

**Perinatal and Pediatric Respiratory Care**, 2nd edition. Michael P Czervinski RRT and Sherry L Barnhart RRT. St Louis, Missouri: Saunders. 2003. Hard cover, illustrated, 778 pages, \$58.95.

**Perinatal and Pediatric Respiratory Care** is the second edition of a book edited by Michael Czervinski and Sherry Barnhart, who also wrote some of the chapters. The editors state that the book is primarily intended for respiratory care students and practitioners new to this aspect of respiratory care. It is also intended to serve as a reference for experienced practitioners and as a study guide for the National Board of Respiratory Care Perinatal-Pediatric specialty exam. The book is divided into 5 sections, each section is divided into chapters, and each chapter is written by a different author. Each chapter begins with an outline, contains an abundance of high quality graphs and tables, line drawings, and photos (both color and black-and-white), and ends with a detailed list of references. The references are current and very complete.

Section I is titled "Fetal Development, Assessment, and Delivery," in which Chapter 1, "Fetal Lung Development," gives a good description of embryologic development. Chapter 2, "Fetal Gas Exchange and Circulation," is very detailed and easy to read. Chapter 3, "Anatomic Assessment and High-Risk Delivery," though generally well written, used the terms "IRDS" and "idiopathic respiratory distress syndrome" when referring to respiratory distress syndrome. I believe that is dated terminology. This chapter made no mention of assessing lecithin/sphingomyelin (L/S) ratios or checking for meconium staining when assessing amniotic fluid. Chapter 4, "Neonatal Assessment and Resuscitation," was easy to read and generally followed Neonatal Resuscitation Program guidelines. However, there wasn't any mention of using heat and humidification when applying free-flow oxygen to a newborn.

Section II is titled "Assessment and Monitoring of the Neonatal and Pediatric Patient." This section's chapters are very thorough and generous with illustrations. Chapter 6, "Examination and Assessment of the Pediatric Patient," has some excellent

case studies at the end. Unfortunately, Chapter 6 is the only one that included case studies. In Chapter 7, "Pulmonary Function Testing in Neonatal and Pediatric Patients," I liked the analogy that "a neonate's lung is more like a bag in a bag instead of a bag in a box" because of higher chest wall compliance. In my 23 years of teaching neonatal respiratory care, I have never been able to explain this concept as simply and elegantly as that author did. In Chapter 8, "Radiographic Assessment," the author refers to acute respiratory distress syndrome (ARDS) as "adult RDS." At this point in time, most would agree that ARDS now means "acute respiratory distress syndrome." Other subjects included in this section are assessment of the neonatal patient, flexible bronchoscopy, invasive blood gas analysis and cardiovascular monitoring, and noninvasive monitoring.

Section III is titled "Therapeutic Procedures for Treatment of Neonatal and Pediatric Disorders." There are chapters on oxygen administration, airway clearance techniques and lung volume expansion, surfactant replacement, administration of gas mixtures, extracorporeal life support, pharmacology, and thoracic organ transplantation. Again, each chapter is very thorough. Many of the chapters give detailed suggestions for step-by-step procedures when administering therapies. However, I am mystified by one author's statement in Chapter 13, "Aerosols and Medication Administration," that "auscultation should never be used to assess bronchodilator response." That statement is made without any clarification or reference. I assume the author meant that auscultation should never be used as the *only* means of assessing bronchodilator response.

Chapter 15, "Airway Management," is very detailed, but seems geared toward the surgical resident, as there are numerous descriptions of surgical approaches to maintaining an airway. Also, this author repeatedly makes reference to the laryngeal mask airway yet never talks about it directly or shows any illustrations of it.

The chapters pertaining to ventilation (covering mechanical ventilators, noninvasive mechanical ventilation, high-frequency ventilation, liquid lung ventilation) are all

excellent. Current terminology is used and many different types and brands of ventilator are described. There is one slight discrepancy in Chapter 18, "Continuous Positive Airway Pressure." On Page 29, the author says to switch from mechanical ventilation to nasal continuous positive airway pressure when the ventilator rate is down to 8–10 breaths per minute. On Page 303, he states that mechanical ventilation can be switched to nasal continuous positive airway pressure when the ventilator rate is between 6 and 10 breaths per minute. Though a minor discrepancy to an experienced practitioner, this could cause some consternation for a student (I know that my students would immediately demand to know, for test-answering purposes, which statement is the correct one).

Chapter 25, "Cardiopulmonary Resuscitation," pretty much follows the American Heart Association's 2000 guidelines for child and infant basic life support. It does not mention any of the techniques and guidelines taught in the Neonatal Resuscitation Program; however, Neonatal Resuscitation Program guidelines and protocols are used in Chapter 4, "Neonatal Assessment and Resuscitation."

Section IV is titled "Neonatal and Pediatric Disorders: Presentation, Diagnosis, and Treatment." There are chapters on congenital and surgical disorders, neonatal complications, congenital cardiac defects, sudden infant death syndrome and pediatric sleep disorders, airway disorders and parenchymal lung diseases, asthma, cystic fibrosis, shock and anaphylaxis, sepsis and meningitis, head injury and cerebral disorders, submersion injury, poisoning, disorders of the pleura, and neurologic and neuromuscular disease. As can be seen by the chapter titles this section of the book is all-inclusive! All information is very current and up to date. Again there is generous use of excellent photos and illustrations. However, I am bothered by a small section in Chapter 36, "Acute Respiratory Distress Syndrome." The author gives a very concise, easy-to-understand description of the oxygenation index, but he fails to mention what values are consistent with or indicative of ARDS. Also I am also befuddled by a statement made in Chapter 39, "Thermal and Inhalation Injury." The

author says "using fire safe cigarettes should prevent pediatric thermal injury." Is there really such a thing as a "fire-safe" cigarette? Should a respiratory care book be advocating the use of any kind of cigarette? Generally, though, this section of the book is excellent. I am pleased to see that one of the authors in this section was one of my students some 22 years ago! It is always gratifying when a teacher learns from a former student!

The last section of the book is titled "Neonatal and Pediatric Transient and Ambulatory Care." It contains 2 chapters: "Transport of Infants and Children" and "Home Care." Both chapters are state-of-the-art in describing strategies and equipment used in these environments.

In summary, I think this book is an excellent reference for all practitioners, and especially for those preparing for the National Board of Respiratory Care Perinatal-Pediatric specialty exam. However, the book is more like an encyclopedia than a textbook for respiratory care students. I prefer that a respiratory care textbook contain objectives at the beginning of each chapter, case scenarios or studies so that students can see the material applied to the clinical setting, and discussion questions at the end of each chapter. Indeed, many newer respiratory care textbooks also include interactive CD-ROMs just for this purpose. Again, this is an excellent book for the experienced practitioner but would not be the best one for a respiratory care student.

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**Clinicians' Guide to Asthma.** Kian Fan Chung MD DSc, with a contribution by Andrew Bush MB BS MA MD. London, United Kingdom: Arnold. 2002. Soft cover, illustrated, 165 pages, \$45.

**Clinician's Guide to Asthma** is clearly meant to be a synopsis of a vast and oft-times overwhelming subject. The text is geared toward the practicing physician on one hand, but the novice researcher or fellow would also benefit from the book in that it would provide a springboard off which to jump into the sometimes murky waters

dealing with the pathophysiology and management of asthma. I was impressed at the author's ability to incorporate such a large amount of material into such a compact package.

There are only 8 chapters and 156 pages in this book, with some chapters being easier to read than others. The book is arranged in a logical fashion, beginning with definitions and epidemiology, moving on to clinical diagnosis and assessment, laboratory evaluation, asthma mechanisms, treatment, and management (with a special chapter on infants and children), and ending with a discussion of current and future challenges of asthma.

Chapter 1 is really just a brief overview of the disease, including definitions, clinical presentation, measurement of lung function, and epidemiology, including mortality and economic costs. At the end of the chapter there is also a section dealing with the natural history of the disease, separating children and adults. This chapter and all the subsequent chapters are subdivided into subheadings, making it easy to locate various topics.

Chapter 2 deals with the clinical diagnosis and assessment of asthma, starting with the patient's history and important questions to ask and document. It then moves on to the physical examination and differential diagnosis, since not everything that wheezes is asthma. The differential diagnosis is relatively extensive, with a brief synopsis of each of the differential diagnoses, such as carcinoid or chronic obstructive pulmonary disease. There is a concise segment on when an asthmatic should be referred to a specialist, and a discussion of the various clinical presentations of asthma and classification according to severity.

Chapter 3 deals with the objective evaluation of asthma, such as pulmonary function studies. I found this chapter difficult to follow and somewhat disorganized. There is a reasonable discussion of spirometry and peak expiratory flow and meter readings, followed by a rather scattered discussion of bronchial hyperresponsiveness. The author also includes in this chapter a brief mention of quality-of-life measures available for asthma and an assessment of risk factors such as allergens, briefly covering the most common allergens, such as dust mites, cockroaches, pollen, and cat and dog dander. The end of the chapter has a discussion on airway inflammation and induced sputum, which would have been better placed in the

next chapter, which covers the mechanisms of asthma.

Chapter 4, "Mechanisms of Asthma: Risk Factors and Pathophysiology," is one of the more involved chapters in the book, dealing with the research/pathophysiological aspects of asthma. For working on such a vast topic, the author did a good job of condensing the information. This chapter is subdivided into 3 sections, the first of which covers the risk factors for asthma, including atopy and genetic factors, allergen exposure, respiratory infections, respiratory irritants, pollutants, and chronic stress. The second subdivision covers the processes that lead to chronic airway inflammation and airway remodeling. This includes a succinct discussion of various cytokines, their expression in asthma, antigen presentation and release, the immunoglobulin E response, and mast cells. Included is a section on the role of immunoglobulin E and eosinophils and associated cytokines. For a subject that can be overwhelming and confusing to the novice or non-research-oriented individual, I particularly like that the author included some well done diagrams summarizing the text in an easy-to-follow manner. The third subsection of this chapter involves a dialogue about the underlying pathophysiology of airway wall narrowing and of bronchial hyperresponsiveness. This section also has some clear and informative diagrams discussing transcription factors and inflammatory mediators in asthma, as well as the link between inflammation and abnormal physiology.

Chapter 5 is one of the longest chapters, giving an extensive review of current asthma therapy, dividing the asthma drugs by class, then mechanism of action, pharmacokinetics, available preparations, and adverse effects. This chapter has a number of tables summarizing the text, and the author has included tables of the inhalable corticosteroids and  $\beta_2$  agonists, with both generic and brand names and the available modes of delivery. The most extensive discussions cover corticosteroids and  $\beta_2$  agonists, and there are discussions on anticholinergics, theophylline, cromolyn, and anti-leukotrienes. The author cites the potential benefits of these drugs and references some studies with these agents. There is a good discussion on inhaler devices and a brief but very interesting section on immunotherapy and alternative therapies.

Chapter 6 deals largely with the management of asthma. It covers the overall ap-

proach to care using the Global Initiative for Asthma Management and Prevention. It examines the overall plan and aims of asthma management, discussing in a stepwise fashion the important components, avoidance of triggers, and pharmacologic management, with several summarizing diagrams using the British Thoracic Society recommendations. It includes a brief discussion on patient education and self-management and a short comment on asthma during pregnancy and in the elderly. The last few pages of the chapter cover asthma exacerbations—a topic that I think deserves a separate chapter. There is some redundancy in the discussion of pathology, causes, and clinical presentation of patients with acute exacerbations. The treatment section is short, with most of it summarized in several tables drawn from the British Thoracic Society recommendations. The tables cover recognition of a severe exacerbation, management in the hospital, and management after hospital discharge.

Chapter 7 is written by Andrew Bush MBBS, a contributing author who is a pediatric pulmonologist. This is a superbly written chapter covering the differential diagnosis, which is quite different for children than for adults, and emphasizes several times that one must be careful in making this diagnosis in younger children, since there are so many disorders that can mimic asthma. He discusses issues involving airway development, the effect of atopy in infants, and associated pharmacologic therapies in children. There is also a discussion on environmental manipulation in children and special issues with older children, such as growth issues and exercise-induced asthma. Bush covers drug delivery devices for children and psychological issues, including adherence, vocal cord dysfunction, and hyperventilation syndromes. There is a brief mention of severe unresponsive asthma, with a take-home message that children are not “miniature adults” when it comes to asthma, and they should be treated differently.

The final chapter in this book covers the current and future challenges of this disease. It is a brief chapter, commenting on severe therapy-resistant asthma and new approaches to the treatment of asthma, such as interleukin 5 monoclonal antibody, promoting of T helper cell type 1 (Th1) cytokine such as interferon (IFN $\gamma$ ), or interleukin 2, and inhibition of immunoglobulin E by using

a monoclonal antibody to immunoglobulin E, in sum treatment at the molecular level.

In summary, this is a well written text for the most part, and the author has indeed accomplished what he set out to do, which was to provide a thumbprint of asthma for those who do not have the time to read 2-volume texts on the disease. For those getting into research, this is a nice summary of the disease; although it is by no means comprehensive, the important points are covered. There are several caveats, however. This book was written with a British bent, with most of the references being to United Kingdom studies and recommendations from the British Thoracic Society. The commercial names mentioned are European, so an American audience must take that into consideration, although the important features are the same regardless of on what continent one resides. In addition, Chapter 3 is rather confusing and includes some subjects, such as induced sputum, that are not very practical to the clinician in the day-to-day practice of medicine. The third thing I found somewhat annoying was the lack of citations in the text, though there is a bibliography in the back of the book, divided by chapter. It would be more useful to include numbered citations in the text so one could more easily reference information discussed in the chapters.

On the other hand, the book cover is attractive, the illustrations are well done and very informative, the style is concise and clear and quite readable for the most part. The information is accurate considering the book's publication date; however one must remember that there are constant revisions to asthma management, such as the recent revision by the National Asthma Education and Prevention Program stating that there is not enough evidence to support adding a leukotriene modifier or theophylline to inhaled corticosteroids in preference to a long-acting  $\beta_2$  agonist.

Asthma diagnosis, management, and treatment continue to evolve, but this book would be of value to the clinician who needs a quick but thorough reference to asthma's pathophysiology and management.

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**Integrated Cardiopulmonary Pharmacology.** Bruce J Colbert MSc RRT and Barb J Mason Pharm D. Upper Saddle River, New Jersey: Prentice Hall. 2002. Soft cover, illustrated, 342 pages, \$46.67.

I looked forward to reviewing **Integrated Cardiopulmonary Pharmacology**. Its bright glossy cover and manageable size make for an inviting appearance. Unfortunately, the book's content did not measure up to my expectations.

The authors state in the preface that they aimed to present an integrated approach to cardiopulmonary pharmacology, in part by linking physiologic and pathophysiologic concepts. The authors accomplished this goal through the use of clear, succinct reviews of basic physiology and supporting diagrams. The authors also integrate a fair amount of therapeutics and disease state management. Although most chapters of the book are organized by drug class, the last 3 chapters focus on drug treatment of chronic obstructive pulmonary disease, respiratory infectious diseases, and cardiac arrest.

In the preface, the authors imply that they tried to avoid “dry and highly technical” discussion of pharmacology, in favor of utilizing humor and an informal style that does not “distance the student from the material.” I agree that most pharmacology texts are “dry” and sometimes difficult to read, and that many students would appreciate an approachable textbook with improved readability. Still, I found Colbert's and Mason's extremely informal style distracting; the text includes colloquialisms such as, “The long and short of it is . . .” and “You will see some pretty dramatic differences.” Chapter 8, “Anti-Infective Agents,” contains this clinical pearl: “Unlike Superman, these super-bacteria are not weakened by kryptonite.” In addition, the authors sometimes refer to drugs by brand name, but with no capital letter or identification of the generic drug name (eg, “amiodarone can interact significantly with other cardiac drugs, especially the blood thinner coumadin.” Chapter 9).

The preface outlines special textbook features, including learning hints, clinical pearls, and, most notably, the supporting Web site, which includes several exciting and innovative features, such as an audio glossary to facilitate correct pronunciations, animations to aid in understanding difficult concepts, and practice quizzes.

There are numerous references to the Web site throughout each chapter, such as in

Chapter 3, "Pharmacology of the Autonomic Nervous System." After discussion of autonomic neurotransmission, the text refers readers to the Web site: "View [the animations] several times if needed to understand this vital physiologic process." The animations were generally helpful, but in some cases the graphics need improvement. In the "Sympathetic Stimulation Leading to Bronchodilation" animation, it is difficult to read the letters "ACh" and "NE", which identify the neurotransmitters. The graphic depicting the effects of sympathetic and parasympathetic stimulation on the eye did not seem to be functioning properly; the animation did not show pupil dilation or constriction. Chapter 12 features a very effective animation with audio discussion of the oxygen-hemoglobin dissociation curve.

The audio glossary is an exciting concept, but none of the glossaries for any chapter include drug names. This is surprising in light of the authors' assertion in their description of the integrated Web site that bright students may be "wrongly judged in clinic owing to poor pronunciation of drug names." The Web site does provide excellent practice quiz questions for each chapter. Students may complete the quiz on-line; the quiz is then "graded" and students get immediate feedback about the questions they missed. The diagrams and tables included in each chapter have been compiled into convenient Microsoft PowerPoint presentations, which would be very useful for classroom instruction.

The Web site also features "extended concepts" for each chapter. Throughout the text, the authors refer the reader to the Web site for more information. This technique is used very effectively in certain areas. For example, readers are referred to the Web site for overviews of treatment guidelines for management of hypertension and hypercholesterolemia. Unfortunately this section of the Web site is "hit or miss" and does not always provide the promised information. For example, Chapter 4 refers readers to the Web site for a discussion of the differences between spacers and valved holding chambers. Chapter 10 states that readers will find "current consensus recommendations for warfarin use and goals of therapy," but that information does not seem to be available on the Web site.

The table of contents is detailed and easy to use. I did not detect any typographical errors within the text. The diagrams within each chapter are clear, useful, and contain

the right amount of detail; in general I found the tables to be less helpful. One of the worst features of the book is the lack of referencing throughout the text. References are listed by chapter at the end of the book instead of immediately following each chapter. The number of references cited in some chapters is very low: 7 of the 15 chapters cite fewer than 10 references.

Chapter 1 explains general pharmacologic principles and guides the reader through the sections included in a package insert. Chapter 2 reviews the metric system and provides examples of dosage calculations. Chapter 3 provides a very effective discussion of the autonomic nervous system. Chapter 4 focuses on aerosol treatments, including metered-dose inhaler technique. Chapters 5–12 discuss the pharmacology of bronchodilators, mucokinetics, surfactants, anti-inflammatory agents, anti-infectives, cardiac and renal agents, neuromuscular blockers, anesthetics, sedatives, analgesics, and therapeutic medical gases. Chapters 13–15 discuss the pharmacologic management of chronic obstructive pulmonary disease, respiratory infectious diseases, and cardiac arrest.

Overall, the chapters are reasonably well organized. However, Chapter 9, "Cardiac and Renal Agents," and Chapter 10, "Blood Pressure and Antithrombotic Agents," are particularly weak. The division of cardiac drugs into these 2 chapters seems arbitrary, and several drug classes are discussed multiple times throughout both chapters. For example,  $\beta$  blockers are discussed in the context of arrhythmia, congestive heart failure, and angina in Chapter 9, and as antihypertensives in Chapter 10. Despite this duplication, readers are never informed in any section as to which  $\beta$  blockers are  $\beta_1$ -selective. Chapter 9 includes a very brief discussion of renal physiology and pharmacology of diuretic drugs, and includes one paragraph entitled "Other Renal Medications," which mentions drugs to treat urinary tract infections and benign prostatic hypertrophy. Only finasteride is listed as a treatment for benign prostatic hypertrophy. Alpha blockers are discussed in Chapter 10 as antihypertensives only.

Trying to condense cardiopulmonary pharmacology into a manageable 350 pages is a daunting task. I appreciate that the authors faced difficult decisions about what information not to include. However, this book contains serious omissions and some factual errors. In the section discussing he-

parins, the authors state that low molecular weight heparins "are also referred to as unfractionated heparin."

Chapter 1 includes a table entitled, "Drugs That Affect Liver Enzymes." Of over 100 identified liver enzyme inducers and inhibitors, the authors selected 8 representative drugs, and the inducers they selected are appropriate. On the other hand, 2 of the drugs listed as inhibitors (allopurinol and influenza vaccine) are, to my knowledge, not inhibitors. Documented enzyme inhibitors with drug interactions of major clinical importance are not listed (eg, azole antifungals, protease inhibitors, serotonin re-uptake inhibitors).

The information on heart failure is especially poor. The roles of angiotensin-converting enzyme (ACE) inhibitors, dobutamine, dopamine, nitroprusside, and  $\beta$  blockers in managing congestive heart failure are covered on one page. The authors state that  $\beta$  blockers are "used occasionally for congestive heart failure." National consensus guidelines state that  $\beta$  blockers should be prescribed for proven morbidity and mortality benefits for *all* patients with congestive heart failure and without contraindications to  $\beta$  blockade. Treatment of acute versus chronic heart failure is not distinguished; a table entitled "Subgroups of Drugs for Congestive Heart Failure" does not help to clarify this issue. The table includes phosphodiesterase inhibitors but not dobutamine; it includes calcium channel blockers, which are explicitly identified in consensus guidelines as drugs not indicated for the treatment of heart failure.

In the section discussing nitrates for treatment of angina, nitroglycerin is the only nitrate that is named; isosorbide mononitrate and isosorbide dinitrate are commonly used and should at least be listed as examples. Other sections (eg, calcium channel blockers, ACE inhibitors) include examples of commonly used drugs in the class (both brand and generic names are provided).

**Integrated Cardiopulmonary Pharmacology** is a pharmacology text, and complete coverage of therapeutics is beyond the scope of the book. However, it seems remiss that the concept of evidence-based medicine is almost completely absent. In a paragraph describing the use of ACE inhibitors after myocardial infarction, there is a clumsy discussion of number-needed-to-treat. Readers who were not already familiar with the number-needed-to-treat concept are likely to be confused by this unsatisfac-

tory introduction to the concept of decision analysis.

The coverage of pulmonary physiology, pharmacology, and therapeutics is clearly the focus and strength of the book. Pharmacology and therapeutic considerations for cardiac drugs are generally oversimplified or omitted. For example, the idea that ACE inhibitors are both nephrotoxic and renoprotective is traditionally a difficult concept for students to grasp. The text simply states that ACE inhibitors can "cause renal damage even though they are also used to protect renal function" and does not provide an explanation.

The authors do not identify the book's intended audience; its depth of coverage is probably not sufficient for the book to be useful to students in pharmacy and medicine. My overall impression is that the book was designed with the respiratory therapy student in mind, intending to provide a student-friendly text that includes the drug-related information necessary to provide high-quality respiratory care.

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**Learning Lung Sounds: Interactive Media Course for PCs**, 2nd edition. RLH Murphy MD DSc and MA Murphy PhD RNCs ANP. Compact disc for Windows or Macintosh computers with Internet Explorer or Netscape. System requirements: Windows 95/98/ME/XP/NT/2000 or Macintosh operating system. Westborough, Massachusetts. 2001. \$49.

**Learning Lung Sounds**, a new CD-based program of lung sound instruction is, as stated in the introduction, "Intended for everyone interested in clinical medicine, particularly students and residents in medicine, nursing, and respiratory care, as well as those in physician assistant, emergency care, and nurse practitioner programs." It is the work of a physician and scientist who has been consistently engaged in lung sound study and teaching for 3 decades. The program hits its intended mark but not as well as it could have.

The program is organized into several sections. The "Start" section appears when the program opens. It contains the credits, a short introduction, and concise instructions.

The remaining sections are selectable at random from the home page.

The "Common Lung Sounds" section shows a graphic of conventional and time-expanded lung sound wave forms, reprinted from a 1977 *New England Journal of Medicine* report by Raymond Murphy.<sup>1</sup> The terminology used in the graphic is dated and some of it is no longer used, including in the rest of this CD (eg, "sibilant rhonchus"). The sounds available in this section are selectable from a list. Once selected, the user sees a waveform with a color-coded indication of the respiratory phase. A click of the mouse plays the sound, generally a single breath that loops continuously until stopped by the user. Besides the discrete sounds, there are head-to-head comparisons of fine versus coarse crackles and wheeze versus rhonchus.

The "Sound Patterns" section contains a description of the sounds typically heard in 6 common conditions (asthma, heart failure, pneumonia, chronic obstructive pulmonary disease, bronchiectasis, and pulmonary fibrosis) and a variety of graphic aids. These include a 16-channel matrix on a diagram of the chest (see below) that allows the user to play the sound recorded at each of the 16 locations, static graphics of wheeze and crackle profusion (termed "rates") and, for 4 of the conditions, a 3-dimensional animation (see below).

The "Cases" section is a quiz. For each of the 7 cases, there is a clinical summary, 16-channel sounds, sound analysis, chest radiograph, and a multiple-choice question.

The "Help" section contains citations, troubleshooting assistance, a link to the Stethographics Web site, and a software use license.

Part of this program's strength is also the source of one of its weaknesses. The recordings are all made using a system developed in the author's laboratory. Their multi-channel lung sound analyzer, named the Stethograph, employs a matrix of 14 microphones connected to stethoscope chest pieces embedded in a foam pad that is applied to the back of the patient. An additional microphone is applied to the trachea over the neck and another over the heart. Sounds are acquired simultaneously from all 16 channels. The recorded sounds are of good quality and generally free from artifacts. (One exception is the coarse crackle recording in the "Common Lung Sounds" section that contains a bothersome background buzz). The sound from any of the 16

channels is accessible by clicking on the waveform at the appropriate location on a schematic of the chest wall.

Although useful for research, I find the Stethograph to be of limited value as a teaching tool. It does allow the student to explore the sounds at different sites of the chest, and I enjoyed clicking on the different sites and hearing how the sound varied across the chest. However, this wears thin after a short time, and in most cases the multiple site recordings do not help the student recognize certain sounds, and many of the channels contain no useful sounds at all. The surfeit of sounds recorded simultaneously appears to be at the cost of longer sound recordings (most of those here are one breath only) and sounds recorded from different patients with similar conditions. I would have much preferred to have examples of sounds from a variety of patients with similar conditions, since all lung sounds do not sound the same. For instance: wheezes may be single, few, or multiple; rhonchi may be musical (as demonstrated in the CD) or coarse and nonmusical; and the stridor example appears to have been recorded at the neck, but it would have been useful to hear it also from the chest and from a few feet away, as that is how it is often first noticed. This program gives no sense of the spectrum of variability that exists among abnormal lung sounds, and this is its most serious deficiency.

In addition, the description of the recording technique and focus on time-expanded waveforms (a specialty of the author) would be of little interest to the intended audience. It appears that the authors could not resist directing some of the material at those with a special interest in lung sound physiology and technology. This appears in statements such as "when crackles are counted, one has to pay special attention to avoid counting the same crackle twice." The graphic information on wheeze and crackle rates (profusion) is also of questionable usefulness to the novice trying to learn clinical auscultation.

There is a 3-dimensional modeling function available for some of the sounds. It graphically displays the breathing phases as the schematic chest appears to expand and contract to illustrate inspiration and expiration. Representations of crackles and wheezes appear and disappear on the chest during breathing. This gave me the (probably unintentional) visual impression that they were arising from different locations *within* the chest. I liked

the schematic "breathing" chest as a means to orient the student to the phases of respiration, and I would have liked to see it incorporated into all the examples instead of the kymograph-style display that is mainly used throughout the CD.

The CD's packaging indicates that the program will run on a Macintosh or Windows-type computer. I tested it on a Sony VAIO laptop running Windows XP, on which it ran correctly and was easy and intuitive to use. The graphics were clear and uncluttered. The sections can be accessed in any order, so it is simple to go directly to whatever section is desired. On an iMac running OS 9.1 and Internet Explorer 5.1, the CD appeared to contain a variety of Win-

dows-type programs and folders without organization or a place to start. Many of the components could be loaded and read individually in the Web browser, but the sounds would not play, and there were no links between the components. As tested, this is certainly not a Macintosh-compatible program.

In summary, I thought the program, as run on a Windows-type computer, served adequately as an introduction to lung sounds, but the lack of variety is an important weakness. The graphical aides are generally helpful and make good use of the CD medium. Future versions would benefit from a greater variety of lung sounds and should be better focused on the clinical user. Its flaws not-

withstanding, this program is a useful although basic introduction to lung sounds.

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#### REFERENCE

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