



Tracing the Origins of the Pituitary Adenylate-Cyclase Activating Polypeptide (PACAP)

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Pituitary adenylate cyclase activating polypeptide (PACAP) is a well-conserved neuropeptide characteristic of vertebrates. This pluripotent hypothalamic neuropeptide regulates neurotransmitter release, intestinal motility, metabolism, cell division/differentiation, and immunity. In vertebrates, PACAP has a specific receptor (PAC₁) but it can also activate the Vasoactive Intestinal Peptide receptors (VPAC₁ and VPAC₂). The evolution of the vertebrate PACAP ligand – receptor pair has been well-described. In contrast, the situation in invertebrates is much less clear. The PACAP ligand – receptor pair in invertebrates has mainly been studied using heterologous antibodies raised against mammalian peptides. A few partial PACAP cDNA clones sharing >87% aa identity with vertebrate PACAP have been isolated from a cnidarian, several protostomes and tunicates but no gene has been reported. Moreover, current evolutionary models of the peptide and receptors using molecular data from phylogenetically distinct invertebrate species (mostly nematodes and arthropods) suggests the PACAP ligand and receptors are exclusive to vertebrate genomes. A basal deuterostome, the cephalochordate amphioxus (*Branchiostoma floridae*), is the only invertebrate in which elements of a PACAP-like system exists but the peptides and receptor share relatively low sequence conservation with the vertebrate homolog system and are a hybrid with the vertebrate glucagon system. In this study, the evolution of the PACAP system is revisited taking advantage of the burgeoning sequence data (genome and transcriptomes) available for invertebrates to uncover clues about when it first appeared. The results suggest that elements of the PACAP system are absent from protozoans, non-bilaterians, and protostomes and they only emerged after the protostome-deuterostome divergence. PACAP and its receptors appeared in vertebrate genomes and they probably shared a common ancestral origin with the cephalochordate PACAP/GCG-like system which after the genome tetraploidization events that preceded the vertebrate radiation generated the PACAP ligand and receptor pair and also the other members of the Secretin family peptides and their receptors.

Keywords: deuterostomes, early metazoan, evolution, protostomes, neuropeptide, receptor

Pituitary Adenylate Cyclaseactivating Polypeptide

Jae Young Seong, Hubert Vaudry



Pituitary Adenylate Cyclaseactivating Polypeptide:

Pituitary Adenylate Cyclase-Activating Polypeptide Hubert Vaudry, Akira Arimura, 2012-12-06 Pituitary Adenylate Cyclase Activating Polypeptide is the first volume to be written on the neuropeptide PACAP It covers all domains of PACAP from molecular and cellular aspects to physiological activities and promises for new therapeutic strategies Pituitary Adenylate Cyclase Activating Polypeptide is the twentieth volume published in the Endocrine Updates book series under the Series Editorship of Shlomo Melmed MD *Pituitary Adenylate Cyclase Activating Polypeptide (PACAP) als ein neuer parakriner Faktor in der Hypophyse* Anette Charlotte Klingenberg, 2004 *Molekulare Mechanismen des mitogenen Effekts von Pituitary Adenylate Cyclase Activating Polypeptide (PACAP)* Heiner Schäfer, 1998 **Einfluss von PACAP (Pituitary Adenylate Cyclase-Activating Polypeptide) bzw. des PACAP Rezeptors PAC1 auf Morphologie und Expression Inflammations-/ Apoptose-/ Atherosklerose-relevanter Proteine/Zytokine in Mm. soleus/gastrocnemius bei ApoE defizienten Mäusen unter Standardfütterung** Bianca Inga Konzmann, 2024 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

Psychoneuroimmunology Robert Ader, 2007 Psychoneuroimmunology is the study of interactions among behavioral neural and endocrine and immunologic processes of adaptation These two volumes provide a clearly written extensively referenced summary of some of the behavioral neural and endocrine regulators of immune responses and immunologically mediated disease processes and of the behavioral and neuroendocrine effects of immune system activity Several chapters expand upon topics reviewed in earlier editions of this series most chapters cover active areas of research that have not previously been reviewed As illustrated in this fourth edition interdisciplinary research continues to provide evidence that the brain and immune system represent a single integrated system of defense *Pituitary Adenylate Cyclase Activating*

Polypeptide — PACAP Dora Reglodi, Andrea Tamas, 2016-10-08 The first comprehensive book to cover all aspects of the last 25 years of PACAP pituitary adenylate cyclase activating polypeptide research this book contains contributions from virtually all the leading researchers in the field and addresses some of the following topics evolutionary aspects of PACAP distribution and occurrence of PACAP and its receptors hormonal effects of PACAP intracellular signaling effects on cellular proliferation and differentiation protective effects of PACAP behavioral effects of PACAP developmental aspects of PACAP other physiological effects of PACAP cardiovascular thermoregulatory human studies drug design metabolism and transport This compendium can serve as an important reference for researchers and students in PACAP research and can also be a thorough introduction for those in related fields

Untersuchung der Struktur-Funktions-Beziehung des Pituitary adenylate cyclase activating polypeptide response gene 1 (PRG1/IEX-1) Alexander Sieke, Heiner Schäfer, 2004

PACAP - Pituitary Adenylate Cyclase Activating Polypeptide - vermag zerebrale Gefäße der Ratte über die Aktivierung intramuraler Neurone zu relaxieren Fritz Marcus Löwe, Hubertus Maximilian Mehdorn, 2004 P.A.C.A.P. CHRISTINE.. OUSTRIC, 1996

Wirkung des Neuropeptids Pituitary Adenylate Cyclase Activating Polypeptide (PACAP) auf die glatte Muskulatur des Gastrointestinaltrakts von Meerschweinchen, Ratte und Mensch Andreas Clemens, 1993

Einfluß von PACAP (Pituitary Adenylate Cyclase Activating Polypeptide) auf die Hormonsekretion des Hypophysenvorderlappens und die basale exokrine Pankreassekretion beim Menschen Ulrike von Arnim, 1996 Pituitary Adenylate Cyclase Activating Peptide (PACAP) Kristian Moller, 1997

Die Bedeutung von PACAP (Pituitary Adenylate Cyclase-Activating Polypeptide) bzw. seines Rezeptors PAC1 für die Entwicklung und Progression der Atherosklerose in 10 Wochen mit Cholesterin-gefütterten ApoE-defizienten Mäusen Philip Neudert, 2023

Estrogen Effects on Fertility and Neurodegeneration - Classical versus Non-Classical Actions Zsuzsanna Nagy, Allan Herbison, Andrea Kwakowsky, Gergely Kovacs, Klaudia Barabas, 2023-08-07 **Expression des regulatorischen "Gut-Brain"-Peptids Pituitary Adenylate cyclase Activating Polypeptide (PACAP) in Geweben des Schweins und der Ratte sowie in neuroendokrinen Tumoren des Menschen** Joachim von Bonin, 1995

Proteins, Peptides and Amino Acids SourceBook John Stephen White, Dorothy Chong White, 2002-04-15

Proteins, Peptides and Amino Acids SourceBook John Stephen White, Dorothy Chong White, 2002-04-15 Proteins, Peptides and Amino Acids SourceBook is the second in a series of reference books conceived to cover the explosive growth in commercially available biological reagents The success of our first reference work Source Book of Enzymes published in 1997 encouraged us to continue this series Choosing proteins, peptides and amino acids as the subject matter for the second volume was simple given their preeminence in regulating biochemical processes and their importance to modern molecular biology The SourceBook series was inspired by our difficulty in locating a suitable replacement for a depleted reagent in the midst of an urgent research project To our dismay we found the reagent supplier out of business and the product line no longer available Other reagent catalogs on our library bookshelf offered a narrow selection and incomplete functional information We were

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Einfluss von PACAP (Pituitary Adenylate Cyclase-Activating Polypeptide) beziehungsweise des PACAP-Rezeptors PAC1 auf die Morphologie der Nierenrinde bei cholesterin- und normalgefütterten ApoE^{-/-} Mäusen Teresa Blähser, 2019 *Neuroendocrine Control of Energy Homeostasis in Non-mammalian Vertebrates and Invertebrates* Suraj Unniappan, Ian Orchard, María Jesús Delgado, 2020-07-31 This eBook is a collection of articles from a Frontiers Research Topic Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series they are collections of at least ten articles all centered on a particular subject With their unique mix of varied contributions from Original Research to Review Articles Frontiers Research Topics unify the most influential researchers the latest key findings and historical advances in a hot research area Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office frontiersin.org about contact

Neuropeptide GPCRs in neuroendocrinology Jae Young Seong, Hubert Vaudry, 2014-11-07 The human genome encompasses 860 G protein coupled receptors GPCRs including 374 non chemosensory GPCRs Half of these latter GPCRs recognize neuro peptides as natural ligands GPCRs thus play a pivotal role in neuroendocrine communication In particular GPCRs are involved in the neuroendocrine control of feeding behavior reproduction growth hydromineral homeostasis and stress response GPCRs are also major drug targets and hence possess a strong potential for the development of innovative pharmaceuticals The aim of this Research Topic was to assemble a series of review articles and original research papers on neuropeptide GPCRs and their ligands that would illustrate the different facets of the studies currently conducted in this domain

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