

Function of the Hypophysis-Thyroid System in the Rabbit Foetus with Regard to Cholesterol Metabolism

THE experimental studies of Jost¹ and Hwang and Wells² have demonstrated the functional inter-relationship of the pituitary and thyroid in the rabbit and rat foetus. Rumph and Smith³ showed that the thyroid of the 90-mm. pig foetus contains a substance which would induce metamorphosis in the hypophysectomized tadpole. Geloso⁴ demonstrated the presence of thyroid hormones in the blood of the rat foetus. Jost and Picon⁵ showed that foetal thyroidectomy resulted in an increase in total body fat in the rabbit foetus. Bearn⁶ found an increase in liver fat following hypophysectomy by decapitation in the rabbit foetus, and correlated this with the increase in the fat content noted in human anencephalic fetuses. These experiments can be taken to indicate that the foetal thyroid is capable of function, and that its function is regulated by the foetal pituitary.

It is well known that there is in both adults and in infants a close relationship between thyroid function and cholesterol metabolism. A rise in blood cholesterol has been reported in hypothyroidism⁷ and in cretinism⁸. It was therefore decided to investigate the role of the pituitary and thyroid of the rabbit foetus in the regulation of cholesterol metabolism.

Nineteen rabbit foetuses were decapitated by a modification of the method described by Jost⁹. Nine foetuses were decapitated through the neck to remove the thyroid as well as the pituitary, and ten were decapitated through the mouth to preserve the thyroid. The operation was performed between days 21 and 23 following witnessed mating, and the foetuses were recovered after seven days of further intrauterine development; 53 litter mates were used as controls.

The cholesterol-level of the blood was determined blind by the method described by Abell *et al.*¹⁰, and the results expressed in mgm. per 100 ml. As used in this laboratory, the method has a standard error of blind duplicates of 8.3 mgm. The results are summarized in Table 1.

Table 1. CHOLESTEROL-LEVELS IN SERUM OF DECAPITATED AND CONTROL FETUSES

Foetuses	Age at investigation	No.	Mean serum cholesterol (mgm./100 ml. \pm S.E.)
Low decapitation (at 21-22 days)	28-29 days	9	142 \pm 5.2*
Litter mate controls	28-29 days	29	87 \pm 2.9*
High decapitation (at 22-23 days)	29-30 days	10	156 \pm 6.5*
Litter mate controls	29-30 days	24	97 \pm 4.2*

* These differences are significant, $P < 0.001$.

There is a variability in the level of blood cholesterol from one litter to another, but the level in each of the control foetuses from a single litter shows little variation.

The decapitated foetuses all showed a significant rise in blood cholesterol, even in those foetuses in which the thyroid was left behind and only the pituitary removed.

These preliminary results indicate that the foetal pituitary and thyroid play a part in the cholesterol

metabolism of the foetus. In addition, they indicate that maternal thyroid hormones and maternal thyrotropic hormone do not compensate for the absence of foetal thyroid and pituitary hormones in the rabbit.

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Rate of Anaerobic Glycolysis versus Structure in Pork Muscle

THE pH of pork musculature after cessation of post-mortem glycolysis (ultimate pH) has long been known to be decisive for structure and water-holding capacity of the muscle. Recent observations^{1,2} have shown that considerable variation in structure of muscle with the same ultimate pH may be recorded. The rate of the post mortem pH fall was found to be of considerable importance.

The investigations which are briefly reported here were facilitated with a pH meter (Radiometer model No. 31; electrode-selector type ELS31; electronic recorder type 153, Honeywell) for continuous and simultaneous pH and temperature recordings. Six pH electrode pairs (glass electrodes G 2326, calomel electrodes 4116) were inserted in representative muscles and permitted to remain in position from 1 to 24 hr. post mortem. Careful tests have not revealed any indications of artefacts arising from this procedure. The carcasses from 20 Danish Landrace pigs (85-95 kgm.) were used in this work. The continuous recordings from these carcasses depict at least four distinct types of post mortem pH patterns: (1) A slow gradual decrease to an ultimate pH of 5.7-6.3. (2) A gradual decrease to approximately 5.7 at 8 hr. with an ultimate pH of 5.3-5.7. (3) A relatively rapid decrease to approximately 5.5 at 3 hr. with an ultimate pH of 5.3-5.6. (4) A sharp, significant decrease to a pH of approximately 5.1 at 1½ hr. and a subsequent elevation to 5.3-5.6.

The anaerobic glycolysis of the type 4 compared to the type 2 pH pattern and the effect on the tissue of the longissimus dorsi muscle will be briefly elaborated.

A Radiometer pH meter (model 24) was used to determine pH values at 15-min. intervals to the 1-hr. period while the carcasses were in the slaughter line. Afterwards the carcasses were transferred to a 3° C. atmosphere for continuous recordings (pH