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BOOK REVIEW

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Oxygen Free Radicals in Shock (International Workshop on Oxygen Free Radicals in Shock, Florence, May 31–June 1, 1985),
Karger, Basel, 1986, 248 pp.

It was rather bold thinking that connected oxygen free-radicals with shock. In many ways there is nothing worse than oxygen free-radicals to produce a "rude unhinging of the mechanics of the body", in the epigrammatic definition of shock. But a word of caution is fitting. In a dispute on the toxicity of the superoxide radical, almost certainly a progenitor of free-radical and other damaging oxygen species, B. Halliwell has retorted "superoxide-generating species are nasty". Indeed they are in *in vitro* model systems. The problem is to pass to the functional whole, the living organism. This should not be taken as a stricture. Science advances by bold hypotheses. This book is a collection of perspectives, bold ideas and tests of bold ideas, the central theme being oxygen free-radicals in shock. The contributions were presented at an international workshop on oxygen free-radicals in shock, held in 1985. There are in all 37 papers in the book containing much interesting and thought-provoking information.

It is rather a pity the book does not start with an overview of shock. It seems to have been taken for granted that free radical scientists are familiar with the various types and physiopathologies of shock. However, free radical scientists are not confined to experimental and clinical medicine! Also, although the contributions are in fairly logical sequence, the book has not been organised into sections. It starts with reviews of oxygen free-radicals, lipid peroxidation and defence mechanisms, enzymatic and non-enzymatic, and a review of the mechanism of oxygen free-radical production by polymorphonuclear neutrophils (the respiratory burst). Two other comprehensive review articles deal with events in experimental thermal injury (acute lung injury and appearance of lipid peroxidation products secondary to skin burns and the role of complement-activated neutrophils), and xanthine oxidase-related damage in myocardial injury (the inhibitor of the enzyme, allopurinol protects against infarction and sequelae).

Various pathogenic processes attributable to damaging *oxy* species in a wide sense are considered, including decreased fluidity of cell membranes, increased capillary permeability, mitochondrial damage and alterations of mitochondrial function and Ca^{2+} transport, heart muscle damage (negative inotropic effect), and lung damage (cellular ATP levels fall before onset of oedema in lung perfused with hydrogen peroxide). The demonstration by electron-spin-resonance of a carbon based oxygen free-radical in broncho-alveloar lavage fluid from hyperoxic rats, obviously applicable to investigations of shock lung models, is also described. Involvement of oxygen free-radicals in hypovolaemic-traumatic shock, disseminated intravascular coagulation (DIC), and adult respiratory distress syndrome (ARDS) in animal models is described, while multiple organ failure in clinical sepsis is shown to resemble that in

zymosan-treated rats. Central to the arguments given in favour of involvement of oxygen free-radicals in shock conditions is activation of neutrophils. Some conclusions reached rest on protective effects of the antioxidant enzymes, superoxide dismutase and catalase.

The damaging effect of complement-activated neutrophils in shock states has been amply demonstrated, and a number of contributors deal with attempts to modulate neutrophil activity in experimental shock. Approaches described include the administration of antineutrophil serum, the complement-inhibiting drug rosmarinic acid, and steroids. Another approach described is the treatment of shock with a combination of antioxidants, including the enzymes superoxide dismutase and catalase, in experimental animals. Results were encouraging. Pretreatment with catalase (like insulin) was also found to protect ischaemically damaged dog liver allografts, while pretreatment with catalase and superoxide dismutase improved the function of ischaemically damaged isolated perfused liver. Of particular interest is a report demonstrating an apparently intrinsic antioxidant activity of a glucocorticoid, methylprednisolone in Fe^{2+}-induced lipid peroxidation in cat spinal cord. A novel idea considered is the treatment of shock with a spin trap, (phenyl-*t*-butyl-nitrone, PBN) to capture oxygen free-radicals immediately after generation. Phenyl-butyl-nitrone proved effective in endotoxin and traumatic shock rats. It appears to prevent alteration of the phospholipids of cell membranes and alveolar surfactant. The *Foreword* to the book expresses the hope of new avenues of approach to the treatment of clinical shock. Though the use of α-tocopherol supplemented with ascorbic acid and a thiol, α-mercaptopropionylglycine to reduce lipid peroxidation in intensive care patients is described, it is a big step to take in therapy from experimental to clinical shock. An impetus from oxygen free-radical studies, however, exists and it is an important merit of this book to show this.

This is but a brief and non-exhaustive sketch of the material in this book. The book is a valuable contribution to awareness of the importance of oxygen free-radicals in the pathophysiology and clinical problem of shock. It is definitely a book to read and think about.

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