Book reviews

Two interactive rheumatology tutors on CD-ROM

The widespread availability of information and communication technology offers new possibilities for education of professionals and of patients. One of these possibilities is computer assisted learning.¹ Ten years ago, research focused on the development of computer assisted diagnosis and text based help to rheumatologists and others.² Despite the initial enthusiasm about artificial intelligence (AI), resulting in several diagnostic expert systems, in routine care a precise diagnosis is rarely an important issue and as a consequence these systems are hardly used. The experience with expert systems, however, evolved into systems intended for educational purposes. "AI/Learn", based on the "AI/Rheum" expert system and exploiting a videodisk with an image library, proved to be an effective means of teaching rheumatology.³ The same image library was used to teach occupational and physical therapy students with the "HP-Rheum" system (HP: Health Professionals).⁴ In recent years the introduction of sound, images, and movies on PCs, and the replacement of videodisks by CD-ROM facilitated production and access to these methods. The products resulting from the AI/Rheum project are not yet available on this medium, but two European rheumatologists have now completed educational systems on CD-ROM. They are to be honoured for their pioneering efforts. The main characteristics of the systems are summarised in table 1, details are discussed below.

Interactive rheumatology tutor. A multimedia guide to clinical rheumatology. Ray Armstrong. (\$190, £125) Cambridge University Press, 1997. ISBN 0-521-62914-4.

This CD is dedicated to education and has won several awards. It uses text, images, sound, and video. The first time user receives clear instructions, and is invited to browse a wide variety of materials and subjects. The interface is straightforward and easy to use.

The materials can be accessed using keywords and text search, or by structured menus. The program provides excellent instructions on history, physical examination, and local injections. Although information on specific diseases is included, methodological topics have more emphasis. This property makes the system particularly useful as an educational tool for medical students, general practitioners, or for paramedical personnel working in rheumatology units. For rheumatologists

the CD-ROM is fun to look around, but it is not intended to and cannot replace a textbook at a specialist level.

The quality of the photographs and radiographs is excellent. The video captures are presented in a small window, but do suffice to illustrate physical examination or local injections. There are 10 amusing quizzes, of adequate difficulty for final year medical students or specialist trainees. The CD-ROM is also equipped with a glossary, a set of patient problems presented in a hospital clinic or in a general practitioners' office, and an "Arthritis Expert". The latter is an elementary expert system that can generate diagnostic hypotheses.

In our hospital final year medical students are now using the *Rheumatology Tutor* during the five day rheumatology course. They are given an instructions sheet to get them started on the first day. The first group enjoyed the program, and agreed that it was a more efficient introduction to rheumatology than a textbook or than instructions by a busy specialist during an outpatient clinic.

A drawback of the system is that it aims at a wide view of rheumatology and therefore is vulnerable for inconsistencies or details about which different opinions may exist. In an earlier review, for example, the different names of drugs between the US and the UK were mentioned as a minor disadvantage.⁵

RheumaTutor. A case-based rheumatological training program. Stefan Schewe. (\$50, DM 98, students \$34.00, DM 68). Wiesbaden: Ullstein Medical Verlag, 1999. ISBN 3-86126-934-1.

This CD-ROM is centred on a set of 25 cases with various rheumatic diseases. The user-interface has a common format, but it takes a couple of cases to learn to navigate through the program.

Cases may be selected from a list, or be chosen randomly by the system. A patient is presented with a chief complaint and data on age, sex and profession. The student is asked to select further questions from a standard list. Subsequently, physical examination is mimicked by photographs of hands, feet, or other parts of the body. The user marks interpretations in standard lists of findings or on a figure, a process that is critiqued and scored by the system. Both correct and incorrect answers are explained and illustrated. The same process is repeated for radiological interpretation, laboratory testing, differential diagnosis, and therapeutic advice. The system's

Table 1 Main characteristics of the two CD-ROM tutors

	<i>Interactive Rheumatology Tutor</i>	<i>RheumaTutor</i>
Language	English	German
Main purpose	Enhance teaching and learning of Rheumatology as a practical discipline	Case based training in diagnosis and treatment of rheumatic diseases
Suitable for	Medical students, general practitioners, paramedical personnel	Medical students, general practitioners
Cases	35	25
Number of photographs	>100	1-5 per case
Number of radiographic examples	>100	1-5 per case
Pathology images	60	None
Video and audio clips	33	None
Background textual material	Texts from journals and other sources	Quality Guidelines of the German Rheumatological Association
History taking	Illustrated by examples, followed by a single question for the student	Questions can be selected from a list
Physical examination	Illustrated by video clips, with spoken text	Interpretation of colour images, critiqued by the system
Laboratory examination	Textual information	Tests may be selected from a list
Radiological diagnosis	Illustrations on radiographs, clarifying anatomy	Thorough interpretation of abnormalities in rheumatic conditions, with critique
Differential diagnosis		
Treatment	Textual information	Included in cases
Expert system	Simple system, generates hypotheses	Not included
Cost effectiveness of diagnostic strategies	Absent	Graphical representation of cost in terms of economy, time, and patient discomfort
Examination or critique of students	Quiz, resulting in score	Test cases, with scoring and critique for history, physical exam, radiological interpretation, and case handling

critiquing is supported by texts, based on the Quality Guidelines of the German Rheumatological Association. The quality of photographs and radiographs is adequate for the purpose of the program.

The degree of difficulty in the cases makes it suitable only for students who have at least basic knowledge of rheumatology. Even for an experienced rheumatologist it is hard to obtain the maximum scores. This is because of the degree of detail in which the system requires answers, which also slows down the process of going through a case.

This program is limited to case-based teaching. It lacks direct access to instructions on physical examination or interpretation, although the critiquing by the system substitutes for this. As a consequence of its architecture, originally based on an expert system, it uses long lists of possible signs and symptoms, which are sometimes cumbersome to work with. The author solved this by clustering findings into groups, which can be unfolded by clicking on them.

On the positive side, the system forces the student to observe accurately whatever can be seen, and provides adequate corrections for misinterpretations and funny rewards for the user's efforts. The scoring method, including rewards for cost effectiveness, is interesting, although it is not easy to see how a particular score was reached. A majority of German students evaluated the system positively, as long as it was part of a clinical course.⁶ It is sad that an official version of the system is only available in German, which limits its use to speakers of that language (an unofficial English translation is available from the author).

Conclusion

These CD-ROM tutors illustrate both the vast potential and the wide range of possibilities offered by multimedia computers. From a practical point of view, Armstrong's *Rheumatology Tutor* is the most useful tool for medical students. As an adjunct to an elective week it can help to fill the gaps that generally exist in training based on outpatient clinics or ward rounds. As a case-based tutor, the technology of Schewe's program is more interesting. However, I would prefer the latter to focus less on detail and more on common symptoms. Also, the inclusion of instructions in the form of video-clips would make it even better suited to the needs of medical students.

These CD-ROMs mark the beginning of a new era of education in rheumatology. They will complement clinical teaching, but—despite my enthusiasm—I do not believe that they will replace it!

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- 3 Bridges AJ, Reid JC, Cutts JH, Hazelwood S, Sharp GC, Mitchell JA. *AI/Learn/Rheumatology*. A comparative study of computer-assisted instruction for rheumatology. *Arthritis Rheum* 1993;36: 577-80.
- 4 Sanford MK, Hazelwood S, Bridges AJ, Cutts JH, Mitchell JA, Reid JC, *et al*. Effectiveness of computer-assisted interactive videodisc instruction in teaching rheumatology to physical and occupational students. *J Allied Health* 1996;25:141-8.
- 5 Lahita RG. Rheumatology on a disk. *Lancet* 1998;352:827.
- 6 Schewe S, Reinhardt B, Betz C. Experiences with a knowledge-based tutoring system for student education in rheumatology. Electronic publication. University of Würzburg, 1998: <http://ki.informatik.uni-wuerzburg.de/forschung/publikationen/lehrstuhl/XPS-99/XPS-99.pdf>

Rheumatic diseases and the environment. Lee D Kaufman and John Vaga. (Pp 240; £45.) London: Arnold, 1999. ISBN 0-412-07911-9.

When a patient develops a rheumatic disease one of the first questions asked is "why me?" The answer is, of course, complex. For almost all rheumatic disorders there are genetic factors, host factors, and environmental factors. This book focuses predominantly on non-host environmental factors as triggers of rheumatic disorders. These are described as foods,

drugs, chemicals, biologicals, radiation, noise, and emotional and physical stresses. The book is aimed at physicians and other healthcare providers, biomedical scientists, epidemiologists, toxicologists, regulators, law makers, and members of the legal profession. This is a very broad audience and it is difficult to judge whether the needs of people from such varying backgrounds will be met.

There are 35 contributors and 21 chapters. The first section, which provides an overview of epidemiology and differential diagnoses, would appear very superficial to the epidemiologist and rheumatologist. It gives a brief description of epidemiological study designs and then reviews laboratory tests such as the erythrocyte sedimentation rate, full blood count, anti-nuclear antibodies, and rheumatoid factor. The clinical features of systemic lupus erythematosus (SLE), systemic sclerosis, and idiopathic inflammatory muscle disease are given in less than a page. This includes a list of the American Rheumatism Association criteria for SLE, which a rheumatologist would be likely to know and a lawyer likely to find incomprehensible.

The second section deals with aetiopathogenic considerations. This includes tables of chemicals (mainly drugs) associated with autoimmunity and, in a different chapter, tables of the immunogenetic associations between drugs and autoimmunity. There follows a series of chapters which examine specific syndromes such as the toxic oil syndrome and silicone related rheumatic disorders. This represents a useful collection of reviews of syndromes which are often too rare to justify more than a paragraph or two in a standard text book. They provide a useful starting point for someone who has come across a syndrome for the first time and the list of references is usually sufficiently comprehensive to point the reader towards further source material.

The third section deals with fibrosing disorders, the fourth section with rheumatic syndromes related to drugs and other environmental exposures, the fifth section deals with rheumatic syndromes and the work place, and the sixth section with surveillance, regulatory, and legal approaches to environmental exposure associated rheumatic disease. This last section contains interesting chapters on the safety surveillance of food and drugs, on the contrasting views of causation in law, science and medicine, and on surveillance and monitoring (lessons learnt from the eosinophilia-myalgia syndrome). These chapters are, however, written from an American perspective and so will be of limited practical value to an international audience, although the underlying theory is clearly of interest.

Rheumatic Diseases and the Environment would be a valuable addition to a medical library with a rheumatology section. It is likely to be of interest to medical students, trainees in rheumatology, and to rheumatologists who wish to read a brief overview of any of the syndromes described within. With such a broad remit, it is perhaps inevitable that there is not space in the individual chapters to provide an in-depth review. Most of the chapters are no longer than six pages.

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Rheumatic diseases: Immunological mechanism and prospects for new therapies. J S H Gaston, editor. (£50, \$85). Cambridge: Cambridge University Press, 1999. ISBN 0 521 59327 1.

Rheumatology is entering an exciting new era. The rapid expansion in knowledge of the complexities of the immune system as it functions in both health and disease has provided fresh hope to those engaged in the search for effective and safe novel treatment modalities. In particular, the power of current molecular techniques has provided several new inspirational pieces of the pathogenetic jigsaw puzzle, which may in time expose a refreshingly new therapeutic landscape. In this book, *Rheumatic diseases: immunological mechanisms and prospects for*

new therapies, the editor, Professor J S H Gaston, and his collaborators consider a range of expanding topics that are fundamental to understanding the immunopathogenesis of the systemic inflammatory rheumatic diseases. Apart from one chapter, the authors were recruited from the UK and the USA. In just under 300 pages a considerable volume of information is assembled and discussed although, bearing the title in mind, there are some deficiencies and there is a lack of balance: the book is particularly strong on immunological mechanisms but, regrettably, somewhat weaker on prospects for new treatments. For example, there is no discussion of the potential role of gene therapy.

The declared concept behind the book is to place emerging experimental information on disease pathogenesis in a clinical context and to emphasise the relevance of each conclusion to potential therapeutic innovation. Rheumatoid arthritis is the predominant disease examined but a considerable amount of discussion is also directed towards wider issues relating to inflammatory pathways and autoimmunity. The book, therefore, will appeal to a number of constituencies including clinical rheumatologists, immunologists, some pharmacologists and research scientists working in arthritis, inflammation and autoimmune disease.

The contents of the book lean heavily toward aspects of T cell biology, which is the primary theme of five chapters. Practising rheumatologists are aware of the disappointments that followed previous attempts at modulating T cell function in rheumatoid arthritis. However, new insights into T cell biology may offer fresh therapeutic opportunities. The mechanisms involved in T cell autoreactivity, T cell cytokine release, the role of CD40 in maintaining immune responses and the relevance of the T_H1 and T_H2 balance in chronic inflammation and autoimmunity are very well reviewed but the discussion relating to the possible therapeutic implications of these issues is disappointingly inadequate. In contrast, the reviews of lymphocyte antigen receptor signal transduction and, in particular, the potential for manipulating T cell functions through CD28 and CTLA-4 fulfil the editor's stated aspirations more satisfactorily. There are also excellent reviews of the role of MHC antigens, the formation and structure of autoantibodies, the relevance of cell adhesion mechanisms, apoptosis, monokines and complement receptors. In these chapters, some imaginative therapeutic possibilities are elegantly explored.

Most chapters contain a number of black and white diagrammatic illustrations that considerably enhance the understanding of the more complicated mechanisms. In addition, each chapter is very liberally referenced but because of the logistics of compiling and printing a book of this sort the references end in 1997. Already, since then, the therapeutic potential of modulating IL18 in rheumatic diseases is being considered. Could the publishers have proceeded faster? Nevertheless, the book is informative, relevant, authoritative and very readable. Professor Gaston should be pleased with his accomplishment.

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Biology of the synovial joint. Eds C W Archer, B Caterson, M Benjamin, J R Ralphs. (Pp 443; £70.) Amsterdam: Harwood Academic Publishers, 1999. ISBN 90-5702-327-X.

Biology of the Synovial Joint grew out of a symposium held during the summer of 1996 at the University of Wales in Cardiff. The editors convened that meeting in the "belief that joints need to be seen as whole organs", and the contributors were chosen to provide expert perspectives on each of the major articular tissues. For this volume, the same authors were asked to review their topics to provide "a useful source of reference for anyone interested in the biology of joints". This is an ambitious goal but in many respects they have succeeded admirably. One example, of many that might have been cited, is a nice review of the structure and mechanisms of entheses. Many rheumatologists who see enthesopathies often, have not thought much about the unique stresses that affect these hard/soft tissue interfaces, the special adaptations found there, and the possible significance of these features in the pathogenesis of common rheumatic diseases. Similarly, the biochemical parallels between the matrices of the synovium and of articular cartilage deserve careful consideration by students of synovitis. Those intrigued by such interrelations of structure and disease will find many other useful starting points.

"Biology" encompasses a panoply of perspectives and many biologists will be disappointed in the attention paid to their viewpoints. It is surprising, for instance, that there is so little information about subchondral bone or about the unique system of lubrication that makes synovial joints such effective mechanical bearings. Less surprisingly, perhaps, this book avoids almost all of the foci of research interest that dominate most rheumatological meetings and journals. Those seeking information on molecular genetics of rheumatic disease and cellular and molecular mechanisms of arthritis will have to look elsewhere.

For matters of structure, however, this book is a useful, though somewhat uneven, reference. Havelka and Horn, for instance, make generous use of illustrations to draw attention to the tidemark of articular cartilage, and review effectively the little that is known about this seemingly important interface. Another important chapter, by contrast, includes no illustrations. There is one reference in a discussion of clinical problems of the shoulder but 176 in a review of the collagens of cartilage. Unfortunately, none of the references is more recent than 1997. Given the structural focus of the book, this lack of timeliness is less of a problem than it would be in covering "hotter" areas of science. It is an obvious concern, however, in discussions of more active research areas such as strategies for repair of damaged articular cartilage.

This volume, though uneven, has many strengths. It is particularly recommended for rheumatologists who would like to shore up their foundation knowledge of the structure and mechanics of articular tissues.

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