

Central and peripheral regulatory peptides

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In 1902 the discovery, by Bayliss & Starling, of secretin, the first regulatory peptide, began a new era of endocrinology. New concepts of the hormonal control of bodily functions were formed and eclipsed all the previous concepts of neural control. Almost 80 years later, the endocrine and nervous systems, far from being mutually exclusive, has been unified by the discovery of a diffuse neuroendocrine system (DNES), made up of a large number of regulatory peptides present in APUD cells or autonomic nerves or both.

Two immunological methods, immunocytochemistry and radioimmunoassay, used in combination, have provided the most fruitful approach to the study of the distribution and tissue localization of the central and peripheral regulatory peptides. It is now well known that these regulatory peptides are widely distributed in a variety of peripheral tissues, including the lung, urogenital tract, adrenals, salivary glands and skin, although they were originally extracted from the brain or gut.

As well as having a spectrum of distributions in the body, the central and peripheral regulatory peptides have varied modes of action. Some, such as gastrin and secretin, act via the circulation in a classical endocrine manner. Others are local (paracrine) hormones, for example, somatostatin and some are neurotransmitters/neuromodulators, such as vasoactive intestinal polypeptide and substance P.

In the central nervous system, neurones containing regulatory peptides are most frequent in the hypothalamus. In the periphery, the gastrointestinal tract and pancreas form the main depositories for the components of the DNES.

There is a great deal of knowledge on the actions of the regulatory peptides in the control of many different bodily functions and furthermore, it has been established that some of these peptides are involved in pathology. Recently the involvement of peptide containing nerves in certain gut diseases has been established. Where hypo or aganglionosis exists, such as in Hirschsprung's or Chagas' disease, a decrease of VIP and substance P containing nerves can be observed. In contrast, in Crohn's disease a significant increase in VIP containing nerves has recently been seen.

In conclusion, the complexities of this neuroendocrine system must be investigated in both health and disease so that new understanding of the workings of the body and the importance of subtle changes in its normal regulatory balance can be achieved.