



Mitotic activity in the anterior pituitary of immature thyroidectomized rats
by C William Reiquam

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the degree of Master of Science in Zoology
Montana State University
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Abstract:

Most workers are agreed that there is an inter-relationship between the pituitary body and other hormone-producing organs of the body. This study attempts to show some of the trends in cellular changes in the anterior lobe of the immature rat pituitary resulting from thyroidectomy.

Indications point to an increase in mitotic chromatophobe activity over the normal in rats thyroidectomized at 28 days with chromatophobes and acidophiles showing decreases.

little variation between normals and experimentals is observed in the 20-day period after a group of rats was thyroidectomized at 14 days. There is a peak of activity 15 days after thyroidectomy in both normals and experimentals. Results of this study point to a minimum in acidophils mitosis in 28-day thyroidectomy at the 15-day period which indicated the maximum for 14-day thyroidectomies.

It appears evident from this collection of data that the great majority of chromatophobes, basophiles and acidophiles in all the animals used in this study were arrested in the metaphase of their mitotic cycle at the time of killing.

Correlations of data from this study and findings of other workers presents a problem because of the lack of sufficient data. Various problems of pituitary body functions have been studied but under such a variety of conditions that the total collection of data is not sufficient to be conclusive in most cases.

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OF IMMATURE THYROIDECTOMIZED RATS

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Master of Science in Zoology

at

Montana State College

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Bozeman, Montana

June, 1947

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TABLE OF CONTENTS

	Page
ABSTRACT	3
INTRODUCTION	5
MATERIALS AND METHODS	7
OBSERVATIONS	11
A. General Considerations	11
B. Effect of Thyroidectomy	17
TABLES I, II, III, and IV.	13-16
DISCUSSION	23
TABLES V, VI, VII, VIII, IX, AND X	24-29
FIGURES 1, 2 and 3	34-36
CONCLUSIONS	37
LITERATURE CITED AND CONSULTED	38

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Wm. J. Graduate Committee

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ACKNOWLEDGMENTS

Much credit is due Mr. Harold Wetling for his suggestions and criticisms in the preparation of this paper. A word of thanks is due the many others whose aid and helpful suggestions have gone into this problem and its writeup.

INTRODUCTION

According to Severinghaus (1933) early workers on the anterior lobes of the pituitary were interested mainly in the anatomy and the unique embryology of the structure. Early studies of the pituitary by Flesch (1884) and Schönemann (1892) indicated the presence of the three well established cell types: acidophiles, basophiles and chromatophobes. Most of the succeeding studies have been concerned with the variations of these cells as to number, shape, granules, and position in relation to disturbed physiological functions. Still more recently experimentation has been on the study of these organ components in relation to the endocrine functions of the pituitary.

Pituitary histology and cytology have been investigated most commonly after splenectomy, castration and thyroidectomy. Pomerat (1941) in his study of rats castrated between the ages of 21 and 44 days, found that castration increases mitotic activity in the basophile cells of the anterior lobe, the rate rising proportionally as the interval between castration and autopsy increases. He also reports that the number of dividing acidophiles does not change significantly as a result of castration, while 10-day post-castrates show reduction in mitotic rate among chromatophobes.

Guyer and Claus (1937) report much the same structural and physiological changes in anterior lobe - increased and vacuolated basophiles and increased potency of transplanted substance in stimulating ovarian size and sexual precocity - occur in cancerous individuals as those following castration in either male or female.

In the case of splenectomy, Edwards and Wright (1937) found that

in animals killed 14 days after operation there appeared to be numerous mitotic activity in the basophiles.

Wolfe (1938) and his coworkers have studied the pituitary changes induced by variations in hormone supply. Their reports indicate frequent mitosis among acidophile and chromatophobe cells of the anterior lobe.

Most observers are agreed that thyroidectomy affects the pituitary. Studies made by Bryant (1930) indicate a great reduction in the number of acidophiles in the thyroidectomized rabbit. Also he reports a marked hypertrophy of chromatophobes and a loss of differential character in basophiles.

Investigations made on the pituitary have been made primarily on the rat though Bryant's (1930) work on the rabbit, Dawson and Friedgood's (1938) differentiation of two classes of acidophiles in the female rabbit and cat, Dawson's (1940) work on the African lung fish, and Hartman (1946) and coworkers' very recent study of the dog pituitary with special reference to a fourth cell type, all indicate a wide range of study in pituitary functions. In addition, pituitary studies on the guinea pig by Eirkman (1937), on the normal fowl from embryo to old age by Payne (1946), and data collected by Smith and MacDowell (1930) on a hereditary anterior pituitary deficiency in the mouse, indicate some other of the more important contributions to the field of pituitary body study.

General correlations of these data would seem impractical now because of the relative shortage of information on each form studied. Too, in studies as these, variations in species may demonstrate differences in the histological picture, the handling of the animals, or modifications of their natural habitats may modify the end result. According to McClung

