

6168

Effect of Antero-Pituitary Hormones upon Blood Sugar.*

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The reasons which prompted our investigation, and the discussion and possible conclusions, with further data, will be presented at another time. The observations were made on rabbits. The question of whether urinary Hebin (the Antero-Pituitary Sex Hormone obtained from the urine of pregnant women) is identical, derived from or similar to pituitary Hebin (the Antero-Pituitary Sex Hormone obtained from the anterior pituitary lobe), is aside from the purpose of this presentation, but because of the comparative ease with which the former is obtained (as compared to pituitary Hebin) it was used in our work—made from pregnancy urine according to a modification of the Aschheim-Zondek method. Our Growth Hormone was prepared from bovine pituitary by a modification of the Van Dyke method. It was shown to have little luteinizing effect. Both preparations were first tested in animals and showed the characteristic sex and growth responses.

Our observations are then divided into 2 groups: (1) those following injections of Hebin, and (2) those following injections of Growth Hormone. Each of these groups are further considered as (1) acute response and (2) changes after repeated and continued injections (chronic response). All animals were placed on a standard fixed diet—green leaves, lettuce, carrots, and water (later changed to corn, wheat, oats, etc., mixture), and fed once a day. Our blood was taken from a vein in the thigh (1 cc.), and the injections made into the marginal vein of the ear, intraperitoneally, etc. The blood sugar determinations were made according to the Folin-Wu method.

Sex Hormones: Following a control determination, 100 units were injected, and blood drawn at intervals. The rabbits had received no food for 15 to 24 hours. A rise in the blood sugar level occurred, the peak coming from $\frac{1}{2}$ to 2 hours after the injection, the average being about 1 to $1\frac{1}{2}$ hours. We decided to consider a rise of 40 mg. per 100 cc. as the minimum to be interpreted as a

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positive response. Our greatest increase above the control was 222, while most increases were between 100 and 175. We made determinations at various intervals for about 4-5 hours, by which time the blood sugar had fallen again to near or below the original level. A certain (small) number of failures occurred, the percentage awaiting a larger series.

Similar rises were obtained using smaller amounts (25 and 50 units). Injections intraperitoneally likewise gave a rise in blood sugar, varying in amount and in different animals—the rise being delayed 1-2 hours.

In several animals, in whom the above was repeated a number of times (chronic effect), it was noted that the control level became persistently elevated above the original control level (35 to 55).

Growth Hormone: Contrary to the observations indicated above, the injection of Growth Hormone (4 to 6 cc. intravenously and 15 to 30 cc. intraperitoneally) produced but a slight rise or drop in the blood sugar level (20 to 35) in 3 to 5 hours.

Several animals, in whom repeated injections of Growth Hormone were carried out (chronic effect), showed a persistent elevation of the control blood sugar level (30 to 40) above their original control levels.

Conclusions. At this time but little definite conclusion can be drawn. We must allow for normal fluctuations, physiological changes, and the like, due to handling, trauma, and changes resulting from the introduction of foreign materials. Still, certain observations and trends are recorded. The marked hyperglycemia recorded seems unexplainable on the basis of these suggestions.

FOOTNOTE: As to reliability of rabbits for blood sugar studies: (1) Rabbits are used for the standardization of Insulin. (2) Many workers have already done exhaustive studies on rabbit blood sugar levels, and the non-specific expectancies observed as minimal. (E. L. Scott, *et al.*). (3) A large amount of work has been done in determining the hyperglycemic function of Epinephrin, Pituitrin, etc., in rabbits (Nitzescu, Benetato, G. Smith, Watkins, Cori). These men considered rabbits as sufficiently desirable for their work. (4) My own observations in control experiments, led me to set a rise of 40 mg. of sugar per 100 cc. blood as the minimal amount to be interpreted as a positive response.