

A Suggested Test for Functional Cortical Adrenal Tumor.

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A clinical syndrome characterized by facial and trunk obesity, hirsutism, pig eyes, either persistently high blood pressure or attacks of hypertension, amenorrhea or menstrual irregularity, pinkish skin striae, rarefaction in the bones, polycythemia, acrocyanosis of extremities and susceptibility to infection, has attracted increasing attention, particularly since Cushing described basophilic adenoma as a probable cause.¹ Previously a number of these cases had been found due to cortical adenoma or adrenal tumor.² It might readily be conceived, as suggested by Cushing, that a pituitary overfunction, perhaps limited to the basophilic type of cells, might secondarily produce cortical adrenal changes.

A typical case, diagnosed as "basophilic adenoma" was under my observation in my clinic and laboratory for 1½ years during which time thorough hormonal studies were performed with extremely striking findings. This patient died suddenly (on the service of Dr. B. S. Oppenheimer) in consequence of an erysipelas secondary to an acute middle ear infection (unoperated), permitting a full autopsy. At autopsy the pituitary was found normal (serial sections, Dr. Joseph Globus), the basophilic elements proving diminished in number. A large carcinoma of the adrenal cortex was found. The case will be described in detail elsewhere. At the moment, the hormonal findings alone will be discussed.

Hormonal examination, extending over a period of 4 weeks, showed negative pregnancy tests, no increase in the prepituitary and female sex hormones circulating in the blood.³ On the other hand, the excretion of female sex hormone in the urine was at times tremendously increased, to a degree seen normally only in pregnancy (13,000 Mouse Units per liter). Fig. 1. During what corresponded to one cycle, this patient excreted more than 57,000 M.U. of female sex hormone. It was repeatedly possible to obtain a mouse reaction with as little as a total of 0.075 cc. of undiluted urine 48 hours after injection into the castrated mouse.

¹ Cushing, Harvey, *Papers Relating to the Pituitary Body, Hypothalamus and parasympathetic System*, Charles C. Thomas, Springfield, Illinois, 1932, 113 *et seq.*

² Thumin, *Berlin. Kl. Wchensch.*, 1909, No. 3.

³ Frank, R. T., *J. Am. Med. Assn.*, 1931, **97**, 1852; Frank, R. T., Goldberger, M. A., and Spielman, F., *Proc. Soc. Exp. Biol. and Med.*, 1931, **28**, 999.

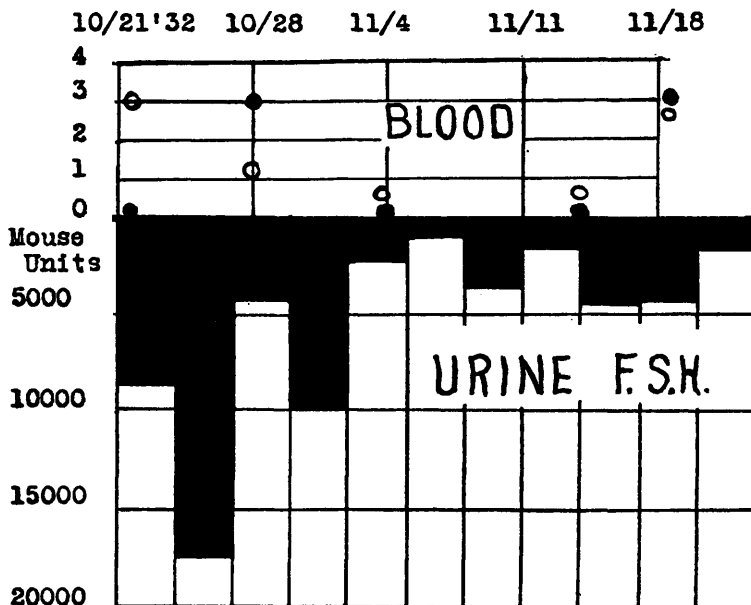


FIG. 1.

Through the courtesy of Dr. John Wyckoff of Bellevue Hospital and Dr. Douglas Simmers of this hospital, I was able to study another case. This patient presented all the cardinal symptoms previously mentioned, and was seen one week before death.

The undiluted urine of this patient likewise gave a strong female sex hormone reaction in quantities of 0.2 cc. (5000 M.U.L.).

At autopsy of the Bellevue patient, no basophilic adenoma of the pituitary was encountered. A large carcinoma of the adrenal cortex with metastases in the liver was found. Extracts made from the primary and secondary tumor in the liver showed twice as much female sex hormone in the extracts, as in control tissues such as the spleen.

Since these findings were obtained, I have had occasion, through the courtesy of various colleagues, to test a number of other patients who have shown at least some of the symptoms ascribed to the above mentioned syndrome, without encountering the same high urinary findings of female sex hormone, as in the 2 cases of undoubted cortical tumor. As these patients have not been operated upon and are still alive, they do not enable me to draw further conclusions.

Because of the rarity of the "basophilic pituitary adenoma" and of cortical tumors of the adrenal, I feel justified in drawing the at-

tention of the profession to the hormonal findings obtained in these 2 clearcut cases, with the hope that this test (high female sex hormone excretion in the absence of positive pregnancy reaction) may serve as a means of recognizing adrenal cortical tumors at an early and operable stage. Perhaps this test will also serve in differentiating them from the "basophilic pituitary adenomas" if further observations prove that their presence does not produce the same overexcretion.*

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Importance of the Spleen as a Reservoir for Erythrocytes.

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One of the modern conceptions of the physiology of the spleen is to regard this organ in human beings and in animals as a reservoir which is able under different conditions to pour red blood cells into the circulation (Lauda¹). The discrepancy of the results obtained by various authors (Lauda and Haam, Radosaljevic and Sekulic, Testoni² and others) concerning the appearance or nonappearance of adrenalin polycythemia in splenectomized animals makes the supposition acceptable, that other organs or organ systems substitute sooner or later the erythrocyte-storing function of the spleen.

The methods of our experiments were simple. Three dogs and 3

* Since this paper was handed in for publication, 10 further cases which showed at least some of the symptoms of so-called basophilic adenoma—all of them hirsutes, 4 with increased blood pressure, 3 with striae, were examined with negative results. These included 3 cases obtained through the kindness of Drs. Wilder and Snell of the Mayo Clinic, 2 in whom cortical adenomas of the adrenal had been removed some time previously, the patients remaining well; and one in whom cortical hyperplasia was found at operation, the urine obtained just before operation. All proved negative. These findings make me all the more anxious to have the profession apply the test in order to determine whether the high female sex hormone titer in the urine is limited to cases with metastases, similar to the large amount found in testicular tumors not containing chorionepithelioma, when general dissemination occurs.

¹ Lauda, E., *Physiologie der Milz*, Urban & Schwarzenberg, Wien, 1933.

² Lauda, E., and Haam, E., *Z. f. exp. Med.*, 1932, **80**, 640; Radosaljevic and Sekulic, *Wien. Arch. f. inn. Med.*, 1930, **20**, 81; Testoni, A., *Arch. internat. Pharmacodyn.*, 1930, **37**, 1.