

## Book reviews

Keith N. Frayn. *Metabolic Regulation: a Human Perspective*, 2nd ed. Oxford, UK: Blackwell Publishing 2003. p. 339. £24.99 (paperback). ISBN 0-632-06384-X

*Metabolic Regulation: a Human Perspective* is the second edition of Keith Frayn's excellent textbook. This volume is a textbook aimed at a broad audience including research scientists, medical practitioners and students working and studying across a broad range of allied health sciences including nutrition, dietetics, sports science and nursing. The utility of this book for undergraduate teaching across a range of subject areas is a major asset, boosted by the fact that it is relatively inexpensive. This second edition retains all of the excellent qualities of its predecessor and, with the inclusion of the recent advances in the understanding of nutrient–gene interactions and endocrine integration of metabolism and physiology, has evolved into a text that all nutritionists should have on their shelves.

The book opens, like most nutrition texts, with an overview of the chemistry of food (and bodies), but unlike many of the competitor texts immediately takes the opportunity here to set out some fundamental chemical and physiological concepts instead of the usual focus on nomenclature of fatty acids or the various sources of macro- or micronutrients. From here the book moves on to consider the general principles of metabolic regulation at the level of the tissue via endocrine effects on biochemical pathways, via signal transduction chains and at the level of gene expression. In this latter aspect the book is fully up to date with detailed explanation of the role of sterol regulatory element-binding proteins and peroxisome proliferator-activated receptors in the control of gene expression by cholesterol and fatty acids.

The book considers the main aspects of metabolic regulation in the major organs, including liver, digestive system, skeletal muscle, pancreas and adipose tissue. The section on adipose tissue covers the uncoupling proteins and the role of the tissue as an important endocrine organ through the production of leptin, cytokines and other important peptides. Following on from these descriptions of metabolism in different tissues the book gives detailed overviews of the metabolism of carbohydrate, amino acids and fats and how metabolism is influenced via the autonomic nervous system. The way in which the book is written will help students grasp that understanding of metabolism requires an appreciation of the flux of material through pathways and that this flux will vary under different conditions. This is well illustrated by the metabolic diary in chapter 6 which details the difference between the post-absorptive state, the postprandial state and how the different metabolic scenarios are further influenced by physical activity levels. These are themes that are taken further in later chapters on exercise and starvation.

The book concludes with three chapters that take a more clinical focus, dealing with disturbances of lipoprotein metabolism, with diabetes and with energy balance, weight regulation and obesity. Like the rest of the book, these chapters are well supported with recommended further reading.

A major advantage of this text is that it was written by a single author. This provides a degree of consistency in the level of detail and the clarity of the explanations that is often lacking from multi-author-edited volumes. Keith Frayn illustrates the concepts with clear examples throughout the book and makes effective use of supplementary text boxes that provide additional detail to accompany the main thread of the text or fill in possible gaps in the knowledge of the reader.

*Metabolic Regulation: a Human Perspective* is an essential textbook for those teaching and studying the nutrition sciences. The combination of this text with the new series of nutrition textbooks produced by the Nutrition Society (also published by Blackwell) allows students to pick and choose the texts that meet best their interests, be they in basic science, clinical science or public health nutrition and also the level of their study. The flexibility that this range of books will offer over existing large nutrition 'bibles', such as Garrow and James, will guarantee their popularity for many years to come.

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G. Deby. *Dietary Proteins and Atherosclerosis*. Boca Raton, FL: CRC Press. 2004. £103 (hardback). ISBN 0 8493 2102 6

The current preoccupation of professional and lay audiences with the roles of fat and cholesterol in the aetiology of CHD has left little room for consideration of other dietary factors. In fact, the first purely nutritional studies of atherosclerosis (by Ignatowski in 1908) were based on the hypothesis that there was an atherogenic principal in animal protein. In the 1950s when Ancel Keys began his international studies of fat, cholesterol and heart disease, Yerushalmy and Hilleboe, using the same data set, showed that the effect of dietary protein on atherogenesis was as strong as that of fat. Over the last century, there have been studies of the effects of protein and specific

amino acid on cholesterolaemia and atherosclerosis, but until now there has been no systematic review of these effects. This slim (340 pp.) but exhaustively researched book has remedied that deficiency. Since it is the first book to address this area there is no basis for comparison, but future efforts will be hard put to improve on it.

There is a short opening chapter relating to the design of experimental studies. This is followed by a long discussion of the data derived from animal studies. The effects of dietary protein on cholesterol metabolism in birds, rabbits, rodents, dogs, pigs and monkeys are described, as are the effect(s) of low-protein diets on plasma lipids, liver enzymes and biliary flow. This is followed by a discussion of the different effects of diets rich in casein or soyabean protein on plasma cholesterol levels in eight different animal species: birds, rabbits, rats, mice, guinea-pigs, hamsters, pigs and monkeys. After the discussion of diets containing casein or soyabean protein is a section on effects of soyabean protein and casein derivatives. Finally, the interaction of other dietary components with soyabean protein and casein is described.

This chapter is followed by one on the effects of other food proteins, of both animal and vegetable origin, and also by data relating to the effects of amino acid mixtures or of specific single amino acids (fifteen are cited). The section on effects of proteins on lipid metabolism in animals concludes with reviews of effects of non-protein components of diets.

The chapter on experimental data in human subjects is understandably shorter than that on animal effects and covers, in addition to lipid data, sections on endocrine responses and possible mechanisms of action. The next chapter summarizes data concerning protein effects on experimental atherogenesis, including diets high or low in protein, specific amino acids and amino acid ratios. Immunological effects of dietary proteins are also discussed. A short section is devoted to effects of proteins in human subjects discussed from medical and epidemiological points of view.

Experiments conducted in the 1920s indicated that proteins exerted effects on blood pressure and this neglected area is the subject of one chapter, which is followed by another on thrombosis. There is one reference to the pioneering blood pressure studies of Nuzum *et al.* in 1926, but the bulk of the chapter concerns itself with more recent epidemiological and experimental data. Possible mechanisms of action of arginine, lysine, methionine, taurine and tyrosine on blood pressure are discussed. The relatively short chapter on protein nutrition and thrombosis is devoted to actions of specific peptides and a few (arginine, methionine, homocysteine, taurine, tryptophan) specific amino acids.

This is an all-inclusive book, which in addition to valuable experimental data, boasts a bibliography of 102 pages (more than 2000 references). A very useful inclusion is an index of references to specific amino acids. This reviewer would have liked to see more data in tabular form, but this is a personal prejudice. The book is well printed and eminently readable. It should be a mandatory addition to the libraries of workers in the field of atherosclerosis and would be helpful to most nutritionists as well. Research

is beginning to reveal that all dietary components (and their interactions) play a role in the aetiology of heart disease. This book contributes to our understanding of the role of one essential dietary component.

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J. Zemleni and H. Daniel (editors). *Molecular Nutrition*. Wallingford, Oxon.: CABI Publishing. 2003. p. 409. £37.50 (US\$65) (paperback). ISBN 0 85199 6795 5

This is an excellent book that covers a wide range of nutrients and their effects on gene expression and cellular functions. It is reasonably priced and just over 400 pages long, yet still manages to cover a wide range of nutrients in an up-to-date and detailed manner. It is an extremely useful book for researchers in the area of nutrient–gene interactions, although due to the rapid expansion in research in this area, some of the chapters may become ‘out-of-date’ relatively quickly. It is also an excellent introductory text for undergraduate and postgraduate teaching and I intend to use it as the recommended text for a third-year undergraduate course on nutrient–gene interactions.

*Molecular Nutrition* comprises twenty-four chapters grouped into six parts, with each chapter written by international experts in their respective field. The first two chapters are grouped under the heading ‘Methods in molecular nutrition research’ and are an excellent introduction to the genomic, proteomic and metabolomic technologies and how they relate to nutrition research. Chapters 3 to 6 are grouped under the heading ‘Cellular nutrient homeostasis, proliferation and apoptosis’ and include aspects of nutrient transport into cells, nutrient requirements for cell proliferation and the effects of various nutrients on programmed cell death (apoptosis). The main part groups together chapters 7 to 15 under the heading ‘Roles for nutrients in signal transduction, gene expression and proteolysis’. This relates to the molecular effects of the various categories of nutrients, including glucose, amino acids, fatty acids, various vitamins and flavonoids, with particular emphasis on gene transcription. Part 4 comprises chapters 16 to 18 and relates to ‘Nucleic acids and nucleic acid-binding compounds’. This includes effects of diet on DNA methylation, histone biotinylation and genomic stability. The various aspects of nutrient–gene interactions are then brought together with some of their physiological consequences in chapters 19 to 22, grouped under the heading ‘Molecular events affect physiology’. This covers aspects of lipoprotein and cholesterol metabolism, cataract formation and immune function. The last part (chapters 23 and 24) is simply called ‘Foods’ and relates

to the molecular mechanisms of food allergy and the safety of GM foods.

I particularly enjoyed the chapters on the effects of glucose, amino acids and fatty acids on gene expression, all of which were very up-to-date reviews of the areas. I also enjoyed reading about some of the other nutrients that I knew less about. My only criticism would be that the authors have tended to concentrate on nutrient effects on gene transcription, whereas a number of nutrients have been shown to regulate mRNA stability and/or translation as well, although the mechanisms for these effects are probably less well understood.

The study of molecular nutrition or nutrient–gene interactions is an extremely exciting area of biology to

be working in. An increased understanding of the interactions between nutrients, hormones and other biomolecules in regulating gene expression and cell physiology is likely to impact upon a wide variety of biological systems, particularly human health and disease.

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