

Book Review

**HANDBOOK OF OXIDANTS AND
ANTIOXIDANTS IN EXERCISE**
EDS. C.K. SEN, L. PACKER AND
O. HANNINEN, ELSEVIER, AMSTERDAM, 2000

The title of this large (> 1,200 pages) and heavy book is misleading; it implies that it deals only with exercise. In fact the book is far more than – in a series of well-written chapters it covers the essentials of all aspects of the role of free radicals in Biology and Medicine. The book begins with a well-written account (Asmus and Bonifacic) of the basics of free radical chemistry, including the major oxygen free radicals and semiquinones (which are essentially phenoxyl radicals). Part II (“Reactive species in tissues”) begins with a good description (Jackson) of free radical production by exercising muscle and touches on the role of xanthine oxidase, a topic expanded on in Chapter 3 and 7.

Part III (“Oxidative stress: Mechanisms and manifestation”) begins with an excellent account of protein damage by reactive species and its relevance to exercise and muscle wasting due to immobilization (Tirosh and Reznick). Immobilization atrophy is further discussed in Chapter 23. The chapter by Tirosh and Reznick is followed by an equally-good discussion of lipid peroxidation in the exercise context (Alessio). I particularly enjoyed the calculations of potential $O_2^{\bullet-}$ production during exercise (pp. 118–119).

Hartmann and Niess review the available data on oxidative DNA damage in exercise (Chapter 9). Jenkins and Beard discuss the role of iron in its various forms in exercise. Cannon and Blumberg (Chapter 8) describe the acute phase response in exercise and how it can affect measurements of antioxidants and oxidative damage. All these are well-written and informative chapters.

Part IV of the book is devoted to “Antioxidant Defences”. Powers and Sen begin very well in showing how levels of enzymic and non-enzymic antioxidants are affected by exercise. In subsequent chapters Suzuki *et al.* expand on this theme for the superoxide dismutases and Sen and Goldfarb (Chapter 12) discuss the vexed question of antioxidant supplementation in exercise. This leads naturally into Part V of the book, entitled simply “Nutrition”, which describes the basic features and metabolism of the various antioxidants found in the diet, although not in the context of exercise.

Part VI covers “Cellular and Molecular Mechanisms”. There are excellent chapters on redox regulation of signal transduction (Sen) and non-antioxidant actions of α -tocopherol (Azzi *et al.*) although again neither is presented in relation to exercise. “Analytical Methods” is the title of Part VII of the book, and the problems of measuring oxidative stress are well-presented in the introductory chapter (Ham *et al.*), as in the subsequent chapters are those of the use of mag-

netic resonance and IR spectroscopy to follow muscle metabolism (Hamaoka *et al.*).

“Environmental factors” is the topic of Section VIII. Well-written chapters cover biological effects of O₃ and NO₂[•] in the context of exercise (Meacher and Menzel) and oxidative stress at high altitude (Simon-Schnass). Weber gives a good account of the effects of reactive oxygen species on the skin, although this is not obviously relevant to exercise.

Part IX discusses “Organ Functions”; Reid gives a detailed account of muscle fatigue, followed by excellent accounts of oxidative damage in muscle atrophy (Kondo) and the role of free radicals in cardiac performance (Das and Maulik) and exercise-induced cardiac stress (Ji). Somani and Husain present an interesting chapter on the role of exercise-induced oxidative stress on the brain, leading on to Part X of the book, devoted to “Aging”. Beckman and Ames present their usual high-quality review on “Oxidants and Aging” – I especially enjoyed their discussion of mitochondrial O₂^{•-} generation (pp. 760–761). This leads on to discussions of caloric restriction (McCarter, Chapter 28) and its relation to exercise and a very-relevant chapter on the role of reactive oxygen species on loss of muscle function with age (Lopez *et al.*).

Part XI of the book is entitled “Disease processes”, covering the role of ROS in cancer, alcohol-induced damage, cigarette smoking, wound healing and drug side-effects. Apart from the well-written chapter on wound healing (McGuire), none of these related the material presented to exercise. However, Shern-Brewer *et al.* (Chapter 36) give an excellent and provocative account of the relationship of exercise, ROS and atherosclerosis, and Tisi and Shearman (Chapter 37) expand this to the area of intermittent claudication. Laaksonen and Sen review exercise and oxidative stress in diabetes, and Viña *et al.* give a nice account of how exercise-induced oxidative stress is affected by the presence of COPD (chronic obstructive pulmonary disease). In the last chapter of the book, Blake *et al.* re-present and expand their hypothesis that exercise-induced ischaemia-reperfusion contributes to the pathology of rheumatoid arthritis.

Overall, this is an excellent book that I recommend highly. Although some chapters do not mention exercise, this does not detract from their quality.

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