

Recent progress in luteinizing hormone/human chorionic gonadotrophin hormone research

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ABSTRACT: The role of luteinizing hormone (LH) and human chorionic gonadotrophin hormone (hCG) in the regulation of normal reproductive functions in males and females is quite well established. Besides the use of hCG in the development of diagnostic immunoassays, it has been successfully used in the induction of final follicular maturation and ovulation in the assisted reproductive technologies. The basic and clinical research on the nongonadal actions of LH/hCG in the recent years has extended the potential of using these hormones in several clinical indications. Hereby we will analyze the advances in the LH/hCG research (briefly emphasizing the nongonadal research), which has the potential for multiple novel therapies in reproductive and the other areas of medicine.

Key words: luteinizing hormone / human chorionic gonadotrophin / luteinizing/human chorionic gonadotrophin receptor / gonadal and nongonadal effects

Introduction

Hypothalamic gonadotrophin-releasing hormone stimulated the secretion of luteinizing hormone (LH) by the anterior pituitary. Human chorionic gonadotrophin (hCG) is secreted by the placenta (Pierce and Parsons, 1981). Both LH and hCG are heterodimeric glycoprotein hormones belonging to cystine-knot growth factor families possessing the properties of cytokines and chemokines (Lapthorn et al., 1994). hCG is structurally related to LH and both hormones bind to the same LH/choriogonadotrophin receptor (LHCGR). LHCGR belongs to a family of seven-trans membrane spanning G-protein coupled receptors (McFarland et al., 1989; Ascoli et al., 2002). hCG is more potent than LH due to its higher receptor binding affinity and a longer circulatory half-life (Rao, 1979). Chorionic gonadotrophin is produced in primates, equines and in man, whereas LH is present in all species. hCG appears in the circulation around the time of implantation, increases to reach its peak about ninth week of pregnancy and then drops down to about one-tenth of the peak levels and remains there until the end of pregnancy. hCG is believed to be essential for the maintenance of the pregnancy by stimulating progesterone production by the corpus luteum gravidarum, although this concept was challenged by the discoveries of the multiple actions of hCG in nongonadal tissues throughout pregnancy and during labor (Lei and Rao, 2001a, b). hCG has been shown to

stimulate testosterone production of fetal Leydig cells (Huhtaniemi and Pelliniemi, 1992; Huhtaniemi et al., 1977; Apaja et al., 2005). This review will concentrate on the LH/hCG in reproductive biology and general medicine with particular emphasis on nongonadal research.

The majority of the studies on nongonadal LH/hCG receptors were done on human rather than on other species (Rao and Lei, 2007). Although the studies on nongonadal LH/hCG actions led to a greater potential for novel therapeutic uses of hCG/LH than from the studies on the gonadal actions of LH/hCG (for a review, see Rao and Lei, 2007), few studies have been done in transgenic murine models, where physiologic significances of nongonadal LHR expression in reproductive function is questioned (Ahtaiainen et al., 2007; Pakarinen et al., 2005, 2007). We will enclose a brief discussion on some recent studies based on transgenic murine models either overexpressing or showing disrupted genes, including analysis of the pros and cons of LH/hCG actions in nongonadal tissues.

The LH/hCG research on reproductive biology issues

Classical expression of the LHCGR has been well established in the testicular Leydig and ovarian theca, granulosa and luteal cells where

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Research C. Wayne Bardin, 2013-09-11 *Recent Progress in Hormone Research* Volume 47 covers the developments in the field of endocrinology and metabolism. The book discusses the molecular mechanism of action of a steroid hormone receptor, neuroendocrine control of human reproduction in the male, and the immortalization of neuroendocrine cells by targeted oncogenesis. The text also describes the neuroendocrine regulation of the luteinizing hormone releasing hormone pulse generator in the rat, the gonadotropin releasing hormone pulses and steroids receptors and response elements. The molecular biology of human renin and its gene, the cellular and molecular analysis of pancreatic islet cell lineage and differentiation, and sulfonylurea signal transduction are also considered. The book further tackles the complex hormone response unit regulating transcription of the phosphoenolpyruvate carboxykinase gene and the structure and molecular regulation of mammalian glucose transporters. Endocrinologists, physiologists, and biochemists will find the book invaluable. *Recent Progress in*

Hormone Research James H. Clark, 2013-10-22 *Recent Progress in Hormone Research* Volume 44 contains examples of the molecular biological approach to unraveling the mysteries of hormone action. The book presents papers on the structure and function of receptors and their role in the control of cell function via signal transduction and intracellular second messengers. The text also includes papers on the interactions and functions of the inhibin peptides and their role in the control of gonadotropin secretion. The role of growth factors and lymphokines in autocrine, paracrine, and endocrine physiology is also encompassed. The book will prove invaluable to endocrinologists, physiologists, biochemists, and scientists involved in hormone research. *Recent Progress in Hormone Research* Astwood, E B, Ed, 1969 **Recent Progress in Hormone Research** E.

B. Astwood, 2013-10-22 *Recent Progress in Hormone Research* Volume 25 presents the proceedings of the 26th meeting of the Laurentian Hormone Conference held in Mont Tremblant, Quebec, Canada, on August 23-29, 1968. The book presents papers on reproductive endocrinology, i.e., a model for the regulation of ovulation in the rat, comparative aspects of uterine luteal relationships, proinsulin, i.e., proinsulin and the biosynthesis of insulin, and the secretion of hormones by tumors of nonendocrine origin, i.e., clinical and laboratory studies of ectopic humoral syndromes. The text also includes papers on the ultrastructure of the endocrine glands, on the thyroid, i.e., studies of the thyroid iodide trap in human, on neuroendocrinology, i.e., the mammalian pineal as a neuroendocrine transducer, and on steroid hormones, i.e., metabolic events associated with steroid hydroxylation by the adrenal cortex and steroid dynamics under steady state conditions. Endocrinologists and people involved in hormone research will find the book invaluable. *Recent Progress in Hormone Research* Roy O.

Greep, 2013-10-22 *Recent Progress in Hormone Research* Volume 29 covers the proceedings of the 1972 Laurentian Hormone Conference held in Mont Tremblant, Province of Quebec, Canada, on August 27-September 1, 1972. The book discusses the studies on sex differentiation in mammals, male pseudohermaphroditism in the laboratory Norway rat, and androgen metabolism and mechanism of action in male pseudohermaphroditism. The text also describes the mechanism of initiation of

parturition in the ewe the neurovascular regulation of the anterior hypophysis and microtubules and beta cell secretion The role of microtubules and microfilaments in thyroid secretion the functional and morphological alterations produced in target cells by anti inflammatory steroids and protein kinases are also considered The book further tackles the role of phospholipids in hormone activation of adenylate cyclase the chemistry of growth hormone and the lactogenic hormones and hormonal regulation of gene expression in mammary cells The text then encompasses the endocrine and metabolic effects of experimental obesity in human the studies on luteinizing hormone and its subunits and chemical studies of luteinizing hormone from human and ovine pituitaries The studies on the structure and function of interstitial cell stimulating hormone are also looked into

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transgenic model for studying isles development protein phosphatases the androgen receptor molecular genetics of steroid 5 α reductases and benign and malignant prostatic neoplasms **Recent Progress in Hormone Research - Volume 50**
 C. Wayne Bardin, 2013-10-22 Recent Progress in Hormone Research Volume 50 Proceedings of the 1993 Laurentian Hormone Conference focuses on the advancements of processes methodologies techniques and approaches involved in hormone research The selection first offers information on the molecular design of the NMDA receptor channel synthesis and signaling of growth hormone releasing hormone and signaling mechanisms during the response of pituitary gonadotropes to GnRH The discussions focus on calcium economy of gonadotropes role of oscillations structure and expression of the GHRH gene transgenic animal models for GHRH action and functional determinants in NMDA receptors The text then elaborates on signaling mechanisms during the response of pituitary gonadotropes to GnRH molecular genetic analysis of cAMP and glucocorticoid signaling in development and activins and the receptor serine kinase superfamily The publication takes a look at MAP kinase cascade expression and signal transduction pathways of gonadotropin releasing hormone receptors ovarian cell differentiation and the role of oxytocin and its receptor in parturition The book also examines the role of prolactin in developmental differentiation of hypophysiotropic tuberoinfundibular dopaminergic neurons and calcitonin gene expression in rat uterus during pregnancy The selection is a valuable source of data for researchers interested in hormone research Neuroendocrinology Transmembrane signaling Reproduction Steroids and the steroid receptor family Hypertension

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of steroid hormone metabolism some consequences of secretory dynamics and metabolic transformations This book also surveys the biological effects of steroid analogs with a particular emphasis on the relation between hormone structure and function The remaining chapters consider the problem of aldosterone and ecdysone mode of action as well as hormones in fetal life Endocrinologists and biologists will find this book rewarding

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Table of Contents Recent Progreb In Hormone Research

1. Understanding the eBook Recent Progreb In Hormone Research
 - The Rise of Digital Reading Recent Progreb In Hormone Research
 - Advantages of eBooks Over Traditional Books
2. Identifying Recent Progreb In Hormone Research
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Recent Progreb In Hormone Research
 - User-Friendly Interface
4. Exploring eBook Recommendations from Recent Progreb In Hormone Research
 - Personalized Recommendations
 - Recent Progreb In Hormone Research User Reviews and Ratings
 - Recent Progreb In Hormone Research and Bestseller Lists
5. Accessing Recent Progreb In Hormone Research Free and Paid eBooks
 - Recent Progreb In Hormone Research Public Domain eBooks
 - Recent Progreb In Hormone Research eBook Subscription Services

- Recent Progreb In Hormone Research Budget-Friendly Options
- 6. Navigating Recent Progreb In Hormone Research eBook Formats
 - ePub, PDF, MOBI, and More
 - Recent Progreb In Hormone Research Compatibility with Devices
 - Recent Progreb In Hormone Research Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Recent Progreb In Hormone Research
 - Highlighting and Note-Taking Recent Progreb In Hormone Research
 - Interactive Elements Recent Progreb In Hormone Research
- 8. Staying Engaged with Recent Progreb In Hormone Research
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Recent Progreb In Hormone Research
- 9. Balancing eBooks and Physical Books Recent Progreb In Hormone Research
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Recent Progreb In Hormone Research
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Recent Progreb In Hormone Research
 - Setting Reading Goals Recent Progreb In Hormone Research
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Recent Progreb In Hormone Research
 - Fact-Checking eBook Content of Recent Progreb In Hormone Research
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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web specialists consultants that support zakat payers to calculate their zakat in relation to their tax the payment of zakat and payment of the tax affect each other in malaysia and in some cases could be replacements in total or partial amounts however because the nature of each is different the laws for each are different

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