A NOTE ON THE ADRENAL CORTEX

BY

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Since the publication of *The Adrenal Cortex* (Broster and Vines) in 1933, and the endowment of a surgical research bed and fund at Charing Cross Hospital by Viscount Wakefield of Hythe, the scope of our work and material has considerably increased. This has enabled us to extend our studies into the spheres of biochemistry and psychology.

It may be recalled that we had drawn attention to the presence of a differential stain—the Ponceau fuchsin stain—in the cells of the adrenal cortex in our patients with virilism who had been subjected to the operation of unilateral adrenalectomy. This stain has been corroborated by others, who have shown, what we then surmised but now have also substantiated, that the stain is positive in the cortex of both adrenal glands. In a leading article following our publication it was suggested by the *British Medical Journal* that “the substance so staining must be closely related to or even identical with the male hormone or its precursor.” We have now been working in this direction for some years, and consider it a matter of sufficient importance and of general interest to issue a preliminary note, and to state that we have been successful in detecting not only an androgenic principle in the urine of these patients but in isolating a new biochemical compound, specific to virilism, of adrenal origin. An important corollary to these investigations is the fact that there is a diminution in both the androgenic principle and of this new specific substance immediately after unilateral adrenalectomy.

Biochemical Investigations

Only a short abstract of each biochemical investigation is here included, since it is proposed to issue a second report on this work giving the full details.

The following is a report from Dr. Jocelyn Patterson of Charing Cross Hospital and Dr. Alan W. Greenwood of the Institute of Animal Genetics, University of Edinburgh:

Case J. K.: (a) Pre-operative.
(b) Post-operative.

“Investigations have been made of the ‘free’ male hormone (androgenic substance extracted from the urine without drastic hydrolysis) and ‘bound’ hormone (extractable only after drastic hydrolysis) with the following results:

“(a) Pre-operative findings:

Free hormone, 8 international units.

Bound hormone, not estimated because at the time our attention was focused entirely on the free hormone.

“(b) Post-operative findings:

Free hormone, 3 international units.

Bound hormone, 6 international units.

“In the normal female urine the free hormone is entirely absent, but with regard to the bound hormone we have as yet insufficient data to indicate the normal range.

“The capon method has been used for assay, androsterone being taken as the standard for comparison (1 mg. = 10 international units). It will be appreciated that in the present state of our knowledge the figures are only of relative significance, but they suffice to show that the immediate effect of the operation is to cause an appreciable drop in the excretion of free male hormone, though it has not brought about its complete disappearance from the urine.”

The following samples of urine were collected at Charing Cross Hospital, evaporated to a thick syrup, and dispatched to Professor G. F. Marrian and Mr. G. Butler of the University of Toronto:

Case J. K.: (a) Pre-operative, 6 litres collected over ten days.

Case J. K.: (b) Post-operative, 2½ litres.

Case M. M.: (c) Pre-operative, 6 litres collected over eight days.

Professor Marrian and Mr. Butler report as follows.

“The ether-soluble neutral fractions of both pre-operative samples of urine yielded a white crystalline substance which after repeated crystallization melted at 243–244°. Yields of 242 and 95 mg. of the unpurified substance were obtained from the concentrates (a) and (c) respectively. Acid hydrolysis of the urine concentrates did not increase the yield. The post-operative urine sample from J. K. contained only a trace of this compound. We have, in the course of other work in this laboratory, examined a large number of urine samples collected from normal men and pregnant and non-pregnant women, but we have never been able to demonstrate the presence of this new compound in such urines. It would appear, therefore, to be specific to virilism of adrenal origin.

“This crystalline compound analyses sharply for the formula $C_{21}H_{36}O_3$. It appears to contain one tertiary and two secondary hydroxyl groups. The main features of the constitution of this interesting compound have been elucidated and will shortly be published by us elsewhere. It seems possible that the new compound is closely related to the series of compounds isolated by several groups of workers from adrenal tissues.”

The Adreno-genital Syndrome and Sexuality

Dr. Clifford Allen has established the fact that the adreno-genital syndrome may influence sexuality to a profound degree. A large percentage of the patients showing this syndrome also show sexual abnormalities, being mainly homosexual or having diminished heterosexuality. Operation may influence this enormously. Patients suffering from the adreno-genital syndrome who showed strong homosexuality have been changed to strong heterosexuality and those with diminished heterosexuality have had it restored to normality. It has been determined definitely that there are two types of homosexuality, one dependent on disease of the glands (the adrenal glands in the cases studied), and the other on psychical disease. Operation cures the former but not the latter, which may respond to psychotherapy. These studies demonstrate the relation between psychical and physical sexuality in a way which has not been possible before.

Conclusion

This advance places the surgery of the adrenal cortex on a par—as one would expect—with the other glands of the endocrine series—namely, that a hypersecretion of the two glands can be controlled by means of the removal of one, and that there is as yet no evidence that the remaining gland hypertrophies sufficiently to cause a return of the clinical condition.