PROOXIDANT EFFECTS OF TRANSITION METALS (IRON AND COPPER) IN BIOLOGICAL SYSTEMS

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Being active catalysts of the decomposition of inorganic and organic peroxides, transition metals, first of all iron and copper, are able to initiate damaging free radical-mediated processes. One of the most important reactions catalyzed by iron is the catalytic decomposition of hydrogen peroxide to reactive hydroxyl radicals (the Fenton Reaction). We found that in many cases the reactive species formed in the Fenton Reaction have a lower reactivity than free hydroxyl radical and apparently the iron-hydrogen peroxide complexes. These complexes seem to be the species responsible for the initiation of iron-catalyzed lipid peroxidation. Iron- and possibly copper-catalyzed decomposition of hydrogen peroxide makes also an important contribution to the formation of active oxygen species during the activation of leukocytes and macrophages. We found that "free" metal ions, which can appear in the cells as a consequence of environmental contamination or due to some other reasons catalyze the Fenton Reaction converting innocuous superoxide ion generated by NADPH oxidase of phagocytes into harmful hydroxyl radicals. Iron and copper irons also initiated microsomal lipid peroxidation and LDL oxidation. Antioxidants (vitamin E, dihydrolipoic acid, bioflavonoid rutin, and Bio-Normalizer, a food supplement prepared by the fermentation of *Carica papaya*) were effective inhibitors of the metal-catalyzed formation of free radicals under both *in vitro* and *in vivo* conditions.