

## Book Reviews

### **OXYGEN RADICALS AND THE DISEASE PROCESS.**

EDS. CRAIG E. THOMAS  
AND BALARAMAN KALYANARAMAN  
HARWOOD ACADEMIC PUBLISHERS, 1997,  
282 PP. ISBN 90-5702-227-3.

Reactive oxygen species are implicated in the pathophysiology of human diseases, and recent efforts in this active and, in part, controversial field are compiled in this volume. The book sets out with an introductory chapter by Halliwell in which the current level of limited knowledge in this area is reiterated. Indeed, there is a gap between known chemical and biochemical reactions of reactive oxygen species and the application and appropriate assessment in clinical medicine.

The book addresses the four major areas in which insight is probably most advanced in this context: (1) the central nervous system, (2) inflammation/circulatory system, (3) cardiovascular and (4) cancer, followed by an Index. In this relatively small book, important areas are also missing, e.g. diabetes, diseases of the eye (cataract, age-related macular degeneration), and others. Maybe a comprehensive coverage was not intended.

It is noteworthy that the chapters were prepared by colleagues known by their recent contributions of original work but, with a couple of exceptions, not by previous reviews. Thus, there are a number of new perspectives not

previously presented in the field. (I actually emailed one of the editors asking how the book had come together, and I learned that indeed efforts were made to recruit 'new blood' for this topic, and the book is not the result of a meeting or conference.)

Topic (1) includes chapters on cerebral ischemia/reperfusion, esr studies related to Alzheimer's diseases and stroke, and aging. Topic (2) starts with rheumatoid arthritis and then addresses inflammatory bowel disease, acute lung injury, critical care medicine and HIV. Cardiovascular (topic (3)), of course, is on myocardial ischemia/reperfusion and oxidation of low-density lipoproteins. Topic (4) is one chapter only, on the role of reactive oxygen species in multistage carcinogenesis.

According to the interests of the authors, some chapters are more clinically oriented, some are more focused on fundamentals. This makes for diversity, and the chapters are written at a good standard throughout.

Thus, the book can be recommended to basic researchers, clinically oriented investigators, as well as students who would like to become familiar with the field. Congratulations to the editors.

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**ANTIOXIDANT STATUS, DIET,  
NUTRITION AND HEALTH**

ED. A.M. PAPAS

CRC PRESS, BOCA RATON, 1999, 650 PP.

This is an extremely comprehensive and up to date volume containing contributions by many of the well-known names in the field. It begins with a useful summary of the chemical aspects (by Drs. Noguchi and Niki) which sets out clearly the overlapping distinction between free radicals and reactive oxygen species and gives a table (p. 4) which will be useful for anyone who wants to explain the matter to a non-specialist. Twenty six chapters follow this introduction with perhaps most emphasis on the nutritional aspects of free radicals. Indeed Dr. Papas maintains (p. 25) that diet, *more than any other factor*, affects somatic antioxidant status in both a positive and negative manner. Drs. Handelman and Pryor follow with a chapter on the evaluation, rather than the determinants, of antioxidant status and provide a useful summary of present methods available for the practical assessment thereof. Dr. Simopoulos' treatment of genetic variation maintains *inter alia* that present day diets are deficient in antioxidants in comparison to those of both modern and Paleolithic hunter-gatherers; what is more, the historical balance between n3 and n6 fatty acids has been destroyed in the last one hundred years.

There are interesting nuggets of information throughout the book, as one might expect. For example, on p. 101 Dr. Papas discusses the neglected role of chirality in antioxidant function. The Mediterranean diet is treated in Chapter 6, but in extension, as it were, the Cretan diet, which in the seven countries study was found to have the lowest CHD mortality rate, is discussed in Chapter 7 by Dr. Kafatos.

The carotenoids, vitamin C, vitamin E, and isoflavones quite properly have chapters to themselves. In "Other Antioxidants" (Chapter 12) there is a full discussion of coenzyme Q, and lesser treatment of uric acid, glutathione, and synthetic

food antioxidants. There are separate chapters covering ageing and exercise, premature infants and alcoholism. By this time one is again in full appreciation of the vast scope of free radical research. There is not a lot on nitric oxide in this volume, but this important free radical is well served elsewhere.

The next two sections of the book (Chapters 16–26) deal with diverse areas of pathophysiology including CHD, immune function, cancer, the eye, and neuropathies. On p. 473 (Dr. Hennekens) there is a useful table of the ongoing large scale trials of antioxidant vitamins in relation to cardiovascular disease, so that one can look out for their eventual conclusions. One might hope that the Women's Health Study in USA involving vitamin E and aspirin supplementation of no fewer than 40,000 health professionals might settle something. I purposely looked up the index to see if there was anything on HIV, and indeed it appears in Chapter 17 by Drs. Wu and Meydani. Their assessment is that it is well established that AIDS is associated with antioxidant deficiency and that deficit in thiol groups might be particularly significant.

In the final chapter, again by Dr. Papas, the "controversial" aspects of free radical research are discussed. (Are there any others?) There is an interesting passage on the migration of the concept of RDAs from prevention of deficiency to the improvement of wellness and the reduction of the *risk* of disease, rather than its inevitability. Safety, including prooxidant effects are also discussed, as are the pros and cons of supplementation. Other biological effects are highlighted – among them signal transduction, oestrogen blocking, modulation of cytokine function, and enhancement of drug action. Assessment of these "additional" functions of antioxidants of course occurs elsewhere in the book, notably in Chapter 20 by Drs. Ozer and Azzi. They point out that the additional properties of molecules with antioxidant function are often more important than the antioxidant function itself. This of course must be true. It would take

a bold free radical enthusiast to maintain that the main function of oestrogens is to limit the oxidation of low density lipoprotein. The two authors sum up the concept in their last paragraph. If I may venture to paraphrase it in plain language, it is this:  $\alpha$ -tocopherol, for example, is an antioxidant with a series of other functions, whereas ascorbic acid is an antioxidant with a different set of other functions, and so on for others. Therefore each of these natural antioxidants is a unique molecule; a synthetic one, like propyl gallate, is unlikely to be unique in this sense.

Each section of this excellent book is fully referenced. On many a desk, and for a considerable period, it is bound to sit within easy arm's length.

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### Being FAIR To FUFOS

#### FUNCTIONAL FOOD SCIENCE IN EUROPE.

EDS. F. BELLISLE, A.T. DIPLOCK,  
G. HORNSTRA, B. KOLETZO, M. ROBERFROID,  
S. SALMINEN AND W.H.M. SARIS.  
REVIEW OF BRITISH JOURNAL OF  
NUTRITION, VOLUME 80, SUPPLEMENT  
NUMBER 1, AUGUST 1998.

Those who approach this information-packed *British Journal of Nutrition* (BJN) supplement must first scrutinise a rich menu of acronyms. The document is a result of a 1996 plenary meeting on Functional Food Science in Europe (FUFOS) which identified six areas of human physiology to be reviewed by individual theme groups (ITGs), the project to be managed by the International Life Sciences Institute (ILSI) and funded by the Food and Agroindustry Programme (FAIR) of the European Commission (EC). The ITG reports were scrutinised by a second plenary meeting and modified to the form in which they appear in the

BJN supplement. Apparently however these are not the final consensus documents, but only the building blocks for a document to be entitled *Concepts in Functional Food Science and Options for their Application*. This is to appear in BJN later and will be the work of two ITG chairmen and four members of the steering committee, who will all presumably then be named. To dwell on membership and responsibility is not otiose, for the concept of functional foods is free neither from controversy nor commercial interest and it would be desirable to know what mix of pressure groups, NGOs, industry representatives, consumer associations, health authorities, academics, and bureaucracies (if indeed all are represented) will produce what might be very influential recommendations. However the members of the six ITGs reports are transparent. The most multiply-authored paper is *Functional Food Science and Substrate Metabolism*, on which twelve names appear. Others are *Functional Food Science and the Cardiovascular System*, *Functional Food Science and Gastrointestinal Physiology and Function*, and *Functional Food Science and Behaviour and Psychological Function*.

Readers of *Free Radical Research* will no doubt be most interested in the chapter entitled *Functional Food Science and Defence Against Reactive Oxygen species*. The eight authors of this, surely in itself a consensus paper, are A.T. Diplock (United Medical and Dental School, University of London), J.-L. Charleux (Hoffman La Roche, Switzerland), G. Crozier-Willi (Nestle, Switzerland) F.J. Kok (Wageningen University, The Netherlands), C. Rice-Evans (United Medical and Dental School, University of London), M. Robertfroid (Ecole de Pharmacie, Belgium), W. Stahl (Heinriche Heine University, Germany) and J. Vina Ribes (University of Valencia, Spain). Quite properly the prose has an authoritative ring to it and will repay, not a first reading for the purposes of review, but many weeks of close study. The approach is: to survey oxidative damage and defence, then evaluate methods for assessing damage, nutritional options to reduce

the same, safety implications, and the role of food technology. This corpus is thereafter referred to as the science base. There is then critical assessment of this base, and recommendations for future research. But it does not end there, the authors going so far as to identify priorities among the recommendations they make. These are firstly the validation of available biomarkers of oxidative damage (three types of validation being identified) and secondly the application of validated biomarkers to human studies. Human studies might include not only normal and apparently healthy subjects but pregnant women, neonates and children, senior citizens and perhaps sportspeople. Should we not also include inhabitants of highly polluted cities, especially those on their roads, and perhaps workers doing certain tasks such as herbicide spraying? It is envisaged that the results from these two phases will be available within about five years (presumably from the end of 1997, the limit of the literature survey). The authors decline to estimate the cost of all this, but earlier in the article they do not hesitate to refer to economic issues – for example they recognise that information about antioxidants has to be applied by the food industry in a cost-effective manner.

The authors consider that a “functional food” is one which delivers a physiological benefit, and “description of it should convey unambiguous information that is without deception to the consumer...” The information must establish six identified criteria. It is a measure of the meticulous nature of this paper that four questions preliminary to these criteria are posed and then in a separate section each of the criteria is in itself separately evaluated; conclusions from evaluation of the separate sections of the science base are also made before final conclusions, which are six in number. Inevitably these are reflective of some scepticism. It may be not be valid, for example, and indeed may be “highly dangerous” to extrapolate intervention studies in one population to another – cancer sufferers in China and

heavy smokers are cited as giving data which are non-transferrable. Significantly, “... there is no evidence which shows clearly the optimal amounts of nutrient and non-nutrient antioxidants [the latter defined as flavonoids, polyphenols and terpenes] that are needed in the human diet”. On the other hand there is reassurance about the safety of antioxidants and the basic hypothesis that they contribute to well-being and health is supported.

As might be inferred from the titles of the various contributions to the supplement, there is some subject overlap. Antioxidants crop up in most of them, even the “psychology” chapter (a positive correlation being found between plasma ascorbic acid and non-verbal intelligence scores in one study). Just from the point of view of personal interest, it is rewarding to read the section on the effect of breakfast and lunch, and their absence, on cognitive performance. (On the whole breakfast seems to be beneficial, lunch adverse.)

We look forward to the follow-up documents which should be even more compelling.

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**METHODS IN PULMONARY RESEARCH**  
 EDS. S. UHLIG AND A.E. TAYLOR  
 BIRKHAUSER VERLAG, 1998

A stated aim of this book is ‘to produce a window on the broad range of methods used in pulmonary research’. By stating this, the Editors have kept their options open because they do not mention how large the window is. The task before them was, of course, an enormous one and the windows (in fact the seven) they provide are of varying dimensions. Some topics such as isolation of type II cells are described in general terms while others,

such as the isolation of endothelial cells, are described in great detail with the reader being provided with recipes to follow. As the book is recommended for investigators not familiar with basic pulmonary measurements: it would seem that this level of detail was appropriate in all chapters.

The book is conveniently split into 7 sections, covering (i) lung mechanics and airway smooth muscle, (ii) vessels, (iii) edema, (iv) airway liquid, (v) cell culture, (vi) histology and (vii) miscellaneous. The first section, on lung mechanics and airway smooth muscle, includes four chapters covering *in situ* lung preparations, perfused lung preparations, lung explants and tracheal preparations. The second section, on measurements in vessels, has three chapters covering intravital microscopy, postobstructive pulmonary vasculopathy and segmental vascular resistance and compliance measurements by pulmonary occlusion. The third section, on lung edema, consists of four chapters. The first of these reviews a range of techniques that can be employed to measure edema in both animals and man. The second chapter focuses on neurogenic inflammation and measurement of microvascular leakage.

The remaining two chapters in this section cover intravital microscopy (again) and the lymphatics. The fourth section, dealing with airway liquid, has three chapters, which deal with secretory and transport processes, bronchoalveolar lavage and methods to access surfactant function, respectively. The fifth section deals with culturing techniques for type II epithelial cells and endothelial cells. The sixth section, on histology, discusses approaches to study lung ultrastructure and autoradiography, while the seventh, simply described as Further Methods, covers aerosols and the cryopreservation of human lung tissue.

In producing this book, the editors hoped to facilitate the practical application of these methods. Those who read it will achieve this goal to varying degrees depending on their particular interest. Overall, however, to have these methods collected together in one publication is a valuable resource and I recommend it to all fellow lung boffins.

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