

Respiratory Disease: A Case Study Approach to Patient Care, 3rd edition. Robert L Wilkins PhD RRT FAARC, James R Dexter MD, and Philip M Gold MD. Philadelphia: FA Davis. 2007. Soft cover, illustrated, 521 pages, \$54.95.

Essentially, this is a fresh rewrite of an established textbook. The second edition was published in 1998, so it was arguably overdue for a repaint. As a respiratory therapist (RT) training program director, I have personally specified this text for my pulmonary diseases course since the previous edition was released. I have tenaciously resisted going to another text while waiting for this 3rd edition.

The authors outline the purpose and intended audience in the preface. Though it is mentioned that nurses, physician assistants, and medical students may find the text useful, the text design is primarily targeted toward the RT student. The authors cite the evolution of the profession to where physicians now depend on RTs to be their eyes and ears when they are not at the bedside. The stated goal of the text is "to help RTs become knowledgeable about the diseases they see in the hospital and other health care facilities and to better understand how these diseases affect lung function." A side benefit mentioned in the preface is that the text will help students prepare for the National Board for Respiratory Care Clinical Simulation Examination.

One of the most apparent changes in this 3rd edition is the reduction in chapters, from 27 to 20. This was accomplished by deleting the chapter on ethics and the 5 chapters on diseases of children and neonates. The ethics chapter was arguably not mainstream to the overall intent of the textbook. The authors' rationale was that the pediatric diseases are well covered in other texts, so they focused their attention on adult disorders. Nevertheless, the authors kept croup/epiglottitis in their list of obstructive diseases on page 3 and retained an infant chest radiograph on page 25. The exclusion of the pediatric diseases may come as a disappointment to those who were counting on this part of the text to be included in the 3rd edition. Also, the chapters on emphysema

and chronic bronchitis in the 2nd edition were consolidated under the heading Chronic Obstructive Pulmonary Disease (COPD) in the 3rd edition. The appendix from the 2nd edition was renamed "Appendix A: Normal Laboratory Values," and new in the 3rd edition are "Appendix B: GOLD [Global Initiative for Chronic Obstructive Lung Disease] Standards for Diagnosing and Treating Patients with COPD" and "Appendix C: Web Sites Useful for Learning Information About the Diagnosis and Treatment of Lung Diseases."

The general format was vastly improved in this edition. The 2nd edition began each chapter with a listing of key terms, which offered little value, in that the terms were highlighted in the text and also found in the glossary. The 3rd edition has replaced the key terms lists with a list of behavioral objectives. This should be a welcomed change for RT students, who are geared to embrace learning objectives. Other new features include call-out boxes to draw attention to the take-home points in the text. At the close of each chapter there is a bulleted "Cliff Notes" version of the key content, presented in the order it was found in the chapter. This feature makes it easy to quickly review the material and locate the associated detail in the chapter.

A further formatting upgrade is in the layout of the case studies, which provide an opportunity to apply the content learned in each chapter. In the previous edition the questions were listed separately from the answers, which made the textbook unwieldy for the student user. Now the case study questions are in the left column and the answers immediately to the right. This edition includes a card for covering the answers as you critically ponder the questions.

Other formatting changes include the use of a sans serif font and shaded boxes that set off the case study content. These are much more pleasant to the eye than the previous rendering. Also in the new edition the arterial blood gas values in the case studies are listed in tables rather than in paragraph form. Best of all is the expanded use of subheadings that better organize the text and lend to rapid referencing.

Other minor but needed updates are seen in the use of the term "RT" in place of

"RCP" when referring to the respiratory therapist (consistent with the current international identity and branding) and replacement of out-of-date medications with the newest drugs.

Chapter 1, "Introduction to Patient Assessment," lays a foundation for the rest of the textbook in that it presents an overview of the cardiopulmonary assessment. All of the basics are covered and illustrated in a case study that illustrates the integration of the various findings. The reader must be aware that Wilkins prefers to define crackles as the descriptive term for (1) late inspiratory adventitious sounds associated with airway opening and (2) "movement of excessive airway secretions with breathing." Though much confusion exists with regard to breath-sound nomenclature, there remains a very large contingent that refers to non-musical secretion-related sounds as "rhonchi." The literature provides support for both camps, and it is certainly not a settled issue among educators in the medical and respiratory care professions.

Chapter 2, "Introduction to Respiratory Failure," has changed very little from the previous edition. I would have hoped for a mention of the rapid shallow breathing index and spontaneous breathing trials in addition to the standard descriptions of intermittent mandatory ventilation, pressure support, T-piece weaning, and traditional weaning-readiness indicators.

In Chapter 3, "Asthma," the discussion of pharmacology has been updated nicely, with the addition of anti-immunoglobulin E therapy and heliox. A call-out box "plants a seed" for the RT student to consider seeking the asthma educator certification (AEC). Also new is a short prognosis section.

Chapter 4, "Chronic Obstructive Pulmonary Disease," replaces the former 2 chapters on chronic bronchitis and emphysema, and is longer than those 2 chapters combined. The same 2 case studies from the 2nd edition are wrapped in an all-new overview of COPD. There is even mention of lung-volume-reduction surgery and pulmonary rehabilitation.

Chapter 5, "Cystic Fibrosis," was updated throughout, with data and therapies that are consistent with current knowledge. The case

study has come forward essentially unchanged.

Chapter 6, "Hemodynamic Monitoring and Shock," has gone from 15 pages to 25 pages. It offers a balanced presentation of hypovolemic, septic, and cardiogenic shock. Of special note is an all new case study that features an 18-year-old cystic fibrosis patient who develops septic shock. The second case study enables a comparison of septic shock to hypovolemic shock.

Chapters 7, "Pulmonary Thromboembolic Disease," and 8, "Heart Failure," have received minor updates and remain largely as they were in the previous edition.

Chapter 9, "Smoke Inhalation Injury and Burns," underwent an extensive rewrite with current statistics and up-to-date ventilation management strategies such as tracheal gas insufflation and volumetric diffusive ventilation. There is also a new case study.

Chapter 10, "Near Drowning," now has expanded introduction and definitions sections, and a new section entitled "Prevention and Prognosis." There is also a new box that provides short definitions for the near-drowning lexicon. One of the 2 case studies comes with a revised scenario.

Chapter 11, "Acute Respiratory Distress Syndrome," is updated from the previous edition's chapter "Adult RDS" that was consistent with the former accepted definition. This chapter received a well warranted rewrite pursuant to the past decade's progression of knowledge on the management of ARDS. The same case study is used, but some new questions were added.

Chapter 12, "Chest Trauma," is also refreshed with new statistics in its introduction. The section on ventilation is expanded and an all-new case study illustrates the management.

Chapter 13, "Postoperative Atelectasis," got a general touch up.

Chapter 14, "Interstitial Lung Disease," unfortunately still has the same hazy chest radiographs used in the 2nd edition, which makes it difficult to appreciate the difference between a reticular-nodular pattern and the honeycombing in late-stage disease.

Chapter 15, "Neuromuscular Diseases," and Chapter 16, "Bacterial Pneumonia," received general updating.

Chapter 17, "Pneumonia in the Immunocompromised Patient," is much enhanced by the addition of a section on neutropenia secondary to chemotherapy, and another on immunosuppressive drugs. The organization in charge of microbe names recently changed

Pneumocystis carinii to *Pneumocystis jirovecii*, and this edition reflects that change, except that *Pneumocystis carinii* slipped through unchanged in the glossary.

Chapter 18, "Sleep Disordered Breathing," (previously titled "Sleep Apnea") has an expanded and updated introduction and more depth and breadth, commensurate with the growth in the related literature. There is also a new case study that discusses titration of continuous positive airway pressure.

Chapter 19, "Tuberculosis," is largely unchanged, though there are some new data in the chapter's introduction.

Chapter 20, "Lung Cancer," received new sections on metastatic disease and paraneoplastic syndromes that were not found in the 2nd edition. Also new are sections on newer imaging and diagnostic techniques. The first case study has new images added, and replacement of the radiograph, which was, apparently, reversed on page 387 of the 2nd edition. The new second case study features a tracheobronchial stenting procedure.

I was pleased to have the opportunity to review this new 3rd edition of one of my favorite textbooks. In all respects it is updated and improved. It will be useful to RTs, medical students, physician assistants, and critical care nurses, and it deserves a place on the reference shelf in any respiratory therapy department. In the past my bachelor-level students have found the 2nd edition user-friendly and enjoyed using it throughout my pulmonary diseases course. I am looking forward to this year's presentation with a new group of students using the 3rd edition.

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Respiratory Care. Caia Francis MSc. *Essential Clinical Skills for Nurses* series. Malden, Massachusetts: Blackwell Publishing, 2006. Soft cover, illustrated, 235 pages, \$29.95.

This book is part of the *Essential Clinical Skills for Nurses* series. As the title suggests, the intended readership is beginning and new nurses practicing in the field of respiratory illness. The author is a well-

known and esteemed lecturer from the University of West England.

The book has 8 chapters, each of which ends with a handy multi-point chapter summary. The stated intended readership is beginning and current practitioners who care for pulmonary patients. The book's goal is to provide evidence-based guidelines for care of patients with various pulmonary diseases.

The first chapter is a 20-page overview of the gross anatomy and physiology principles of the respiratory system. The author states that a detailed review is outside the scope of this book. This chapter covers the mechanics of ventilation, pulmonary circulation, transport of gases, and acid-base balance. The author blends basic and more advanced concepts, such as the diagram of gross anatomical features opposite the table on Fick's law of diffusion. Though the presentation of anatomy and physiology is concise, it is not initially apparent how the practitioner can use the information in practice. The author makes 2 brief references (while explaining the composition of inspired air) to altitude and air travel, pointing out how grateful we are for pressurized cabins! This section was improved by the addition of a bit of humor to a potentially dry topic.

Chapter 2 covers asthma. It begins with a brief definition and nice physiological explanation of the disease. As primarily patient practitioners, we found interesting much of the discussion of United Kingdom prevalence and mortality. The chapter presents diagnosis, maintenance therapy, acute crisis, and, most importantly, management after the acute crisis. Another section highlights the importance of assessing and managing the psychological aspects of asthma. Tables 2.4 and 2.5 present guidelines for giving asthma information to the patient, which we think will be helpful for all practitioners, be they community, hospital, or home based. The overview of the British Thoracic Society's 2003 asthma guidelines gives the book a global health perspective.

Chapter 3 discusses in depth the epidemiology and economic impact of COPD in the United Kingdom, the nuances of diagnosing COPD, and both out-patient and in-patient COPD treatments. The case studies blend all these aspects and emphasize the impact on patient and community. As with the chapter on asthma, the space devoted to the psychological care of COPD patients and their families is very well spent and a nice addition to the text.

Chapters 4 covers nebulizer and inhalers. The author provides a cursory overview of the various types of nebulizers and inhalers. Much of the chapter focus is on patient and family teaching. There are photos, diagrams, and a 2-part case study that will be particularly effective for nurses, as it shows very clearly the difference that proper technique can make for the patient. The author points out that hospital-based and community nurses have this opportunity.

Oxygen therapy is covered in Chapter 5, which includes various photos and explanations of delivery systems. We found the explanation of oxygen toxicity a bit confusing. Complications from exposure to high inspired oxygen concentration in the neonatal population versus the adult population are not differentiated. The author also makes reference (page 126) to oxygen toxicity caused by a high level of oxygen in the *bloodstream*, but oxygen toxicity is documented to occur because of a high *inspired* oxygen concentration and the creation of oxygen free radicals in the lung.

Noninvasive and invasive ventilation are covered for the beginning practitioner, as a means of oxygen delivery only. The text lacks a basic overview of mechanical ventilation. Table 5.6 covers advantages and disadvantages of available oxygen masks. We found tables in other texts (eg, Craven RF, Hirnle CJ. *Fundamentals of Nursing, Health, and Human Function*. Lippincott, Williams & Wilkins; 2000, table 33.5) that present this information in a more organized, clear, and concise format.

Lung cancer, surgical intervention, and respiratory infection are addressed in Chapters 6 and 7. These chapters are brief and give the reader a vernal overview of caring for these patients. There is a good diagram of how a chest tube works, and a table of indications for chest tube insertion. Again, the author's attention to the psychological effects of lung cancer diagnosis is well suited for all practitioners, not only nurses. The section on respiratory infection gives brief overviews of the etiology and treatment of pharyngitis, sinusitis, bronchitis, pneumonia, and tuberculosis. Figure 7.1 visualizes where each of these infections occurs within the respiratory tract. There is a very nice explanation of the purified protein derivative test, which practitioners at every level can use to teach patients, families, and other practitioners.

Chapter 8, on respiratory assessment, is very thorough; it covers physical assess-

ment, use and limitations of pulse oximetry, basic blood gas interpretation, and the basics of peak flow and spirometry. It would have been more helpful for this chapter to appear earlier in the book, as it would have lent greater understanding to some of the concepts and data measurements covered in the asthma and COPD chapters.

This is a portable book and so can be used by the beginning practitioner. The case studies are most helpful in illustrating the nurse's ability to impact the care of the pulmonary patient. The book's goal of providing evidence-based practice for caring for patients with pulmonary disease is met with the inclusion of additional resources and citations. Though this book does not cover clinical skills essential for all nurses, it provides an overview of aspects of care needed across the health-care continuum for pulmonary patients.

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The Respiratory System at a Glance, 2nd edition. Jeremy PT Ward PhD, Jane Ward MBChB PhD, Richard M Leach MD FRCP, and Charles M Wiener MD. Malden, Massachusetts: Blackwell Publishing. 2006. Soft cover, illustrated, 108 pages, \$32.95.

The Respiratory System at a Glance is a part of the *At a Glance* series, which is a British series of medical review books. This 2nd edition includes new topics (exercise and history taking), and the other sections have been revised. The book provides a concise review of pulmonary physiology and the major disease processes of the lungs that is intended for students in the health professions and junior doctors.

The book is divided into 2 main parts. The first part reviews respiratory physiology in "bite-size" chapters (eg, on gas laws, respiratory symbols, diffusion, and ventilation-perfusion mismatching). The second part covers diseases and treatment. There is a much smaller section on history, exami-

nation, pulmonary function tests, and chest imaging.

Like other titles in the series, this is a large (8.5 × 11 inches) paperback in which 2 pages are devoted to each topic. On one page is text, and on the facing page are diagrams, images, tables, and lists that supplement the text. The chapters present succinct overviews of their topics by presenting the key concepts with liberal use of bolded text. There are no in-depth discussions, because each of the 43 chapters is limited to 2 pages. Thus, this is not a stand-alone text; it would be most useful as a review, refresher, or supplementary text for the emphasis of key concepts. Despite the concise format, the authors present the information in a readable manner. Concepts are logically and clearly presented. Abundant effort was made in the physiology sections to include clinical examples that nicely demonstrate points and make connections with the later clinical sections.

The affiliations of several of the authors are with physiology departments, and the book's greatest strength is in the sections on physiology. The general approach to each topic is to discuss cellular mechanisms and related laws of physical science, explain the response in normal and abnormal physiology, and offer clinical examples. For example, the section on carriage of carbon dioxide discusses the body's buffering mechanisms, the Haldane effect, the role of ventilation and ventilatory controls, and the respiratory gas-exchange ratio. Supplemental diagrams include the CO₂ dissociation curve and a diagram of CO₂ uptake and oxygen delivery at the tissue level. The authors are particularly skilled at identifying common sources of confusion among medical students and clearly explaining the concepts (eg, the different effects of changes in ventilation on P_{aO₂} and P_{aCO₂}). Especially successful are the explanations of diffusion, control of acid-base balance, ventilation-perfusion mismatching, and embryologic and neonatal aspects of the respiratory system.

A similar format was adopted in the part on diseases and treatment, which features the more common respiratory diseases, including asthma, COPD, pneumonia, interstitial lung disease, pulmonary hypertension, pleural diseases, cystic fibrosis, and venothromboembolic disease. However, the authors are less successful at presenting a concise but complete review in these chapters than they were in the physiology sections. The authors had a harder task in the clinical

sections, as there is greater difficulty in deciding what to include in a short clinical summary, as opposed to one on physiology. For example, the section on pleural diseases includes very little discussion of pleural fluid analysis but devotes a paragraph to mesothelioma. In addition, rapid changes in clinical medicine and practice differences between societies may rapidly make information outdated or inaccurate (eg, ciprofloxacin, rather than more active fluoroquinolone, is mentioned as second-line anti-tuberculosis therapy).

Given the small space allotted to each topic, clarity in statements is essential, but the clinical sections contain occasional unclear or confusing statements. For example, community-acquired pneumonia is defined as "lower respiratory tract infections occurring within 48 hours of hospital admission." It is not clear that this definition could apply to patients who are not hospitalized.

The *At a Glance* series is British in orientation, and the clinical section includes and excludes information that would/wouldn't typically be found in an American text. The text uses European units (eg, kPa rather than cm H₂O), but information on unit conversion is included. Some of the information is clearly not directed at the North American student; for example, the chapter on tuberculosis states that, "Pulmonary tuberculosis is most common in Asian, Chinese, and West Indian people." Other points of difference in the tuberculosis section include a paragraph devoted to the Heaf test and drug therapy, which recommends a 3-drug initial regimen (as opposed to the 4-drug regimen recommended by the United States Centers for Disease Control).

There was an obvious effort to make this book user-friendly. The index is thorough and there are few typographical errors. The diagrams are clear and well-labeled, and the radiographs clearly illustrate the pathology. No references were included, which would have been useful, given the concise nature of this book.

In summary, **The Respiratory System at a Glance** is a basic and concise review of respiratory physiology and disease processes. It would be most useful for students in medicine, nursing, and respiratory therapy as a supplement to more comprehensive texts and as a review for examinations. I recently taught a course on respiratory medicine for second-year (pre-clinical) medical students, and this book's chapters on respiratory physiology would have been a useful

supplement to highlight and concisely explain key concepts. The sections on clinical medicine might also be useful for health-professional students in their pre-clinical years. Students looking for a guide during their clinical years should seek out one of the many available "on the wards" pocket reference books.

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The Washington Manual Pulmonary Medicine Subspecialty Consult. Adrian Shifren MD, editor. *Washington Manual Subspecialty Consult* series, Tammy L Lin MD and Daniel M Goodenberger MD, series editors. Philadelphia: Lippincott Williams Wilkins/Wolters Kluwer. 2006. Soft cover, illustrated, 284 pages, \$29.95.

The Pulmonary Medicine Subspecialty Consult is a pocket-sized manual that addresses a broad range of topics in both inpatient and ambulatory pulmonary medicine in a concise and well-organized fashion. It is one of 11 such subspecialty manuals in the *Washington Manual Subspecialty Consult* series. **The Pulmonary Medicine Subspecialty Consult** has 32 chapters, ranging from basic pulmonary concepts (chest radiograph and pulmonary function testing) to complicated disease processes (interstitial lung disease and pulmonary hypertension), with a targeted and thoughtful design. Each chapter contains at least one table of important concepts or differential diagnoses that should be considered when evaluating an individual patient.

There are also flow diagrams that provide logical diagnostic or therapeutic approaches to common pulmonary difficulties. These graphics nicely complement the text in both organization and content. Each chapter is well organized and designed to function as a quick review of the topic, highlighting key points in the patient's history and physical findings, appropriate laboratory and radiographic studies, differential diagnoses, and therapeutic strategies. Each chapter lists suggested readings, including key consensus statements, practice guidelines, important clinical trials, and review articles.

The primary target audience is medical students, residents, and fellows in in-patient and out-patient consultative services, so the book is a quick reference for key details and issues that should be considered in the typical evaluation of patients with common pulmonary disorders. The book fits in a lab coat pocket. The intent of this text is not to function as a complete reference of pulmonary medicine, and it will not replace traditional textbooks that have detailed descriptions of airway mechanics, pulmonary physiology, and pathology.

However, as a quick reference that can be reviewed in several minutes on an in-patient ward or clinic setting, it will be a useful tool in the evaluation of pulmonary patients, by listing the key issues that should be considered while evaluating the patient at the bedside and providing references for a detailed review later. Another population that will find this text helpful are those who practice in busy primary care and hospitalist settings, where the wide variety of patient issues encountered requires convenient, easily accessible information. It will also be a useful and reliable desktop companion.

Overall, this is a useful and well-written reference that addresses a wide variety of topics with a very logical and practical approach. It will quickly find a niche in the lab coats of medical students and residents on pulmonary services. Those looking for a brief review of basic pulmonary topics will also find a tremendous value that lives up to the expected quality and reputation of other products from the *Washington Manual* series.

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Lung Function: Physiology, Measurement, and Application in Medicine, 6th edition. JE Cotes DM DSc FRCP, DJ Chinn PhD MSc, and MR Miller MD FRCP. Malden, Massachusetts: Blackwell Publishing. 2006. Hard cover, illustrated, 636 pages, \$199.95.

What an honor it is indeed to have the opportunity to review this book, though I must admit that the idea of critically reviewing it gave me as much disquietude as one might expect from an invitation to publicly discuss inaccuracies in Garry Kasp-

arow's chess play. Coates and colleagues have made tremendous contributions to our understanding of respiratory physiology over many decades. Crapo, who wrote the foreword, refers to Coates as "one of my icons"; it is difficult to find higher praise than that. When I began reading **Lung Function: Physiology, Measurement, and Application in Medicine**, it became clear that I had taken on dual roles: reviewer and fortunate student. The book's stated aim is to give "a comprehensive account of lung function and its assessment in healthy persons and those with all types of respiratory disorder, against a background of respiratory, exercise, and environmental physiology." After reading the book I think that sentence is an understatement. Though the book will certainly be useful for physicians and physiologists, it should be regarded as not just appropriate, but *necessary* for respiratory therapists, nurses, and students. This is a book that a student can grow with throughout his or her career.

Aesthetically this is a very nice book. I like the simplicity of the title. The diction and spelling are British, but I think this will not be a distraction, since most North American readers will surely find it necessary to read articles from the fine British and European journals. I appreciate the fact that numerical values are given in both *Système Internationale* units and the units most commonly used in the United States. Moreover, the European Respiratory Society and the American Thoracic Society get equal billing in this book. The beginnings of most chapters include both a general outline and an index of specific topics. References and suggestions for further reading are listed at the end of each chapter. There are very few typographical errors, the index is without difficulties, and the book is loaded with exceptional figures and tables. The book's most remarkable trait is its logical, lucid, and concise writing style. It is a joy to read.

There are 44 chapters and 7 parts. Whilst I thoroughly enjoyed all of this book, there are a few chapters I am particularly fond of. Chapter 21, "The Oxygenation of Blood," reviews in great detail all of the steps and barriers to aerobic respiration. The discussion of the oxyhemoglobin curve is the finest I have ever read. Most texts simply list what makes the curve shift, but this book explains how and when these changes occur and articulates the physiologic necessity of a dynamic relationship between oxygen tension and oxygen saturation at the pulmo-

nary and tissue level. However, in regard to the oxyhemoglobin curve, there is an inaccuracy in Chapter 34, "Hypobaric: High Altitude and Aviation Physiology and Medicine," where it is stated that a leftward shift of the oxyhemoglobin curve results from the combined effects of respiratory alkalosis, lactic acidemia, increased production of diphosphoglycerate (2,3-DPG), and, in some circumstances, a reduction in lung temperature." Of course acidosis and increased 2,3-DPG cause a rightward shift of the oxyhemoglobin curve. Chapter 23, "Control of Respiration," is perhaps the finest in the book. I will revisit this chapter regularly as a clinical reference and for teaching purposes. As I read it, I repeatedly thought, "I've got to use this figure in a presentation." I found the sections on peripheral neural inputs and learned responses of the respiratory control center particularly fascinating and thought-provoking.

I also admired the authors' effective arguments against certain widely accepted practices and terminology. For example, the American Thoracic Society suggests the use of maximum oxygen consumption per kilogram of body weight to determine the ability to sustain work, but the authors cite a study that showed that one third of British shipyard workers would be excluded from employment by that recommendation. In addition, the authors dispute the term "diffusion capacity," because this measurement is made at rest and therefore doesn't measure the true capacity. The term "anaerobic threshold" is also challenged, because intracellular oxygen tension after the anaerobic threshold remains adequate for the functionality of the electron transport chain, and because there is not a point of discontinuity between the oxygen consumption and lactate levels, so "there is no threshold."

There are some inaccuracies in this book. In Chapter 15, in a discussion of bronchial pharmacology, it is stated that magnesium may be beneficial in childhood asthma. However, Silverman et al¹ found a clear benefit from magnesium therapy in adults with acute severe asthma. In Chapter 42, while discussing the blunted ventilatory response to hypercapnia, the text incorrectly states that "the hypercapnic response is already reduced in patients with COPD." The text attempts to support this incorrect statement by citing a study by Montes de Oca and Celli,² but that study actually indicated that the ventilatory response to carbon di-

oxide is preserved even in COPD patients with chronic hypercapnia.

The section in Chapter 42 on mechanical ventilation is the book's only failure. The descriptions of how to ventilate lungs and controlled mandatory ventilation (with fixed time intervals) and expiratory retard are outdated; the citations are from the 1960s. It is also incorrectly stated that the Acute Respiratory Distress Syndrome Network mechanical ventilation study³ showed a mortality benefit from a strategy of "5 mL/kg minute ventilation." The text also states that the prolonged use of positive end-expiratory pressure increases the risk of barotrauma, but Amato et al,⁴ found that higher positive end-expiratory pressure and mean airway pressure, when used with small tidal volume, were associated with less volutrauma.

In conclusion, if you have a passion for respiratory physiology, you will treasure this book. The abundance of exceptional tables and figures is an invaluable resource. The \$199.99 price is a bargain; indeed, for a mere \$199.99 the reader can be a student of some of the world's great respiratory physiologists. Compare that to the cost of one class at your local community college—with book not included!

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Human Respiration: Anatomy and Physiology, Mathematical Modeling, Numerical Simulation, and Applications. V Kulish, editor. *Advances in Bioengineering* series, volume 3. Billerica, Massachusetts: WIT Press. 2006. Hard cover, illustrated, 218 pages, \$150.

The title, **Human Respiration: Anatomy and Physiology, Mathematical Modeling, Numerical Simulation, and Applications**, promises a breadth of pulmonary subject matter that could be difficult to fulfill within 10 chapters. Parsing the title, “Anatomy and Physiology” is obvious; “Mathematical Modeling” and “Numerical Simulation” are 2 closely related, self-explanatory topics; but “Applications” puzzled me at first; however, it proved to be as good a word as any to encompass the topics of chest-wall-vibration therapy, a calculated lung status index, and proportional-assist ventilation. The text’s common denominator is its biomedical engineering view of, primarily, the ventilation and gas-exchange functions of the pulmonary system.

The editor states that the book is the “result of a 10-year research collaboration.” I hoped that this would lead to strong cohesion between the chapters, with one topic following neatly to the next. The existence of a glossary in the front matter strengthened my hope for a tightly knit work. It surprised me, then, that the chapters are such a diverse grouping. Several chapters are the work of the editor and several coauthors, and thus have similar topics and a similar feel. Otherwise, the chapters are as disparate in their subject matter as they are in their readability.

In addition to the topics listed above, this book includes chapters about respiratory gas diffusion through a spatial network of red blood cells, mechanical models of lung ventilation, airflow in a particulate-doped lung, and a toxicity index for inhaled neurotoxins. Some of these analytical models are relatively simple (eg, the model that represents the lungs as a resistance-compliance electrical network). Other models, such as the finite element representation of the airway tree, are extremely complex, both mathematically and computationally. It is doubtful that anyone will be familiar with all the techniques introduced in this volume. The book has value in making the reader aware of various ways that biomedical engineering can be applied to the respiratory system.

Returning to the glossary, I would have been extremely impressed if the editor had convinced his fellow authors to adhere to a single set of abbreviations. Engineers and physicists are notorious for choosing their own particular symbols and sticking to them. I thought the glossary looked too short to include the terms from all 10 chapters, and the first chapter proved me correct. The glossary incompleteness is a slight annoyance, as most of the authors have taken care to define their terms, and they often use abbreviations that are common in pulmonary research. There is the odd symbol that creeps in every now and then. One that stands out, and appears in several chapters, is the use of a V with an open circle (instead of a dot) above it to denote ventilatory flow. While this does not hinder understanding, it is unorthodox.

The first chapter opens with a remarkably concise yet thorough review of anatomy and physiology by Johnson and Hsia. To give you an idea of the brevity, adult anatomy is dispatched with 2 short paragraphs and the standard Weibel airway-generation schematic. This chapter is also the first hint of the physics bent of this book. The authors discuss 2 dimensionless flow and transport parameters: the Reynolds and Péclet numbers. The treatment of laminar versus turbulent flow, as represented by the Reynolds number, can be found in many graduate level pulmonary physiology texts. However, before reading this chapter I had not seen the parallel analysis using the Péclet number to estimate relative convection and diffusion of the respiratory gases. The reader needs to be familiar with similar concepts to understand the topics presented. I nevertheless enjoyed seeing the engineering treatment of pulmonary physiology from the onset of this volume.

The editor, Kulish, offers this compilation as recent advancements in pulmonary bioengineering for researchers and students. I found it hard to judge the merits of this claim. Some of the work, with which I am familiar, is currently ongoing. Other projects, judging from their citations, appear to have been dormant for a number of years. A case in point is Lua and Shi’s chapter, “Mechanics of Proportional Assist Ventilation.” This ventilator design has 2 separate settings, one for flow and the other for lung volume, used to adjust the gain to amplify a patient’s inspiratory effort. I polled several pulmonologists I work with before finding one familiar with this ventilator. He

informed me that proportional-assist ventilation units are found in Europe, but are not used in the United States. The most recent citations in this chapter that deal directly with proportional-assist ventilation are nearly 10 years old. This makes me question whether this topic can be considered a recent advancement and whether there is any current engineering moving the technology forward. Even though the research about this topic may be a little stale, the authors’ description of this ventilator intrigued me enough to do some outside reading on the topic.

The chapters are of extremely uneven quality. On the lower end is the chapter about “Lung-Gas Composition and Transfer Analysis,” by Ghista et al, who were inconsistent with the values they chose to represent expired gas composition. These discrepancies are trivial but should have been corrected, because they confuse the reader. The writing style of this chapter is poor; it is not much more than equations separated by single phrases or sentences. After plodding my way through the derivations, I had that lost feeling that comes from skipping class for a week and trying to catch up with a classmate’s notes. The authors attempt to describe the concentrations of oxygen and carbon dioxide in inspired and expired air and derive a method for determining gas-diffusion rates with respect to cardiac output. The calculated diffusion coefficients can then be used as indices of lung performance. Other than a case study, the authors do not attempt to show clinical sensitivity or specificity for the calculated diffusion coefficients. I am unclear as to the utility of this method in a clinical setting.

Tawhai’s chapter “Anatomically Based Modeling of Pulmonary Structure” sits in stark contrast to the one described above. The mathematics needed to describe the formation of a mathematical airway tree could easily overwhelm the reader. Tawhai here opted for a prose description that I found informative and easy to read. Clear graphics supplement the text; for example, one figure shows how a standard airway tree morphs to an individual representation based on computed tomography scans. I felt that I came away from this chapter with a fair understanding of the methods involved. The ultimate aim of this research is to produce a patient’s individualized computational model of the pulmonary system, from the trachea down to the alveoli and capillary networks.

The quality of the graphics is one place where this book shines, when compared to its siblings. The quality varies somewhat between chapters, but most chapters have clean, crisp line plots and graphs. There are only a few bitmapped images; even these pixilated plots are legible. This is a welcome change from many previous texts of this type.

Many of the chapters could have used some editing to correct overlooked points in the methods, spelling, and other minor errors. Units, especially, are an issue throughout. Pulmonary resistance and compliance units are variously contorted into both correct and incorrect versions, sometimes switching within a single chapter. This is one place where the editor should have imposed consistency. In a chapter authored by the editor, several plots refer to incorrect equation numbers, making it awkward to

follow his results. These errors are inconsequential.

However, I take issue with the calculation of work of breathing in the chapter "Lung Ventilation and Modeling Assessment," by Ghista et al. Pressure-volume work is the integral of pressure with respect to volume ($\int PdV$), and not the integral of volume with respect to pressure ($\int VdP$). The calculations in this chapter are valid only because they take into account an entire breath, which is the only time these 2 formulations agree. The mistakes throughout the text add to the feeling that some of the authors did not give appropriate attention to their final product.

I began reading this book hoping that it would expose me to fresh ideas in mathematical modeling of the respiratory system. I was rewarded most notably by the 3 "Ap-

plications" chapters, primarily because I had no previous familiarity with these topics. Overall, the majority of the chapters are well developed and presented clearly and thoroughly. However, several topics disappointed me, especially when the authors did not convince me that their research has any application outside of this text. Better editing to strengthen the weaker chapters would have mitigated my hesitancy to recommend this compilation.

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