

Biochemical Characterization of the Kinase Activity of the DNA Repair Enzyme PNKP from *C. elegans*

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DNA damage by genotoxic agents such as ionizing radiation or reactive oxygen species is likely to occur in the DNA of all living organisms. Therefore the cells of living organisms have developed complex protein networks overtime to help discover and repair DNA damage (Bernstein et al. 2005). Polynucleotide Kinase/Phosphatase (PNKP) is an enzyme that plays a crucial role in repairing a type of DNA damage known as DNA strand breaks (Bernstein et al. 2005). This enzyme has 3 domains, a kinase domain at the C-terminal, a phosphatase domain at the center, and an FHA domain at the N-terminal (Figure 1) (Bernstein et al. 2008). The kinase and phosphatase domains are responsible for directly repairing DNA strand breaks while the FHA domain is responsible for binding PNKP to other DNA repair enzymes (Bernstein et al. 2008).

The general objective of this study is to analyze the kinase activity of PNKP derived from *C. elegans* (CePNKP) in comparison to PNKP derived from humans (hPNKP) by conducting kinase assays. A long term goal for this research is to characterize useful orthologs of PNKP for structural studies of an inhibitor binding to this enzyme.

Results from this research showed that the kinase activity of CePNKP is more selective for the recessed 5' terminus compared to the kinase activity of hPNKP, and this suggests that it might possibly be a good model for hPNKP.

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