

Oxytocin: cellular and molecular approaches in medicine and research

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In May 1995 the third Hanseatic Endocrine Conference at Stade, Germany, attracted 140 scientists from all over the world to summarize the current knowledge on one hormone – oxytocin. This article presents the major findings of the meeting with the realisation that oxytocin provides major model systems with which to elaborate a whole series of novel endocrinological paradigms, as well as being the example of choice for establishing revolutionary new techniques, which will no doubt spread to studies of other hormone systems. The papers from this symposium will be published in full*.

For many biomedical scientists and clinicians, oxytocin is still the small peptide hormone released from the posterior pituitary at the end of pregnancy, which is involved in causing uterine contractions at birth, and is subsequently the prime agent in mediating the milk let-down reflex in response to suckling. This concept is exploited all over the world when an oxytocin infusion is applied to accelerate a slowly progressing birth, and occasionally to assist lactation. It is, however, now clear that oxytocin has other functions in reproduction, being produced peripherally as well as by the neurohypophysis, and it has important actions within the brain, evident as specific behaviours.

Molecular biology and evolution

Oxytocin belongs to a very old family of molecules, with representatives throughout the animal kingdom: from worms and insects to vertebrates. Early in vertebrate evolution the single representative of the family, probably vasotocin, which is still found today in cyclostomes, underwent a gene duplication giving rise to the two subfamilies of oxytocic and pressor peptides found in all higher vertebrates (R. Acher, Paris). One of the major questions here is what duplicated first – the hormone, the receptor, or the function? The cloning and analysis of genes for the peptides and their receptors from numerous organisms will help us understand how such endocrine systems evolve and develop. An interesting highlight of the symposium was the description of the entire gene locus encoding both isotocin and vasotocin in the Japanese pufferfish, *Fugu rubripes* (B. Venkatesh, Singapore). Unlike the situation in higher vertebrates, here the two genes are in the form of tandem repeats, with two other genes in between. It was suggested that the inverse arrangement in mammals may have evolved by a subsequent inversion of one of the genes encoding the hormones, bringing the two related genes even closer together in the genome, and thus possibly encouraging the gene conversion events that appear to be so characteristic of the mammalian vasopressin and oxytocin genes. The combined gene

locus in mice was described in detail by A. Ratty (Singapore) and H. Gainer (Bethesda).

Although we now have a linear description of the chromosome sequence, very little is known about what the sequence means, and how this genetic information is interpreted by cells expressing oxytocin. Several reports were presented describing potential control elements in the upstream, promoter region of the oxytocin gene (H. Zingg, Montreal; P. Burbach, Utrecht; N. Walther, Hamburg). The clear message was that, although such elements may respond to oestrogen receptors, or thyroid hormone receptors, or retinoic acid receptors under heterologous conditions *in vitro*, there is little evidence that these control elements respond to such nuclear receptors *in vivo*. Even in the one case where it was proven that nuclear orphan receptors like the steroidogenic factor 1 (SF-1) bind to the oxytocin gene promoter *in vivo*, in luteinizing ovarian granulosa cells (N. Walther, Hamburg), this factor alone is insufficient to explain the massive upregulation of the oxytocin gene in this tissue. Some insight into the problem was provided by results from painstaking studies in transgenic mice (D. Murphy, Singapore; H. Gainer, Bethesda), which suggest that a combination of elements involving both the oxytocin and the vasopressin genes may be involved, with interest being focussed on a region downstream of the oxytocin gene.

One of the enigmas in oxytocin and vasopressin research has always been the role of neurophysin, which is co-produced with the nonapeptide hormone within the same polypeptide precursor in all species so far examined. Now a plausible explanation has been offered (P. Burbach, Utrecht), with neurophysin taking on the role of a molecular chaperone. Mutations in the neurophysin moiety appear to disrupt the normal secretory pathway for the peptide, and may be decisive in determining a constitutive or a secretory route for peptide production.

One aspect which illustrates that things may not be quite as they seem on superficial inspection was the observation that oxytocin immunoreactivity in rat magnocellular neurones need not mean that there is normal oxytocin gene expression in those neurones. It has been elegantly shown that homologous recombination can take place *in vivo* between the vasopressin and the oxytocin genes in solitary neurones to give rise to chimaeric molecules that are translated, and appear to be accompanied

*Ivell, R. and Russell, J. A. (Eds) (1995) *Oxytocin: Cellular and Molecular Approaches in Medicine and Research* Plenum Press, London and New York.

Oxytocin Cellular And Molecular Approaches In Medicine And Research

I.J.A. Urban, J.P.H. Burbach, D. De Wied



Oxytocin Cellular And Molecular Approaches In Medicine And Research:

The Oxytocin Factor Kerstin Uvnas Moberg, Kerstin Moberg, 2003-09-18 In recent years there have been exciting scientific discoveries about a powerful hormone whose role in the human body has long been neglected Oxytocin is the hormone involved in bonding sex childbirth and breast feeding as well as in relaxation and feelings of calm It is the mirror image of the stress hormone adrenaline which triggers the fight or flight systems in the body Much has been written about the latter but the many sided importance of oxytocin is currently known only to specialists in obstetrics physiology and psychiatry The Oxytocin Factor by Dr Kerstin Uvn s Moberg is the first book on the subject for a general audience The new research findings as well as the potentially beneficial applications of this hormone in reducing anxiety states stress addictions and problems of childbirth are not only fascinating but of great significance to all our lives Oxytocin Richard Ivell, John A. Russell, 1995 During the last ten years research has been flourishing on what was the first peptide hormone to have its structure completely elucidated and the first to be chemically synthesized Oxytocin is involved in virtually all activities related to reproduction as well as in some that have less apparent **Recent Advances in Cellular and Molecular Aspects of Angiotensin Receptors** Mohan K. Raizada, M. Ian Phillips, Colin Sumners, 2013-06-29 Scientific advances over the past two decades have afforded unprecedented opportunities to understand the structure and function of receptors receptor ligand interactions and receptor signaling The extent of progress in this area is underscored by the recent Nobel Prize for Medicine and Physiology to Alfred Gilman and Martin Rodbell both of whose work in understanding receptor/G protein interactions has redefined the way in which we think of how hormones and neurochemicals exert their activity on cellular function This book is replete with examples of current research approaches to help us better understand the cellular roles in which the renin angiotensin system and the angiotensin receptors participate Clearly defining the structure of angiotensin receptor subtypes is an important first step in clarifying the mechanisms by which these receptors take part in cellular function However the chapters within this book range far beyond structural studies and encompass research on tissue specific expression of the angiotensin receptor subtypes the genetic regulation of these receptors and the unique function of various angiotensin subtypes in different organ systems such as the brain the reproductive system adipose tissue the heart and the kidneys **Regulatory Peptides and Cognate Receptors** Dietmar Richter, 2013-06-05 In the last two decades our knowledge on regulatory peptides and their cognate receptors most of which are members of the seven transmembrane receptor families has increased enormously Regulatory peptides are small proteins which besides their hormonal functions in regulating cellular metabolism in various tissues may also act as neurotransmitters and thus they often carry the prefix neuro Many of the cognate receptors involved in transducing the peptidergic signal across the cell membrane via a family of G proteins exist in multiple forms the number of which frequently exceeds that of the corresponding peptide ligands In this book various peptide receptor systems are discussed e g CRF somatostatin TRH opioid

peptides vasopressin and oxytocin It also discusses new strategies such as reverse physiology to uncover new peptides and orphan receptors

Advances in Brain Vasopressin I.J.A. Urban,J.P.H. Burbach,D. De Wied,1999-02-16 Advances in Brain Vasopressin elucidates the functions of the regulatory peptide vasopressin in the nervous system and reviews the current status of this field at different levels It deals with the cell biology and anatomy of the neurons that produce vasopressin in the brain and provides an overview on the receptors of vasopressin and the signal transduction pathways that they activate including the cellular responses that are triggered by vasopressin Reviews are presented on the modulation of behavior induced by vasopressin in a number of different contexts such as sex linked and steroid dependent behaviors social behaviors and learning and memory Furthermore the volume deals with several controversial issues in the field by presenting overlapping chapters from different research groups in order to provide the reader with current views Highly relevant and useful for those working on this first neuropeptide and for young investigators entering the field and in addition shows how important a multidisciplinary approach is to unravelling the function of a neuropeptide in the brain

Biomental Child Development Frank John Ninivaggi,2013 Biomental Child Development Perspectives on Psychology and Parenting provides the reader with a basic understanding of child adolescent and adult psychology and applies it to the growth of the integrated body and mind of children from infancy through childhood It offers caregivers a roadmap and a philosophy for positive parenting

Handbook of Biologically Active Peptides Abba Kastin,Abba J. Kastin,2011-04-28 Peptides play a crucial role in many physiological processes including actions as neurotransmitters hormones and antibiotics Research has shown their importance in such fields as neuroscience immunology pharmacology and cell biology The Handbook of Biologically Active Peptides presents for the first time this tremendous body of knowledge in the field of biologically active peptides in one single reference The section editors and contributors represent some of the most sophisticated and distinguished scientists working in basic sciences and clinical medicine The Handbook of Biologically Active Peptides is a definitive all encompassing reference that will be indispensable for individuals ranging from peptide researchers to biochemists cell and molecular biologists neuroscientists pharmacologists and to endocrinologists Chapters are designed to be a source for workers in the field and will enable researchers working in a specific area to examine other related areas with which they would not ordinarily be familiar Chapters are designed to be a source for workers in the field and will enable researchers working in a specific area to examine other related areas that they would not ordinarily be familiar Fascinating relationships described in the book include the presence of some peptides originally found in frog skin that persist in the human human and brain where they can affect food intake and obesity

The Oxford Handbook of Health Psychology Howard S. Friedman,2014-02 The Oxford Handbook of Health Psychology brings together preeminent experts to provide a comprehensive view of key concepts tools and findings of this rapidly expanding core discipline

The Integrative Neurobiology of Affiliation Carol Sue Carter,I. Izja Lederhendler,Brian Kirkpatrick,1999 This book examines the biological

especially the neural substrates of affiliation and related social behaviors Affiliation refers to social behaviors that bring individuals closer together This includes such associations as attachment parent offspring interactions pair bonding and the building of coalitions Affiliations provide a social matrix within which other behaviors including reproduction and aggression may occur While reproduction and aggression also reduce the distance between individuals their expression is regulated in part by the positive social fabric of affiliative behavior Until recently researchers have paid little attention to the regulatory physiology and neural processes that subserve affiliative behaviors The integrative approach in this book reflects the constructive interactions between those who study behavior in the context of natural history and evolution and those who study the nervous system The book contains the partial proceedings of a conference of the same title held in Washington DC in 1996 The full proceedings was published as part of the Annals of the York Academy of Sciences **Current**

Pharmaceutical Design, 1996-02 *The Oxford Handbook of Stress, Health, and Coping* Susan Folkman, 2011 Few publications have changed the landscape of contemporary psychology more than Richard Lazarus and Susan Folkman's landmark work *Stress Appraisal and Coping* Its publication in 1984 set the course for years of research on the dynamic processes of psychological stress and coping in human beings Now more than a quarter century later *The Oxford Handbook of Stress Health and Coping* pushes the field even further with a comprehensive overview of the newest and best work in this dynamic subject Edited by Susan Folkman and comprising chapters by the field's leading scientists this new volume details the expanded knowledge base that has emerged from extensive research on stress and coping processes over the last several decades Featuring 22 topic based chapters including two by Folkman this volume offers unprecedented coverage of the two primary research topics related to stress and coping mitigating stress related harms and sustaining well being in the face of stress Both topics are addressed within their relevant contexts including chronic illness calamity bereavement and social hardship *The Oxford Handbook of Stress Health and Coping* is an essential reference work for students practitioners and researchers across the fields of health psychology medicine and palliative care **Housing, Husbandry, and Welfare of**

Sheep and Goats D'Anna J. B. Jensen, 1997 Values, Empathy, and Fairness across Social Barriers, Volume 1167 Oscar Vilarroya, Scott Atran, Arcadi Navarro, Kevin Ochsner, Adolf Tobeña, 2009-07-27 What makes suicide bombers capable of sacrificing themselves for a belief Why do members of one race believe they are superior to another How do subliminal messages affect the outcome of political polling Using the tools of neuroscience and social science researchers have learned a great deal about the brain's role in human behavior and interactions This volume is the proceedings of the first Barcelona Social Brain Conference which was organized by the New York Academy of Sciences the Fundació Catalana per a la Recerca i la Innovació the Ctedra UAB el cervell social and the European Science Foundation Through a neuroscientific lens the invited chapters examine the human qualities of empathy sacred values and cooperation and focus on the ways in which what they learn can be used to understand human conflicts NOTE Annals volumes are available for sale as individual books or as a

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In the Company of Women Pat Heim, Susan Murphy, 2003-05-26 In the Company of Women explains how indirect or relational aggression can hurt women and hinder them from achieving success and harmony in their adult lives Gender studies have shown that when a goal is in sight men generally use direct action to attain it Women on the other hand have been socialized to express aggressive actions through indirect means using behavior such as shunning stigmatizing and With startling insights into the meaning of our everyday behavior this book offers straightforward techniques to change conflict among women into cooperation by resolving discords peaceably building relationships and making the most of women's unique leadership and communication skills

Molecular Cloning, Structure and Functional Characterization of a Vasotocin Receptor Subtype that is Expressed in the Shell Gland and Brain of the Domestic Chicken Fen-Lai Tan, 2000

Foundations of Health Psychology Howard S. Friedman, Roxane Cohen Silver, 2007 Health psychology is the scientific study of psychological processes related to health and health care Although the field is only 25 years old it has burgeoned into a major scientific and clinical discipline Health psychology has excellent scientific journals thousands of scientists and practitioners and many students Yet there has not been a sufficient statement or explication of the foundational concepts upon which this flourishing field is built Foundations of Health Psychology brings together top experts to provide a much needed conceptual base for this rapidly expanding field Rather than take a medical model approach the volume examines health psychology from a theoretical conceptual and psychological perspective After presenting an overview of the field's history and methods the contributors address core concepts of the biopsychosocial approach to health and then discuss applications to health promotion and illness prevention and treatment Providing a deep understanding of the intellectual foundations of health psychology this volume will be invaluable for both new and experienced researchers as well as students and other scholars seeking a firm basis for successful research and practice

Interdisciplinary Research : Case Studies from Health and Social Science Frank Kessel, Patricia Rosenfield Carnegie Corporation of New York, Norman Anderson American Psychological Association, 2008-03-11 Interdisciplinary research now receives a great deal of attention because of the rich creative contributions it often generates But a host of factors institutional interpersonal and intellectual also make a daunting challenge of conducting research outside one's usual domain This newly updated and revised edition of Interdisciplinary Research is a substantive and practical guide to the most effective avenues for collaborative and integrative research in the social behavioral and bio medical sciences It provides answers to questions such as what is the best way to conduct interdisciplinary research on topics related to human health behavior and development Which are the most

successful interdisciplinary research programs in these areas How do you identify appropriate collaborators How do you find dedicated funding streams How do you overcome peer review and publishing challenges This is the only book that provides answers directly from researchers who have carried out successful interdisciplinary programs The editors give a concise account of the lessons that can be taken from the book and then present a series of case studies that reveal the most successful interdisciplinary research programs These programs provide a variety of models of how best to undertake interdisciplinary research Each of the chapter authors has carried out innovative collaborative programs and all give compelling accounts of the benefits of interdisciplinary research and the central strategies required to achieve them

The Tending Instinct Shelley E. Taylor, 2014-05-20 A groundbreaking work that reveals how the instinct to tend and befriend is vital for human society In times of crisis and upheaval our responses to stress become especially important We have long heard about the fight or flight response but renowned psychologist Shelley E Taylor points out that hardwired in females both humans and those of other species is an instinct that can transcend fight or flight Their tend and befriend response is not only demonstrable but as Taylor deftly explains in this eye opening work a key ingredient in human social life With great skill and insight Taylor examines stress relationships and human society through the special lens of women's biology She draws on genetics evolutionary psychology physiology and neuroscience to show how this tending process begins virtually at the moment of conception and literally crafts the biology of offspring through genes that rely on caregiving for their expression Taylor also examines what drives women to seek each other's company and to tend to the young and the infirm acts that greatly benefit the group but often at great cost to the individual The Tending Instinct will forever change the way we view ourselves and will revolutionize our understanding of the role of women and nurturing in maintaining a stable society

Novel Strategies in the Design and Production of Vaccines Sara Cohen, Avigdor Shafferman, 2013-06-29 Vaccination is one of the most efficient and cost effective methods of promoting human health and has been in clinical use for at least 200 years Nevertheless infectious diseases continue to constitute a constant threat to the well being of humanity Common pathogens once believed to be under control acquire increased virulence and resistance to drugs while exotic microorganisms emerged from hidden reservoirs to cause yet incurable diseases in humans These changes together with epidemic outbreaks related to political and socio economic instabilities increase the needs for the development of new advanced vaccines In this volume devoted to the proceedings of the 39th OHOLO Conference we present some of the recent strategies for the design and production of novel vaccines The advent of recombinant DNA technology has stimulated the production of several subunit vaccines In spite of the obvious advantages to this approach the limited immunogenicity of many subunit candidates has hindered their development Strategies to enhance the immunogenicity of subunit vaccines is therefore critical Several approaches toward this goal including design of novel adjuvants and delivery systems as well as design of advantageous carriers are presented here Among the carriers evaluated here are polypeptides flagellin HBV core

antigen J3 galactosidase attenuated virions Vaccinia Sindbis and nonpathogenic licensed bacteria Salmonella Portable
Biosensing of Food Toxicants and Environmental Pollutants Dimitrios P. Nikolelis, Theodoros Varzakas, Arzum
Erdem, Georgia-Paraskevi Nikoleli, 2013-10-21 Biosensors are poised to make a large impact in environmental food and
biomedical applications as they clearly offer advantages over standard analytical methods including minimal sample
preparation and handling real time detection rapid detection of analytes and the ability to be used by non skilled personnel
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