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**A Statistical Study of Normal Male Adult Human Hypophysis.**

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Due to the uncertainty that still exists with reference to the involvement of particular parts of the hypophysis in certain diseases, and the general lack of quantitative data on the normal proportion of the different subdivisions of this organ, it seemed desirable to study by recognized statistical methods enough normal hypophyses to give standards which would be sufficiently accurate for evaluating abnormal proportions. Clinical and pathological literature contain numerous statements to the effect that one or more parts of the hypophysis are enlarged or are too small, etc., without the author knowing the range of normal variability. In many cases unwarranted clinical deductions are based on such statements. This condition can lead only to further confusion.

The material used consisted of 111 carefully selected normal male hypophyses, 20 to 76 years of age, from cases of relatively sudden accidental death. After getting the fresh weight of the organ serial sections were made. Every 20th section was projected and the different parts of the gland outlined at a magnification of 20 diameters, in general. In certain cases *pars intermedia* was projected at a higher magnification (up to 100 diameters). The different portions of the outline were cut out and weighed. This gave the proportion that any particular part constitutes of the whole. The weight of the paper was always more than 100 times the weight of the corresponding part of the fresh organ. The method is more fully explained in a previous note.<sup>1</sup> The routine method of obtaining the hypophysis at autopsy made it necessary to cut off and discard the stalk and as much of the surrounding connective tissue as possible.

The frequency distribution of the weight of the whole gland, of the anterior lobe, and of the posterior lobe, is of the common fairly symmetrical unimodal type; while that of the epithelium of *pars intermedia* and of the colloid is greatly skewed in the positive direction, *i. e.*, towards the small values.

A summary of the absolute weights (in mg.) follows: The anterior lobe varied from 224 to 611; mean,  $394 \pm 5.4$ ; standard deviation, 84.5; coefficient of variation, 21.4. The posterior lobe

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<sup>1</sup> PROC. SOC. EXP. BIOL. AND MED., 1922, xix, 416.

varied from 27 to 246; mean,  $121 \pm 2.3$ ; standard deviation, 35.7; coefficient of variation, 29.1. The epithelium of *pars intermedia* varied from .5 to 20.1; mean,  $4.6 \pm .3$ ; standard deviation, 4.3; coefficient of variation, 93.9.

These figures thus give quantitative support to the great variability of *pars intermedia* as frequently noted from general inspection of a limited number of sections. While some argue that there is no true functional *pars intermedia* in the adult human hypophysis—the epithelium in this region being merely a rudimentary structure or, according to others, an invasion from the anterior lobe—it would seem best to retain the term *pars intermedia* for the epithelium and associated colloid in the usual location for *pars intermedia*. However, it may be so small in a normal human adult as to be equivalent to a cube only .8 mm. in dimensions and on the average would make a cube slightly less than 1.7 mm. in size. These small quantities should be kept in mind by those who ascribe much functional importance to this part of the hypophysis.

The colloid associated with *pars intermedia* and within the residual lumen varied from 0.1 to 51.1; mean,  $6.3 \pm 6$ ; standard deviation 8.6; coefficient of variation, 137. There is absolutely no correlation between the amount of colloid and the amount of epithelium in *pars intermedia*.

The whole gland (without capsule, stalk and *pars tuberalis*) varied from 358 to 788; mean,  $526 \pm 6.2$ ; standard deviation, 96.8; coefficient of variation, 18.4. The fresh gland after being dissected out (*i. e.*, including on the average 44.5 mg. of the surrounding connective tissue or capsule that could not be dissected away without tearing the gland, but without stalk or *pars tuberalis*) varied from 400 to 855 and averaged 570.

The relative weights of the different parts of the hypophysis as percentage of the whole gland (with capsule, stalk and *pars tuberalis*) are as follows: Anterior lobe varied from 56 to 92; mean,  $74.8 \pm 0.4$ . Posterior lobe varied from 7.1 to 41.3; mean,  $23.1 \pm 0.4$ . The epithelium of *pars intermedia* varied from 0.13 to 3.64; mean,  $0.85 \pm 0.05$ . The colloid in the region of *pars intermedia* and in the residual lumen varied from 0.02 to 10.39; mean,  $1.20 \pm 0.10$ .

The correlation coefficient ( $r$ ) between the weight of the hypophysis and stature is  $+0.28 \pm 0.06$ . This is entirely due to the anterior lobe. In the case of the weight of the anterior lobe and stature,  $r = +0.31 \pm 0.06$ . There is a moderate and significant negative correlation between the weight of the anterior lobe and age ( $r = -0.29 \pm 0.06$ ). This decrease in the anterior lobe takes place mostly after 50 years of age. There is probably a small positive

correlation between the weight of the posterior lobe and age ( $r = \pm 0.22 \pm 0.06$ ). Hence in the case of the whole gland, the correlation with age is small, negative, and only of probable significance ( $r = -0.19 \pm 0.06$ ).

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## Ruffed Grouse Are Susceptible to Tularemia.

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The diminution in number of wild rabbits and ruffed grouse has occurred simultaneously in Minnesota during the last 4 years. Human cases of tularemia have occurred in Minnesota during the same period. The occurrence of specific agglutinins in the blood of many of the wild rabbits still remaining has been indicated by studies which we are carrying out in Hubbard County. This finding points to tularemia as the cause of the disappearance of the rabbit. The susceptibility of the ruffed grouse to tularemia has been studied, as it was felt that there was some relationship between the disappearance of grouse and the disappearance of the rabbit. At the outset of the work it was found that Parker and Spencer<sup>1</sup> had considered the possibility of grouse susceptibility, and produced an infection in blue grouse. They demonstrated that the rabbit tick *Haemaphysalis leporis-palustris* is an important carrier of tularemia, and further pointed out that this parasite is found on both rabbits and game birds. There is, therefore, a possible natural carrier of the disease between rabbits and grouse.

The grouse used in our transmission experiments were ruffed grouse (*Bonasa umbellus*) and were trapped wild in Hubbard County. Before inoculation they were tested for agglutinins and their blood did not agglutinate *Bact. tularensis* antigen in dilutions of 1-10 or above.

The strain of *Bact. tularensis* used for inoculation was obtained from a human case of tularemia originating in Hubbard County from the bite of a deer-fly. The organism was grown in pure culture on rabbit blood-cystin agar. At the beginning of this work it was inoculated into a guinea pig, which died on the 3rd day with

<sup>1</sup> Parker, R. R., and Spencer, R. R., Sixth Biennial Report of the Montana State Board of Entomology, 1925-1926, 30.