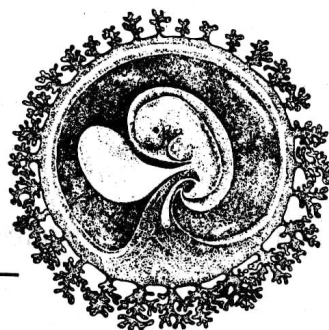


**PERINATAL MEDICINE**  
**the basic science**  
**underlying clinical practice**

65721



# underlying clinical practice

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Baltimore • The Williams & Wilkins Co.

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428 E. Preston Street

Baltimore, Md. 21202, U.S.A.

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*Made in the United States of America*

Library of Congress Cataloging in Publication Data

Main entry under title:

Perinatal Medicine.

Bibliography: p.

Includes index.

1. Pregnancy. 2. Fetus—Physiology. 3. Infants (Newborn)—Physiology. I. Goodwin, James W. II. Godden, John O. III. Chance, Graham W. [DNLM: 1. Fetal diseases. 2. Fetus. 3. Infant, Newborn. 4. Infant, Newborn, Diseases, WQ210 P442]

RG 558.P38 618.3'2 75-37771

ISBN 0-683-03649-1

Composed and printed at the

WAVERLY PRESS, INC.

Mt. Royal and Guilford Aves.

Baltimore, Md. 21202, U.S.A.



# PERINATAL MEDICINE

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the basic science



**PERINATAL MEDICINE**  
**the basic science**  
**underlying clinical practice**

foreword

This book is dedicated to the memory of

**JAMES CLIFFORD GOODWIN**

(1902-1953)

**A SUPERB OBSTETRICIAN**

**AN EXCELLENT TEACHER**

**A GENTLE MAN**

who made a thorough appreciation and

application of scientific principles

the basis of

concerned and skillful obstetrical practice

W. J. HANNAH, M.D., F.R.C.S.(C)  
Obstetrician and Gynecologist-in-Chief,  
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# foreword

During the past two decades more has been accomplished in securing a sound, scientific base in reproductive medicine than at any comparable period in the history of this discipline.

Nearly everything we know about human reproduction has derived from two major sources. First, we have drawn heavily on the accumulated experience of our predecessors, especially in the mechanical aspects of obstetrics. Fundamental principles, which inform clinical practice, are as valid today as they were a generation or more ago; many have required modification, and many have been replaced by new concepts, but all derive from a common source—clinical experience. The second source of our knowledge is the laboratory. We have been the beneficiaries of work done in anatomy, embryology, physiology, biochemistry, endocrinology, and many other special fields. Often these investigations were directed toward other disciplines, and an inspired opportunism enabled us to adapt them to our own purposes.

The development of obstetrics itself into a respected scientific discipline owes its origin to a series of scientific borrowings, such as that which led to the application of endocrinologic research to modern obstetrics.

Obstetrics now no longer concerns itself chiefly with the mechanics of parturition, important though that is; it has become a multidisciplinary field, deriving its scientific base from all the basic sciences and encompassing a wide range of clinical interests. For example, rhesus isoimmunization was described, its clinical pattern defined, its treatment outlined, and its prevention discovered all within my professional lifetime. This was a laboratory achievement but it required the cooperation of hematologists, immunologists, radiologists, obstetricians, and pediatricians. Our current knowledge of the fetus, its physiology and biochemistry, has been contributed by investigators from all over the world. The maturity of perinatal medicine will be measured by its success in collating all this information and developing the techniques through which it can be applied to improve perinatal salvage. Much remains to be done. The benefits to be gained through prevention are enormous because premature labor,

intrauterine deaths, and sublethal intrauterine hypoxia leading to various degrees of intellectual and/or perceptual handicap involve life at its beginnings.

Those of us in clinical gynecology and obstetrics have an obligation to persuade students, residents, and our colleagues that the quality of human existence itself can be improved by discoveries yet to be made in laboratories of fetal physiology, biochemistry, genetics, and immunology. The necessity in our training programs for selected laboratory experience is therefore a matter of increasing importance. It is no longer enough for us to train skilled technicians in the mechanics of the several specialties that contribute to perinatal medicine and ignore the qualities of mind and heart required before that skill can be intelligently applied. We should not become preoccupied with a computerized diagnostic technology and overlook intuition—the clinical acumen that accompanies increasing experience. Therefore I must remind the graduate physician who is about to read this book that the information it contains can and should be used to provide a firm scientific foundation for practice and that it should be used in concert with the discriminating clinical judgment that can only be acquired in the emergency rooms, in the labor rooms, at the bedside, and in the nurseries of our teaching hospitals.

I have known the editor-in-chief of this book for most of my professional career, and know how he has cherished the dream of creating a book which would focus on the scientific basis of perinatal medicine. I believe he has realized his dream. He and his co-editors and the contributing authors have put into the hands of graduate students and practicing clinicians a carefully selected synthesis of the foundations of modern reproductive medicine. Their contributions have added distinction to themselves and lustre to the specialties of obstetrics and pediatrics.

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University of Toronto*



## preface

To those who observed the evolution of this book, its preparation has been an occasion for wonder. A busy teacher-researcher-clinician planned it, and he and his colleagues pursued their objective in laboratories, clinics, and offices across the nation until gradually the chapters took shape from a welter of drafts, revisions, emendations, and correspondence. Scientific authorship like virtue is its own reward, if only because the authors can never know what they have contributed to the professional development of their readers and, through them, to improved health care whenever these readers are found. Knowledge confers responsibility and the authors of *Perinatal Medicine* have in part discharged an obligation to their colleagues and to posterity by creating this synthesis of their experience.

At the time of this book's conception, the failure rate was high among candidates sitting for the examination of The Royal College of Physicians and Surgeons of Canada in obstetrics and gynecology, and pediatrics, in part because, during their training, many had had no solid laboratory experience and were unfamiliar with the basic science upon which the foundations of perinatal medicine were laid. In the course of his training in Toronto, Boston, and Oxford, the senior editor, James W. Goodwin, was stimulated by such men as Douglas E. Cannell, the late Duncan Reid, George V. Smith, James Metcalfe, Geoffrey Dawes, William Paul, and others. The example they set and his own experience in the laboratory convinced him of the need for a book that would examine the basic science underlying the practice of perinatal medicine. Not only does the resident completing his training need this unified view, but many practicing specialists could with benefit revise their knowledge of the laboratory studies which have provided the basis for most clinical advances.

The senior editor (J. W. G.) discussed with his fellow obstetricians, with pediatricians, and with those conducting research in Canada in fields related to perinatal medicine, his concept of a multidisciplinary text to cover all the events from conception to the end of the first week of postnatal life. Then he drew up a plan and set out to enlist the authors. At this point he in-

vited the second editor (J. O. G.) to coordinate the assembly of the manuscripts, to supervise the pre-publication review and redactory activities, and to supervise preparation of final copy for the publisher. Subsequently, the third editor (G. W. C.) came in to take responsibility for the pediatric chapters and to give the pediatrician's view of the other chapters.

The authors of any textbook are bound to declare why they included what they did and why they excluded much other pertinent material. We wanted this book to present the basis of reproduction and perinatal medicine in chronological order from ovulation through gestation, to culminate in a discussion of the obstetric and pediatric aspects of perinatal intensive care. Inevitably certain subjects were excluded, for example, placental morphology, maternal nutrition, and physiologic adjustments to obstetrical anesthesia. Chapter 19 on fetal pharmacology covers the placental transfer of some anesthetic agents. A central theme, toxemia, does not have a chapter of its own although it is dealt with in Chapter 30, "Renal Function in Pregnancy." We have shown discrimination giving a chapter both to the thyroid and adrenal in pregnancy but none to the liver and lungs. Finally, because we were dealing with the foundations of perinatal medicine in basic science, we have been content to point toward rather than to detail the clinical applications of these basic data.

The editors were determined to complete each chapter in every detail before surrendering it to the publisher. They were convinced that this degree of control was essential if they were to achieve the book the senior editor had envisioned. This decision protracted the book's gestation and involved the editors in matters which are usually left to the publisher or in some textbooks are left to the reader to sort out. However, rigorous quality control was not required in many of the manuscripts received. These authors, through special aptitude or long practice, had attained that high standard described by Cardinal Newman, "Thought and speech are inseparable from each other. Matter and expression are parts of one." The editors are conscious of their special debt to these authors who submitted their manuscripts on time, complete



and in good order, and hence waited longest for publication.

The word "edit" means "to set in order before publication." The editor tests every part of each manuscript, making every effort to misunderstand it, identifies the causes of misunderstanding, and then removes the obscurities and infelicities with as little disturbance to the text as is consistent with clarity, accuracy, good composition, and good taste. In all this he is the reader's proxy, making sure that, in so far as this is possible, each sentence will have but one meaning and that this meaning is clearly and concisely stated.

In this painstaking review, the coordinating editor (J. O. G.) had a special service to render, being neither an obstetrician nor a pediatrician. The physician-editor, who is a true peer, may divine the meaning even in a fragmentary or disordered sentence because he knows what the author *should* be saying in that context. Having deciphered the sentence with relatively little difficulty, he may approve it without objection, assuming that the reader has his own experience and grasp of the subject. However, once a non-peer editor draws his attention to the obscurity, pointing out that it is vague or ambiguous, the peer sees the difficulty at once, suggests an apt and lucid paraphrase, and to the reader's great benefit the difficulty is removed.

Who made this book? A little girl was once promised for her birthday "a cake that it took 1000 men to make." She was greatly disappointed at its modest size until her mother told her about the farmers who grew the grain, the men who milled the flour, the factory worker who made the machines, the planter who grew the sugar, the people who gathered the spices, and so on. The small cake then became marvelous in her eyes. This analogy has a lesson to teach about scientific publishing because behind books such as this stand many faithful, diligent people who have toiled, often without recognition, so that the authors' best words in their best order can be placed on record for the benefit of their contemporaries and of posterity. In the final analysis, however, the book is the

authors'—their experience, their precious hours, and their reputation go into it; without them there could be no book.

The editors wish to recognize the important contributions made by colleagues who offered critical commentary on the various chapters, especially to Dr. Brian Little of Case Western Reserve University, to Dr. Jacques Roux of the University of Montreal, to Dr. David Armstrong of the University of Western Ontario, and to Drs. Rudy Borth, Charles Bryan, John Crookston, George de Veber, Goran Enhorn, Calvin Ezrin, Alan Gardner, Martin Gelfand, C. K. Gorman, George Iwaniuk, Anne Kenshole, George Kutas, Vernon J. MacMillan, William Mahon, Leslie Organ, Noreen Rudd, Andrew Shennan, Jerry Shime, Charles Tator, and C. A. Woolever of the University of Toronto.

Most of the illustrations in this book were prepared by Alan Bakes, O.S.A. (Ontario Society of Artists), Art Department, Division of Instructional Media Services, Faculty of Medicine, University of Toronto, from material supplied by each author. The value of his contribution is self-evident.

James W. Goodwin and Graham W. Chance wish to acknowledge the consistent and unfailing support of their colleagues in Women's College Hospital and The Hospital for Sick Children, particularly during the final stage in this book's preparation. We wish also to remember our secretaries Jane Atanas, Mary Foster and Vivian Griffin for their cheerful assistance and Anne Fischhoff for the skill and efficiency with which she readied the manuscripts for publication.

The editors wish Dick M. Hoover, Vice President, The Williams & Wilkins Company, to know how much they have appreciated his keen interest, unfailing good humor and his moral support throughout.

Finally, we wish to record our great debt to Robert L. Randall who, drawing upon a long experience in scientific publishing, managed the day-to-day production of this book with equanimity and seemingly boundless patience.

JOHN O. GODDEN, M.D. C.M.,  
F.R.C.P.(C)

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*The publication of this volume was made possible by grants from*

**Mead Johnson Canada**

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**Gordon C. Leitch Trust within the  
Department of Obstetrics and  
Gynecology, University of Toronto**

**Dorothy Francis Graham Research Fund,  
Women's College Hospital,  
Toronto**

**Syntex Ltd.**

**Wyeth Ltd.**

**Medical Research Council (Dean's) Fund,  
Faculty of Medicine,  
University of Toronto**

**The Hospital for Sick Children Foundation,  
Toronto**

**The Physicians' Services Incorporated  
Foundation, Toronto**

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# contents

<i>Dedication</i> .....	v
<i>Forword</i> .....	iv
<i>Preface</i> .....	vii
<i>Publication grants</i> .....	xi
<i>Contributors</i> .....	xii
<b>CHAPTER 1/OVULATION</b>	
E. V. YoungLai and Kurt B. Ruf .....	1
<b>CHAPTER 2/GAMETOGENESIS TO IMPLANTATION</b>	
Gilles D. Hurteau .....	16
<b>CHAPTER 3/COUNSELING IN GENETICS AND CYTOGENETICS</b>	
Margaret W. Thompson .....	34
<b>CHAPTER 4/ABORTION</b>	
Part I: Pathogenesis—Betty J. Poland .....	48
Part II: Cytogenetics—David H. Carr .....	57
<b>CHAPTER 5/TERATOGENESIS</b>	
James R. Miller .....	69
<b>CHAPTER 6/FETAL-MATERNAL IMMUNOLOGIC RELATIONSHIPS</b>	
G. I. Urbach .....	82
<b>CHAPTER 7/Rh ISOIMMUNIZATION</b>	
J. M. Bowman and R. F. Friesen .....	92
<b>CHAPTER 8/BILIRUBIN METABOLISM IN THE FETUS AND NEWBORN</b>	
Leo Stern .....	108
<b>CHAPTER 9/BIOPHYSICAL PRINCIPLES IN THE CARDIOVASCULAR SYSTEM</b>	
Margot R. Roach and Derek R. Boughner .....	119
<b>CHAPTER 10/THE UMBILICAL VESSELS</b>	
Margot R. Roach .....	134

**CHAPTER 11/THE FETAL CIRCULATION**

James W. Goodwin ..... 143

**CHAPTER 12/FETAL RESPIRATORY PHYSIOLOGY**

Molly E. Towell ..... 171

**CHAPTER 13/FETAL ACID-BASE PHYSIOLOGY  
AND INTRAUTERINE ASPHYXIA**

Molly E. Towell ..... 187

**CHAPTER 14/BLOOD VOLUME OF THE FETUS  
AND THE NEWBORN INFANT**

Molly E. Towell ..... 209

**CHAPTER 15/FETAL INTERMEDIARY METABOLISM**

Peter Hahn ..... 223

**CHAPTER 16/CEREBRAL METABOLISM IN THE FETUS  
AND NEWBORN**

J. A. Lowden ..... 239

**CHAPTER 17/FETAL GROWTH AND NUTRITION**

P. G. R. Harding ..... 255

**CHAPTER 18/THE FETALLY MALNOURISHED NEWBORN**

Graham W. Chance ..... 270

**CHAPTER 19/PRINCIPLES OF FETAL PHARMACOLOGY**

Garry R. Van Petten ..... 286

**CHAPTER 20/RADIOIMMUNOASSAY OF PROTEIN  
HORMONES**

Brian R. Webster ..... 303

**CHAPTER 21/THYROID FUNCTION**

Robert Volpé ..... 306

**CHAPTER 22/ADRENAL CORTICAL FUNCTION  
IN PREGNANCY**

Donald W. Killinger and Charles E. Bird ..... 315

**CHAPTER 23/PROGESTERONE METABOLISM**

Yves Lefebvre, Dominique Gattereau, and Edouard Bolté ..... 321

**CHAPTER 24/GONADOTROPINS DURING PREGNANCY  
AND THE PUERPERIUM**

Charles Faiman ..... 330



# **CHAPTER 25/HUMAN PLACENTAL LACTOGEN AND CHORIONIC THYROTROPIN**

H. G. Friesen and William Singer ..... 341

# **CHAPTER 26/HUMAN PITUITARY PROLACTIN AND LACTATION**

Harvey John Guyda ..... 354

# **CHAPTER 27/ESTROGENS AND PREGNANCY**

Saul L. Cohen ..... 363

# **CHAPTER 28/CARBOHYDRATE METABOLISM IN NORMAL AND DIABETIC PREGNANCY**

R. A. H. Kinch and David Schiff ..... 383

# **CHAPTER 29/MATERNAL CARDIOVASCULAR ADJUSTMENTS IN PREGNANCY AND LABOR**

Melville G. Kerr ..... 395

# **CHAPTER 30/RENAL FUNCTION IN PREGNANCY**

Douglas R. Wilson ..... 409

# **CHAPTER 31/MATERNAL HEMATOLOGIC CHANGES, IRON METABOLISM, AND ANEMIAS IN PREGNANCY**

Nannie K. M. de Leeuw and Lauder Brunton ..... 425

# **CHAPTER 32/THE HEMOSTATIC MECHANISM AND ITS DISTURBANCES IN PREGNANCY**

Ashley T. Coopland ..... 448

# **CHAPTER 33/HEMORRHAGE IN THE TERM AND PRE-TERM INFANT**

Peter McClure ..... 459

# **CHAPTER 34/THE MYOMETRIUM**

Atef H. Moawad, T. B. MacLachlan, and M. Wolowyk ..... 464

# **CHAPTER 35/BIOCHEMISTRY OF OXYTOCIN**

Luis A. Branda and Barbara M. Ferrier ..... 481

# **CHAPTER 36/AMNIOTIC FLUID**

T. A. Doran ..... 499

# **CHAPTER 37/THE DEVELOPMENT OF THE LUNG AND THE ONSET OF RESPIRATION**

Victor Chernick ..... 517



<b>CHAPTER 38/PERINATAL CARDIOPULMONARY CHANGES</b>	
Paul R. Swyer .....	537
<b>CHAPTER 39/ANOXIA AND RESUSCITATION IN THE NEWBORN</b>	
Ann Llewellyn and J. E. Milligan .....	546
<b>CHAPTER 40/METABOLIC RATE AND TEMPERATURE CONTROL IN THE NEWBORN</b>	
J. C. Sinclair .....	558
<b>CHAPTER 41/PERINATAL INTENSIVE CARE: OBSTETRICAL CONSIDERATIONS</b>	
S. B. Effer .....	578
<b>CHAPTER 42/PERINATAL INTENSIVE CARE: PEDIATRIC ASPECTS</b>	
Sydney Segal .....	593
<b>INDEX</b> .....	609
<b>CHAPTER 31/MATERNAL HEMATOLOGIC CHANGES, IRON METABOLISM, AND ANEMIAS IN PREGNANCY</b>	
Nannie K. M. de Leeuw and Lander Brunton .....	425
<b>CHAPTER 32/THE HEMOSTATIC MECHANISM AND ITS DISTURBANCES IN PREGNANCY</b>	
Ashley T. Coopland .....	448
<b>CHAPTER 33/HEMORRHAGE IN THE TERM AND PRE-TERM INFANT</b>	
Peter McGuire .....	459
<b>CHAPTER 34/THE MYOMETRIUM</b>	
Atet H. Mosward, T. B. MacLachlan, and M. Wolowysk .....	464
<b>CHAPTER 35/BIOCHEMISTRY OF OXYTOCIN</b>	
Luis A. Branda and Barbara M. Petrier .....	481
<b>CHAPTER 36/AMNIOTIC FLUID</b>	
T. A. Doran .....	499
<b>CHAPTER 37/THE DEVELOPMENT OF THE LUNG AND THE ONSET OF RESPIRATION</b>	
Victor Chernick .....	517