

DISEASES OF THE

Kidney & Urinary Tract

Eighth Edition

Volume 1

Robert W. Schrier



Wolters Kluwer | Lippincott
Health Williams & Wilkins

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Design Coordinator: Risa Clow
Compositor: Techbooks
Printer: RR Donnelley-Willard

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530 Walnut Street
Philadelphia, PA 19106 USA
LWW.com

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Printed in the USA

Library of Congress Cataloging-in-Publication Data

Diseases of the kidney & urinary tract.—8th ed. / edited by Robert W. Schrier.
p. ; cm.

Includes bibliographical references and index.

ISBN 13: 978-0-7817-9307-0

ISBN 10: 0-7817-9307-6 (alk. paper)

1. Urinary organs—Diseases. 2. Kidneys—Diseases. I. Schrier, Robert W. II. Title:

Diseases of the kidney and urinary tract.

[DNLM: 1. Kidney Diseases. 2. Urologic Diseases. WJ 300 D6115 2007]

RC900.D56 2007

616.6'1—dc22

2006028279

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■ DEDICATION



Carl William Gottschalk, MD was a man for all seasons—brilliant scholar, committed mentor of students, dedicated citizen of the University of North Carolina and the broader academic community, and a gentleman in every sense of the word. Carl was a native Virginian whose southern manners and warm demeanor emanated a personal charm to his friends, colleagues, and students. He graduated Phi Beta Kappa from Roanoke College in 1942 and received an Honorary Doctor of Science from that institution in 1966. An Alpha Omega Alpha graduate from the University of Virginia School of Medicine, Carl received his training in internal medicine at the Massachusetts General Hospital and his fellowship in Cardiology at the University of North Carolina. For the next 40 years (1952–1992), his loyalty and many talents were an integral part of the University of North Carolina, which accounted for the respect and affection that he received from his many colleagues and friends. He was the Kenan Professor of Medicine and Physiology from 1969 until his untimely death on October 15, 1997, in Chapel Hill, North Carolina.

Carl's scientific contributions were recognized by his election to the National Academy of Science. He was president of the American Society of Nephrology from 1976 until 1977 and was a Councilor of the International Society of Nephrology (ISN). Carl founded the History of Medicine Commission of the ISN and the ISN Archives in Amsterdam, *The Netherlands*, which are appropriately named the Carl W. Gottschalk Archives of the ISN. Among many honors, awards, and distinguished named lectureships, Carl received the Homer W. Smith Award from

the New York Heart Association and the David H. Hume Award from the National Kidney Foundation. The American Physiological Society has established the Carl W. Gottschalk Distinguished Lectureship in Renal Physiology, and the University of North Carolina has inaugurated the Carl W. Gottschalk Lectureship in the Basic Sciences.

The written persona of Carl W. Gottschalk—scientist, medical historian, lepidopterist who has a butterfly (*Strymon cecrops Gottshalki*) named after him, recipient of many honors and awards—can only project a very modest picture of this Renaissance man. His kindness and consideration for others was unparalleled. It was my honor to have worked with him on three editions of *Diseases of the Kidney* and to dedicate this current edition to his memory.

Robert W. Schrier, MD

■ PREFACE

The recent advances in all aspects of our knowledge of the kidney and its diseases mandate a new edition of *Diseases of the Kidney & Urinary Tract*. As in previous editions, a group of international experts was assembled to present this information in a comprehensive, authoritative, concise, and readily accessible fashion. The chapters have been extensively revised and updated.

Nephrology is a discipline that combines the basic and clinical sciences. Successful integration of this knowledge is the goal of this eighth edition. The 14 sections of the three volume book are actually individual texts which can stand on their own. Moreover, a unique feature of the book is a comprehensive inclusion of diseases of the urinary tract as well as the kidney.

The first section presents an overall view of the structural, physiologic, and biochemical aspects of the kidney. This section incorporates the latest developments in cellular and molecular biology, emphasizing the most current information and concepts on cell signaling, receptors, and ion channels. The subsequent 13 sections are disease-oriented, with each section beginning with a pathophysiology chapter. The goal of *Diseases of the Kidney & Urinary Tract* is to publish the most comprehensive material for practicing and academic physicians caring for patients with renal, hypertension, and urological diseases. The 14 sections of the book cover 104 chapters and are summarized as follows:

- I. **Biochemical, Structural, and Functional Correlations in the Kidney** includes structural, hemodynamic, hormonal, ion transport and metabolic functions in nine chapters.
- II. **Clinical Evaluation** is covered in six chapters on urinalysis, laboratory evaluation, urography, tomography, and angiography, with indications and interpretations for renal biopsy.
- III. **Hereditary Diseases**, in five chapters, covers genetic mechanisms, medullary cystic and sponge disorders, polycystic kidney disease, Alport syndrome, Fabry disease, and nail-patella syndrome, as well as isolated renal tubular disorders.
- IV. **Urological Diseases of the Genitourinary Tract** are described in six chapters, including congenital abnormalities, urinary tract obstruction, renal calculi, reflux nephropathy, and prostatic and micturition disorders.

- V. **Neoplasms of the Genitourinary Tract** are addressed in five chapters covering molecular mechanisms in malignancy, testicular carcinoma, prostate and bladder cancer, and primary neoplasms of the kidney and renal pelvis.
- VI. **Infections of the Urinary Tract and the Kidney** are contained in seven chapters, including host defense mechanisms; urinary bacterial infections, including tuberculosis and fungal infections; renal abscesses; and cystitis.
- VII. **Acute Renal Failure** is described in 11 chapters, including the pathophysiology of renal cell ischemia and nephrotoxic injury, acute tubular necrosis, acute interstitial nephritis, and acute nephrotoxic renal disease.
- VIII. **Hypertension** and its renal manifestations are covered in seven chapters, which include pathophysiology, renal vascular and endocrine-related hypertension, as well as hypertension in pregnancy and in diabetes.
- IX. **Glomerular, Interstitial, and Vascular Renal Diseases** are discussed in 16 chapters, including collagen vascular diseases, chronic interstitial nephritis, primary glomerulonephritides, and vasculitides.
- X. **Systemic Diseases of the Kidney** are covered in eight chapters, including diabetes, hepatorenal syndrome, sickle cell disease, gout, myeloma/amyloidosis, and tropical diseases.
- XI. **Disorders of Electrolyte, Water, and Acid-Base** are covered in ten chapters, including SIADH, central and nephrogenic diabetes insipidus, cardiac failure, cirrhosis, and the nephrotic syndrome.
- XII. **Uremic Syndrome** covers pathophysiology, anemia, osteodystrophy, the nervous system, cardiovascular complications and metabolic and endocrine dysfunctions in six chapters.
- XIII. **Management of End-Stage Renal Disease** by transplantation, peritoneal dialysis and hemodialysis, including complications outcomes, and is discussed in four chapters.
- XIV. **Nutrition, Drugs, and the Kidney** are covered in four chapters, including protein and caloric dietary issues, as well as drug dosing recommendations in renal failure.

I would like to thank our authoritative and remarkably talented contributing authors whose dedication to nephrology is unmatched.

Robert W. Schrier, MD

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