

# **Structural and kinetic studies of bifunctional and monofunctional proline catabolic enzymes**

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## **Abstract**

Oxidation of proline to glutamate occurs through two consecutive enzymatic reactions catalyzed by proline dehydrogenase and P5C dehydrogenase. In some bacteria, these two enzymes are fused together to make a bifunctional enzyme called PutA. However in eukaryotes, these enzyme activities are on two separate polypeptide chains. I have solved the crystal structure of bifunctional PutA from *Bradyrhizobium japonicum* and of monofunctional P5C dehydrogenase from human and mouse. The structure of bifunctional PutA showed a channel connecting the proline dehydrogenase and P5C dehydrogenase active sites, which suggests the possibility of substrate channeling in PutAs. The phenomenon of substrate channeling was also studied by kinetics. The structure of human and mouse P5C dehydrogenase help us in understanding the molecular basis of type II hyperprolinemia.