Editorial

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Antioxidants: how good are they?

Oxidation processes are essential in normal cell metabolism. Free radicals, i.e. reactive oxygen and nitrogen compounds, are formed continuously. They participate in metabolic and cell signalling pathways, in spite of their potentially deleterious effects. A system of endogenous antioxidative compounds and systems operates to control strictly the concentrations and actions of free radicals.

Deleterious effects of free radicals in disease and ageing processes, referred to as oxidative stress, are related to their ability to initiate oxidation of, in particular, unsaturated fatty acids and proteins, interfering with essential functions of cell membranes, for example. Inflammatory processes, increasingly implicated in various chronic diseases, are characterized by surplus formation of free radicals.

The possibility of decreasing oxidative stress with dietary antioxidants is the basis for hypotheses on the health-promoting effects of antioxidants in foods. Protective effects against cardiovascular disease and some cancers of fruit and vegetables are strongly supported by a host of observational studies. It is generally assumed that antioxidants in these foods are an important factor, even the most important factor behind their health-promoting effects. However, intervention studies with increased intake of fruit and vegetables so far have failed to show substantial effects on markers of oxidative stress, and studies with supplementation of single antioxidants have generally been negative. The increased frequency of lung cancer in smokers supplemented with β-carotene drew attention to potentially deleterious effects of single antioxidants, possibly related to their pro-oxidative effects in high doses.

Fruits and vegetables contain a host of components with antioxidative effects in addition to the well-known antioxidative vitamins C and E. These include carotenoids, notably β-carotene, flavanoids, lutein and hundreds of other more or less characterized potentially bioactive compounds. One hypothesis is that a balanced battery of different antioxidants from foods is needed for optimal protection.

To increase our understanding of the effects of dietary antioxidants for health, it is essential to have methods for measurement of oxidative stress, i.e. markers for evaluation of physiological effects, both positive and negative, of dietary antioxidants. In this issue, the usefulness of one newly discovered and documented type of such a marker, isoprostanes, is reviewed by a pioneer in this field, *Samar Basu*.

Equally important is substantiation of methods for measuring antioxidants in foods. Owing to the many antioxidant compounds present in foods, methods for determination of total antioxidative capacity (TAC) have been developed and such estimates have been published for a large number of foods. The extent to which TAC estimates in foods indicate *in vivo* protective effects remains to be substantiated, and in this context it is necessary to have validated markers for measuring oxidative stress *in vivo*.

Nils-Georg Asp
Editor-in-Chief
E-mail: asp@snf.ideon.se

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