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Book Reviews

FOOD PHENOLICS, SOURCES, CHEMISTRY, EFFECTS, APPLICATIONS

FEREIDOON SHAHIDI AND MARIAN NACZK, TECHNOMIC PUBLISHERS, LANCASTER, PA, USA, 1995

This is a very useful book. It begins with a description of the phenolic compounds found in the cereals and legumes that are important in the human diet, even including the cashew nut. The phenols present in rapeseed, canola, sunflower and cottonseed oils and in soybean products are also well described as are the simple phenols and polyphenols (especially the flavonoids) found in common fruits and vegetables. The book also gives a good summary of the phenols present in beverages – black tea, coffee, cocoa, beer and wines. Ciders and fruit juices (apple, orange, pear, strawberry) are also discussed.

The second part of the book discusses the nutrition-related and pharmacological effects of food phenolics – their interaction with proteins and carbohydrates, binding of minerals, effects on micro-organisms, contributions to aroma, colour and flavour (I enjoyed the table on page 205 giving the "pungency threshold" of capsaicin and the other capsaicinoids), the chemistry of browning and haze formation, and antioxidant properties (including a brief discussion of woodsmoke).

Finally, the book gives a good account of the methods used to separate and quantitate phenolic compounds and investigate their interaction with proteins.

Overall, this is a very useful reference work and I recommend it strongly.

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ANTIOXIDANT AND REDOX REGULATION OF GENES

EDS. C.K. SEN, H. SIES AND P.A. BAEUERLE, ACADEMIC PRESS, NEW YORK, 2000

Not so long ago, it was still uncertain whether reactive oxygen species (ROS), were important in the modulation of gene expression in mammals. However, work done during the past decade has resulted in a dramatic increase in our knowledge and understanding of the modulation of gene expression in mammalian cells, and uncovered yet another major biological function of reactive oxygen and nitrogen species: the regulation of cellular transduction processes. Hence, this new book "Antioxidant and Redox Regulation of Genes", dedicated to Lester Packer for his 70th birthday, is a timely up-date of the newly discovered role of ROS in cell biology.

The reader strides through an easy progression from reactive species as intracellular messengers to their role in redox-sensitive molecular processes and cellular responses, culminating in the clinical implications of redox signaling and antioxidant therapy. In chapter after chapter the editors and contributors comprehensively review the role of ROS and antioxidants in gene expression, ion channel regulation, intracellular calcium metabolism, protein tyrosine phosphorylation, pro- and anti-apoptotic activities, cell adhesion, cell cycle regulation as well as the effect of changes in redox equilibrium on physiological and pathological phenomena such as aging and senescence. To that effect the book could have easily been titled: "ROS, Antioxidants and Cell Biology". The reader gets to refresh his knowledge of basic cell biology, as much as he learns about the critical roles of ROS and antioxidants in regulating life and death at basic cellular and molecular levels and in organisms as small as the fly to as complex as human body. Moreover, redox regulation of gene expression, ion channels, cell adhesion or transcription factors such as NF-κB reminds us that oxidative stress does not always correlate with death, and prooxidant state can be beneficial for life. For example, experiences from W.C. Orr and R.S. Sohal demonstrate that altering the redox state by overexpressing antioxidative genes may interfere with some tissue-specific function requiring a more pro-oxidizing state. Indeed, they have noted that overexpression of Cu/Zn SOD by more than 50% in flies interferes with development and has a negative effect on viability. Such observations demonstrate the fine balance between oxidants and antioxidants that can determine life or death. Hence, it appears that the next challenge most probably will be to understand the mechanisms involved in production of ROS at strategic sites in the cells. Answering some of this question, H.H. Hassanain and P.J. Goldshmidt-Clermont review our knowledge about the mechanisms involved in ROS production and underline the increasing importance of the small GTP-binding protein Rac1 in the field of ROS. The role of Rac in production of ROS may turn out to be particularly important in carcinogenesis, as Rac and other proteins from the same family have clearly been involved in the development of tumors. Indeed, tumor cells have for some time been known to present a survival advantage over normal cells due to their prooxidant state. Manipulating intracellular ROS level of tumor cells may become a new approach in controlling tumor development.

In short, this work is an elegant compilation of the biology of oxygen species even beyond gene regulation, for which the editors deserve commendation. However, an issue that deserves special consideration, in my opinion is to clearly decipher the role of the different ROS, such as superoxide ($O_2^{\bullet -}$) or hydrogen peroxide (H_2O_2) in cell signaling. In the present publication most of the authors do not clearly identify if $O_2^{\bullet -}$ or H_2O_2 is the ROS involved in the various physiological pathways described. This confusion of nomenclature is probably due to the assumption that production of $O_2^{\bullet -}$ will invariably lead to H_2O_2 production through its dismutation by superoxide dismutase. However, it may not always be the case and particularly in the field of apoptosis such distinction may turn out to be critical in determining pro- or anti-apoptotic activity of ROS.

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