

Adrenergic Nerves in the Major Salivary Glands of the Rabbit

In the rat, i.v. adrenaline or cervical sympathetic stimulation^{1,2} induces a good secretion of saliva from the submandibular gland but very little from the major sublingual gland. A corresponding quantitative difference in the number of adrenergic nerves in the glands – extensive in the submandibular gland and sparse in the sublingual gland – has been found to be present, by the catecholamine fluorescence technique³.

The rabbit appears to be unique amongst animals so far examined in that sympathetic stimulation induces a much greater secretion from the parotid than from the submandibular gland, which usually gives very little secretion on such stimulation⁴. It was therefore decided to examine both glands in rabbits, by the catecholamine fluorescence technique of FALCK and HILLARP⁵, to see if there were a quantitative difference in the numbers of adrenergic nerves in the glands corresponding to the differences in sympathetic secretion.

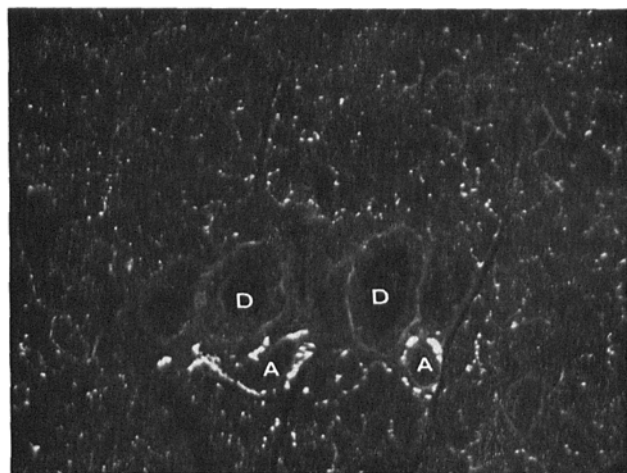


Fig. 1. Parotid gland, normal rabbit. (A) arteries; (D) collecting ducts. The adrenergic fibres among the acini are abundant, but less fluorescent than those around the arteries. $\times 165$.

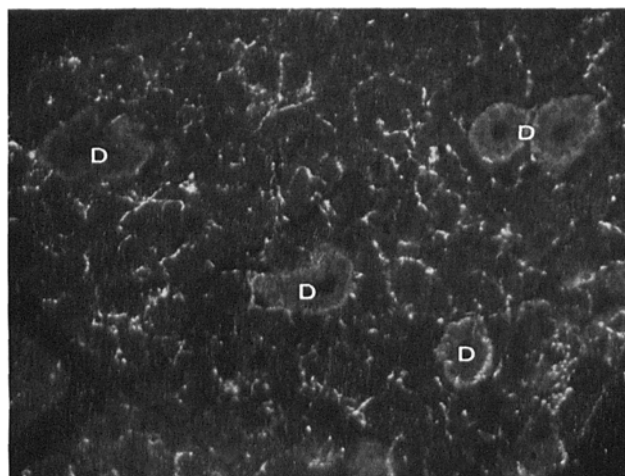


Fig. 2. Submandibular gland, normal rabbit. (D) striated ducts, one of which is surrounded by adrenergic fibres. Abundant adrenergic fibres among the acini. $\times 165$.

Tissues from the parotid and submandibular glands from 5 rabbits were examined for the presence of adrenergic nerves. In one of these animals, the effect of cervical sympathetic stimulation on secretion from the glands was tested, prior to the histochemical examination, and the usual response of a greater flow of saliva from the parotid than from the submandibular gland occurred.

In all the animals, the distribution of adrenergic nerves among the acini was abundant and was essentially similar in both parotid and submandibular glands (Figures 1 and 2). The nerves often appeared to be encircling the acini, and in the submandibular gland a few of the striated ducts were also surrounded by a meshwork of nerves. Adrenergic nerves were found in the usual plexus formation around the media of muscular blood vessels and the fluorescence of these nerves was much stronger than that of the nerves around the acini.

The similarity of the number and distribution of the adrenergic nerves in the parotid and submandibular glands contrasts with the dissimilarity in the quantities of secretions that are evoked by cervical sympathetic stimulation. One explanation may have been that the sympathetic supply of the submandibular gland arises from a source other than the cervical chain. This possibility was tested, in 1 additional animal, by the unilateral removal of the cervical sympathetic chain, 2 weeks before examination of the glands. The picture on the control side was normal but on the operated side both glands were devoid of adrenergic nerves, thus confirming that both glands do receive their adrenergic innervation from the cervical chain.

One can only speculate about the disparity that occurs in the secretion from submandibular and parotid glands in rabbits, on sympathetic stimulation, in view of the present finding that the distribution of adrenergic nerves is similar in both glands. It would appear, however, that in the submandibular gland – at least – the adrenergic nerves associated with the secretory structures have function(s) other than solely for the induction of secretion⁶.

Zusammenfassung. Es ist bekannt, dass die Ausbreitung der adrenergischen Speicheldrüsenerven der Ratte in enger Verbindung mit der Sekretion bei sympathischer Reizung steht. Die Submaxillaris- und Parotisdrüsen des Kaninchens waren reichlich mit adrenergischen Nerven versorgt. Die sympathische Sekretion der Submaxillarisdrüse war indessen sehr gering, während die der Parotisdrüse beträchtlich war. Die Versuche deuten darauf hin, dass die sympathischen Nerven nicht nur eine sekretorische Funktion haben.

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⁷ J. R. GARRETT on leave from the Department of Oral Pathology, Kings College Hospital, London S.E. 5, wishes to acknowledge a travel grant made by the ELEY-WEBSTER Trust.