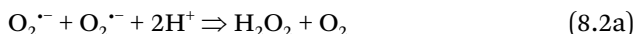
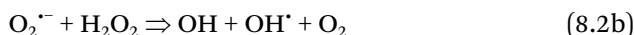


$O_2^{\cdot-}$ in cells and tissues, there are NADPH-cytochrome-C-reductase and cytochrome P-450 of endoplasmic reticulum, xanthine oxidase, catecholamine and other biogenic amines, mono- and di-amine oxidases, aldehyde oxidases, oxidases of D-aminoacids, D-galactosidase, lipoxigenase, nitric oxide synthase, leukoflavines, hemoglobin and myoglobin, ascorbate, NADPH-oxidase of phagocytes and other so-called NOX enzymes (NADPH oxidases).^{23,26}

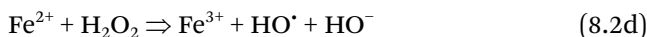
From chemistry, it is known that hydrogen peroxide (H_2O_2) is formed as the product of the reaction of dismutation of the $O_2^{\cdot-}$ radicals:



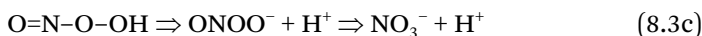
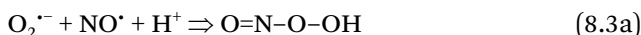
Next, $O_2^{\cdot-}$ reacts with H_2O_2 with the formation of the OH^{\cdot} radical, which is known as a strong oxidant, the so-called Haber-Weiss reaction:



Moreover, this reaction is accelerated in the presence of ions of variable valence, like iron (Fenton reaction):



Besides, there are reasons to believe that $O_2^{\cdot-}$ can react with the nitric oxide (NO^{\cdot}) radical with the formation of peroxynitrite ($ONOO^-$):



Peroxyntirite is considered as a strong oxidant and nitrating species that mediates the biological effects of the superoxide and the nitric oxide.^{25,27}

To protect cell structures from $O_2^{\cdot-}$ and its toxic chemical products, there is a special defense enzyme, superoxide dismutase (SOD), which catalyzes the reaction of dismutation of $O_2^{\cdot-}$ into H_2O_2 and oxygen. There are three kinds of SOD, mitochondrial Mn-SOD, cytosolic Cu,Zn-SOD and periplasmatic Fe-SOD. SOD enzymes work in cooperation with other antioxidant enzymes, catalase and glutathione peroxidase, which catalyze decomposition of H_2O_2 .²³⁻²⁶

The reliability theory approach to the problems of free-radicals and aging was first proposed in.¹⁰⁻¹² Elementary acts of occurrence of $O_2^{\cdot-}$, as well as elementary acts of disappearance of $O_2^{\cdot-}$ in the dismutation reaction, are stochastic processes. Inasmuch as SOD, like all other enzymes, operates with limited reliability, the $O_2^{\cdot-}$ radicals can slip through the SOD defense system.