

LIPID CONTENT AND LIPASE ACTIVITY IN PINEAL
BODY OF ADRENALECTOMIZED RATS RECEIVING
DIETS WITH DIFFERENT SODIUM CONTENTS

V. V. Markina

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Adrenalectomy in rats causes a definite decrease in the lipid content in the pineal body, with a simultaneous increase in its lipase activity. A salt-free diet lowers the lipase activity still further. Sodium loading increases the content of pineal lipids without causing any significant change in lipase activity.

Investigations have shown that the pineal body is rich in lipids, and that they play an important role in the activity of the gland [2-6]. In particular, the lipid content of the pineal body is known to vary with the phase of the sex cycle [7] and the sodium content in the body as a whole [3]. Panagiotis and Hungerford [3] found that the lipid content in the pineal falls if animals are given a salt-free diet, and if salt deprivation is preceded by adrenalectomy the lipids almost completely disappear.

It was therefore decided to investigate changes in the lipid content and level of lipase activity in the pineal body of adrenalectomized rats kept on a synthetic sodium-free diet and also on a diet with increased sodium content.

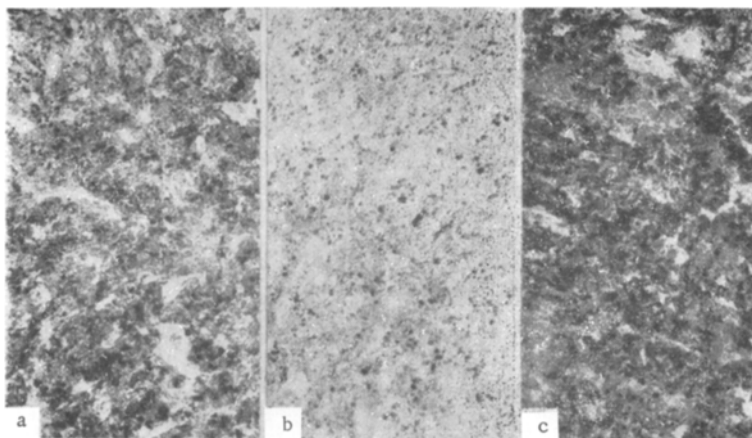


Fig. 1. Distribution of lipids in pineal body of intact rats (a) and of adrenalectomized rats kept on a salt-free diet (b) and a high-sodium diet (c). A salt-free diet against the background of adrenalectomy causes a marked decrease in the lipid content in the gland, while sodium loading leads to an increase in the lipid content.

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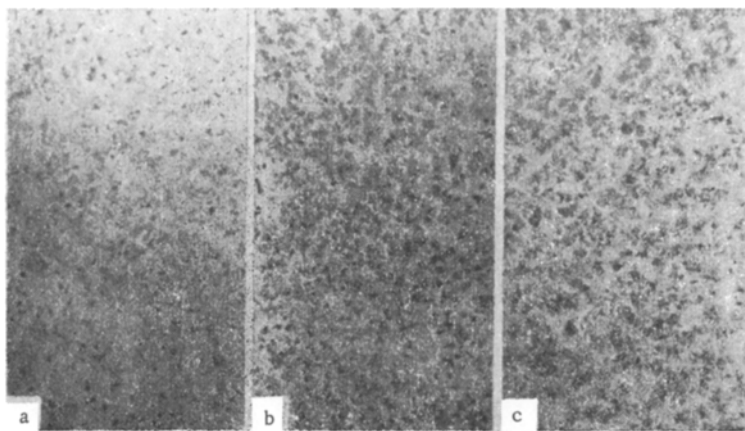


Fig. 2. Distribution of lipase in pineal body of intact rats (a) and of adrenalectomized rats (b) and adrenalectomized rats kept on a salt-free diet (c). Adrenalectomy causes an increase in lipase activity. Keeping the adrenalectomized rats on a salt-free diet leads to some decrease in lipase activity.

EXPERIMENTAL METHOD

Experiments were carried out on male rats weighing 100–110 g, adrenalectomized bilaterally. Intact animals and animals undergoing a mock operation acted as controls. All the rats were kept on a synthetic diet containing 0.6% NaCl [1]. The adrenalectomized animals were divided into three groups: those of group 1 received tap water, the rats of group 2 received a sodium-free diet, with distilled water to drink, and those of group 3 received 2% sodium chloride solution instead of drinking water. The low rate of survival of the rats on a salt-free diet and on a diet with an increased salt content should be noted. The animals were sacrificed by decapitation 1, 3, 7, 14, and 21 days after the operation. The pineal bodies were removed quickly from the animals of both control and experimental series after decapitation, and mounted in a single block with solid carbon dioxide, from which sections were cut on a cryostat to a thickness of 10 μ . To detect lipids, the sections were first treated with chromates by Elftman's method and then stained with Sudan black B. Lipase was detected by the "Tween" method.

EXPERIMENTAL RESULTS

Pineal parenchymatous cells of the control rats had a high content of lipids, which were distributed irregularly over the gland. Lipid droplets were usually located in the cytoplasm of the cells, although some were perhaps extracellular. The highest lipid content was observed at the periphery of the gland and in its caudal part. The lipid droplets were large here, frequently confluent, and very numerous. The parenchymal cells located in the center of the gland and in its rostral part contained tiny, dust-like lipid droplets, which were less numerous (Fig. 1a).

A clearly visible decrease in the lipid content in the pineal body of the first group of adrenalectomized animals was observed 1, 3, 7, 14, and 21 days after the operation. At the same time, the lipase activity was increased (Fig. 2b). In adrenalectomized animals kept on a salt-free diet (group 2), the decrease in lipid content in the pineal body was more marked than in the animals of group 1 (Fig. 1b). Some decrease in lipase activity was observed on the 14th day of the experiment (Fig. 2c). A high sodium diet, given to the adrenalectomized animals, led to an increase in the lipid content in the pineal body (Fig. 1c). Lipase activity in the pineal in this case was almost indistinguishable from the lipase activity in the rats of the control group.

Bilateral adrenalectomy is thus accompanied by a definite decrease in the lipid content in the pineal body, and by a simultaneous increase in its lipase activity. A salt-free diet leads to a still further decrease in the lipid content in the pineal and to some decrease in its lipase activity. Sodium loading increases the lipid content in the gland. The results correlate well with those obtained by other workers [3, 4].

LITERATURE CITED

1. P. M. Hartfort and A. B. Eisenstein, *Endocrinology*, 60, 641 (1957).
2. G. F. Hungerford and N. M. Panagiotis, *Endocrinology*, 71, 936 (1962).
3. N. M. Panagiotis and G. F. Hungerford, *Endocrinology*, 69, 217 (1961).
4. N. Prap, *Progr. Brain Res.*, 10, 454 (1965).
5. W. Quay, *J. Histochem. Cytochem.*, 5, 145 (1957).
6. G. B. Wislocki and E. W. Dempsey, *Endocrinology*, 42, 56 (1948).
7. J. Zweens, *Nature*, 197, 1114 (1963).