

## Book Reviews

### NATO Science Series

# Thiol Metabolism and Redox Regulation of Cellular Functions. Series I: Life and Behavioural Sciences

Alfonso Pompella, Gabor Banhegyi and Maria Wellman-Rousseau, (Eds)  
Vol. 347, ISSN 1566-7693, 350 pages, 2002, USD 95/Euros 95, IOS Press

This timely and much awaited volume is an outcome of the workshop organised in Pisa, Italy from 10 to 13 April, 2002, on biological and pathophysiological implications of thiol redox biochemistry in oxidative cell signalling, glutathione biosynthesis, novel roles of  $\gamma$ -glutamyltransferase and protein glutathionylation. The discovery of thiol-redox sensitive transcription factors and its role in gene transcription has challenged the researchers to understand the various biological events such as cell proliferation, apoptosis, cell survival and inflammation. Knowledge of cellular thiol metabolism and redox status will lead to the understanding of pathogenesis of various chronic diseases such as cancer, cardiovascular diseases, liver disease, diabetes mellitus, neurodegenerative disorders and lung diseases.

This volume covers 32 chapters in the field of cell redox regulation with respect to "new evidence, insight, and speculation". The chapters are written by some well-known experts in the respective field of research and are clearly presented with illustrations using modern graphics. The book covers several interesting aspects on thiol/glutathione regulation. The topics covered are extensive and informative. This volume will amaze the readers how much wealth of knowledge is now available on thiol metabolism and redox regulation of cellular functions. The extensive updated bibliography accompanying each chapter is very useful.

The chapters cover the following major categories, basic understanding of redox biochemistry in cellular signaling, e.g. redox signalling of MAP kinase pathways, gene expression, redox regulation

in chaperone function, ascorbate-mediated thiol protein folding/protein glutathionylation and glutathione membrane, endo/sarcoplasmic reticulum transport; cell signalling in biosynthesis of glutathione and its metabolism (gene knock-out strategy/cell survival) and transcriptional regulation of GST P1 using different promoters. It also covers the novel roles of glutathione peroxidase and other peroxidases in hydroperoxide metabolism in pathogens and cell signalling,  $\gamma$ -glutamyltranspeptidase and its folding,  $\gamma$ -glutamyltransferase regulation in lung homeostasis and their involvement in cell signalling, hydroperoxide metabolism and involvement of  $\gamma$ -glutamyltransferase in pro-oxidation reaction. This volume also contains chapters on the role of GSH,  $\gamma$ -glutamyltransferase and glutathione peroxidases in liver metabolism, diabetes mellitus, cancer, cardiovascular disease, neuroprotection against amyloid beta toxicity, drug metabolism, multidrug resistance, detoxification of toxic chemical carcinogens and chemotherapeutic drugs and electrophilic compounds by glutathione S-transferase. The chapters on redox state of GSH and thioredoxin in differentiation and apoptosis, redox regulation of mitochondria permeability transition by lipoic acid and its positively charged analogue, DNA repair and proliferation/apoptosis/differentiation are clearly presented. The chapter on the analytical developments in the assay of intra- and extracellular glutathione homeostasis is well written. Similarly, the chapter on detoxification of electrophilic compounds by GSTs describes the tissue-specific expression, the complexity of interaction between

genetics, function and cancer aetiology. In addition, the role of thiols in diverse cellular functions has been well justified and established. However, the category-wise chapter layout/uniformity of chapters is not maintained in this volume. Although the book contains individual chapters that address each of these areas separately, there is a lack of integration of information between chapters. Similarly, a subject index is not provided.

Nevertheless, this volume is useful for both students and researchers who are not only seeking an overview of redox biochemistry but also in-depth knowledge of specific subject for research. The book

might also prove useful for those involved in therapeutic interventions based on thiol modulation in clinical conditions. This book will facilitate fundamental understanding so that one can utilize the knowledge gained from this book for many years, to understand the redox thiol biochemistry, metabolism and regulation of cellular functions. The volume is highly recommended.

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## Oxygen. The Molecule that made the World

N. Lane (Ed.), 2002 Oxford University Press, Oxford, UK

This book is about life, death and oxygen. It is written (very well indeed) for both the lay reader and scientists, and is full of amusing anecdotes. Thus oxygen may well not have been discovered by Lavoisier, Scheele and Priestley as commonly supposed, but in 1604. Indeed, in 1621 oxygen may have been bottled and used to "refresh the air" on the world's first submarine. Linus Pauling recommended that you trust the biochemistry of a goat more than the advice of a physician. In 1942, the world's first hyperbaric chamber was dismantled for scrap and aided the American war effort. Some stories are less amusing, such as that girls painting the faces of luminescent watches were told that radium would put a glow in their cheeks and give them a smile that would glow in the dark, that in terms of free radical production breathing for a year may be  $10^5$  times more dangerous than a chest X-ray, that if it were not for melanin and haemoglobin we would change colour when we exercised, that some of the Salem witches burnt at the stake were sufferers from Huntington's disease (a defective gene which may, paradoxically, favour increased fecundity early in life), and that type 2 diabetes is a "forlorn attempt to survive by delaying reproduction".

The author argues that pharmacogenomics is misguided, that we should envy birds not only for their power of flight but also for their "sealed" inner mitochondrial membranes, that the dominant position of predators in modern ecosystems is a consequence of the availability of  $O_2$ , that fires do not really regulate atmospheric  $O_2$  levels, that

photorespiration does and also protects against  $O_2$  toxicity, that scorpions a metre long scurried about in the Carboniferous period, that mitochondrial DNA is sometimes altruistic, that telomeres are a characteristic biological fudge, that reactive chlorophyll in photosynthesis is analogous to a dragon that must be fed with virgins to stop it ravaging the neighbourhood, that haploid males are "defect sieves", and that the  $O_2$ -evolving complex of photosynthesis evolved in an anoxic world, yet one stressed by  $H_2O_2$  generated by recombination of OH radicals generated photochemically in rainwater. In other words, oxidative stress predated oxygen production by photosynthesis and allowed the evolution of that process, and even more paradoxically, aerobic respiration evolved before  $O_2$  became abundant.

Equally enthralling is the author's discussion of ageing. John Brinkley almost became governor of Kansas in 1930 because of his "success" in transplanting sliced goat testicles (each paying patient could select the goat of his preference). My own attempts to organise ageing conferences indicate that some physicians have not moved much further forward.

An excellent book. It held me spellbound for a 7 h plane flight. I recommend it unreservedly.

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