Crystallographic Study of the Archaeal DNA Repair Enzymes: EXOIII and APE

Chieko Naoe[a,c], Shuichi Miyamoto[b,c], Masaru Tsunoda[a], Kazuo T. Nakamura[a], *[a]School of Pharmaceutical Sciences, Showa University, Japan. [b]School of Pharmaceutical Sciences, Sojo University, Japan. ([c]equal contribution)*. E-mail: naoe@pharm.showa-u.ac.jp

The apurinic/apyrimidinic (AP) sites occur frequently and spontaneously. They are both cytotoxic and highly promutagenic due to a lack of coding information. All organisms have mechanisms to repair this DNA damage, specifically by the base excision repair (BER).

The AP site endonuclease (APE) catalyzes an important step in BER pathway, in which the enzyme first recognizes the AP site and then cleaves the DNA backbone 5' to the AP site. The exodeoxyribonuclease III (EXOIII) is 3' to 5' directed DNA exonuclease. Although these two enzymes belong to the same family and their primary sequences are similar to each other, they have different nuclease activities.

To reveal structurally the reaction mechanisum and the specific recognistion of DNA, we crystallized EXOIII and APE from *Sulfolobus tokodaii* strain7.

*St*EXOIII and *St*APE crystals are obtained using the vapor diffusion method. *St*EXOIII crystal diffracts at 1.7 Å resolution with R_{merge} of 7.7% using synchrotron radiation at 100K. It belongs to the spacegroup $C222_1$ with unit cell dimensions of a = 48.0, b = 155.0, c = 75.3 Å. There is a monomer in an asymmetric unit.

Keywords: protein crystallization, DNA repair enzymes, archean