

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

disease, results in a greater health burden and shares many similar pathophysiologic mechanisms.

This book is volume 196 of the *Lung Biology in Health and Disease* series. Its goal is to provide a general overview of all aspects of lung injury, in both acute and chronic phases, with an emphasis on pathophysiology. The book is in 3 sections. The first third of the book focuses on the mechanisms by which lung injury develops, from both clinical/epidemiologic and cellular/molecular perspectives. The middle third of the book focuses on the physiology of lung injury and models used to study lung injury. The final third of the book deals with emerging therapies for lung injury. Each chapter begins with an overview of the topic to be covered and concludes with a summary of relevant information. Although each chapter can only provide a general summary of its topic, the chapters serve as a good starting point for understanding specific aspects of lung injury, and they provide reference lists that can lead to more in-depth reading.

Chapter 1, "Introduction to Lung Injury," provides an overview of lung injury and describes the book's organization and goals. Tables summarize the types of pathology observed in lung injury and the different molecular mediators that have been described in lung injury. The primary value of this chapter is to guide the reader to specific sections of interest.

Chapter 2, "Principles of Lung Development, Growth, and Repair," summarizes current knowledge about lung organogenesis, including alveolarization and development of the pulmonary vasculature. This material is included at the beginning of the book because many of the same processes involved in initial lung development are thought to be important in the remodeling and repair phase of lung injury. Included is a description of the physiology of lung development and an overview of the dynamic roles of external stimuli, hormonal regulation, and transcriptional control in the temporally dynamic process of organogenesis. This chapter is concisely written yet contains a great deal of information about the complex processes of lung development. It has an extensive list of references.

Chapters 3 and 4 discuss the epidemiology and physiologic and molecular pathophysiology of ALI. Chapter 3 provides a nice summary of the known risk factors for ALI, the various mechanisms of alveolar epithelial injury, and an introduction to ther-

apeutic considerations when managing ALI. Chapter 4 reviews cytokine expression in ALI, with an emphasis on chemokines and leukocyte recruitment. Chapters 5 and 6 discuss the pathophysiology and relevant molecular mediators of chronic lung injury. The juxtaposition of these 4 chapters is useful for understanding the relationship between acute and chronic lung injury.

The next third of this book focuses on specific components of the physiology of lung injury and reviews different models of lung injury. Chapters 7–9 cover 3 specific aspects of lung injury: the role of reactive oxygen and nitrogen species, vascular dysfunction, and surfactant dysfunction. All 3 chapters provide a reasonable review of their specific topic; however, Chapter 7 is particularly good, with a nice summary on the generation of reactive oxygen and nitrogen species and a discussion of animal models and clinical studies, which illuminate the role of these molecules in normal biology and lung injury.

Chapters 10–12 review models of lung injury. Chapter 10 summarizes cell-culture models and animal models of lung injury. The first half of the chapter reviews isolation and the use of primary alveolar macrophages, Type II alveolar epithelial cells, and pulmonary endothelial cells. The second half of the chapter reviews animal models of lung injury. A comprehensive reference list is included. This chapter provides an excellent starting point for the biomedical researcher interested in applying these models to the study of lung injury. Chapter 11 reviews the timely issue of genetically modified mouse models of lung injury and repair. In the first half of this chapter, the basic methods used for transgenic mouse generation are reviewed, followed by a discussion of important advances, such as the use of inducible promoters or cell-type-specific promoters. The second half of the chapter gives several specific examples of how transgenic mice have been used to elucidate mechanisms of lung inflammation and repair. Chapter 12 begins with a discussion of lung structure and function and then reviews various methods used to study inhalation toxicology in human and animal models.

The final third of this book reviews therapeutic strategies for ALI, with a focus on results of clinical trials and future directions. Chapter 13 reviews the mechanisms by which ventilation can worsen injury in patients with acute respiratory distress syndrome and may contribute to the develop-

ment of extrapulmonary multiple-organ dysfunction. Animal studies, clinical trials, ventilation strategies, and adjunctive therapies are discussed. Chapters 14–17 cover anti-inflammatory therapies, surfactant replacement, anti-oxidant therapies, and treatments directed at the vascular compartment in both acute and chronic lung injury. Chapter 18 discusses the potential of gene therapy for treating lung injury and reviews gene-delivery methods and research on gene therapy for several different causes of lung injury.

Chapter 19 explores combination therapy for ALI. This chapter includes a list of agents and scenarios in which combination therapy could be considered, but its primary focus and value is a thorough consideration of the design of combination-therapy studies. Scientists considering participation in such a study will find this chapter a very useful starting point in understanding the complexities involved.

In summary, this book provides a current overview of acute and chronic lung injury. This is a very broad and diverse topic, so this book obviously cannot be a comprehensive source of information for any specific aspect of lung injury. Rather, it serves as a starting point for understanding different facets of lung injury. The book's extensive reference lists are a valuable resource for more in-depth investigation. This book is primarily directed toward individuals in biomedical research and focuses on current concepts and research directions in the field of lung injury. It is not a clinical guide to the management of lung disease. This book will probably be most valuable as a reference for libraries, academic departments, and other such institutions, rather than to individuals who want a narrower focus and greater detail on a specific lung-injury topic.

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REFERENCES

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