

cDNA and deduced amino acid sequence of rat copper-zinc-containing superoxide dismutase

Ye-Shih Ho and James D.Crapo

Laboratory of Molecular Biology, Division of Allergy, Critical Care and Respiratory Medicine, Department of Medicine, Duke University Medical Center, Durham, NC 27710, USA

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Superoxide dismutases are involved in cellular antioxidant defense mechanisms against the oxidative damage mediated by superoxide anion radicals which are generated intracellularly during normal metabolism (1). Two distinct types of superoxide dismutases have been found in mammalian cells. The copper-zinc-containing superoxide dismutase consisting of two identical subunits is found principally in the cytosol (2), and the manganese-containing superoxide dismutase consisting of four identical subunits is found predominately in the mitochondrial matrix (3,4). We have isolated cDNA clones coding for the rat copper-zinc-containing superoxide dismutase from a Sprague-Dawley rat liver λ gt10 cDNA library (Clontech Laboratories, Inc., Palo Alto, CA) by cross hybridization with the corresponding human cDNA (5,6). Sixty hybridized clones were recovered from ~ 350,000 recombinant bacteriophages. The nucleotide and deduced amino acid sequences of one of these clones containing the entire coding region are shown in Figure 1. The deduced amino acid sequence of the 154 amino acids of rat copper-zinc-containing superoxide dismutase possesses 83.1% identity with the corresponding human enzyme (5,6).

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      1
      Met Ala Met Lys
GTTTTCACC TTCGTTTCT CGGCGGCTT CTGTGCTCTC CTTGCTTTTT GCTCTCCAG GTTCCGAGGC CGCCGCGGT CTCCCGGGA AGC 30  ATG GCG ATG AAG 105
      10
Ala Val Cys Val Leu Lys Gly Asp Gly Pro Val Gln Gly Val Ile His Phe Glu Gln Lys Ala Ser Gly Glu Pro Val Val Val Ser Gly
GCC GTG TGC GTG CTG AAG GGC GAC GGT CCG GTG CAG GGC GTC ATT CAC TTC GAG CAG AAG GCA AGC GGT GAA CCA GTT GTG GTG TCA GGA 195
      40
Gln Ile Thr Gly Leu Thr Glu Gly Glu His Gly Phe His Val His Gln Tyr Gly Asp Asn Thr Gln Gly Cys Thr Thr Ala Gly Pro His
CAG ATT ACA GGA TTA ACT GAA GGC GAG CAT GGG TTC CAT GTC CAT CAA TAT GGG GAC AAT ACA CAA GGC TGT ACC ACT GCA GGA CCT CAT 285
      70
Phe Asn Pro His Ser Lys Lys His Gly Gly Pro Ala Asp Glu Glu Arg His Val Gly Asp Leu Gly Asn Val Ala Ala Gly Lys Asp Gly
TTT AAT CCT CAC TCT AAG AAA CAT GGC GGT CCA GCG GAT GAA GAG AGG CAT GTT GGA GAC CTG GGC AAT GTG GCT GCT GGA AAG GAC GGT 375
      100
Val Ala Asn Val Ser Ile Glu Asp Arg Val Ile Ser Leu Ser Gly Glu His Ser Ile Ile Gly Arg Thr Met Val Val His Glu Lys Gln
GTG GCC AAT GTG TCC ATT GAA GAT CGT GTG ATC TCA CTC TCA GGA GAG CAT TCC ATC ATT GGC CGT ACT ATG GTG GTC CAC GAG AAA CAA 465
      130
Asp Leu Gly Lys Gly Asn Glu Glu Ser Thr Lys Thr Gly Asn Ala Gly Ser Arg Leu Ala Cys Gly Val Ile Gly Ile Ala Gln
GAT GAC TTG GGC AAA GGT GGA AAT GAA GAA AGT ACA AAG ACT GSA AAT GCT GGA AGC CGC TTG GCT TGT GGT GTG ATT GGC CAA 555
      140
TAA ACATCCCTA  TGTGCTGTA  GTCTCAGACT  CATCTGCTGT  CCTGCTAAAC  TGTAGAAAAA  AACCAACCA  TTAACCTGTA  ATCTTAACAG  TTAACAAAAA  AAAAAA

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Figure 1. Nucleotide and deduced amino acid sequences of rat copper-zinc-containing superoxide dismutase cDNA.

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