SOD2 encodes a manganese-superoxide dismutasethat is localized to the mitochondrial matrix and is involved in oxygen radical detoxification. S. cerevisiae also carries a copper-zinc superoxide dismutase, Sod1p, which is located in both the cytosol and the mitochondrial intermembrane space. SODs catalyze the breakdown of the superoxide radical, O2-, to an oxygen moleculeand hydrogen peroxide. Strains with null mutations in SOD2 are hypersensitive to high concentrations of oxygen and ethanol, but grow normally in atmospheric oxygen and die rapidly in stationary phase. sod2 mutations are also associated with defects such as sensitivity to oxidative stress, defective sporulation and a high mutation rate. SOD1 and SOD2 are among the first genes to be implicated in the chronological aging of yeast. Deletion of SOD1 or both SOD1 and SOD2 dramatically reduces the chronological and replicative life span of yeast, while overexpression of both SOD1 and SOD2 extends survival but does not affect metabolic rates.Sod2p is a homotetramer with one atom of manganese per subunitwhich is acquired after import into the mitochondrial matrix. The specific manganese chaperone Mtm1p activates the apo-Sod2p by delivering the manganese ion to Sod2p. Another metal ion transporter protein, Smf2p, regulates the availability of manganese to Sod2p. SOD2 expression is repressed in the absence of heme and by low levels of intracellular cAMP levels. SOD2 expression is positively regulated by the heme-dependent activator Hap 2-3-4-5 complex and the heme binding transcription activator, Hap1p. Transcription of SOD2 involves proteins that sense oxygen or by-products of respiration since paraquat, a superoxide radical producer, and oxygen can induce SOD2 transcription.Mn-SOD is a highly conserved gene. Inactivation of the mouse mitochondrial form of SOD results in dilated cardiomyopathy, hepatic lipid accumulation, and early neonatal death and other biochemical abnormalities that have features similar to mitochondrial myopathy, Friedreich ataxia, and 3-hydroxy-3-methylglutaryl-CoA lyasedeficiency.