

THIRD EDITION

# REPRODUCTIVE ENDOCRINOLOGY



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# REPRODUCTIVE ENDOCRINOLOGY

Physiology, Pathophysiology and Clinical Management

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THE OVARIAN CYCLE

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PROSTAGLANDINS AND PROSTAGLANDIN-LIKE PRODUCTS IN  
REPRODUCTION: EICOSANOIDS, PEROXIDES, AND OXYGEN RADICALS

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NEUROENDOCRINE MECHANISMS: CELLS AND SYSTEMS

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THE THYROID GLAND AND REPRODUCTION

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GONADOTROPIC HORMONES: BIOSYNTHESIS, SECRETION, RECEPTORS, AND ACTIONS

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CONTRACEPTIVE HORMONES AND THEIR CLINICAL USE

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THE MENOPAUSE AND PERIMENOPAUSAL PERIOD

DISORDERS OF SEXUAL DEVELOPMENT

ENDOCRINE PHYSIOLOGY OF THE FETUS AND FETOPLACENTAL UNIT

PROTEIN HORMONES OF THE PLACENTA, DECIDUA, AND FETAL

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CYTOGENETICS IN REPRODUCTIVE ENDOCRINOLOGY

MOLECULAR BIOLOGY IN REPRODUCTIVE ENDOCRINOLOGY

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PRACTICAL EVALUATION OF HORMONAL STATUS

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INFERTILITY: SURGICAL ASPECTS

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REPRODUCTION: EICOSANOIDS, PEROXIDES, AND OXYGEN RADICALS

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THE HUMAN MENSTRUAL CYCLE: NEUROENDOCRINE REGULATION

PROLACTIN IN HUMAN REPRODUCTION

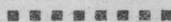
CHRONIC ANOVULATION CAUSED BY PERIPHERAL ENDOCRINE DISORDERS

CHRONIC ANOVULATION DUE TO CNS-HYPOTHALAMIC-PITUITARY

DYSFUNCTION

ENDOCRINE-METABOLIC ADAPTATIONS IN PREGNANCY

## FOREWORD



When the textbook *Reproductive Endocrinology* by Yen and Jaffe first appeared in 1978, it was an immediate success, not only in the United States, but worldwide. With the first edition rapidly exhausted, an expanded second edition came out in 1986 that was similarly well received. Five years later, the third edition of this text is at hand and, unquestionably, is going to achieve the same success.

*Reproductive Endocrinology*, edited by Drs. Yen and Jaffe, with contributions by them and by 20 other colleagues is, for all practical purposes, a new text that has kept pace with the fundamental and clinical discoveries of the last few years that have significant implications in reproductive medicine. And once more, probably to a greater degree than in the previous two editions, this new text describes, as only experts can do in their own fields, the basic research in all its novelty as the sole source and fountain of the clinical material that it generates in terms of rationales for etiologies, diagnostics; and treatments of the always complex patient with a problem in reproductive endocrinology. I should not be misunderstood here: The clinical parts of the text are just as expertly done as those on basic research. Indeed, what is most remarkable and in keeping with what has been the teaching of medicine in this country for the last 50 years, is that many of the fundamental contributions and their clinical implications and applications are presented mostly by the same people.

The practitioner as well as the medical student will find in this new text the latest in several fields. For instance, molecular biology is revolutionizing our understanding of many cellular mechanisms, not only in physiological states but even more so in disease. Several new chapters deal with molecular biology in reproductive medicine, from the cloning of steroid and thyroid hormones to cytogenetics in reproduction. The latest developments in neuroendocrinology, along with their implications in the physiology and pathology of the menstrual cycle and its complex and subtle disorders, are also to be found in totally new or extensively revised chapters. Recent technology of practical importance in reproductive medicine, such as the endocrine background for *in vitro* fertilization, is described and discussed.

Let me close this foreword, which obviously is enthusiastic about this text, by repeating that this book is also a hands-on text for the practitioner to be educated and guided—more than a handbook, more than a textbook.

I have only one point of argument with my two friends, the editors/authors. Fortunately, it pertains only to the text of the preface of this edition (also of the second one!). In a text on reproductive endocrinology, why qualify new discoveries, new advances, as “seminal”? Why not “pregnant”? As I know them, I can’t believe it is sexism on their part; at worst, it would be unconsciously so. Let us say only that here is one of my own idiosyncrasies toward the flawless style and *le mot juste*. In his *Lives of the Poets*, Samuel Johnson (Dr. Johnson!), in one of the few nice things he writes about Milton, would appear to have the answer to my sensitivity:



"It is pleasant to see great works in their seminal states, pregnant with latent possibilities of excellence." But what about the implied physiology?

Let me conclude that the third edition of *Reproductive Endocrinology* is a superb offspring of its two predecessors.

ROGER GUILLEMIN

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## *PREFACE TO THE THIRD EDITION*



Strides in both the biological and clinical aspects of reproductive endocrinology are being made with almost unbelievable rapidity. One need only scan the basic and clinical endocrinologic literature over the past few years to find evidence of these remarkable advances. The explosion of scientific information brought about by molecular and cellular biology has been paralleled by advances in new clinical reproductive technologies.

We have attempted to reflect these striking advances in both the biological and clinical spheres in this third edition of our textbook. The reader will find entirely new chapters dealing with the fundamental aspects of molecular biology and genetics on the one hand and the new clinical reproductive technologies and surgical aspects of endocrinology and infertility on the other. Many chapters have been written by new authors, others have been extensively rewritten, all by contributors at the cutting edge of their fields. Because of the explosion of new studies, reviews and key papers, rather than exhaustive literature citations, will be found in many of the chapters.

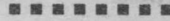
Keeping pace with these exciting, seminal advances in the basic and clinical arenas has been a stimulating and rewarding challenge. We hope that the reader shares our excitement in this dynamic and fascinating field.

The editors and authors acknowledge with gratitude the dedicated efforts of Martin Wonsiewicz and the staff of W. B. Saunders Gail Laughlin, and Del Alsobrook.

S. S. C. YEN  
R. B. JAFFE



# PREFACE TO THE FIRST EDITION



Among those biomedical fields in which a virtual explosion of new knowledge and understanding has occurred over the past decade, the physiology and pathophysiology of reproductive processes are prime examples. The neural and endocrine regulation of reproduction has been explored with new and sophisticated methods and with increasing comprehension of the important factors involved in the control of this important function. By extrapolation from animal models, as well as by direct investigation involving humans, new light has been shed on the operation of the human reproductive system in both health and disease.

The planning of a book embodying these advances began in July, 1976, when the author-editors were Visiting Scholars at the Villa Serbelloni, an elegant conference and study center operated under the auspices of the Rockefeller Foundation in the picturesque environment of Lake Como, Italy. An outline of this book was completed there, contributing authors were identified, and the writing of several chapters was begun.

Our overall purpose is to provide contemporary factual information and new understanding of human reproductive processes. We attempted to keep in mind the needs of students and investigators in reproductive endocrinology and biology, as well as the needs of clinicians who face the problem of diagnosing and treating reproductive dysfunction. To accomplish these purposes, our authors' expert knowledge ranges from the clinical and systemic to the cellular and molecular. Thus, whenever possible, cellular or molecular mechanisms for normal or disturbed function are presented.

The elements of the reproductive system with which we deal most extensively are various parts of the brain, the pituitary gland, and the gonads. Each of these obviously is a separate and distinguishable component of the system. However, not only are they intimately associated to form an integrated system for periodically releasing germ cells and hormones but, in addition, they have a number of common mechanistic features. We hope that these similarities and integrated modes of action will impress the reader as they have impressed us, and that some readers will be provoked into continued, deeper study of this intriguing field.

The contributing authors were chosen for recognized authority in their respective areas and for their ability to transmit information in a manner we think is lucid and interesting. The lists of references are not intended to be exhaustive but do include key articles and reviews.

Our task as editors was greatly facilitated by the help and cooperation of the contributing authors. We also wish to express our appreciation to Marcia Finkle, Leslie Muga, Alana Schilling, and Rae Feinstein, our secretaries, whose capable assistance helped overcome the few trying problems we met. My (S.Y.) special

thanks to Dr. Allen Lein for his critical review of and suggestions for several of my chapters. The editors are grateful to the staff of the W. B. Saunders Company, particularly John Hanley for his confidence, encouragement, and courtesies, which made the preparation of this book a satisfying experience.

The information in this book is at the cutting edge of contemporary reproductive endocrinology. If the book assists the clinician, excites and teaches the student and investigator, and lends deeper understanding of the control of reproductive processes, it will have served its purpose.

S. S. C. YEN  
R. B. JAFFE



# CONTENTS



*Foreword* xi

Roger Guillemin

*Preface to the Third Edition* xlii

*Preface to the First Edition* xv

## **Part One**



### ***Endocrine Regulation of the Reproductive System* 1**

#### **Chapter 1**

***Neuroendocrine Mechanisms: Cells and Systems* 1**

Floyd E. Bloom

#### **Chapter 2**

***Molecular Biology in Reproductive Endocrinology* 25**

Paul G. McDonough

#### **Chapter 3**

***The Hypothalamic Control of Pituitary Hormone Secretion* 65**

S. S. C. Yen

#### **Chapter 4**

***Gonadotropic Hormones: Biosynthesis, Secretion, Receptors,  
and Actions* 105**

Kevin J. Catt

Maria L. Dufau

#### **Chapter 5**

***Steroid Hormones: Metabolism and Mechanism of Action* 156**

Bert W. O'Malley

Charles A. Strott

**Chapter 6**

***The Ovarian Cycle* 181**

Eli Y. Adashi

**Chapter 7**

***Prostaglandins and Prostaglandin-like Products in Reproduction:  
Eicosanoids, Peroxides, and Oxygen Radicals* 238**

Harold R. Behrman  
Roberto J. Romero

**Chapter 8**

***The Human Menstrual Cycle: Neuroendocrine Regulation* 273**

S. S. C. Yen

**Chapter 9**

***The Endometrium: Regulation and Dysfunction* 309**

Jerome F. Strauss III  
Erlio Gurpide

**Chapter 10**

***Prolactin in Human Reproduction* 357**

S. S. C. Yen

**Chapter 11**

***The Menopause and Perimenopausal Period* 389**

Robert B. Jaffe

**Chapter 12**

***The Hypothalamic-Pituitary-Testicular Axis* 409**

Johannes D. Veldhuis

**Part Two**

***Pathophysiology* 461**

**Chapter 13**

***Cytogenetics in Reproductive Endocrinology* 462**

Paul G. McDonough

**Chapter 14**

***Disorders of Sexual Development* 480**

Robert B. Jaffe



## Chapter 15

### *Disorders of Puberty in the Male and Female* 511

Dennis M. Styne  
Melvin M. Grumbach

## Chapter 16

### *The Thyroid Gland and Reproduction* 555

Gerard N. Burrow

## Chapter 17

### *Chronic Anovulation Caused by Peripheral Endocrine Disorders* 576

S. S. C. Yen

## Chapter 18

### *Chronic Anovulation Due to CNS-Hypothalamic-Pituitary Dysfunction* 631

S. S. C. Yen

## Chapter 19

### *Infertility* 689

Robert H. Glass

## Chapter 20

### *Infertility: Surgical Aspects* 710

John A. Rock

## Chapter 21

### *Male Hypogonadism* 739

Richard J. Santen

## Chapter 22

### *Ectopic Hormonal Secretion and Reproductive Dysfunction* 795

Judith L. Vaitukaitis

## Chapter 23

### *Contraceptive Hormones and Their Clinical Use* 807

Milan R. Henzl

## Chapter 24

### *Practical Evaluation of Hormonal Status* 830

Robert W. Rebar

**Part Three**

***Endocrine-Metabolic Alterations Induced  
by Pregnancy 887***

**Chapter 25**

***Endocrine Physiology of the Fetus and Fetoplacental Unit 888***

Robert B. Jaffe

**Chapter 26**

***Protein Hormones of the Placenta, Decidua, and  
Fetal Membranes 920***

Robert B. Jaffe

**Chapter 27**

***Endocrine-Metabolic Adaptations in Pregnancy 936***

S. S. C. Yen

***Index 971***



Part One

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*Endocrine  
Regulation  
of the  
Reproductive  
System*

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