JSPS Special Seminar

Mirror Image Oligonucleotides:
New Opportunities in Biotechnology

Lecture:

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Group web page

Abstract:

Despite enormous promise, molecular probes and other devices constructed from nucleic acids remain poorly suited for application in biological environments. In particular, exogenously delivered DNA and RNA are susceptible to degradation by cellular nucleases and off-target interactions with endogenous macromolecules, both of which impede performance. Our laboratory is pursuing the use of L-(deoxy)ribose nucleic acids (L-DNA and L-RNA), which are mirror images (i.e., enantiomers) of natural D-nucleotides, as a potential solution to this problem. As enantiomers, D- and L-oligonucleotides are identical in terms of their physical and chemical properties, yet L-oligonucleotides are more orthogonal to the stereospecific environment of native biology. Consequently, L-oligonucleotide-based technologies evade typical biological interference, including nuclease degradation, thereby overcoming a key barrier to employing nucleic acids-based technologies in living systems.

In this presentation, I will discuss a unique chimeric D/L-DNA architecture for constructing intracellular probes of DNA repair, which are being used to study DNA repair biology and to develop therapies targeting repair enzymes. I will also discuss our recent efforts to characterize the intracellular behavior of L-oligonucleotides and to establish an L-oligonucleotide “interactome”, which is expected to have a broad impact on how future L-oligonucleotide-based technologies are designed and applied.

May 19th(Mon) 2025,16:00~17:00

@North campus 7th building, 1F community hall

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