Application of modified nucleobase: new design and study tool for biomolecular interaction and engineering

백승필†, 장의경, 여기백, 박기성, 민기하, 김성호, 손려강
고려대학교
(spack@korea.ac.kr†)

Previously, we proposed the use of a unique modified nucleobae, oxanine (Oxa), as a novel cross-linker for covalent linkage of DNA with amine-modified solid materials. Basically, Oxa is a lesion formed by the nitrosative oxidation of guanine (Gua).The specialty of Oxa is that it has an O-acylisourea structure in the base ring. Oxa can react with easily accessible nucleophile in biomolecules without any activation steps. It was confirmed that DNA containing Oxa interacts with nucleoproteins to form a cross-linked product, suggesting an adduct-mediated genotoxic mechanism. Several studies have characterized the biochemical properties of Oxa. O-acylisourea of Oxa is maintained stably against hydrolysis. Unlike the Gua nucleoside, the N-glycosidic bond of the Oxa nucleoside is not easily cleaved. Moreover, Oxa forms hydrogen bonds with cytosine or thymine, so that Oxa could be well positioned in the DNA duplex structure. Oxa nucleotides could be also recognized as substrates by DNA-modifying enzymes or by polymerase. Here, we summarize the results of Oxa in terms of new design and study tools for biomolecular interaction and engineering.