

CAN REACTIVE OXYGEN SPECIES (ROS) COMPETE OR COOPERATE WITH PROOXIDATIVE/ANTIOXIDATIVE GENES IN AGING?

I. Afanas'ev

Vitamin Research Institute, Moscow, Russia

ROS and hereditary disorders (defective genes) are rightly considered as major causes of aging. However, up-to-date studies show that both factors can be mutually interconnected. Reactive oxygen species (ROS) superoxide and hydrogen peroxide perform important signaling functions in many physiological and pathophysiological processes, cell senescence and organismal age are being no exemptions. Aging-regulating genes p66shc, Sirtuin, FOXO3a, and Klotho are new important factors which are stimulated by ROS signaling. It has been shown that ROS participate in initiation and prolongation of gene-dependent aging development. ROS also participate in the activation of protein kinases Akt/PKB and extracellular signal-regulated kinase ERK, which by themselves or through gene activation stimulates or retard cell senescence. Different retarding/stimulating effects of ROS might depend on the nature of signaling species – superoxide or hydrogen peroxide. Importance of radical anion superoxide as a signaling molecule with “super-nucleophilic” properties points out at the possibility of the use of superoxide scavengers (SOD mimetics, ubiquinones, and flavonoids) for retarding the aging development.