Preface

Over the past four decades, the number of peptides identified as neurotransmitters or neuromodulators in the central and peripheral nervous systems has significantly increased. These compounds, known as neuropeptides, have been recognized for playing an important role in the communication between cells in a variety of neuronal networks. Although a considerable number of neuropeptides have been characterized so far, their quantity is limited compared to the number of precursor proteins that are actually found to be expressed in the cells of the nervous system. Numerous studies have confirmed that neuropeptides are involved in a number of biological activities. These include modulation of brain reward, pain processing, and immune response, as well as neuroendocrine regulations, control of neurovegetative functions, and trophic effects.

In recent years, it has become evident that the role of neuropeptides as fast-acting neurotransmitters is challenged by the observation that many of them may act as growth factors by stimulating cell proliferation and slow-acting mitogenesis. It has thus been demonstrated that a number of neuroactive peptides, such as pituitary adenylate cyclase–activating polypeptide (PACAP), adrenocorticotrophin (ACTH), opioid peptides, somatostatin, and substance P, may modulate proliferation and cell viability. Some peptides act as stimulatory factors on brain circuits involved in cognition, whereas others may act as inhibitory factors. Accordingly, many neuropeptide systems appear as important targets for neuroprotective drugs and drugs that promote neuroregeneration. The recently discovered nuclear protein or polypeptide prothymosin alpha (ProTα), which inhibits neuronal necrosis, suggested to be of clinical use for stroke, is also a neuroprotective agent of interest in this regard. This volume aims to describe recent aspects on the impact of neuropeptides on processes involved in neuroprotection and neuroregeneration. It is by no means exhaustive, but intends to highlight some examples of neuropeptides, neuroactive polypeptides, and growth factors that typify the actual area of research.

This book begins with chapters describing important features of the endogenous neuropeptide systems with regard to their formation, receptor signaling, and inactivation. However, unlike many books dealing with this topic, it also includes chapters focused on the design and development of peptide-like drugs (peptidomimetics). It further includes a contribution highlighting neuropeptide circuits as targets of cognitive enhancers. Most of the authors who have contributed to this volume belong to the core of international top scientists in their particular area of research.

Finally, it is interesting to note that it has been possible to get contributors to this volume who are such a good representation of geographical districts around the world.

With the current advances in neuropeptide research, this volume presents a timely book that underlines an important aspect of interest to a diverse group of people, from scientists and medical practitioners to basic clinical investigators and students.

I am grateful to all my colleagues who have contributed such excellent chapters to this volume. As editor, I would like to point out that all these chapters were submitted within a time period of 15 months and therefore they present the most recent knowledge in the respective fields covered within the volume.

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