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Arginine and 'Neurosecretory' Material in the Pituitary Gland of the Pig

IN a previous publication[1], the distribution of arginine as demonstrated histochemically by an improved Sakaguchi reaction[2] was examined in sections of rat pituitary gland. The results were discussed in relation to present knowledge of the origin and chemical nature of the hormones of the pituitary gland, with particular reference to the correlation between the stainable 'neurosecretory' material of the pars nervosa and the octapeptide antidiuretic-vasopressor hormone (ADH-vasopressin). It was further suggested that a similar examination of the neurohypophysis of the pig would be of interest since the ADH-vasopressin extracted from the posterior lobe of the pituitary of this animal contains lysine in place of arginine. Unfortunately, there does not appear to be a specific histochemical method for lysine; nevertheless, some information may be derived by applying the reaction for arginine, for if the stainable 'neurosecretory' material represents the hormones oxytocin and ADH-vasopressin, as postulated by the neurosecretory theory, then it might be expected to give no reaction for arginine in the case of the pig.

This communication describes results of such a preliminary investigation; pituitary glands were fixed in Susa or Lewitsky's fluid and the methods used were as described previously[1].

By comparison of adjacent sections it was found that the 'neurosecretory' material of the pars nervosa of the pig, as stained by the chrome alum-hæmatoxylin method, showed no reaction for arginine. However, other structures within the same section, such as cells of the pars intermedia, acidophils of the pars anterior, blood vessels and connective tissue fibres, gave a positive reaction for arginine, as did also 'neurosecretory' material in sections of rat pituitary stained under exactly the same conditions and used as a 'control'. It is therefore concluded that arginine is either very low in concentration or absent from 'neurosecretory' material in the pars nervosa of the pig, as predicted from the known chemical structure of pig ADH-vasopressin and the theory of neurosecretion. The investigation is being extended to other species.

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Renal Proliferation in the Unilaterally Nephrectomized Rat

RENAL growth following unilateral nephrectomy has been referred to as 'compensatory renal hypertrophy'[1]. The work of Rollason emphasizes the importance of hyperplasia in this process[2]. Utilizing thymidine as a specific precursor of deoxyribonucleic acid (DNA), and assuming the constancy of DNA in the absence of dividing cells, the incorporation of thymidine serves as an index of cellular proliferation[3]. We now describe the effect of uninephrectomy on the incorporation of tritium-labelled thymidine into renal DNA.

Male Wistar rats, approximately 4 weeks of age and weighing 40 gm., were housed in colony cages and maintained on 'Purina Laboratory Chow' and water *ad lib*. Experimental and control groups were chosen at random from a group of sixty rats. Left nephrectomies and sham operations were performed under pentobarbital sodium anæsthesia (29 mgm./kgm. body-weight intraperitoneally). 36 hr. following the operative procedure each animal received intraperitoneally three separate injections, 1 hr. apart, of tritium-labelled thymidine, 20 μc./kgm. body-weight; 24 hr. following the last injection, the animals were killed by decapitation, the kidneys removed and frozen. DNA protein was isolated from the kidneys according to a modification of the Schmidt–Tannhauser procedure as outlined by Friedkin[4]. The dried DNA protein was weighed into a counting vial and 1 ml. of methanolic 'Hyamine' (Packard Instrument Co., Chicago, Illinois) was added. The vials were sealed and heated in a water-bath at 55° C. for 18 hr.; 5 ml. of a toluene scintillation solvent system were added[5]. A homogeneous solution was obtained by swirling. The vials were cooled to 4° C. and counted in a liquid scintillation counter (Packard Instrument Co.). The final counts were corrected for quenching by use of an internal standard. In order to express the counts as counts per min. per milligram of DNA, an aliquot of each DNA protein sample was heated with 3 per cent perchloric acid for 15 min. at 70° C., and the optical density of the supernatant solutions was read at 265 and 295 mμ and compared