Structures of A Novel *N*-acetyl-L-ornithine Transcarbamylase

Dashuang Shi[a], Xiaolin Yu[a], Lauren Roth[b], Hiroki Morizono[a], Norma M. Allewell[b], Mendel Tuchman[a], [a]*Children's National Medical Center, George Washington University.* [b]*College of Life Science, University of Maryland, USA*. E-mail: dshi@cnmcresearch.org

N-acetyl-L-ornithine transcarbamylase, a new member of the transcarbamylase family, is an essential enzyme to synthesize arginine in a few of eubacteria. Since this enzyme is not present in other bacteria, plants, animals and human, *N*-acetyl-L-ornithine transcarbamylase could provide a potential non-toxic target for specific inhibition to control certain agriculture and human pathogens. We report here the crystal structures of the binary complexes of enzyme from *Xanthomonas campestris* with its substrate carbamoyl phosphate or *N*-acetyl-L-ornithine only and the ternary complex with carbamoyl phosphate and *N*-acetyl-L-norvaline. Comparison of the structures of the enzyme in the different substrate binding states demonstrates that the binding mechanism of this novel transcarbamylase is different from those of aspartate and ornithine transcarbamylases. The enzyme can bind carbamoyl phosphate and *N*-acetyl-L-ornithine independently, and does not require one of substrate binds first in order to bind the second substrate. The main conformational change is the ordering of the 80's loop upon binding the carbamoyl phosphate besides a small domain closure around the active site. The structures of the complexes provide insight into how the enzyme facilitates the carbamoyl group transfer, and provide a starting point for inhibitor design.

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