

## Book Reviews

**Oxidative Stress and Aging**; Edited by R.G. Cutler, L. Packer, J. Bertram and A. Mori, Birkhäuser Verlag, Basel, 1995; xii + 396 pp. \$ 124.00 (hb). ISBN 3-7643-5039-3.

Oxygen is a necessary evil. We, as aerobic organisms, cannot live without it. Yet, oxygen may also be the ultimate cause of our death. The same processes which are obligatory for our survival can also be the basis of our demise. But the story of life and death is not that simple and straight forward. The role of oxygen and oxidative stress in the growth, differentiation, development, maturation, aging and death has several layers of complexity, some of which are dealt impressively in this book resulting from the *First International Conference on Oxidative Stress and Aging*, held in Hawaii in 1994.

As is almost always the case with books which compile proceedings of a conference, this book is also a varitable collection of 25 review-type articles which provide overviews of various aspects of oxidative stress and 11 research papers reporting new results. Although it is very difficult to maintain the same standards of quality for every paper presented in an international meeting, the editors of this book have been able to bring together quite an impressive lot of subject matters and authors within the framework of oxidative stress and aging.

Two introductory papers by L. Packer and R.G. Cutler do a great job of setting the scene for this important topic. Packer has given not only a highly informative overview of the oxidative and antioxidative processes in the cell, but also has discussed the wide ranging consequences of oxidative stress in neurodegenerative diseases including Parkinson's disease, Alzheimer's disease and Huntington's disease. Richard Cutler, in an uncharacteristically short article by him, has discussed the nature of the longevity determinant genes and the effects of oxidative stress on the process of, what he calls, dysdifferentiation.

The other 34 articles in the book are grouped into 9 groups according to different themes. In the section on oxidative stress and cellular senescence, A. Slater and S. Orrenius deal with the possibility of alteration in intracellular redox state as a cause of altered gene transcription that puts the cell on the path of apoptosis. The issue of the generation of superoxide or hydrogen peroxide, cell proliferation and intracellular signalling is discussed by R. Burdon. Some new results on the effects of hyperbaric oxygen on reducing the proliferative lifespan and changing the cellular glutathione concentration are presented by M. Matsuo and colleagues. The production of nitrogen oxide and its role in endogenous mutation and carcinogenesis are discussed by R. Cooney and L. Mordan.

Five articles in the section on genetic stability and damage deal with various aspects of DNA damage and repair during aging. Robin Holliday has discussed the implications of a progressive decrease in DNA methylation during aging in the context of an accumulation of epimutations and epigenetic defects. Age-dependent increase in the formation of oxidative damage products such as 8-hydroxyguanosine and some bulky covalent modifications of DNA known as I-compounds are discussed by T. Hirano and K. Randerath, respectively. An excellent review by Vilhelm Bohr and colleagues covers the issues of DNA repair, oxidative stress and aging. They have also discussed some of the recent developments in the gene-specific and strand-specific repair of nuclear and mitochondrial DNAs with respect to aging and carcinogenesis. Two articles in the section on genetics and lifespan

contain an article on the relationship between genetic mechanisms of DNA repair in the context of poly(ADP-ribose) polymerase system, antioxidant defences and longevity by A. Bürkle and colleagues. Similarly, the effects of the selection of *Drosophila* for extended lifespan phenotype on antioxidant genes are critically discussed by R. Arking.

In the section on proteins and lipid oxidation, V. Monnier et al. have discussed novel approaches in search of enzymes which degrade glycated substrates and could be used for gene therapy of the complications of diabetes and aging. Age-associated changes of oxidative modification and turnover of proteins is discussed briefly by S. Goto and colleagues from Chiba, Japan. Recently, much attention has been paid to mitochondria as the primary source and target of oxidative stress. Three articles by A. Schapira, A. Reznick and P. Singh have discussed various aspects of the effects of oxidative stress on mitochondria and the new methodological approaches to study mitochondrial alterations.

No discussion of oxidative stress can be considered complete without a thorough analysis of its applications in aging related diseases including cancer. Therefore seven articles on various aspects of this issue have dealt with a wide range of topics which include the pathogenesis of diabetes by F. Gries, carcinogenic activation by Y. Li and the accumulation of ubiquitinated proteins in aging animals, by R. Takahashi. The effects of oxidative stress on neurodegenerative diseases are presented in the section on neurodegeneration by J. Gutteridge, N. Ogawa, A. Mori and P.H. Evans covering areas such as Parkinson's disease, epilepsy and senile neurodegeneration.

Another way to understand the role of oxidative stress on aging is by analysing the effects of various modulators of aging and lifespan. Of these, dietary restriction and antioxidant treatments have proved to be quite useful experimental tools in elucidating the role of oxidative stress in normal aging. For example, dietary restriction has been shown to be the most effective way to modulate free radical induced damage and activate various antioxidative pathways of defence and repair. Articles by B. Yu on modulation of oxidative stress and by M. Meydani on dietary vitamin E in oxidative stress and aging are very useful contributions to this volume. There is some new and interesting data by I. Tomita et al. about the antioxidant properties of some of the components of normal tea leaves. However, much more research is needed in this area to establish the role of natural dietary antioxidants in preventing or defending against oxidative stress. Similarly, some preliminary observations regarding age-related changes in nitric oxide content and nitric oxide synthase activity are also presented.

Finally, although this proceedings of a conference is a collection of 36 articles covering a wide range of topics within the framework of oxidative stress and aging, the book turns out to be a very useful source of background information and new developments in this topical subject. Research workers and students in the field of experimental gerontology will definitely find this book worthy of frequent consultations.

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