The concept of hormonal regulation using intercellular peptide messengers dates back to the discovery of secretin in 1902. The concept was simple: A peptide is released from specific hormone producing cells, endocrine cells, into circulation upon stimulation of the cells. The peptide hormone travels via blood to its target, the cells of which are equipped with specific receptors for high-affinity binding of the particular peptide hormone. Receptor binding subsequently elicits action of the target cells.

This concept has been seriously challenged by modern biochemistry and cell biology. Thus, it is now well established that the gene of a specific peptide hormone may be expressed in different types of endocrine cells, in neurons, and in some instances also in adipocytes, myocytes, osteoblasts, and immune cells. Today, only a few hormones – including the old master hormone insulin – represent the original endocrine paradigm. Instead, the widespread cellular synthesis now raises the question of how the body maintains the regulation of its functions by peptide hormones when a hormone may originate from a variety of cells.

Fortunately it has become apparent that several mechanisms act to ensure lack of interference. The first mechanism is simple. Peptide hormone gene expression in cells vary considerably during the ontogenetic development at all levels of the expression cascade. Secondly, biological barriers such as the blood–brain barrier ensure that the peptide hormones in peripheral circulation do not compete with the release of similar or identical peptides in the cerebral synapses. Thirdly, paracrine release of peptides between neighboring cells or autocrine secretion from self-stimulating cancer cells display a large concentration gradient in tissue so that locally released peptides do not interfere significantly with the systemic distribution of hormones in circulation. Finally – but not least – the cell-specific posttranslational processing helps to avoid interference by ensuring that different bioactive fragments of the prohormones are released from different cells. Thus, the fact that different cell types express the same hormone gene appears to be under control by counter-regulatory mechanisms in the normal organism. But the phenomenon is also of interest for the understanding of the dysregulation observed in several major diseases such as diabetes mellitus, cancer, and cardiovascular diseases.

The present volume of the well-established book series “Results and Problems in Cell Differentiation” is an attempt to illustrate the modern and universal concept.
Preface

of peptide hormone biology with emphasis on the cellular hormone synthesis and secretory pathways. Originally a more comprehensive text was planned. Nevertheless, the actual volume illustrates well the key information in the up-to-date basic peptide biology that we wished to see unfolded and discussed in one book. We are grateful to the series editors, Dr Dietmar Richter and Dr Henri Tiedge, for the invitation to edit the volume. We also owe a large debt of gratitude to the authors for the excellent contributions and for their patience with the editorial process. Finally, we wish to thank Springer Verlag in general and Ms Ursula Gramm in particular for perfect collaboration.

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