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Dual Calorogenic Activity of Suprarenal Gland.

ALFRED E. KOEHLER. (Introduced by A. B. Hastings.)

From the Lasker Foundation for Medical Research and the Department of Medicine, University of Chicago.

Our earlier studies have shown the beneficial effects of an epinephrin-free suprarenal preparation in a group of cases characterized by asthenia and fatiguability, functional circulatory disturbances and a faulty energy metabolism. These results, however, at first, were frequently variable. Occasionally a patient who improved with a certain preparation was made decidedly worse with the succeeding supply.

One of the methods that we have used in the study of the potency, fractionation, and stabilization of the active principles of the suprarenal gland depends upon the calorogenic effect of the preparations when administered to animals by mouth. The preparations which improved our patients showed a definite elevation of the basal metabolic rate of dogs, while those which had a depressing influence caused a lowering of the metabolic rate of the animals. This method of differentiation enabled us to obtain 2 suprarenal preparations of opposite calorogenic activities.

Fig. 1 shows the metabolic response of a dog after a single dose of the preparation which had been administered orally at the point indicated by the arrow.

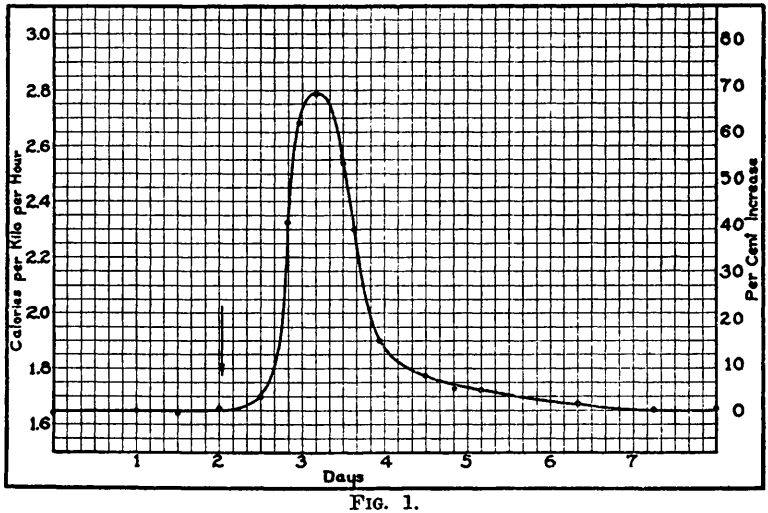

FIG. 1.

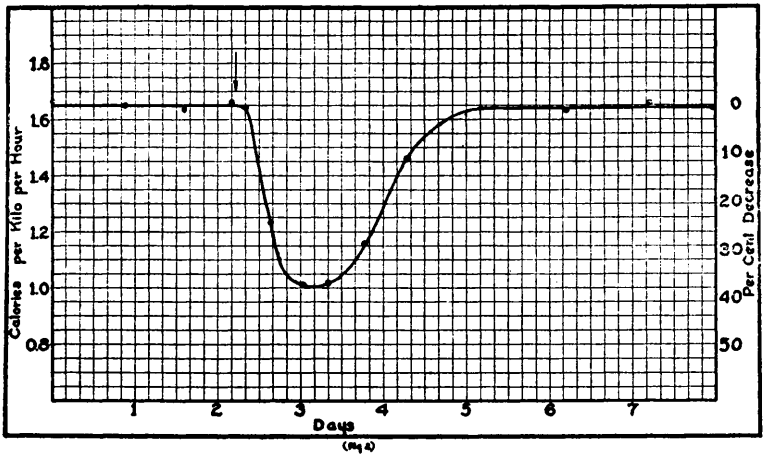

FIG. 2.

Fig. 2 shows the response of the same dog a week later to the depressing preparation. Although the metabolism was increased 70% in one case and depressed 38% in the other, the dog showed nothing unusual except a tendency to increased activity and restlessness in the one case and decreased activity and listlessness in the other.

The depressing preparation is now being tried in the treatment of hyperthyroidism with some encouragement.

We have, however, been particularly interested in the preparation which raises the metabolic rate and have attempted to devise other means of evaluating its efficacy in the treatment of the entity we have tentatively termed hypo-suprarenalism. In order to understand the mechanism underlying the improvement obtained in these cases and particularly to obtain accurate measurable criteria of improvement, we have studied the reaction of these patients to exercise both before and after treatment. For this purpose we have used a simplified type of work that can be carried out by the untrained individual during the metabolism test. While the patient is reclining he raises and lowers with the forearm a weight suspended over a pulley. The movement is synchronously timed with a metronome and the distance that the weight moves per minute is registered by a revolution counter connected to the pulley. Thus the patient does a type of accustomed work without suffering from fatigue.

Fig. 3 shows 2 such curves obtained on a patient suffering from hypo-suprarenalism. The continuous line shows the oxygen consumption before treatment while the broken line shows the metabolic

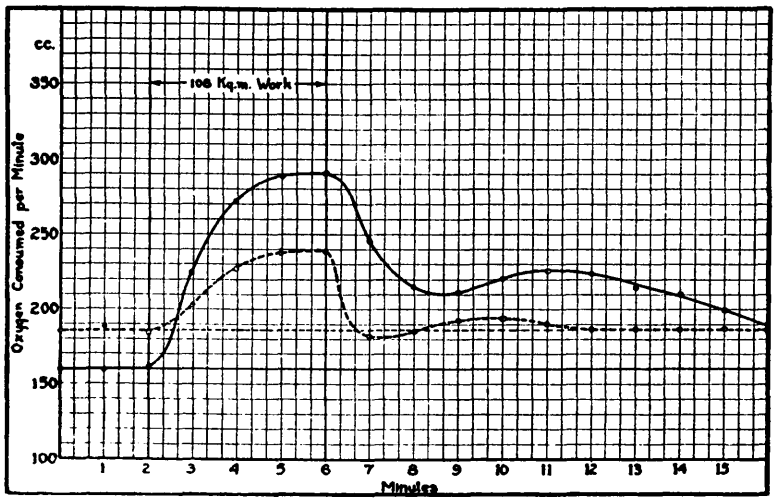

FIG. 3.

response 20 hours after a single dose of the preparation which raises the metabolic rate. The amount of work at each time was identical but the total amount of oxygen consumed varied greatly. The net mechanical efficiency increased from 3.6% to 14.8% after therapy. This gradually decreased again and nearly reached its former low level on the fourth day. In addition to giving the relative cost of work the work-metabolism test shows the large oxygen debt after cessation of work in this group of patients. The ratio of the oxygen used during work may be termed the D/W ratio. In the case illustrated in Fig. 3 this ratio before treatment was 1.8, but 20 hours after treatment it dropped to 0.8, about the normal ratio for this particular type of work.

The relatively large oxygen debt in these cases can at least in part be explained by the poor cardio-vascular response during this type of exercise. The pulse rate and pulse pressure was taken at frequent intervals during the tests and their product interpreted as the circulatory response. In the case illustrated the product before medication rose from 1200 to 1400, while the day after treatment it rose from 1400 before work to 2500 at the cessation of work.