6737

Anterior Lobe or Anterior Lobe-Like Sex Hormone Combinations on Growth of Ovaries of Immature Rats.*

H. L. FEVOLD, F. L. HISAW, A. HELLBAUM AND R. HERTZ.

From the Department of Zoology, University of Wisconsin.

Evans *et al*[1] found that the simultaneous injection of extracts of the anterior pituitary and prolan from pregnancy urine, resulted in a greater effect on the ovaries of immature rats than could be accounted for by the additive effects of the 2 preparations when injected alone. Their theory is that prolan does not act on the ovaries directly but activates the anterior lobe growth hormone so that it becomes the agent which causes the ovarian growth. Leonard[2] found that anterior lobe preparations which contained the gonadotropic substances but were free from growth hormone, would produce augmentation effects when injected in combination with prolan, thus showing that the growth factor was not essential for the reaction. We reported[3] that an anterior lobe luteinizing preparation which produced little or no increase in weight of the immature ovaries when given alone, would augment the action of a given dose of a follicular stimulating preparation. These results, together with others, were interpreted as showing the presence of 2 gonad stimulating hormones. We have now succeeded in separating the 2 principles more completely[4] and have studied the ovarian effects when the 2 are recombined and injected, or used in combination with prolan and the anterior lobe-like hormone of human placentae.

The follicular stimulating extract, in the dosages employed, usually produced only follicular growth, though slight luteinization was present in a few cases. The luteinizing preparation had no noticeable effect on the ovaries of immature rats even when 25 mg. of the luteinizing powder was given. In the present experiments only 5 mg. were used. Castrated horse pituitary powder[5] was also used

* Assisted by grants from the Committee for Research on Problems of Sex of the National Research Council, the University of Wisconsin Research Funds, and the Wisconsin Alumni Research Foundation.

[1] Evans, H. M., Meyer, K., and Simpson, M. E., *Am. J. Phys.*, 1932, **100**, 141.

[2] Leonard, S. L., PROC. SOC. EXP. BIOL. AND MED., 1932, **30**, 403.

[3] Fevold, H. L., Hisaw, F. L., and Leonard, S. L., *Am. J. Phys.*, 1931, **97**, 291.

[4] Fevold, H. L., Hisaw, F. L., Hellbaum, A., and Hertz, R., *Am. J. Phys.*, in press.

[5] Hellbaum, A., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 641.

as a source for follicular stimulating hormone. Prolan was prepared from pregnancy urine by acetone precipitation followed by pyridine extraction and the placental hormone from dried human placentae by the same general method used for pituitary powder. Although the preparations from pregnancy urine and placentae have been subjected to the same chemical procedures used in fractionating the anterior pituitary hormones we have obtained no evidence of a separation of 2 principles.

Rats 21 days old were injected for 5 days, twice daily, with equal volume of extract and killed on the sixth day. The ovaries, freed from tubes and bursae, were weighed and the percentage increase over those of normal uninjected controls was calculated.

TABLE I.

		5 mg. Lut. P.		8 R. U. Prolan		8 R. U. Hu. P. H.	
	A	B	C	B	C	B	C
A		none		200		221	
2 R. U. C. H. P.	157	553	252	907	154	1071	183
3/4 R. U. F. S.	50	228	356	560	124		
3 R. U. F. S.	357	1057	196				
4 R. U. F. S.	528	1425	142			1435	91
5 mg. Lut. P.	none			215	none	235	none

Columns A—% increase in ovarian weight for various preparations when given alone.
Columns B—% increase in ovarian weight for various preparations when given in combination.
Columns C—% augmentation over that which can be accounted for by the addition of the increase produced by the preparations when injected alone.
F. S.—Follicular stimulating preparation from sheep pituitary.
C. H. P.—Castrated horse pituitary powder.
Lut. P.—Luteinizing powder prepared from sheep pituitaries.
Hu. P. H.—Anterior lobe-like hormone from human placenta.

The results, presented in Table I, are the averages of at least 6 animals in each case. The luteinizing fraction, which does not increase the ovarian weight when given alone, when added to a given dosage of the follicular stimulating preparation produced a marked augmentation which cannot be accounted for on the basis of an additive effect. When the luteinizing fraction was added to prolan or placental extract, no augmentation occurred. However, when the follicular stimulating preparation was injected with prolan or placental extract marked augmentation resulted. In the experiments

with anterior pituitary factors, augmentation is associated with luteinization of the ovaries and is apparently due to the combined action of 2 hormones. Prolan and placental hormone, both strong luteinizers, act like the luteinizing fraction when given in combination with the follicular stimulating fraction. These results do not lend support to the pro-hormone theory as the preparations which were used did not contain growth hormone. Moreover, augmentation does not necessarily depend on the use of prolan as demonstrated with the fractionated sex hormones of the pituitary.

6738

Skin Temperature of the Extremities and Basal Heat Production.

WALTER G. MADDOCK AND FREDERICK A. COLLER.
(Introduced by L. H. Newburgh.)
From the Department of Surgery, University of Michigan.

In the maintenance of a constant body temperature the importance of the skin in the dissipation of body heat is universally recognized. Several studies of normal subjects[1, 2] have shown that in the adjustment to different environmental temperatures there are much greater changes in the skin temperature of the extremities than that of the head and trunk. Therefore, the shift of blood to or from the skin in order to meet the required heat dissipation under the new environmental condition takes place to a much greater extent in the extremities than it does in the head and trunk. Accordingly, we believe that the extremities have a more important part in the regulation of the dissipation of heat from the skin than does the remainder of the body. Such being the case, under a constant environmental temperature differences in heat production ought to be reflected in the skin temperature of the extremities and particularly that of the toes since they show the widest range of normal variations.

This study was carried out under a constant room temperature of 83°F. ± 1°. The basal heat production of 5 normal male subjects wearing only "shorts" was determined by indirect calorimetry, using the Tissot tank and Haldane gas analyzer. The skin tempera-

[1] Benedict, F. G., Miles, W. R., and Johnson, A., *Proc. Nat. Acad. Sci.*, 1919, **5**, 218.

[2] Coller, F. A., and Maddock, W. G., *Ann. Surg.*, 1932, **96**, 719.