Internet-based course on pulmonary pathophysiology

John B. West

Department of Medicine, University of California-San Diego, La Jolla, California

Submitted 7 December 2011; accepted in final form 3 January 2012

West JB. Internet-based course on pulmonary pathophysiology. Adv Physiol Educ 36: 1–2, 2012; doi:10.1152/advan.00125.2011.—A course of seven video lectures on pulmonary pathophysiology has been placed on the internet. This is a companion to the course on respiratory physiology available at http://meded.ucsd.edu/ifp/jwest/. That course dealt with normal respiratory physiology, and the new lectures are about the function of the diseased lung. The topics covered include pulmonary function tests, chronic obstructive pulmonary disease, asthma and localized airway obstruction, restrictive lung diseases, pulmonary vascular diseases, environmental or industrial lung diseases (with a short section on neoplastic and infectious diseases), and respiratory failure. Although it could be argued that PhD physiologists do not have a responsibility for teaching pathophysiology, collaborative teaching has become increasingly common in medical schools where, for example, a pulmonary block includes both normal respiratory physiology and some pulmonary pathophysiology. It is hoped that these lectures will be useful to physiologists in that setting.

teaching methods; collaborative teaching; different learning techniques; lung diseases

This internet-based course on pulmonary pathophysiology is a companion to my course on respiratory physiology (2), which can be accessed online at http://meded.ucsd.edu/ifp/jwest/index.html. That set of 14 lectures provided comprehensive coverage of normal respiratory physiology, and the lectures described here deal with the function of the diseased lung. The material is partly based on my little book Pulmonary Pathophysiology: the Essentials (3), although the video format allows a fuller discussion of some of the difficult areas, and it also means that many more illustrations can be used than in a book.

Traditionally, a course in respiratory physiology is given to first-year medical students, and pulmonary pathophysiology is often reserved for the second year. However, in recent years, many medical schools have tended to combine these two areas in what is known as a pulmonary block, or something similar. This often includes some pathology and an introduction to the clinical aspects of pulmonary disease.

There is widespread agreement on the content of the first-year course on respiratory physiology. For example, an extensive list of topics was compiled by the American Physiological Society in conjunction with the Association of Chairs of Departments of Physiology (1). This agreement on subject matter is reflected in many textbooks. In contrast, the content of a course on pulmonary pathophysiology is not so well defined, despite the fact that a good understanding is necessary for the intelligent practice of pulmonary medicine. In addition, the time made available for pulmonary pathophysiology is usually much less than that for respiratory physiology. Also, as stated above, the teaching is often combined with other related topics in pulmonary medicine.

There are several reasons why an internet-based course of lectures can be useful, and, indeed, the previous course on respiratory physiology has already proved to be popular. The first reason is that present-day students use a variety of learning methods. While the traditional pattern in the past was attending lectures and reading assigned texts, today’s students have a number of additional resources, including iPod lectures and many sources of material on the internet. Another reason is that many medical schools have introduced problem-based learning, which is often stimulating for the students. However, this has a potential disadvantage of not providing a systematic coverage of the whole range of topics. A third reason for these videos is that some medical schools have difficulty finding faculty members who are sufficiently familiar with the material that they are willing and able to teach it. This is partly because the scope of medical education has become so extensive in the last few years and also because the interests of many faculty members have become very molecular. This trend, in turn, has been partly driven by the attitudes of some funding agencies.

It could be argued that faculty members in Departments of Physiology (or whatever the equivalent Departments are called these days) do not have a responsibility for teaching pulmonary pathophysiology. It is certainly true that there is no substitute for a thorough grounding in the principles of normal respiratory physiology because these are essential for the practice of medicine. However, collaborative teaching has become increasingly common, and PhD physiologists frequently find themselves in settings where some familiarity with pulmonary pathophysiology is valuable. For example, this is the case in our own institution, where physiologists now find themselves assisting in the discussion of problems dealing with lung disease. It is hoped that this series of videos will be helpful in that context.

Description

The series consists of seven videos, which are shown in Table 1.

The first session is on pulmonary function tests. This is a reasonable place to start because we learn about the function of diseased lungs by using these tests. However, pulmonary function testing is a very large topic, and it would be impossible to cover this in detail. Instead, the lecture concentrates on two of the most important tests: the forced expiration test and arterial blood gases. Other pulmonary function tests are dealt with in less detail, and the emphasis is on the principles of the tests and the interpretation of the results.

The next two lectures are on obstructive lung diseases. Of course, this is a very important topic. In fact, chronic obstructive pulmonary disease is now the third commonest cause of death in the United States, after cancer and heart disease. The first of the two videos is entirely devoted to chronic obstructive...
pulmonary disease, including emphysema and chronic bronchitis, their definitions, clinical presentations, pathogenesis, and pulmonary function. The second video on obstructive lung diseases mainly deals with asthma, but in addition it briefly discusses tracheal and bronchial obstruction.

The fourth lecture is devoted to restrictive lung diseases. It begins with a survey of the cellular aspects of the lung parenchyma and then deals in detail with diffuse interstitial pulmonary fibrosis. Other fibrotic diseases are then briefly covered, and restrictive diseases caused by abnormalities of the pleura, chest wall, and neuromusculature are briefly described.

The lecture on vascular diseases concentrates on pulmonary edema and pulmonary embolism. Incidentally, the lecture on pulmonary blood flow in the respiratory physiology series could have dealt with some aspects of pulmonary edema because fluid movement out of pulmonary capillaries occurs under some normal physiological conditions, such as exercise. However, I decided that it was better to wait for a full discussion of pulmonary edema. This lecture also deals briefly with pulmonary hypertension, cor pulmonale, and arteriovenous malformations.

The main emphasis of the next lecture is on environmental or occupational lung diseases caused by pollutants in the workplace. However, there is an introductory section on the handling of aerosols by the lung, although this was also covered in the lecture on defense systems of the lung in the respiratory physiology series. The emphasis here is on the pneumoconioses and other diseases caused by inhaled materials. This lecture also includes a brief discussion of neoplastic and infectious diseases. These topics are extremely important in the general context of pulmonary medicine, but actually they do not fit well into a discussion of pulmonary pathophysiology. For example, pulmonary function (and pulmonary function tests) is largely irrelevant in a discussion of neoplastic diseases. In bronchial carcinoma, the objective is to make a diagnosis early enough to effect a cure, and measuring pulmonary function is essentially of no help. Nevertheless, it was felt important to include something about these conditions that are so important in clinical medicine.

The final lecture is on respiratory failure, with an emphasis on the physiological effects of hypoxemia and CO₂ retention. The various causes of respiratory failure are discussed, and, in particular, adult respiratory distress syndrome is covered. There are also sections on oxygen therapy and mechanical ventilation.

Availability

The videos are available on YouTube and can be accessed from http://meded.ucsd.edu/ifp/jwest/; clicking on this will allow the reader to choose either the respiratory physiology or pulmonary pathophysiology series. The website for the new series includes a list of credits for the images. However, some of these have been accumulated over many years of teaching, with the result that the origin is not known. I hope that since this is a noncommercial project solely for educational purposes no one will be offended.

ACKNOWLEDGMENTS

The author thanks Gil Jansky for professional production of the videos and Doug Ramsey and Alex Mathews for help in placing them on YouTube. Zhenxing Fu and Amy Clay helped with the preparation of PowerPoint slides, Keith Lander with transcriptions, and Jess Mandel with financial assistance.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

J.B.W. drafted manuscript; J.B.W. edited and revised manuscript; J.B.W. approved final version of manuscript.

REFERENCES