

## Introductory remarks to the new series of reviews: From dietary antioxidants to regulators in cellular signalling and gene expression

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Reactive oxygen species for a long time has been considered to be only toxic, and many diseases were believed to be caused or at least aggravated by oxidative stress. This notion prompted various clinical trials, in which the preventive capacity of antioxidants, preferentially dietary antioxidants, was tested. The results, however, remained largely inconclusive and it is being recognized that the potential antioxidant action of micronutrients and other redox-active dietary compounds does not always explain their pivotal physiological role. Vitamin E, for example, turns out to regulate cellular signalling and gene expression, selenium is a constituent of at least 25 selenoproteins with highly diversified functions, which have only partially been identified, and also many plant-derived bioactive food components have a substantial impact on gene expression. Finally, the pivotal role of reactive oxygen species in host defence must not be forgotten, and, more recently, hydroperoxides and oxygen- and nitrogen-centred radicals have been implicated in the regulation of many cellular processes. Certainly it can no longer be uncritically stated that blocking oxidative stress is always beneficial.

For these reasons it is time to reconsider the antioxidant strategy, which—if promoted as biased as

in the past decades—might underestimate the important physiological role dietary ‘antioxidants’ definitely have. The series of reviews we start here is planned to first summarize the present knowledge on the role of reactive oxygen species in signalling cascades, e.g. the modification of protein kinases and phosphotyrosine phosphatases, and the regulation of protein activities by thiol/disulfide exchange, which might be similarly important as phosphorylation. These introductory reviews will be followed by reviews about novel and sometimes surprising functions of individual dietary ‘antioxidant’ compounds. Along this line also novel functions of, e.g. vitamins C and E, phytoestrogens, isothiocyanates, flavonoids, polyphenols and selenium will be introduced and discussed.

The antioxidants do not exert these functions by merely scavenging radicals but by either inducing/activating enzymes counteracting toxic, including oxidative stress or by modulating redox-sensitive metabolic pathways. The mechanism often is a specific modification of redox sensitive proteins. Such insights might even open up the perspective that a regulated, moderate oxidative stress could rather be beneficial than harmful.

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