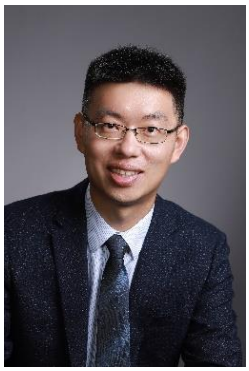
Chemical Biology of Xeno-Nucleic Acids (XNAs)



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Abstract

Xeno-nucleic acids (XNAs) are synthetic genetic polymers that are structurally distinct from DNA and RNA. XNAs possess superior biological stability and diverse chemical functionality, and thus offer promising molecular tools for biomedical applications. Our recent work has been focusing on developing functional XNA molecules, including XNA aptamers and catalysts, which provide chemical biology tools for selective gene silencing and targeted protein degradation.

We primarily studied threose nucleic acid (TNA), and identified TNA aptamers and TNAzymes that exhibited unique advantages in various biomedical scenarios. 1) We isolated an RNA ligase TNAzyme that site-specifically introduced an unnatural phosphodiester linkage in RNA. This TNAzyme offers a novel tool for fundamental research of RNA structure-activity relationship. 2) We produced an RNA-cleaving TNAzyme that was capable of discriminating single point mutation in its substrate. This TNAzyme could be used to mediate cell-selective gene silencing. 3) We generated biostable TNA aptamers towards therapeutic protein targets such as c-Myc and PD-L1. These TNA aptamers specifically recognize the target proteins and could be utilized in targeted protein degradation and cancer immunotherapy.

Biography

Hanyang Yu is currently a professor at College of Engineering and Applied Sciences, Nanjing University. He obtained his bachelor's degree from Peking University, and doctoral degree from Arizona State University. After a postdoctoral training at Yale University, he started his research lab in Nanjing University in 2015. His research interest is nucleic acid chemical biology, primarily focusing on xeno-nucleic acids (XNAs). He has published research articles in journals such as *Nature Chemistry* and *Journal of the American Chemical Society*.