Henderson-Hasselbach equation is fully derived, which is something of an exception in this book; most of the physiologic equations elsewhere are simply presented in final form. The 4 primary acid-base disturbances and their compensations are described with reference to the Davenport diagram. Blood-tissue gas exchange is addressed, with consideration of capillary density, tissue diffusion, and critical P_{O_2} at the mitochondrial level.

The chapter on mechanics of breathing begins with a brief description of the respiratory muscles; then the pressure-volume curve of the lung is presented, with hysteresis, and compliance is discussed. Students often have difficulty with positive and negative signs when dealing with lung-chest wall mechanics, and Figure 7.3 may add some confusion, because the pressure-volume curve is depicted with negative pleural pressure on the X axis, but the accompanying text states that "this axis also measures transpulmonary pressure," without making clear that the values would then be positive.

Surface tension and surfactant receive detailed attention. The previously described difference in ventilation from top to bottom of the lung and basilar airway closure at low lung volume are well explained with graphic presentations of the vertical gradient of pleural pressure and relative position on the lung pressure-volume curve. The interaction with the chest wall is introduced with the classic 3-component pressure-volume curve. The topic of airway resistance and dynamic compression during forced expiratory flow extends to presentation of isovolume pressure-flow curves that may be beyond introductory readers.

Chapter 8 gives a basic presentation of ventilatory control, including neural aspects, chemoreceptors, and responses to CO_2 and hypoxia. This is followed by a chapter titled "Respiratory System Under Stress," which includes a potpourri of topics, many not typically encountered in a text of this type. Exercise physiology, but not clinical exercise testing, is briefly discussed, followed by a section on high-altitude gas exchange, another long interest of Dr West. Other topics are oxygen toxicity, space flight, diving physiology, decompression sickness, effect of atmospheric pollutants, the concept of liquid breathing, and perinatal respiration from placenta to first breath.

The tenth and final chapter deals with tests of pulmonary function, but with an emphasis that seems ill-suited to the intended reader. After a very brief introduction to spirometry, the flow-volume curve, and measurement of functional residual capacity via nitrogen washout (helium dilution and plethysmography were included in Chapter 2), diffusion is passed over, and the author's interest is reflected in more detailed discussion of tests that reflect ventilation-perfusion relationships, such as the single-breath alveolar plateau, multi-breath nitrogen-washout profile, closing volume, frequency dependence of compliance, and construction of an O_2-CO_2 diagram.

The appendixes include a listing of symbols and equations used in the text (some in more detail), answers to the study questions, and suggestions for further reading. For each chapter 5–7 classic papers, reviews, or books by the pioneers and luminaries of respiratory physiology are listed. Appropriately, most of these are not recent, but a few publications from the past 5 years are included. For more experienced readers who want to better understand the foundation of their specialty, this citation list may be the most valuable component of the book. Finally, a detailed subject index is provided to guide the reader to areas of interest.

In a volume polished over many iterations, one would expect only rare errors, and that is true here. On page 39 a reference that should be to Figure 1.6 in an earlier chapter, has been to Figure 1.3 in at least the last 3 editions. On page 63, the denominator term is missing from the ventilation-perfusion equation, which is correctly shown in the appendix.

West's **Respiratory Physiology: The Essentials** has stood the test of time and will continue to introduce medical, nursing, and respiratory-therapy trainees to the physiologic concepts and relationships that underlie respiratory care practice. It can also serve as a useful guide for those who wish to refresh that knowledge. The focus is normal physiology, with only a few allusions to pathologic alterations, so students in respiratory system courses that encompass both normal function and disease processes of the lungs will need additional resources. West has also produced a companion volume, *Pulmonary Pathophysiology: The Essentials*, now in its 6th edition.

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Respiratory Physiology: A Clinical Approach. Richard M Schwartzstein MD and Michael J Parker MD. *Integrated Physiology* series. Baltimore: Lippincott, Williams, & Wilkins/Wolters Kluwer. 2006. Soft cover, illustrated, 232 pages, with CD-ROM, $37.95.

In the preface the authors state that they have organized the contents of this book to emphasize that breathing depends on more than the lungs; this approach is necessary for understanding the clinical problems that result from malfunctions of the respiratory system. The emphasis is on what the clinical student needs to know (or review) to deal with a patient's problem on hand, although this book is a physiology—not pathophysiology—text. The authors have indeed succeeded admirably in their goals. This book would be appropriate for any student of physiology, but especially those interested in clinical problems.

Chapter 1, "Getting Started: the Approach to Respiratory Physiology," gives an overview of the integrated approach. The authors divide the system into the respiratory controller, the ventilatory pump, and the gas exchanger. This chapter also introduces the book's accompanying CD-ROM, which contains animations and simulations. Material covered in the CD-ROM is marked in the book with a "film" icon, which makes the CD-ROM material easy to find. Each chapter starts with a clear outline, followed by an extensive list of learning objectives. The book's sections are well marked by headers, the level of which is easily discerned because of the judicious use of fonts and color. Where appropriate, "Quick Check" lists summarize major points. Figures and tables are well-placed, well-designed, and clearly marked. "Thought Questions" are interspersed in the text and give the reader a chance to see whether the material just covered is appreciated well enough to integrate into an overall understanding; some of these questions are clinical in nature.

Four sections complete each chapter: the "Putting It Together" sections give clinical vignettes, followed by physiologic explanations. The "Summary Points" are bulleted lists of the major concepts covered in the section. Then a section provides the answers to the "Thought Questions." Concluding each chapter is a section of review questions, the answers to which are at the end of the book. The strength of this approach is

that the material is introduced, presented, and reviewed while giving the reader a chance to think about it, work on simulations, and solve problems, which reinforces the learning. Short of being in a classroom with the authors, this approach is the best and longest-lasting.

Chapter 2, "Form and Function," is much more than a review of anatomy. Following up the description of the concepts of the respiratory controller, the ventilatory pump, and the gas exchanger, the authors detail the components of each and their functional importance, including, in addition to the usual, topics such as bones, pleura, and peripheral nerves.

The mechanics of the pulmonary system are covered in Chapter 3, "Statics: Snapshots of the Ventilatory Pump." In addition to the usual description of lung volumes, there are good descriptions of how lung volumes are measured clinically with spirometry, gas dilution, and body plethysmography. In contrast, Chapter 4, "Dynamics: Setting the System in Motion," covers the concepts of flow, pressure, resistance, compliance, and their application to the lung. The clinical correlations include the flow-volume loop during quiet breathing, forced expiration, and maximal inspiration in normal lungs, in obstruction, and before and after a bronchodilator.

Rather than separating (as some textbooks do) the steps of ventilation, perfusion, the matching of ventilation and perfusion, and gas transport, the authors place those concepts together in Chapter 5, "The Gas Exchanger: Matching Ventilation and Perfusion." In so far as the processes are a continuum, this is a good way to approach them. For example, carbon dioxide is discussed not only in the context of transport, but also by looking at elimination and, more importantly from the clinical stand-point, the causes of hypercapnia. Similarly, the discussion on oxygen includes the physiologic causes of hypoxemia.

The control of ventilation is complex. Chapter 6, "The Controller: Directing the Orchestra," does a superb job of discussing not only the usual role of the brain and the peripheral chemoreceptors; it also integrates volition, and pulmonary receptors in the airways, lungs, and chest wall with the overall response. Ventilatory responses during hypercapnia, hypoxemia, exercise, and respiratory failure are a nice addition to this complex topic and are useful applications for clinical situations that we encounter daily. Chapter 7, "The Controller and Acid-Base Physiology: An Introduction to a Complex Process," provides an excellent discussion on respiratory and metabolic acidosis and alkalosis and their compensation, a topic that has received too cursory a discussion in some basic pulmonary physiology texts. Renal physiology is an integral part of this topic, and it is covered in enough detail to make the material clear. This chapter is enough to teach the clinical student the physiologic basis of blood-gas interpretation.

Shortness of breath is an important symptom of many respiratory diseases. One of the difficulties of dealing with it is that, while we can rate it, grade it, and try to correlate it with other variables, most of us don't really understand the underlying physiologic basis of dyspnea—until now: Chapter 8, "The Physiology of Respiratory Sensations," deals with dyspnea and the subtle differences between cases; for example, being short of breath after having run up the stairs is very different than dyspnea during an asthma attack. The interaction between the lung and the controller are explained for the various respiratory sensations, and asthma is used for a model of multiple sensations. The authors acknowledge that this chapter is borderline between physiology and pathophysiology, but they believe it is an important topic because it can pull together various topics previously discussed in the book, because an understanding of the underlying physiology aids in diagnosing, and because there is a paucity of basic information in physiology textbooks. I agree on all counts.

To demonstrate how the controller, the ventilatory pump, and the gas exchanger work together, the authors discuss exercise, which is the topic of the last chapter, "Exercise Physiology: A Tale of Two Pumps." Exercise also depends on the cardiovascular system, and a succinct but clear explanation of this topic is found here, as well as a discussion of the metabolic demands during exercise and the limits of these systems in preventing us from exercising harder or longer.

The book concludes with a very helpful glossary of terms and formulas, and a detailed index.

The accompanying CD-ROM very cleverly displays the most important principles. It is organized into the same chapters as the book. There are as few as one (spirometry in Chapter 1) and as many as 9 animated figures in each chapter, which are numbered the same way as in the text. The animated figures are referred to in the text, making it easy to determine when it is a good time to view them and play out scenarios (eg, perform a vital-capacity maneuver in spirometry).

The interactive animations are also available on the Lippincott, Williams, & Wilkins *Connection* Web site (http://connection.lww.com), for which the reader is provided an access code. Unfortunately, it is not just a matter of connecting and typing in the access code. A lengthy registration process is required, which asks for information that I didn't think necessary for me to use animations, and thus I was not willing to give. I suspect that the publishing company is afraid that the access code would be used by more than one person, and that is a possibility, but if the Web site is like the CD-ROM, the animations are not stand-alone. Using the animations on the Web may convince some folks to buy the book, which is reasonably priced for a medical textbook. I hope the publishing company will become enlightened enough to change the deterring Web registration, or at least make it less cumbersome: name, e-mail address, and access code should be enough.

This book is part of a series that, following the same approach, will cover cardiovascular, renal, gastrointestinal, and endocrine physiology. I look forward to future monographs in the series.

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Lung Injury: Mechanisms, Pathophysiology, and Therapy. Robert H Notter, Jacob N Finkelstein, Bruce A Holm, editors. (*Lung Biology in Health and Disease*, volume 196, Claude Lenfant, executive editor). Boca Raton, Florida: Informa/Taylor & Francis. 2005. Hard cover, illustrated, 857 pages, $199.95.

Lung injury is a broad category of acute and chronic diseases, characterized clinically by disruption of the normal gas-exchange function of the lung. Much attention and research has focused on acute lung injury (ALI) and acute respiratory distress syndrome, since it was first described by Ashbaugh and co-authors in 1967.[1] However, chronic lung injury, including chronic obstructive pulmonary disease and fibrotic lung