



THIRD EDITION

CASE FILES[®]

PHARMACOLOGY

- 56 clinical cases with USMLE-style questions help you ace core exams and the boards
- Pharmacology pearls highlight key points
- Primer teaches you how to approach clinical problems
- Proven learning system maximizes scores

TOY • LOOSE • TISCHKAU • PILLAI

Mc
Graw
Hill
Education

LANGE[®]

THIRD EDITION

CASE FILES™ Pharmacology

Eugene C. Toy, MD

Vice Chair of Academic Affairs and
Residency Program Director
Department of Obstetrics and Gynecology
The Methodist Hospital, Houston
John S. Dunn, Senior Academic Chair of
Obstetrics and Gynecology
St. Joseph Medical Center
Clinical Professor and Clerkship Director
Department of Obstetrics and Gynecology
University of Texas Medical School
at Houston
Houston, Texas

David S. Loose, PhD

Associate Professor
Department of Integrative Biology and
Pharmacology & Graduate School of
Biomedical Sciences
University of Texas Medical School
at Houston
Houston, Texas

Shelley A. Tischkau, PhD

Associate Professor
Department of Pharmacology
Southern Illinois University School
of Medicine
Springfield, Illinois

Anush S. Pillai, DO, FAAFP

Attending/Faculty Physician
Methodist Family Medicine Residency
Program
Deputy Vice Chair – The Methodist
Hospital
Clinical Associate Professor
Weill Medical College, Cornell University
Vecino Health Centers – Denver Harbor
Clinic
Houston, Texas

**Mc
Graw
Hill**
Education

Medical

New York Chicago San Francisco Athens London Madrid Mexico City
Milan New Delhi Singapore Sydney Toronto

Copyright © 2014 by McGraw-Hill Education. All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher. Previous edition copyright © 2005 by The McGraw-Hill Companies, Inc.

ISBN: 978-0-07-179024-6

MHID: 0-07-179024-1

e-book conversion by Cenveo® Publisher Services

Version 1.0

The material in this eBook also appears in the print version of this title: ISBN: 978-0-07-179023-9, MHID: 0-07-179023-3.

All trademarks are trademarks of their respective owners. Rather than put a trademark symbol after every occurrence of a trademarked name, we use names in an editorial fashion only, and to the benefit of the trademark owner, with no intention of infringement of the trademark. Where such designations appear in this book, they have been printed with initial caps.

McGraw-Hill Education eBooks are available at special quantity discounts to use as premiums and sales promotions or for use in corporate training programs. To contact a representative, please visit the Contact Us page at www.mhprofessional.com.

Case Files™ is a trademark of McGraw-Hill Education.

Notice

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The authors and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standard accepted at the time of publication. However, in view of the possibility of human error or changes in medical sciences, neither the editors nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they disclaim all responsibility for any errors or omissions or for the results obtained from use of the information contained in this work. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this work is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.

TERMS OF USE

This is a copyrighted work and McGraw-Hill Education and its licensors reserve all rights in and to the work. Use of this work is subject to these terms. Except as permitted under the Copyright Act of 1976 and the right to store and retrieve one copy of the work, you may not decompile, disassemble, reverse engineer, reproduce, modify, create derivative works based upon, transmit, distribute, disseminate, sell, publish or sublicense the work or any part of it without McGraw-Hill Education's prior consent. You may use the work for your own noncommercial and personal use; any other use of the work is strictly prohibited. Your right to use the work may be terminated if you fail to comply with these terms.

THE WORK IS PROVIDED "AS IS." McGRAW-HILL EDUCATION AND ITS LICENSORS MAKE NO GUARANTEES OR WARRANTIES AS TO THE ACCURACY, ADEQUACY OR COMPLETENESS OF OR RESULTS TO BE OBTAINED FROM USING THE WORK, INCLUDING ANY INFORMATION THAT CAN BE ACCESSED THROUGH THE WORK VIA HYPERLINK OR OTHERWISE, AND EXPRESSLY DISCLAIM ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. McGraw-Hill Education and its licensors do not warrant or guarantee that the functions contained in the work will meet your requirements or that its operation will be uninterrupted or error free. Neither McGraw-Hill Education nor its licensors shall be liable to you or anyone else for any inaccuracy, error or omission, regardless of cause, in the work or for any damages resulting therefrom. McGraw-Hill Education has no responsibility for the content of any information accessed through the work. Under no circumstances shall McGraw-Hill Education and/or its licensors be liable for any indirect, incidental, special, punitive, consequential or similar damages that result from the use of or inability to use the work, even if any of them has been advised of the possibility of such damages. This limitation of liability shall apply to any claim or cause whatsoever whether such claim or cause arises in contract, tort or otherwise.

To Dr. Larry C. Gilstrap III, whose encouragement is largely responsible for my writing this series of books. He has been a personal inspiration, mentor, and role model of an outstanding physician, teacher, and leader;
and to Dr. Edward Yeomans, who has been a dear friend
and gleaming light of brilliance in obstetrics.

—ECT

To the medical and graduate students of the UT Health Medical School in Houston who continually challenge and make both teaching and research far more interesting; and to my son William and innumerable colleagues for their patience and encouragement during the writing and editing of the manuscript.

—DSL

To my patients, who humble me with their trust and respect; to my residents, students, and colleagues who challenge, teach, and inspire me;
and of course to my family who support and encourage my passion.

—ASP

To my students, who continue to provide inspiration.

—SAT

This page intentionally left blank

Contributor / vi

Acknowledgments / vii

Introduction / ix

Section I

Applying the Basic Sciences to Clinical Medicine..... 1

Part 1. Approach to Learning Pharmacology..... 2

Part 2. Approach to Disease..... 3

Part 3. Approach to Reading..... 3

Section II

Clinical Cases..... 9

Fifty-Six Case Scenarios..... 11

Section III

Listing of Cases..... 421

Listing by Case Number..... 423

Listing by Case Topic (Alphabetical)..... 424

Index / 427

CONTRIBUTOR

Kathleen Bottum, MD, PhD

Assistant Professor

Department of Internal Medicine

Division of Medicine and Psychiatry

Southern Illinois University School of Medicine

Springfield, Illinois

ACKNOWLEDGMENTS

The inspiration for this basic science series occurred at an educational retreat led by Dr. L. Maximilian Buja, who at the time was the dean of the medical school. It has been such a joy to work together with Dr. David Loose, who is an accomplished scientist and teacher. It has been rewarding to collaborate with Dr. Anush Pillai, a scholar and an excellent teacher. It has been a pleasure to work with our new author Dr. Shelley Tischkau, who is both a content expert and an excellent educator. I would like to thank McGraw-Hill for believing in the concept of teaching by clinical cases. I owe a great debt to Catherine Johnson, who has been a fantastically encouraging and enthusiastic editor.

At the University of Texas Medical School at Houston, we would like to recognize the bright and enthusiastic medical students who have inspired us to find better ways to teach. At The Methodist Hospital, I appreciate the support from Drs. Mark Boom, Judy Paukert, and Alan Kaplan. At St. Joseph Medical Center, I would like to recognize some of the finest administrators I have encountered: Pat Mathews, John Bertini, MD, and Thomas V. Taylor, MD. I appreciate Linda Bergstrom's excellent advice and assistance. Without the help from my colleagues and friends, Drs. Konrad Harms, Priti Schachel, Gizelle Brooks-Carter, and John C. McBride, this book could not have been written. Most importantly, I am humbled by the love, affection, and encouragement from my lovely wife, Terri, and our four children, Andy, Michael, Allison, and Christina.

Eugene C. Toy, MD

This page intentionally left blank

Often, the medical student will cringe at the “drudgery” of the basic science courses and see little connection between a field such as pharmacology and clinical problems. Clinicians, however, often wish they knew more about the basic sciences, because it is through the science that we can begin to understand the complexities of the human body and thus have rational methods of diagnosis and treatment.

Mastering the knowledge in a discipline such as pharmacology is a formidable task. It is even more difficult to retain this information and to recall it when the clinical setting is encountered. To accomplish this synthesis, pharmacology is optimally taught in the context of medical situations, and this is reinforced later during the clinical rotations. The gulf between the basic sciences and the patient arena is wide. Perhaps one way to bridge this gulf is with carefully constructed clinical cases that ask basic science-oriented questions. In an attempt to achieve this goal, we have designed a collection of patient cases to teach pharmacology-related points. More importantly, the explanations for these cases emphasize the underlying mechanisms and relate the clinical setting to the basic science data. The principles are explored rather than overemphasizing rote memorization.

This book is organized for versatility: to allow the student “in a rush” to go quickly through the scenarios and check the corresponding answers and to provide more detailed information for the student who wants thought-provoking explanations. The answers are arranged from simple to complex: a summary of the pertinent points, the bare answers, a clinical correlation, an approach to the pharmacology topic, a comprehension test at the end for reinforcement or emphasis, and a list of references for further reading. The clinical cases are arranged by system to better reflect the organization within the basic science. Finally, to encourage thinking about mechanisms and relationships, we used open-ended questions in the clinical cases. Nevertheless, several multiple-choice questions are included at the end of each scenario to reinforce concepts or introduce related topics.

HOW TO GET THE MOST OUT OF THIS BOOK

Each case is designed to introduce a clinically related issue and includes open-ended questions usually asking a basic science question, but at times, to break up the monotony, there will be a clinical question. The answers are organized into four different parts:

Part I

1. **Summary**
2. **A straightforward answer** is given for each open-ended question.
3. **Clinical Correlation**—A discussion of the relevant points relating the basic science to the clinical manifestations, and perhaps introducing the student to issues such as diagnosis and treatment.

Part II

An approach to the basic science concept consisting of three parts:

1. **Objectives**—A listing of the two to four main knowledge objectives that are critical for understanding the underlying pharmacology to answer the question and relate to the clinical situation.
2. **Definitions of basic terminology.**
3. **Discussion of the specific class of agents.**

Part III

Comprehension Questions—Each case includes several multiple-choice questions that reinforce the material or introduces new and related concepts. Questions about the material not found in the text are explained in the answers.

Part IV

Pharmacology Pearls—A listing of several important points, many clinically relevant, reiterated as a summation of the text and to allow for easy review, such as before an examination.