

Abstract

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Mechanism and atomic structure of superoxide dismutase.

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BACKGROUND: The active site Cu ion in Cu,Zn superoxide dismutase is alternately oxidized and reduced during the enzymatic dismutation of superoxide to hydrogen peroxide and molecular oxygen.

METHODS: For oxidized Cu,Zn superoxide dismutase, an atomic structure has been determined for the human enzyme at 2.5 Å resolution. The resolution of the bovine enzyme structure has been extended to 1.8 Å. Atomic resolution data has been collected for reduced and inhibitor-bound Cu,Zn superoxide dismutases, and the interpretation of the electron density difference maps is in progress.

CONCLUSION: The geometry and molecular surfaces of the active sites in these structures, together with biochemical data, suggest a specific model for the enzyme mechanism.

Similarities in the active site geometry of the Mn and Fe superoxide dismutases with the Cu,Zn enzyme suggest that dismutation in these enzymes may follow a similar mechanism.

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