

BOOK REVIEWS

FREE RADICALS, METAL IONS AND BIOPOLYMERS

Edited by P.C. Beaumont, D.J. Deeble, B.J. Parsons and C. Rice-Evans

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Free Radicals, Metal Ions and Bipolymers is the 5th volume in the Free Radical Series currently being published by Richelieu Press. The volume emerged from the 1988 summer meeting of the Society for Free Radical Research in Bangor, North Wales.

The book is divided into four sections, namely: "Chemistry of Metal-catalysed reactions (6 papers)", "DNA and radical reactions (4 papers)", "Copper and iron in diseased states (5 papers)", and "metal ions and peroxidation in biochemical systems (7 papers)". It also contained an appreciation of Dr George Scholes, on the occasion of his official retirement from Newcastle University, for his contribution to free radical research.

The book begins with an interesting examination by Hall of the thermodynamic and kinetic aspects of iron binding to macromolecules in solution. This is followed by an article by Rush and Koppel on the reactive intermediates formed by the interaction of H_2O_2 and Fe^{2+} -complexes. Although the authors have suggested in the past that the reactive species produced in Fenton-type reaction is not $\cdot OH$, their conclusion that "encapsulated metal complexes might also react *via* the ferryl state, but the products appear indistinguishable from those of the hydroxyl radical", does not negate involvement of $\cdot OH$ in Fenton reactions. The article by Jones on iron-complex peroxide reactions complements the preceding article. We are reminded that studies of iron-complex hydrogen peroxide reactions have a long history emanating from the discovery of H_2O_2 in 1818 by Louis-Jacques Thenard. Considerations of the intermediates in copper catalysed reactions of H_2O_2 by Johnson and Nazhat, formation of O_2^- from organic peroxy radicals by von Sonntag and the reaction of peptide peroxy radicals in aqueous solutions by Mieden and von Sonntag complete the first section. Reactions mediated by copper-complexes are important but the exact mechanisms involved in these reactions remain unresolved. The growing interest in damage to the genetic apparatus DNA presents a mechanistic challenge to free radical chemists and biochemists alike.

The second section contains a mix of papers that reviews the state of knowledge on DNA and free radical reactions mediated for example by Laser flash photolysis (Atherton and Beaumont) and interaction of ruthenium polypyridyl complexes with DNA (Kelly *et al.*). The role of copper in radiation and drug induced changes in the quaternary structure of DNA (Cramp *et al.*) is also discussed.

In section three, the reactions of free radicals with hyaluronic acid (Deeble *et al.*), caeruloplasmin (Winyard and Blake) and synovitis (Merry *et al.*) are considered in the light of the involvement of copper and iron in disease states. Van der Kraaij *et al.* review the role of iron in the pathogenesis of rheumatoid arthritis and myocardial ischaemia. The section concludes with a review of the involvement of iron in the host-pathogen relationships exemplified by malaria (Hunt *et al.*).

In the last part of the book, devoted to peroxidation in biochemical systems, Aust

et al. discuss the role of iron in model lipid peroxidation. It remains equivocal (from my viewpoint) if ferric ion is an *absolute* requirement in the initiation of lipid-peroxidation by ferrous ion. Rice-Evans considers oxidative damage in erythrocytes and its suppression by iron chelators. Davies then discusses ESR studies on metal catalysed breakdown of t-butyl hydroperoxide. The next two chapters concentrate on the peroxidation of hepatocytes. The section concludes with accounts by Jackson on the involvement of calcium in the efflux of cytosolic enzymes from muscle membranes and by del Rio *et al.* discussing the role of superoxide dismutase and oxygen free radicals in plant peroxisomes.

I enjoyed reading the book and feel that it is a valuable addition to the series. All articles in the series have been reproduced from "camera ready" manuscripts. This tends to obscure the quality of the books.

It seems that the emergence of "Biochemist/Chemist composers" is a legacy that will linger on. Peter Jones gives his "masterpiece" on p48 of the volume. A number of chapters in the book did strike chords producing in part, memorable tunes of importance in our attempt to understand for example, the free radical mechanisms of DNA damage produced in (by) biological (biologically relevant) systems.

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FREE RADICALS, DISEASED STATES AND ANTI-RADICAL INTERVENTIONS

vol. VI in the Richelieu Free Radical Series

C. RICE-EVANS, editor

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This book presents the invited lectures and a selection of the poster contributions presented during a symposium held at the Royal Free Hospital, London, in December 1988. It has thus been published reasonably quickly, an essential feature if reports of meetings are to have any value. The appearance of the book is good, a feature not always achieved in camera-ready texts.

The book is divided into four sections. The first is devoted to free radicals and disease. It begins with a fairly-standard and somewhat uncritical account of reperfusion injury to several tissues, followed by a chapter on free radicals and lung disease that is an excellent summary of the current literature. Dabagh *et al.* present an interesting review of the relation of iron to inflammatory joint disease. Davies discusses the clinical importance of myocardial reperfusion injury, a well-written chapter that is marred only by the presentation of data using the discredited technique of octadeca-9,11-dienoic acid measurement.

The second section of the book is devoted to "antioxidant levels and radical inhibitors". Diplock presents a thorough review of selenium and glutathione peroxidase, with a useful compilation of dietary selenium intakes and blood selenium concentrations worldwide. There is an interesting paper on antioxidant enzymes in the development of foetal lung in humans, and a fascinating article by Good *et al.* on the

interaction of desferrioxamine, light and oxygen in producing retinal damage in rats. Darley-Usmar *et al.* discuss the different ways in which iron chelators on the effect of iron overload on α -tocopherol levels in rat liver microsomes and on mitochondrial damage during myocardial reoxygenation injury.

Section three of the book, to my mind the most interesting, is devoted to the rapidly-expanding topic of the relation of free radicals to cell proliferation. Murrell and Francis discuss production of O_2^- by human fibroblasts and the effect of radical scavengers on fibroblast proliferation. Poot *et al.* present a novel cell kinetic assay for measuring impairment of proliferation by reactive oxygen species. Many groups are now interested in measuring end-products of oxidative damage to DNA as a marker of free radical attack upon this molecule *in vivo*. The article by Frenkel, on the role of iron in formation of oxidized thymine, is a useful reminder of the complex series of reactions by which these products are formed.

The last part of the book is devoted to a consideration of oxidatively damaged proteins and membranes. The first two chapters (an application of Fourier transform IR spectroscopy to study free radical damage to biomolecules, and on the ability of bovine lens to degrade oxidatively-modified crystallins) are interesting and novel, but the subsequent chapters on myoglobin, Ca^{2+} uptake by sarcoplasmic reticulum, and free radical formation in droughted wheat plants add little to what is already in the literature.

Overall, this is an interesting book that I recommend. It is unfortunate that no attempt was made to report the discussions that took place at the meeting, often the most interesting part of any gathering.

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