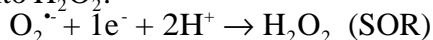


# Detoxification of Superoxide Radical by Reduction Reaction Mechanism of Superoxide Reductase SOR

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Recently, a new concept in the field of cellular defenses against oxidative stress has emerged<sup>1</sup>. A new antioxidant system called superoxide reductase SOR was discovered, by which some anaerobic or microaerophilic microorganisms detoxify superoxide radical. This system catalyzes a monoelectronic reduction of  $O_2^{\cdot-}$  into  $H_2O_2$ :



The SOR active site consists of a  $Fe^{2+}$  center in an unusual  $[His_4Cys_1]$  square pyramidal coordination, which reacts at a nearly diffusion-controlled rate with  $O_2^{\cdot-}$ .

We are studying the reaction mechanism of the SORs from *Desulfoarculus baarsii* and *Treponema pallidum*. The approach combines different techniques, pulse radiolysis, resonance Raman spectroscopy, protein crystallography and site-directed mutagenesis<sup>2-4</sup>. We have characterized the formation of two transient intermediates during the catalytic cycle, consistent with the formation of iron(III)-peroxo and iron(III)hydroperoxo species, respectively<sup>2,3</sup>. Recently, a crystal structure of a SOR-ferrocyanide complex has been solved at 1.7 Å resolution<sup>4</sup>. The reactivity of the SOR-ferrocyanide complex with superoxide has been investigated.

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