

Nucleic Acids as Drugs and as Catalysts

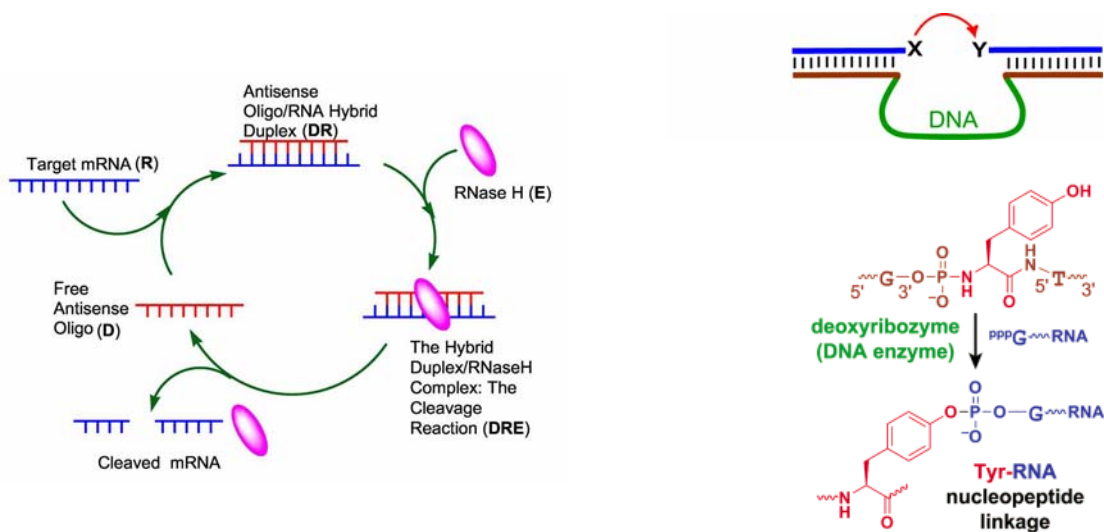
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Applications of chemically synthesized nucleic acids are increasingly gaining attention in biology and medicine. Antisense technology employs single stranded oligomeric DNAs for gene down-regulation by targeting disease related messenger RNAs, and it is evolved as the most matured therapeutic application of nucleic acids. In the first part of the lecture, the development of a novel chemically modified Antisense Oligonucleotide (AON) as a therapeutic agent will be presented. *North-East* conformationally constrained oxetane nucleosides [1-(1',3'-*O*-anhydro- β -D-*psicofuranosyl*)nucleosides] have been synthesized and evaluated for their antisense potentials using various biochemical and cell biology techniques.

In the second part of lecture search for novel deoxyribozymes (DNA enzyme or DNAzymes) that are capable of catalyzing bioorganic reactions such as the formation of nucleopeptide linkages will be presented. DNA enzymes are homogeneous DNA molecules with particular well-defined sequences that can catalyze specific chemical reactions. We have employed a combinatorial biology technique called *in vitro* selections to discover DNA enzymes that can ligate a DNA-bearing amino acid to another RNA bearing 5'-triphosphate through the nucleophilic substitution reaction between the functional group on the amino acid (OH of serine and tyrosine) and the 5'-triphosphate.



References

- (1). **Pradeepkumar, P. I.**; Cheruku, P.; Plashkevych, O.; Acharya, P.; Gohil, S.; Chattopadhyaya, J. Synthesis, physicochemical and biochemical studies of 1',2'-oxetane constrained adenosine and guanosine modified oligonucleotides, and their comparison with those of the corresponding cytidine and thymidine analogs. *J. Am. Chem. Soc.* **2004**, *126*, 11484-11499.
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