

Book reviews

Adrienne E. Hardman and David J. Stensel. *Physical Activity and Health: The Evidence Explained*. London: Routledge 2003. £24.99 (paperback). pp. 320. ISBN 0 415 27071 5

This book addresses an important and topical issue, which is of increasing importance to public health. As such, it is a valuable addition to the literature for undergraduate students studying a range of sport- and exercise-related degrees. The literature in this field is substantial in terms of journal articles and reviews and it is somewhat surprising that few texts such as this have attempted to pull this large body of evidence together in a focused academic text. Students will undoubtedly benefit from having this dedicated text to support their studies.

The book covers a range of important diseases, cardiovascular disease, diabetes, obesity, insulin-resistance syndrome, cancer and skeletal health. There are also sections on levels and trends in activity, older individuals, therapeutic effects of activity, risks of exercise and the role of activity in public health. This is an impressive list, but it is surprising that children are not addressed as a population group in a more substantial way and the same can be said of mental health. Both of these are major public topics deserving of inclusion; the book clearly focuses on physical health.

The book is well illustrated using data from a variety of sources encompassing both epidemiological and experimental techniques. Students are given study tasks to complete at the end of each section and summary boxes that highlight each section's main points. Further reading for each section is also provided. The book contains an excellent glossary of key terms used in this field.

The real strength of the book is that it draws on both epidemiology and the basic sciences, predominantly physiology, to explain the current state of knowledge in some important areas of health. Essentially, the text details the strength of relationships between activity levels and various indices of health, as identified by epidemiological studies. For each of these, it then discusses the level of biological plausibility of such relationships. A valuable feature of the book is that it explains the nature and the quality of the various sources of evidence, pointing out the strengths and weaknesses of each method. This is extremely valuable, as normally students need to delve into complicated statistical texts in order to get a feel for this dimension of interpretation. The most valuable feature of the text is therefore that students not only get epidemiological and physiological information, they also get an important insight as to how public health professionals weigh the evidence before translating it into public health policy.

The final sections of the book attempt to provide some links between the preceding sections (focusing on diseases) and public health. In this, the book almost succeeds, but I was left with the feeling that there was something more substantial and possibly very important here that could

have been explored in more depth. However, space is always a major limitation and this slight 'tailing off' in the final sections should not detract from the quality of what has gone before; the thorough treatment of activity–health relationships.

In summary, this is an excellent text addressing activity–health relationships in a unique and insightful way. It will be a valuable addition to the reading lists of students who are engaged in the study of sport and exercise science.

Chris Riddoch

*Institute for Sport, School of Health and Social Sciences
Middlesex University
UK*

c.riddoch@mdx.ac.uk

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Roy Fuller and Gabriela Perdigon (editors). *Gut Flora, Nutrition, Immunity and Health*. Oxford, UK: Blackwell Publishing 2003. £79.50 (hardback). pp. 288. ISBN 1 4051 0000 1

My gut microflora have never been a worry to me except for the few occasions when I've knocked them for six after downing a course of antibiotics or eaten a suspect sandwich. However, having read this book, I have developed a new respect for my large-bowel symbionts and their significant contribution to my nutritional, immune and health status. This book is novel, topical (it pre-empted a news feature in *Nature*; Abbott 2004) and informative. It comprises twelve chapters, including a summary chapter, all of which are well organised and contain a refreshing number of 2000–2002 references.

The first four chapters introduce and explain the basic principles of gut micro-ecology and the bacterial metabolism of food. The gut flora are central to the theme of the book and the first chapter provides an insight into their identification and composition. The author cleverly avoids presenting pages upon pages of bacterial names by discussing applications of the latest molecular technologies including fluorescent *in situ* hybridisation and denaturing gradient gel electrophoresis to identify non-cultivable bacteria. However for those requiring knowledge of the bacterial species there are tables cataloguing and quantifying human faecal bacteria, and illustrating the effects of different diets on the intestinal microflora of adults and infants. The author also uses data from germ-free and conventional animal models to discuss the impact of the microflora on the biochemistry, physiology and immunology of the host intestine. Finally, the concept of quorum sensing is introduced to explain how the numbers of the indigenous gut microbial populations are controlled.

Chapters 2, 3 and 4 provide information on the effects of different foods on the gut microflora, the metabolism of foods by the gut flora and the health benefits of probiotic and prebiotic supplements. Chapter 2 focuses on the effects of different diets. It explains the role of the microflora in vitamin metabolism and the consequences to the host of the microbial breakdown of complex carbohydrates and protein, and their fermentation. The SCFA are known to be the principal products of carbohydrate fermentation in the large bowel and this chapter includes the discussion of their production and metabolism. Boosting the populations of beneficial bacteria living in the human gut is an emerging industry and chapter 3 is mainly concerned with the composition, importance and health benefits of pro- and prebiotics. Studies describing the testing of different oligosaccharide prebiotics in animals and human subjects are presented and the current status of prebiotic usage in foods detailed. Moreover the 'second generation' prebiotics including those with anti-adhesive activities against common gut pathogens are introduced and discussed. The SCFA are revisited in chapter 4, which investigates the metabolic activities of the gut microflora. For those of us who fear biochemical pathways the full-page diagrammatic summary of the bacterial pathways involved in SCFA production appears at first glance quite daunting. However it is in fact very easy to follow and a must for those attempting to comprehend or explain the production of SCFA by colonic bacteria. The text also investigates the mechanisms by which SCFA are transported across the intestinal epithelium and this section is again supported by a simple and elegant diagram. The role of probiotics in the intestinal metabolism of carbohydrates is once more addressed in this chapter but most of this discussion is novel and there is only minor overlap with chapter 3.

The book is entitled *Gut Flora, Nutrition, Immunity and Health* and chapter 5 is our gateway to the immune system. This overview introduces the concepts of innate and adaptive immunity, and describes the key molecules and mechanisms of the immune response. The material is well supported by figures and tables, and I applaud the authors who have summarised an extraordinary amount of complex information in one chapter. While I acknowledge the necessity of this chapter I do, however, question whether some sections may be just too ambitious for those with a limited immunology background.

Relationships between nutrition and the immune system are discussed in chapters 6 and 7. The roles of micronutrients such as Zn, Se, Fe and the vitamins C, E and folic acid in the immune response are addressed in chapter 6, which also explores the effects of malnutrition, arising through eating disorders such as anorexia nervosa, on immune function. The malnutrition theme is continued in chapter 7, which investigates the effects of nutritional deficiencies, and in particular protein deficiencies, on gut mucosal defence systems. This chapter also includes a section on probiotics in which the authors discuss the use of bacteria, as dietary supplements, to facilitate intestinal immunological function in animals and human subjects recovering from malnutrition.

The question of how probiotics work is addressed in chapter 8. This chapter is thorough but challenging,

especially for those who struggle with immunology. However, with help from the summary chapter it becomes apparent that the actual mechanisms are as yet unclear, but probably involve a plethora of immune responses including tolerance.

Chapter 9 presents a short review of food hypersensitivity and food allergy. It lists allergenic foods and describes the clinical symptoms of food allergies. The sections on breast-feeding and the benefits of partially hydrolysed formula milk in preventing allergy are well referenced but rather succinct. As presented I feel this chapter to be the weakest primarily because it does not fit comfortably within the general theme of the book. The opportunity to discuss the potential contribution of the gut flora to an individual's predisposition to food allergy is missed and this is rather disappointing as the seeds for this discussion have already been sown in chapter 1.

The roles of diet and the gut microbes in the aetiology of disease, and in particular cancer, are referred to in chapters 2 and 3 but fully addressed in chapter 10. This chapter focuses on the enzymic activities of the gut microflora, the production of genotoxic agents, carcinogenic products and SCFA, and the roles of these metabolites as putative colon carcinogens or protective agents. The chapter ends with an original section, again concerned with pro- and prebiotics, but this time describing their anticancer potential.

The elderly are the focus of the penultimate chapter. Using data from clinical studies and animal models, chapter 11 reviews the effects of protein–energy malnutrition and nutritional recovery on the immune status of the elderly. Finally, it addresses and discusses whether the supplementation of healthy well-nourished elderly subjects with immuno-modulating nutritional agents, including vitamins and minerals, is a simple and effective means of reducing their susceptibility to infection.

This book addresses the topics of gut flora, nutrition, immunity and health and skilfully weaves them together in twelve chapters. For non-experts the immunology is at times challenging, but overall I can recommend this book as an important text not only to undergraduate and post-graduate students reading for degrees in nutrition, microbiology or immunology but also to lecturers designing courses in these areas. Moreover, as it claims, it will also provide an important resource for gut immunologists, nutritionists, dietitians and those working with prebiotics, probiotics and other food supplements.

Judith Hall

*School of Cell and Molecular Biosciences
University of Newcastle upon Tyne
Agriculture Building
St Thomas Street
Newcastle upon Tyne
NE2 4HH, UK
judith.hall@ncl.ac.uk*

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David A. Bender. *Nutritional Biochemistry of the Vitamins*, 2nd ed. Cambridge, UK: Cambridge University Press 2003. £70.00 (hardback). pp. 496. ISBN 0 521 80388 8

David Bender has set out to review what is known about the biochemistry of the vitamins, their role in metabolism and effects of inadequate or excessive intakes. The result is a scholarly piece of work that manages to cover not only those well-established aspects of vitamin biochemistry but embraces many exciting developments of the past decade. The approach is systematic. The first chapter introduces the vitamins and their nomenclature, and addresses important issues relating to the setting of daily requirements. The reader is led through a critical appraisal of methods used to establish requirements and is introduced to the changing nature of the criteria for adequacy as the emphasis has shifted from preventing deficiency to promoting optimum health.

The author then considers each vitamin in turn and, using a helpful standardised format, discusses the body's handling of the vitamin, its metabolic roles, effects of deficiency and excess, and assessment of status. This latter section is covered so as to allow the reader an appreciation of the relative merits and limitations of the various approaches to the assessment of specific vitamin status and identifies those methods in most common current usage. This is supported by tables showing the biochemical criteria of adequacy and deficiency.

Presentation of the biochemistry is thorough and supported by line diagrams showing key structures and the occasional pathway. For those vitamins for which deficiency is understood to have important current public health significance, the description of biochemical functions and the clinical effects of biochemical deficiency and low intakes are placed in the context of the prevalence of deficiency.

An important addition since the previous edition of this book is the consideration of recent developments in our understanding of vitamin–gene interactions. Of particular recent interest in this context is the common C677T mutation in the gene encoding methylene tetrahydrofolate reductase, which interacts with folate, and probably riboflavin, in determining plasma homocysteine. Vitamin D, as calcitriol, has long been understood to exert many of its

effects through genomic interaction, and the breadth of action in this context is clearly and convincingly discussed in chapter 3. The apparent role of calcitriol in cell differentiation and apoptosis is briefly but succinctly covered in this chapter, raising some interesting mechanisms whereby vitamin D might influence susceptibility to certain cancers. Similarly for vitamin A, in addition to a thorough explanation of absorption, transport and storage, and discussion of the well-established metabolic roles, Bender explores the genomic actions of this vitamin. The subject of retinoid receptors and response elements is complex and Bender has made a good job of introducing the reader to this topic and covering the most important aspects without losing sight of the probable readership of this book.

The final chapter of the book covers 'marginal compounds and phytonutrients', which has evolved from 'compounds of doubtful vitamin status' in the earlier edition. The inclusion of a section on phytonutrients reflects the progress that has been made in our understanding of the metabolism of these compounds, and the possible roles they may play in protecting against certain diseases. Food sources are considered, and metabolic functions are placed firmly in the context of the development of disease, although no mention is made of bioavailability, presumably because of the great uncertainty in this area.

The book admirably fills a niche in the market of textbooks for students of human nutrition, medicine and allied biomedical sciences in that it goes far beyond the relatively superficial coverage of the vitamins in most textbooks of human nutrition whilst avoiding unnecessary biochemical detail and a superfluity of biochemical pathways.

Hilary J. Powers
Human Nutrition Unit
Division of Clinical Sciences
University of Sheffield
Northern General Hospital
Sheffield S5 7AU UK
h.j.powers@sheffield.ac.uk
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