



Editorial

Antioxidants and antioxidant treatment in disease

Antioxidants react with and detoxify reactive free radicals. In mammals, antioxidants consist of small molecules and redox enzymes that prevent or modulate free radical damage. Molecules such as vitamin E, vitamin C, and glutathione are examples of the former, while superoxide dismutase, catalase, and glutathione peroxidase are examples of the latter.

Free radicals are produced naturally in organelles such as the mitochondria, and Mn-superoxide dismutase is resident in mitochondria to modulate superoxide radical levels in this organelle. Tissue resident, as well as dietary/supplementary sources of antioxidants hold some promise for treatment of disease, and some of these approaches to the treatment and/or prevention/modulation of disease are discussed in this Special Issue.

When the rate of production of free radicals eclipses the rate of their being scavenged by antioxidants, oxidative or nitrosative stress (depending on the radical type) is said to exist. Oxidative/nitrosative stress can damage essential and/or large numbers of cells in various organs, potentially leading to diminution of tissue function and promotion of pathogenesis. Examples of such oxidative stress-related diseases/disorders include neurodegenerative disorders (such as Alzheimer disease, Huntington disease, Down syndrome), neurotrauma, kidney disease, cystic fibrosis, various types of cancer, chronic obstructive pulmonary disease, pain, and aging. Each of these conditions is discussed in this Special Issue in the context of oxidative stress and antioxidants as potential therapies for these diseases/disorders.

This special issue of BBA—Molecular Basis of Disease on Antioxidants and Antioxidant Treatment of Disease is the culmination of months of work by the various authors for which we are very grateful. However, we would be remiss not to mention the extraordinary effort of the BBA/Elsevier staff who have been so helpful in bringing this special issue to fruition, particularly Ms. Melissa Murray in San Diego and Ms. Andy Deelen in Amsterdam, to whom we say thank you.

To the reader: It is our belief that this Special Issue provides both basic and applied understanding of antioxidants and their use in a wide variety of diseases. Certain principles arise from these excellent papers, among which is the recognition that the effective use of antioxidants in patients with different diseases requires knowledge of: (a) how the antioxidants react to neutralize free radicals (direct or indirect action); (b) cellular location of the antioxidants (cytosol, membrane bilayer, organelle) relative to the foci of the major sources of free radicals; and (c) the inherent antioxidant status of the subjects being treated with antioxidants. This Special Issue addresses each of these issues and provides examples of diseases/disorders in which antioxidant therapy may be an effective strategy. In so doing we also touch in multiple ways on the contradictions and controversies that currently exist in the field of antioxidant therapeutics, whereby previous studies that

employed antioxidant therapy have failed, and other studies are presented whereby antioxidant therapies were observed to be efficacious. Such studies highlight that there is a role for antioxidant based therapeutics, but that it is clearly not a one size fits all proposition. Much more investigation is warranted as the new generation of antioxidant therapies are being designed and implemented, with treatment beginning in earlier stages of disease onset, and outcomes linked to documented suppression of oxidative stress. We hope and trust that you will enjoy this Special Issue of BBA—Molecular Basis of Disease on Antioxidants and Antioxidant Therapy in Disease.



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