LETTERS TO THE EDITORS

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Pituitary Adrenotropic Hormone, Extract of Suprarenal Cortex, Lymph, and Lymphoid Tissue

WITHIN the past few years, attention has been directed to the effect on lymphoid tissue of pituitary adrenotropic hormone¹. Dougherty and White¹ described a direct depressant effect of the hormone on lymphoid tissue, while Reinhardt and Li² associated this with an observed diminution in the thoracic duct lymphocytes entering the blood.

In experiments with cats, the lymphocytes, dry substance, fat and nitrogen were investigated in thoracic duct lymph. The lymphocyte content markedly diminishes after intraperitoneal injection of 300 units of pituitary adrenotropic hormone, thus agreeing with the observations of Reinhardt and Li². In these experiments, furthermore, the fat diminishes, as also does the flow of lymph and the dry substance. The fat content calculated as percentage of dry substance falls by more than 40 per cent, while the nitrogen also decreases. A typical experiment is shown in Fig. 1. The lowered fat content of the lymph is especially interesting in view of the findings of Reiss, Epstein and Gothe³, concerning the part played by corticotrophic hormone in fat metabolism.

Fig. 1. EFFECT OF CORTROPHIN ON LYMPH FLOW, LYMPHOCYTES, DRY SUBSTANCE, NEUTRAL FAT AND NITROGEN IN THORACIC LYMPH DUCT OF CAT.

In rats given cortrophin, the blood showed an absolute lymphopenia in eight cases out of twelve, at times varying from 2.75 to 5.25 hr. after intraperitoneal injection. With daily injections of cortrophin, or of cortical extract (eschatin) the potency of which had previously been tested by the atrophic changes induced in the suprarenals of normal animals, the blood changes varied. Out of eight experiments in which injections were given daily for 28 days, cortrophin (three experiments) produced a rise in the blood lymphocytes, eschatin (three experiments) a fall, and cortrophin + eschatin (two experiments) also a fall.

In the lymphoid tissues, eschatin given daily for 28 days produced, surprisingly enough, a hyperplasia (Figs. 2 and 3), in spite of the lowering of the blood lymphocytes. The results indicate that the interpretation of the blood changes may not be quite so simple as has been thought. Lymphopenia may possibly be associated with increase in the number of newly formed lymphocytes entering the blood if at the same time the number leaving the blood is increased still further; or, in the terminology employed by Drinker and Yoffey⁴, the lymphopenia would be of the X+/Y++ type.

In the eschatin experiments there was no convincing evidence of increased lymphocyte destruction as reported by Dougherty and White¹, but the animals were killed 24 hours after the last injection

Fig. 2. PHOTOMICROGRAPH OF A SECTION THROUGH THE SUBMANDIBULAR LYMPH NODE OF AN ADULT RAT, TREATED DAILY FOR 28 DAYS BY SUBCUTANEOUS INJECTION, WITH 1 DOG UNIT OF ESCHATIN PER 100 GM. BODY WEIGHT. $\times 12$.

Fig. 3. PHOTOMICROGRAPH OF THE GERMINAL CENTRE SHOWN WITHIN THE DOTTED LINES IN FIG. 2. $\times 310$.

of eschatin, by which time over-compensatory replacement of destroyed lymphocytes might have occurred.

This is a preliminary report, and fuller observations will be reported elsewhere.

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- ¹ Dougherty, T. F., and White, A., *Endocrin.*, **35**, 1 (1944). White, A., and Dougherty, T. F., *Endocrin.*, **38**, 16 (1945). Dougherty, T. F., and White, A., *Amer. J. Anat.*, **77**, 81 (1945). Ingle, D. J., *Proc. Soc. Exp. Biol. and Med.*, **38**, 443 (1938). Simpson, M. B., Li, C. H., Reinhardt, W. O., Evans, H. M., *Proc. Soc. Exp. Biol. and Med.*, **54**, 135 (1943). Reinhardt, W. O., Aron, H., and Li, C. H., *Proc. Soc. Exp. Biol. and Med.*, **57**, 19 (1944). Reinhardt, W. O., *Proc. Soc. Exp. Biol. and Med.*, **58**, 123 (1945). Reinhardt, W. O., and Li, C. H., *Science*, **101**, 360 (1945).
- ² Reiss, M., Epstein, H., and Gothe, L., *Exp. Med.*, **101**, 69 (1937).
- ³ Drinker, C. K., and Yoffey, J. M., "Lymphatics, Lymph and Lymphoid Tissue" (Harvard University Press, 1940).

Tropomyosin : a New Asymmetric Protein Component of Muscle

AN unusual protein of fibrous character has been isolated from the fibrillar fraction of skeletal and cardiac muscle. It is simply prepared by washing away the sarcoplasmic components of finely minced muscle and dehydrating the residue in ethanol and then in ether. The debris, consisting mainly of stroma protein and of myosin denatured *in situ*, is soaked in a molar solution of potassium chloride at pH 7, when a clear viscous extract is obtained containing tropomyosin and other proteins which are then precipitated at pH 4.5. After redispersal at pH 7, the contaminating proteins are largely denatured, and are almost quantitatively removed in ammonium sulphate solutions of 41 per cent saturation. The tropomyosin, precipitated between 49 and 60 per cent saturation, is filtered, dissolved, dialysed and purified by repeating the isoelectric precipitation and salting-out procedures.

Ultracentrifugation at pH 6.5, and electrophoresis at pH 6.5 and 2.9 (that is, above and below the isoelectric point of 5.5) have established the homogeneity of the preparation. The sedimentation constant (kindly determined by Dr. A. G. Ogston) was 2.6×10^{-13} for a protein concentration of 0.6 per cent; this, combined with a diffusion constant of 2.35×10^{-7} (obtained by Mr. H. Gutfreund at the same protein concentration) and a partial specific volume of 0.73 gives a molecular weight of 104,000. Osmotic pressure measurements as a function of protein concentration, with subsequent extrapolation of π/c values to c_0 , give the rather lower value of 88,000. It is possible that a similar extrapolation of sedimentation and diffusion data obtained for different protein concentrations may give a molecular weight agreeing more closely with that from osmotic pressure determinations.

In salt-free solutions between pH 6 and 7 tropomyosin is exceedingly viscous and shows intense (positive) flow-birefringence. A solu-