

Electron Microscopical Evidence for Innervation of Chief Cells in Human Parathyroid Gland

The innervation of the parathyroid glands in dogs and cats was described by RAYBUCK¹ at the light microscopic level. He found nerve endings in intimate relationship with the cell membrane of the chief cells. Many electron microscopists have mentioned unmyelinated nerve fibers in the perivascular spaces of parathyroid glands in various species, including man²⁻¹¹, but the termination of nerve fibers remained unclear. Nerve endings at endocrine parathyroid cells were not observed^{5, 7, 8}.

In our study (parathyroids of 3 patients with secondary hyperparathyroidism and 3 patients without impairment of calcium metabolism), we often found unmyelinated nerve bundles joining the blood vessels. Generally there is a partial unfolding of axons within the free interstitial spaces without contact with epithelial cells, fibroblastoid cells, or blood vessel cells. The mode of innervation found in arterioles is similar to that found in other organs¹².

Additionally we often found an approach of preterminal nerve fibres to the basement membranes of parathyroid chief cells. The preterminal axons are rich in synaptic vesicles and neurosecretory granules. Sometimes a close direct contact of unfolded axons with chief cells can be demonstrated (Figure). This represents the morphological

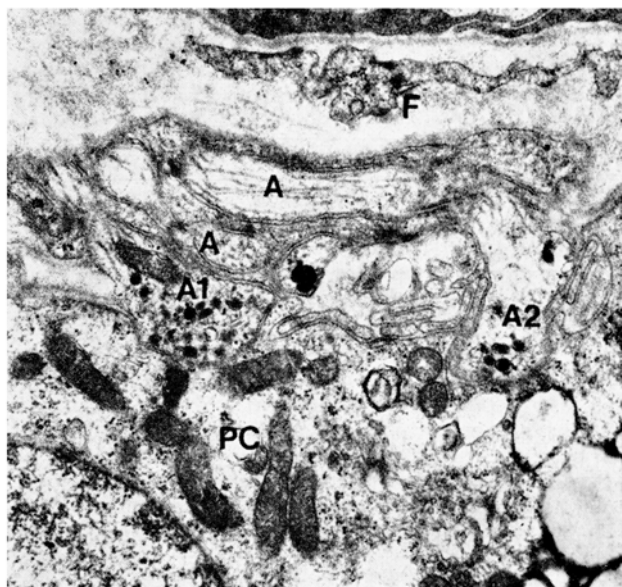
appearance of a neuroepithelial synapse. The intersynaptic space measures 150 Å.

This mode of innervation in blood vessels, interstitial tissue and especially neuroepithelial synapses with chief cells, occurs in both normal and secondary hyperplastic parathyroid glands. Although most work indicates that parathyroid activity is predominantly regulated by plasma calcium level^{10, 13} and calcium concentration in tissue culture medium¹⁴, the demonstrated innervation of parathyroid chief cells might have some significance for the regulation of endocrine parathyroid activity and endocrine cell mechanisms. The findings are of special interest, as HODGES and GOULD¹⁵ found evidence for partial nervous control of avian ultimobranchial body, the other endocrine organ involved in calcium metabolism.

Zusammenfassung. Erstmals werden ultrastrukturell neuroepitheliale Synapsen vegetativer Nerven an den Hauptzellen von Nebenschilddrüsen (Mensch) nachgewiesen. Eine nervöse Beeinflussung der Parathormonsynthese und -sekretion ist daher möglich.

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22 March 1971.*



Parathyroid chief cell (PC) with adjacent axon bundle. Two axons (A1, A2) are in synaptic contact with the chief cell. F = fibroblastoid cell. $\times 19,000$.

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Template Preference of Polymerases and its Relevance to Oncogenic RNA Virus Replication¹

Recent reports of BALTIMORE², TEMIN and MIZUTANI³, SPIEGELMAN et al.^{4, 5}, ROKUTANDA et al.⁶ have caused great excitement because it was thought that the viral polymerases represented unique enzymes found only in oncogenic RNA viruses and that they were contrary to the central dogma of molecular biology, namely, they were using RNA to synthesize DNA. According to these reports there seemed to be two enzymatic activities in these virions: one capable of synthesizing DNA on an RNA template and one that could use the DNA-RNA duplex

formed by the former as a template to synthesize a double stranded DNA product. The presence of DNA in these virions has also been reported⁷. Some of the recent investigations show differences exhibited by these enzymes in their preference toward denatured and native DNA template^{8, 9}. The cause of this excitement was the view that DNA polymerase can only use DNA as template and will only produce a DNA-like product. Consequently an enzyme using RNA or RNA-DNA hybrid as template was considered unique for oncogenic RNA viruses. However,