

Book Reviews

Oxygen, Gene expression and Cellular Function, Vol 105: Lung Biology in Health and Disease

L. B. Clerch and D. J. Massaro
Marcel Dekker, 1997

As highlighted by the editors in the preface, the importance of oxygen and its metabolites in Biology and Medicine is attested by the exponential increase in articles on the subject. In contributing to this phenomenon this text focuses on the detrimental aspects of oxygen—the consequences of having too much of it around. The topic is discussed in a range of comprehensive overviews and in depth discussions of specific aspects of oxygen metabolites. As North American investigators author the majority of the 17 chapters one minor criticism is that it perhaps lacks the wider perspective of this growing area of research. Contributors have used a wide brush approach, which helps illustrate the breadth of techniques employed to further knowledge in this field. The reader is introduced to transgenic animal studies and electrophysiology approaches in cell culture systems, all designed to improve understanding of the molecular events underlying the cellular response to excess oxygen.

The 504 pages include a range of useful illustrations. As full references sections are given at the end of each individual chapter the usefulness of the author index must be questioned, especially as by taking up 54 pages it represents over 10% of the volume. This space could have been put to better use by perhaps some consideration

of the clinical aspects of the excess oxygen. Overall however, the editors have brought to the market an up to date review, under one roof, of current understanding of the cellular and molecular response to excess oxygen. The text, as such will be a valuable source of current information to the ever-growing band of individuals with an interest in free radical biology.

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Food and Free Radicals

Edited by Midori Hiramatsu,
Toshikazu Yoshikawa and Masayasu Inoue
Plenum Press, 1997, ISBN 0-306-45493-9
vii + 169 pages

Food and Free Radicals is the proceedings of the first symposium of the same title held in June 1994 in Yamagata, Japan. As such it is a collection of chapters written by participants. As is invariably the case, the information contained in this book does not reflect the current consensus in the field as it took 3 years to publication. It is also

clear that the authors were not given the opportunity to revise their manuscripts in order to update the information presented.

Eminent consideration of free radicals in chemistry and biochemistry by Niki which traces the advent of the free radical research from Gomberg, Gerschmann through McCord and Fridovich to the present day's interest in the involvement of free radicals in the pathology of diseases. The latter is then reviewed by Kondo. Much attention is now directed towards biomarkers that would enable scientists to assess the efficacy of plant extracts and/or plant-derived antioxidants.

The book continues with a mixture of reviews and research papers mostly written by Japanese authors. Notable examples are: antioxidants in tea and their physiological functions, antioxidant protein in Japanese mushroom, antioxidant action of ginkgo biloba extract (EGB 761), potential antioxidants from minor dietary constituents, riboflavin-sensitised singlet oxygen formation in milk, synergistic effect of sesame lignans and tocopherols and the role of prooxidant imbalances in the pathogenesis of rheumatoid arthritis.

Food chemists will have considerable problems relating to the book as it really has very little to do with food. Nevertheless, one may be comforted when reading this book by the increasing interest in antioxidant biochemistry and pharmacology in the context of human health and degenerative diseases. It is in this light that the book may be best appreciated.

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Preventing Coronary Heart Disease: The Role of Antioxidants, Vegetables and Fruit

Ed Lesley Rogers and Imogen Sharp
National Heart Forum 1997
The Stationery Office London

This report is based on an expert meeting held by the National Heart Forum back in 1995.

However, the issues discussed are still very topical today and certainly the report produced two years later and incorporating research evidence published since the meeting, is still likely to be of great interest to all in the field.

The structure of the report is very accessible and it is most enjoyable to read. Part 1 is the "summary and conclusions" and this section starts by setting out the main conclusions reached, which are worth quoting here:

- "Evidence for a protective effect of specific antioxidants, particularly vitamins E and C and beta-carotene, is incomplete; further research is needed before recommendations for specific antioxidants can be made".
- "There is good evidence that a diet rich in a range of vegetables and fruit is beneficial and lowers the risk of coronary heart disease"
- National and international recommendations to increase fruit and vegetable intakes to at least five portions a day form a sound basis for policy"

Part 2 of this report is the "scientific basis" and contains a useful background chapter on "antioxidants and the development of coronary heart disease: the biological basis" by Professor AT Diplock and Dr L Rogers. In Part 3 "the role of antioxidants and vegetables and fruit: the research evidence", chapters 2-4 review the evidence for this. This is followed in Part 4 "dietary recommendations on vegetables and fruit" by chapters 5 and 6 by C Williams and Professor Michael Marmot and includes two very useful tables summarising in chronological order, "key recommendations on fruit and vegetables for the UK and United States" and the "relationship between fruit and vegetables and the antioxidant vitamins with coronary heart disease and cancer".

The individual chapters contain key references and are well presented. Overall this is a very worthwhile publication and indeed one which I

look forward to recommending to colleagues and to students at all levels.

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Inducible Gene Expression

Volume 1 Environmental Stresses and Nutrients

Volume 2 Hormonal Signals

Ed by P A Baeuerle, Birkhauser Verlag AG, Basel, 1997

These two books, edited by a pioneer in the field, examine the molecular mechanisms that result in altered gene transcription in response to hormones (volume 2) and to such environmental stresses as heat, UV light, metals, viral infection and "xenobiotics" generally (volume 1).

Volume 1 begins with an interesting comparison of eukaryotic and prokaryotic transcriptional control and proceeds to detailed discussions of HSF and heat shock elements, *jun* gene expression (in response to phorbol and UV light) and the properties of the *jun* protein, NF- κ B, responses to peroxisome proliferators and dioxins, upregulation of metallothionein gene expression by heavy metals, and iron responsive elements. Volume 2 discusses cAMP response elements, serum response elements, regulation of the eukaryotic cell cycle, tyrosine phosphorylation of transcription factors, the glucocorticoid hormone receptor, receptors for the thyroid hormones T₃ and T₄, the transcriptional effects of retinoic acid exposure and the effects of the *Drosophila* dorsal protein, required for establishment of correct polarity in the early embryo.

All the chapters are well written and informative. I recommend the series and look forward to future volumes.

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Antioxidants in Science, Technology, Medicine and Nutrition

Gerald Scott
Albion Chemical Science Series, Ellis Horwood Publishing Ltd, Chichester, UK, 1997

This book is dedicated to the memory of W A Waters, a pioneer in free radical chemistry, with whom Professor Scott had the honour to work. Professor Scott himself has had a long and distinguished career in the field of polymer chemistry and polymer stabilization by antioxidants, both synthetic and natural (e.g. vitamin E). A stated primary aim of the book is "to demonstrate the relevance of antioxidant mechanisms to current studies of antioxidants in both technology and biology". Achievement of such an aim, in a comprehensible fashion, would be of enormous value to the biomedical community, many of whose members have only a limited grasp of chemistry.

Unfortunately, Chapter 1 would act as a complete turn-off to this potential target audience. Without any preamble, it launches into discussions of industrial oxidation of cumene and ρ -xylene and "initiation" by singlet O₂ (it is debatable as to whether oxidations by ¹O₂Δg, a non-radical, should be described as initiations). Indeed Chapter 2 ("The biological effects of peroxidation") might have been a more logical starting point. This interesting chapter, unfortunately, begins with a questionable statement: "PUFAs do not normally peroxidize in normal cells". It did not get much better: phrases such "site-specific pro-oxidant effects of catalase" (page 51), "... pentane and MDA are unequivocal evidence of lipid peroxidation" (page 65) and "super fruit flies have an unusually active version of SOD" (page 65) border on the naive.

Chapter 3, devoted to chain-breaking antioxidants, began with a good discussion of what the term "antioxidant" really means. However, application to living systems of the chemical principles so clearly stated was not apparent. The same criticism can be applied to Chapter 4 ("preventive antioxidants"). Not until Chapter 5 ("antioxidants in biology") is this topic addressed, but only in a

simplistic way. Although the discussion of the "pro-" and "antioxidant" effects of vitamin E (e.g. page 200) is good, I was surprised to learn that "paraquat is a potent inducer of Parkinson-like syndrome" (page 202), "bleomycin induces DNA damage by OH[•] generation", "BHT and BHA are co-promoters of tumours in combination with carcinogens", "iron chelation is the main antioxidant function of uric acid in urine" (page 204) and "17 β -oestradiol has a recognized antioxidant function" and to see the definitive statement (page 208) that ONOOH decomposes to OH[•]. Multiple other questionable statements exist in this Chapter, e.g. on page 214 the spelling of carnosic acid has several different versions.

Chapter 6 deals with "antioxidants and disease in oxidative stress". The presentation of epidemiological data is generally good, although the limitations of such data do not come over clearly, e.g. "the incidence of leukaemia in children has been shown epidemiologically to be associated with increased exposure to . . . magnetic fields" (page 279) really means that it has not been shown at all. It is also assumed that the putative anti-cancer effects of BHA, BHT and β -carotene are due to their antioxidant effects: some data exist to suggest that this is not the case.

Overall, the book is a good presentation of the basics of free radical chemistry in relation to polymer science. Unfortunately, application of these principles to biomedical science is not well done and an opportunity to educate the biomedical community has been lost.

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Flavonoids in Health and Diseases

Eds C A Rice-Evans and L Packer
Marcel Dekker Inc, New York, 1997

This book is number seven in the Marcel Dekker series "Antioxidants in Health and Disease", which is developing a reputation for high quality. Particular highlights to date have been volumes

three ("Handbook of Antioxidants"), four ("Handbook of Synthetic Antioxidants") and five ("Vitamin C in Health and Disease"). The present volume maintains the high standard of its predecessors and is particularly topical at the moment with the intense interest being shown in the health-promoting effects of flavonoids and other plant phenolics.

All aspects of flavonoids are covered, including in what plants they occur and how to analyze them. Of particular interest is Chapter 3, which describes the occurrence of flavonoids in medicinal plants and to what extent they might contribute to the putative therapeutic effects of such plants, including species of *Arnica*, *Calendula* and *Ginkgo*. *Ginkgo biloba* makes another appearance in Chapter 13, where its effects on nitric oxide synthase are presented. Pycnogenol, an extract of *Pinus pinaster*, is also discussed in detail.

A particular strength of the book is its emphasis on flavonoid chemistry. Expert chemists review flavonoid structure, reduction potentials, flavonoid radical production and characterization, metal-chelating activity and mechanisms of antioxidant (and pro-oxidant!) effects, including actions on LDL peroxidation and as quenchers of singlet O₂. One area requiring further research is the likelihood of physiological interactions between flavonoid and vitamin E radicals.

The book also presents good accounts of the French paradox, the flavonoid composition of wines and the antioxidant activities of wines *in vitro*. Chapter 16, dealing with the antioxidant activity of fruit juices, makes an interesting comparison. The relation of flavonoid intake to possible protection against cancer and cardiovascular disease is also well presented, both from the point of view of animal studies and of epidemiological observations. The growing data on the absorption, metabolism and bioavailability of flavonoids are well summarized in Chapter 22.

Overall, an excellent and topical book. I learned something from every chapter.

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