

E0008

The Crystal Structure of Fms1 Reveals the Substrate Specificity of Polyamine Oxidase. Qingqiu Huang¹, Qun Liu¹ and Quan Hao^{1,2}; ¹MacCHESS, Cornell Univ., Ithaca, NY, USA; ²Inst. of Physics, Chinese Academy of Sciences, Beijing, China.

Polyamine oxidase (PAO) is an enzyme that catalyzes the oxidation of polyamines. The substrate specificity and the products of the oxidation of PAO depend on the source of the enzymes. The PAOs from plant and bacteria can oxidize both spermidine and spermine to produce 4-aminobutyraldehyde and 3-(aminopropyl)-4-aminobutyraldehyde, respectively, and a common product 1,3-diaminopropane. Like the animal PAOs, Fms1, a PAO from *Saccharomyces cerevisiae*, can oxidize spermine, N¹-acetylspermine and N¹-acetylspermidine, but not spermidine(1). Fms1 converts spermine into β -alanine and spermidine which is essential for hypusine biosynthesis and growth in *Saccharomyces cerevisiae*(2). We have determined the crystal structure of Fms1 by using the Se-SAD method with programs SAPI/ABS/OASIS/DM/ARP/wARP. The overall structure of Fms1 is similar to that of the PAO from *Zea mays*(3), containing two domains and a long U-shaped catalytic tunnel at the interface of the two domains, although the two enzymes have low homology in their amino acid sequences. However, the catalytic tunnel of Fms1 is much shallower than that of the *Zea mays* PAO due to the peptide 451-453 and the huge side chain of the residue F454 located at the bottom of the tunnel. The arrangement of the residues around the tunnel of Fms1 is also different from that of the *Zea mays* PAO. These differences result in the different substrate binding pattern of the two enzymes, and therefore the different substrate specificity and different oxidation products.

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