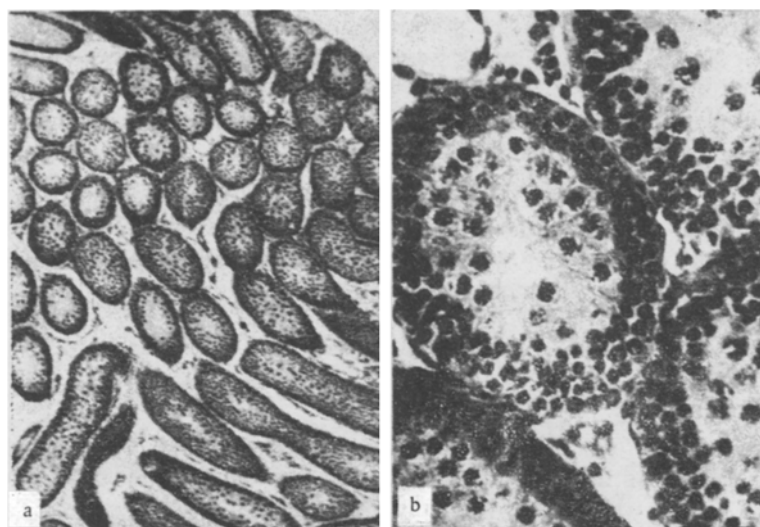
In all the experimental rats fivefold amputation of the lower incisors was followed by hypertrophy of the submandibular salivary glands

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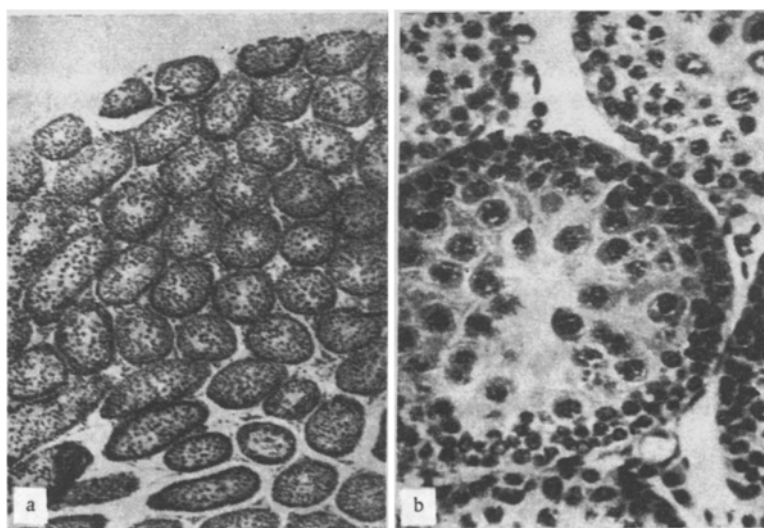
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**TABLE 1. Body Weight and Weight of Testes and Submandibular Salivary Glands in Albino Rats after Fivefold Amputation of Lower Incisors**

Group of animals	Age of rats (days)	No. of animals	Body weight (g)		Wt. of one testis (mg)	% increase	Wt. of one salivary gland (mg)	% increase
			beginning of expt.	end of expt.				
Control	14	13	17±0,3	28±1,1	37±1,8	+76	46±1,4	+80
Exptl.	14	16	17±0,6	29±2,3	65±4,5		83±5,5	
Control	19	8	28±1,7	42±1,5	110±8,0	+19	73±2,2	+65
Exptl.	19	9	29±0,8	43±3,7	137±5,7		121±5,1	
Control	30	10	65±2,7	124±12,8	730±32,2	-9	126±3,9	+59
Exptl.	30	10	63±2,4	84±4,8	665±30,6		201±3,2	



**Fig. 2. Histological structure of testes in control 24-day rats: a) magnification 75×; b) 500×.**



**Fig. 3. Histological structure of testes in experimental 24-day rats: testis retains typical structure, diameter of tubules slightly increased, more rapid differentiation of spermatogenic epithelium; a) magnification 75×, b) 500×.**

(Table 1) which, as has already been shown, was accompanied by hypertrophy of the acini and of the cells composing them [2]. Besides hypertrophy of the salivary glands, in the rats undergoing the operations in the early postnatal period a marked increase in weight of the testes was observed (Fig. 1). Depending on the age of the animals, their increase in weight varied, amounting in one experiment to 176% and in the other to 119% of the weight of the testes in control animals of the same age and belonging to the same litter ( $P < 0.001$ ,  $P < 0.008$ ). The right and left testes were enlarged equally, i.e., by 76% and 19% in each case at the different ages. The difference between their mean weight did not exceed 2%.

The more severe hypertrophy of the testes in these experiments than is usually observed after unilateral castration will be noted. In the latter case the increase in weight of the testes in rats undergoing the operation also at the age of 2 weeks did not exceed 20% [3, 4].

The histological investigation and morphometric data indicate that the increase in weight of the testis following repeated amputation of the lower incisors was due to growth of the tubules and more rapid differentiation of the testis (Figs. 2 and 3). The diameter of the tubules was increased by 37%. The spermatogenic epithelium in the experimental animals was more loosely arranged in the basal part of the tubules. The number of tubules with a large number of primary and secondary spermatocytes was much greater in the experimental series than in the control. However, in the animals with particularly marked hypertrophy, certain destructive changes were observed: epithelial cells with pycnotic nuclei were found in the lumen of some tubules.

Repeated amputation of the lower incisors in the 30-day animals no longer caused enlargement of the testes but led to hypertrophy of the salivary glands only. According to data in the literature [3, 4], the testis loses its ability to respond to unilateral castration in rats undergoing the operation after the age of 23 days.

Amputation of the upper incisors or of only one lower incisor in 14-day rats did not cause enlargement of either the salivary glands or the testes.

The nature and mechanism of the phenomenon described have not yet been explained. The effect of repeated amputation on the testis is evidently transmitted through the endocrine function of the salivary glands, the existence of which is supported by many experimental facts.

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