Title: Nucleic Acid-Protein Crystallography Facilitated by Selenium-Nucleic Acids (SeNA)

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Abstract

Selenium-atom-specifically-derivatized nucleic acids (SeNA) can offer nucleic acid-protein crystallography with many unique and novel strategies via the enhanced properties (such as facilitated crystallization, phase determination and high-resolution diffraction) without significant perturbation of nucleic acids and their protein complexes in 3D structures. In addition to the ability to store genetic information and participate in gene replication, transcription and translation, nucleic acids can fold to well-defined 3-dimensional structures and their structures can be readily adjusted to perform specific functions (such as signal transduction, catalysis, diagnosis and therapeutic applications). Although functions of numerous nucleic acids in catalysis, gene expression regulation, protein binding and therapeutics have been well demonstrated, structures of the nucleic acids and their protein complexes largely remain elusive, especially high-resolution structures. Recently, we have established a selenium strategy for nucleic acid derivatization. This novel Se-atom-specific derivatization and functionalization will provide important tools to study nucleic acids and their protein interactions, to investigate nucleic acid-protein structure/folding, recognition and catalysis, to study and improve biochemical and biophysical properties of nucleic acids, and to discover potential nucleic acid diagnostics and therapeutics. Herein, our presentation in X-ray crystallography and neutron crystallography will focus on the most recent progresses on our SeNA technologies and their applications in structure-function studies and molecular diagnosis-medicine discovery. Work is supported by NIH ES026935.

Selected Publications:


