

Neurosecretion and Brain Peptides



*Implications for Brain Functions
and Neurological Disease*

Advances in Biochemical Psychopharmacology Volume 28

Editors

Joseph B. Martin • Seymour Reichlin
Katherine L. Bick

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Volume Editors

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Preface

Investigations of the neuronal localization and secretion of structurally defined polypeptides have now occupied three decades of scientific endeavor. The historic elucidation of the amino acid composition of vasopressin and oxytocin by du Vigneaud and co-workers provided the first framework for biochemical approaches to the field. The characterization of specific hypothalamic releasing factors essential for regulation of anterior pituitary hormone secretion by Guillemin and Schally and their respective colleagues catapulted peptides into neurobiology. The elucidation of the amino acid sequences of Substance P, neurotensin, and the opioid peptides drew attention to a broader spectrum of neuropeptides important for neurobiology, endocrinology, neurology, and psychiatry.

There have been many publications on the neuropeptides and neuroendocrinology in the past few years. One might ask, "Why another?" The consideration that led to the publication of this volume was the recognition that sufficient information was now available about the synthesis, anatomical distribution, and function of neuropeptides to justify a critical evaluation of their potential importance for the understanding of the pathogenesis and manifestations of neurological disease.

To provide coherence to the volume, individual chapters are organized by topic areas, each of which is summarized by a brief introduction that highlights the topics covered. In the first section, the biology of the neurosecretory neuron, general principles of peptide hormone biosynthesis, and specific examples of peptide processing and degradation are considered. The anatomical distribution of selected neuropeptides including oxytocin, vasopressin, the opioid peptides, Substance P, and neurotensin are reviewed in Sections II and III. Physiological control of neurosecretion and the mechanisms by which neuropeptides regulate neuronal functions are examined in a variety of systems. The topics covered in Section III range from a consideration of general principles of peptide-receptor interaction and characterization of opiate receptors in brain to evaluation of the function of Substance P and endorphins in pain perception.

The role of peptides in regulating neuronal growth and differentiation and their function in visceral homeostasis in pituitary control and regulation of brain volume are considered in Sections IV through VII. Other topics covered in the volume include the function of peptides in shock, circadian rhythms, the significance of cerebrospinal fluid as a pathway of neuroendocrine and nervous system control and the anatomy of the circumventricular organs.

The usefulness of pituitary function studies as an indicator of hypothalamic function, of the practical aspects of evaluation of peptide secretion in man, and

of the use of peptide analogues as pharmacological modulators of brain function are evaluated critically in the last two sections. The possible role of peptides in the pathogenesis of genetic disorders of brain development is reviewed. Speculations about the potential implication of neuropeptides in specific neurological disease are offered.

This volume will be of interest to clinical neurologists, neurosurgeons, and psychiatrists and to basic scientists working in fundamental studies on the neuropeptides.

Joseph B. Martin
Seymour Reichlin
Katherine L. Bick

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Contents

Section I: Biosynthesis, Processing, and Release of Polypeptides

- 1 Introduction
Seymour Reichlin
- 5 The Biology of Neurosecretory Neurons
Harold Gainer
- 21 Principles of Peptide-Hormone Biosynthesis
Joel F. Habener
- 35 Synthesis and Secretion of ACTH, β -Endorphin, and Related Peptides
Richard E. Mains and Betty A. Eipper
- 49 Peptide Processing in the Central Nervous System
Neville Marks, A. Suhar, and M. Benuck

Section II: Neuroanatomy of Peptidergic Distribution in Brain

- 61 Introduction
Michael J. Brownstein
- 63 The Organization of Oxytocin and Vasopressin Pathways
Earl A. Zimmerman
- 77 Opioid Peptides and Related Substances: Immunocytochemistry
Stanley J. Watson and Huda Akil
- 87 Neurotensin
George R. Uhl and Solomon H. Snyder

Section III: Mechanisms of Peptide Actions on Neurons

- 107 Introduction
Leo P. Renaud
- 109 Principles of Receptor Identification
Jeffrey S. Flier
- 117 Type 1 and Type 2 Opiate Receptor Distribution in Brain—What Does It Tell Us?
Candace B. Pert
- 133 Cholecystikinin and Gastrin as Transmitters in the Mammalian Central Nervous System
John S. Kelly and Jane Dodd
- 145 Somatostatin and Cortical Neurons in Cell Culture
Marc A. Dichter and John R. Delfs

- 159 Substance P and Somatostatin Actions on Spinal Cord Neurons in
Primary Dissociated Cell Culture
Robert L. Macdonald and Linda M. Nowak
- 175 Peptides and Amine Transmitter Effect of Embryonic Chick Sensory
Neurons *In Vitro*
*Gerald D. Fischbach, Kathleen Dunlap, Anne Mudge, and
Susan E. Leeman*
- 189 The Role of Substance P in Sensory Transmission and Pain Perception
Thomas M. Jessell
- 199 An Endorphin-Mediated Analgesia System: Experimental and
Clinical Observations
Howard L. Fields
- 213 Possible Role of Opioid Peptides in Pain Inhibition and Seizures
*J. W. Lewis, S. Caldecott-Hazard, J. T. Cannon, and
John C. Liebeskind*

Section IV: Principles of Neuronal Growth and Differentiation

- 225 Introduction
Dennis M. D. Landis
- 229 Observations on the Role of Schwann Cell Secretion in Schwann
Cell-Axon Interactions
Richard P. Bunge, F. Moya, and M. Bunge
- 243 The Extracellular Matrix and the Control of Cell Proliferation
Denis Gospodarowicz
- 263 The Role of Nerve Growth Factor (NGF) and Related Factors for
the Survival of Peripheral Neurons
Hans Thoenen, Y.-A. Barde, and D. Edgar
- 275 Chemical Differentiation of Sympathetic Neuron
David D. Potter, S. C. Landis, and E. J. Furshpan
- 287 Regulation of Noradrenergic and Peptidergic Development: A Search
for Common Mechanisms
Ira B. Black and John A. Kessler

Section V: Blood-Brain Barrier, Cerebrospinal Fluid, and Cerebral Blood Flow

- 299 Introduction
Earl A. Zimmerman
- 303 Relation of Neuropeptides to Mammalian Circumventricular Organs
Adolf Weindl and M. V. Sofroniew
- 321 Neuropeptides and the Blood-Brain Barrier
*William M. Pardridge, Harrison J. L. Frank, Eain M. Cornford,
Leon D. Braun, Paul D. Crane, and William H. Oldendorf*

- 329 Hypothesis: A Central Neuroendocrine System Regulates Brain Ion Homeostasis and Volume
Marcus E. Raichle
- 337 Neural Peptides in the Cerebrospinal Fluid
Ivor M. D. Jackson

Section VI: Functions of Neuropeptides in Homeostasis

- 357 Introduction
Joseph B. Martin
- 359 The Brain Renin–Angiotensin System
Detlev Ganten, G. Speck, P. Schelling, and Th. Unger
- 373 Angiotensin-Induced Thirst and Sodium Appetite
Alan N. Epstein
- 389 Brain-Gut Peptides and the Control of Food Intake
Gerard P. Smith and J. Gibbs
- 397 Peptides and Regulation of Body Temperature
Marvin R. Brown, Yvette Tache, Jean Rivier, and Quentin Pittman
- 409 The Nucleus Tractus Solitarius and Experimental Neurogenic Hypertension: Evidence for a Central Neural Imbalance Hypothesis of Hypertensive Disease
Donald J. Reis
- 421 Naloxone Reverses the Pathophysiology of Shock Through an Antagonism of Endorphin Systems
John W. Holaday and Alan I. Faden
- 435 A Role for Endorphins in the Pathophysiology of Spinal Cord Injury
Alan I. Faden and John W. Holaday

Section VII: Circadian Rhythms

- 447 Introduction
Dorothy T. Krieger
- 449 The Suprachiasmatic Nucleus, Circadian Rhythms, and Regulation of Brain Peptides
Robert Y. Moore
- 459 Circadian Rhythms, Brain Peptides, and Reproduction
Irving Zucker and Marie S. Carmichael
- 475 Biological Rhythms in Man: Relationship of Sleep–Wake, Cortisol, Growth Hormone, and Temperature During Temporal Isolation
Elliot D. Weitzman, Charles A. Czeisler, Janet C. Zimmerman, and Martin C. Moore-Ede

Section VIII: Applicability of Studies of Pituitary Function in Neurological Disease

- 501 Introduction
Seymour Reichlin
- 503 Prolactin Secretion as an Index of Brain Dopaminergic Function
Michael O. Thorner and Ivan S. Login
- 521 Growth Hormone Secretion in Neurological Disorders
A. Martinez-Campos, P. Giovannini, D. Cocchi, P. Zanardi, E. A. Parati, T. Caraceni, and Eugenio E. Muller
- 541 Human Plasma ACTH, Lipotropin, and Endorphin
Dorothy T. Kreiger, Hajime Yamaguchi, and Anthony S. Liotta
- 557 Effect of CNS Peptides on Hypothalamic Regulation of Pituitary Secretion
Hiroo Imura, Y. Kato, H. Katakami, and N. Matsushita

Section IX: New Frontiers in Peptides

- 571 Introduction
Seymour Reichlin
- 573 Systems for the Study of Regulation of Neuropeptide Secretion
Seymour Reichlin
- 599 Cellular Interactions of Biogenic Amines, Peptides, and Cyclic Nucleotides
James A. Nathanson
- 609 Pharmacology of Gonadotropin Releasing Hormone: A Model Regulatory Peptide
Wylie W. Vale, Catherine Rivier, Marilyn Perrin, Mark Smith, and Jean Rivier
- 627 Biologically Active Peptide-Containing Fractions in Schizophrenia and Childhood Autism
Karl L. Reichelt, K. Hole, A. Hamberger, G. Sælid, P. D. Edminson, C. B. Bræstrup, L. Lingjaerde, P. Ledaal, and H. Orbeck
- 645 Potential Role of Neural Peptides in CNS Genetic Disorders
Verne S. Caviness, Jr.
- 657 Problems of Peptide Analysis in Human Post-Mortem Brain
Edward D. Bird
- 673 Potential Implications of Brain Peptides in Neurological Disease
Joseph B. Martin and Dennis M. D. Landis
- 691 Epilogue
Donald B. Tower
- 695 Subject Index