

Crystal Structures of Serine Racemase from *S. Pombe*

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Free D-serine has been found to be confined predominantly to the forebrain structure of mammals and persists at high levels throughout embryonic and postnatal life. Several reports strongly suggest that serine racemase exists in mammalian brain and produces D-serine, an endogenous ligand for N-Methyl-D-Aspartate receptor. Serine racemase requires pyridoxal 5'-phosphate and catalyzes racemization from L-serine to D-serine. Surprisingly, the distribution of putative serine racemase is not limited to higher animals. Mouse serine racemase might fall on a new class of pyridoxal amino acid racemases, which is distinct from both bacterial and fungal alanine racemases, but is similar to bacterial threonine dehydratase in primary structure.

S. pombe gene homologous with mouse serine racemase is overexpressed in *E. coli*. The enzyme is purified and crystallized. Three-dimensional structures of serine racemase in its unliganded form and complexed with the AMP-PCP of activator have been determined at 1.7 and 1.9 Å resolution, respectively. The enzyme is a homodimer, and each subunit is divided into small and large domains. Based on its folding, the enzyme belongs to fold type II. Interestingly, these structures show that an activator is bound at the subunit interface away from the active site PLP.

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