

**Pharmacology and Pathophysiology of the Control of Breathing.** Denham S Ward, Albert Dahan, and Luc J Teppema, editors. *Lung Biology in Health and Disease*, volume 202, Claude Lenfant, executive editor. Boca Raton, Florida: Taylor & Francis. 2005. Hard cover, illustrated, 849 pages, \$199.95.

This multi-author book has an ambitious title that promises more than the book delivers. The title would lead one to assume that the monograph covers most aspects of the control of breathing and its abnormalities in disease states. Unfortunately, that is not the case, and the coverage is selective, both in the basic physiology and the pathophysiology of the control of breathing. On the other hand, there is much focus on the effects of anesthetics on ventilatory control.

Most of the chapters are reviews of the subject, but there are no new insights into ventilatory control mechanisms. The book would be useful for the beginning researcher, to provide a background and bibliography in selected areas of ventilatory control, and it may also be of interest for selective browsing by more experienced workers.

The list of authors includes some well known researchers, but, as with any monograph, some chapters emerge better than others. The book is divided into 3 subject groups: basic physiology of the control of breathing; pathophysiology of ventilatory control; and the pharmacology of ventilatory control.

The chapters in the first section, on the basic physiology of the control of breathing, do not do full justice to the subject, the most striking lacuna being an absence of any discussion of the mechanisms that integrate the various peripheral and central inputs that control breathing. For example, it would have been useful to review the roles of and interaction between peripheral and central chemoreceptors and modulation of ventilation by sensory feedback from the chest-wall and lung receptors. The first chapter, "Peripheral Chemoreceptors," by Nurse, is focused entirely on the carotid chemoreceptors, with no discussion of the neuroepithelial bodies or the aortic chemoreceptors. The discussion is almost entirely on oxygen-sensing mechanisms in the carotid chemo-

receptors, and there is an excellent discussion of the possible mechanisms of oxygen sensing in the carotid body. However, there is no discussion of the carotid chemoreceptor response to CO<sub>2</sub> or of the interaction of the responses to CO<sub>2</sub> and hypoxia. Nor is there any discussion of the effects of bilateral carotid-body denervation in man.

The chapter on central chemoreceptors, by Teppema and Dahan, is a useful overview of the subject, forming a good basic review for a researcher starting in this field. Behavioral, volitional control of breathing is discussed in Chapter 3, "Suprapontine Control of Breathing," by Moosavi et al, and the chapter reflects the concepts of the Harvard school of workers in this subject. It provides an excellent review of the current state of knowledge of the respiratory "centers" involved in volitional control of breathing. Elsewhere it suffers from being too basic, with important omissions: there is little discussion of the influence of peripheral chemical or mechanical sensory inputs on central perception, or of the role of diaphragm and airways sensory receptors, particularly an analysis of studies of chest-wall and airway denervation. The section on the perception of music is somewhat peripheral and speculative.

A highlight of this section is the chapter on respiratory neuroplasticity, by Fuller, Mitchell, and Bavis; this is a very good review of the subject and will be of great use to all workers in this field. On the other hand, the chapters (4 and 5) on drug effects are useful but do not adequately address the myriad possibilities posed by different drugs acting at various neuromuscular sites and affecting ventilatory regulation. The examples are aimed at drugs that depress respiration, primarily anesthetics. Other drugs that stimulate ventilation, such as doxapram and adenosine, are not discussed.

Chapter 7, on airway reflexes, by Nishino, fails to mention the possible role of the non-adrenergic noncholinergic fibers in airway control, nor is there an adequate discussion of the morphology of the airway neurons. This chapter would have benefited from a diagram of the various neurons and pathways.

The section on pathophysiology of ventilatory control is remarkable in what is omit-

ted rather than in what is included: there are no chapters on what are perhaps the commonest conditions associated with abnormalities of ventilatory control: chronic airways obstruction, asthma, pulmonary edema, and the fibrotic lung diseases. On the other hand, congenital hypoventilation syndrome, obesity, sleep apnea, and one physiologic condition (high-altitude hypoxia) receive separate chapters.

The chapters are of variable interest. Chapter 9, by Gozal, on the congenital hypoventilation syndrome, provides a good review of the subject, but the rarity of the condition makes it of limited interest.

Chapter 10, on upper-airway obstruction in sleep apnea, is a detailed and useful review of the subject, but it is limited to obstructive sleep apnea. It would have been of greater interest to include a more detailed review of ventilatory control during sleep.

Chapter 11, on high altitude, is a basic review of the subject, but offers no new insights into the response to high-altitude hypoxia.

The pharmacology section is almost entirely limited to the effects of anesthetic agents on ventilatory control, so it will be of special interest to anesthesiologists. Though many of the chapters provide useful information to the nonanesthesiologist (particularly Chapter 14, on the effects of sedatives), overall this section is only of specialized interest.

The figures included with the discussions are of uniformly high quality and appropriate, and each chapter has an extensive bibliography, though one could argue in some cases on inclusions and omissions.

In summary, this is a useful book to have on the bookshelf, though recognizing that its coverage of the subject is limited in many respects, and most chapters provide only a basic review. However, there are useful overviews in some subtopics of respiratory control, and selective dipping into the relevant chapters would be a very good introduction for the beginning researcher.

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