with tropical sprue in relapse and one subject with hepatic cirrhosis and diarrhea. No consistent pattern of change was observed when folic acid was added. The variable results do not bear any relationship to the presence or absence of free HCl in gastric juice.

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Accentuation of Human Diabetes by "Pituitary Growth Hormone".* (20458)

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Young demonstrated that extracts of the anterior pituitary, which possessed growth-promoting effects, were also diabetogenic(1). Subsequently it has been shown that more highly purified growth hormone preparations retain the property of diabetogenicity in experimental animals(2). It appears to be well established that these diabetogenic effects are not related to ACTH contamination. In studies with "pituitary growth hormone preparations" in human subjects, under chemically controlled metabolic ward conditions extending over the period 1948 to 1953, we have failed to note any diabetogenicity of the preparations used. However, except in one subject, we have also failed to obtain growth-promoting effects(3).

The present study was carried out in a 60-year-old male patient with diabetes mellitus of at least 5 years' duration, and of some severity. It was designed to determine whether "highly purified pituitary growth hormone" would have either growth-promoting or diabetogenic effects under the experimental conditions used.

Experimental. The patient was well equilibrated on a formula diet containing 119 g of protein, 130 g of fat, and 184 g of carbohydrate. The formula was ingested at hourly intervals during the period 6:00 a.m. to 10:00 p.m. Urine and stool collections and chemical and other determinations were carried out as described elsewhere(4). The growth hormone was administered by slow intravenous drip in a solution containing 2 g of potassium chloride and 2 g of sodium chloride per liter. In order to make for precise constancy of conditions throughout the study, the intravenous sodium-potassium chloride solution was administered during the control as well as the treatment periods. Growth hormone (Armour, Lot No. 491132) was administered during the treatment period in a dose of 100 mg equivalents per day, in one liter of solution at a rate of 180 cc per hour. Forty units of N.P.H. insulin daily were given throughout. The assay of the growth hormone provided by Drs. Hays and Steelman and their associates of the Armour Laboratories was as follows: potency—49.5 ± 10 mg stand./vial; T.S.H. —.04 ± .02 USP u/mg; oxytocin — <.8 u/vials; fill—50 mg; ACTH — <.01 u/mg; pH—9.4.

Experimental findings. As shown in Fig. 1 and 2, the effects of "pituitary growth hormone" in this patient were as follows: 1. Blood and urine sugars were elevated during and following the administration of the hormone. The daily urinary sugar excretion

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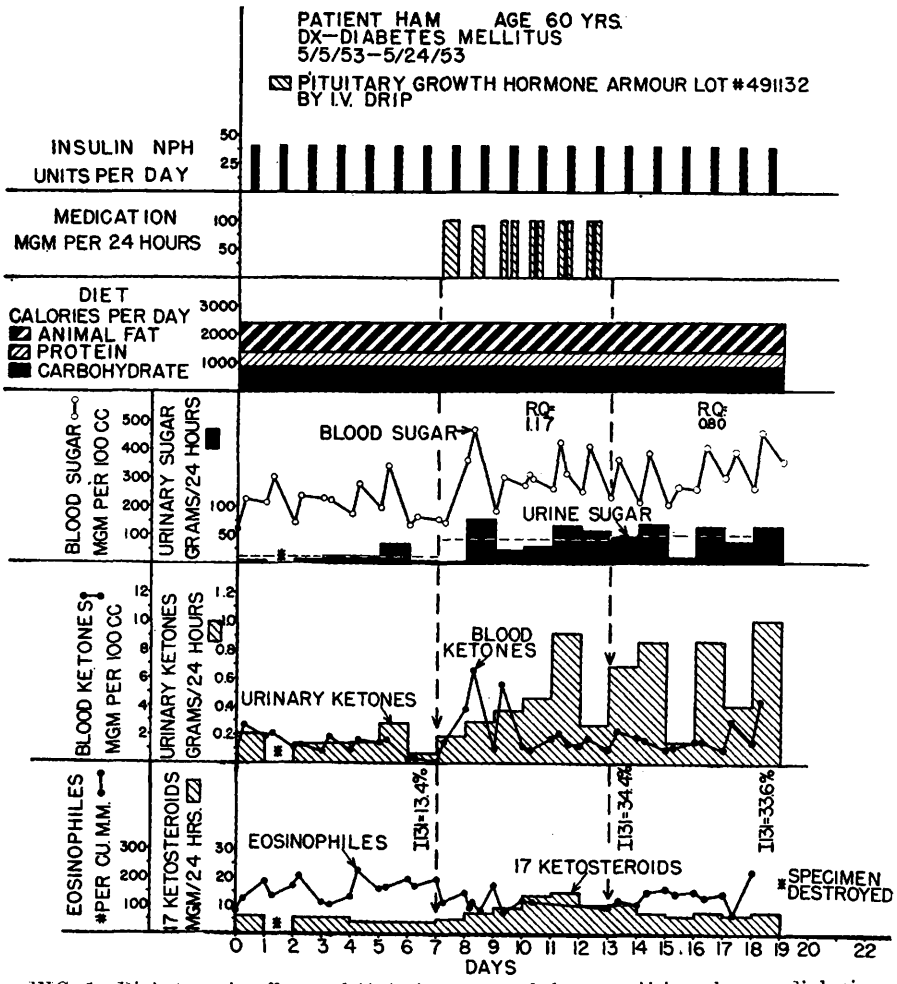

FIG. 1. Diabetogenic effects of "pituitary growth hormone" in a human diabetic.

during pre-treatment averaged 11.8 g per day; 43.0 g per day during hormone administration; and 49.0 g per day following hormone administration.

2. A significant but unimpressive increase in blood and urinary ketones occurred during and following the administration of pituitary growth hormone. The increase is much less than has been noted in similar diabetic patients to whom ACTH has been administered under essentially identical experimental conditions(5).

3. There was a significant, but not marked, elevation of 17-ketosteroids during pituitary growth hormone administration, with a less than complete return to base line levels when the hormone was stopped.

4. A probably significant, but not impressive, decrease in circulating eosinophils occurred during the administration of pituitary growth hormone. (In one other study in a non-diabetic, the administration of one unit of ACTH by slow intravenous drip caused a more marked fall in eosinophils than that noted in this study.)

5. An increase in iodine-131 uptake from 13.4% to 34% was noted during and following the administration of the hormone. (The patient showed some clinical evidence of hypothyroidism prior to treatment. This was part of the basis for his selection as a candidate for the study.)

6. A respiratory quotient of 1.17 during the hormone administration. (In diabetic pa-

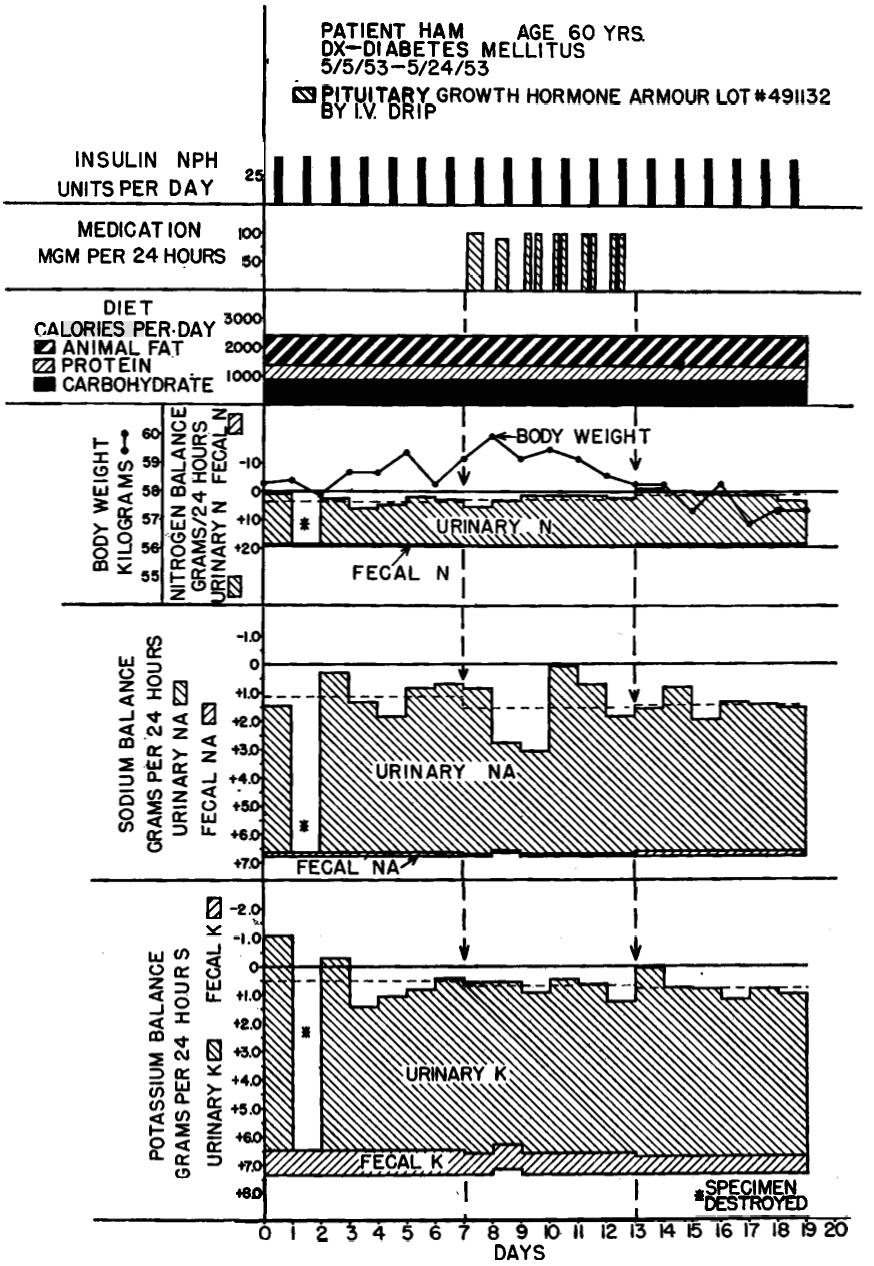

FIG. 2. Effects of "pituitary growth hormone" upon nitrogen, sodium and potassium balances in a human diabetic.

tients in whom the severity of the diabetes has been accentuated with ACTH or cortisone, without exception, the respiratory quotient has been depressed below 0.70.)

7. The average daily nitrogen excretion prior to growth hormone was 15.97 g, during —16.90 g, and following—18.15 g.

8. There was a net retention of 0.639 g of sodium per day during, and 0.385 g following growth hormone, as compared to the pretreatment control period.

9. There was a slight net retention of potassium.

The changes in body weight were probably

referable to the combined effects of changes in fluid balance, changes in nitrogen balance, and secondarily to the loss of the sugar in the urine.

Discussion. From the foregoing, it appears that the administration of "pituitary growth hormone" to a diabetic patient results in marked accentuation of the diabetic state. It is possible that the thyrotropin and/or adrenocorticotropin present in the preparation may have played some role in the hyperglycemia and in the increased glycosuria. It seems probable, however, that the role played by these 2 factors was small for the following reasons: 1. The relatively slight change in circulating eosinophils and urinary 17-ketosteroids; 2. Slight increase in nitrogen excretion; 3. Elevation of the respiratory quotient above one, rather than below 0.7. (The latter occurs consistently in diabetics receiving ACTH)(5); 4. Decreased rather than increased potassium excretion; 5. Decreased oxygen utilization.

Summary. Administration of "highly purified pituitary growth hormone" to a diabetic patient, under chemically controlled conditions, resulted in increased hyperglycemia and glycosuria, in minimal increase in blood and urinary ketones, and in minimal change in the nitrogen balance. The data support the concept that the increased hyperglycemia and glycosuria are probably attributable to diminished carbohydrate utilization rather than increased neoglucogenesis. The diminished utilization in turn may be referable to diminished endogenous insulin production as the result of the exhaustion of the beta cells of the islets.

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Identification of Trypsinogen in the Lipotropic Fraction.* (20459)

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Haanes and György(1) analyzed the lipotropic fraction prepared by Bosshardt *et al.* (2) from the residue remaining after the extraction of pancreas for insulin, and identified trypsin and trypsin inhibitor as components of this fraction. Furthermore, they postulated that enterokinase is capable of overcoming the action of trypsin inhibitor on trypsin. Mars, Peanasky, and Laskowski(3) studied a system composed of crystalline trypsin, crys-

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