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Abstract

Aptasensors for detection of small molecules

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Abstract:
Aptamers are polymeric molecules of oligonucleotides, peptide nucleic acids (PNAs), locked nucleic acids (LNAs), xeno-nucleic acids (XNAs) or any other modified nucleic acids. It can fold into distinct secondary and tertiary structures, bind to their targets (small inornaic molecules to large macromolecules like protein, whole cells etc.)with high affinity (dissociation constants may be nano- to picomolar range) and recognize their targets with high specificity that challenges antibodies and other biological ligands. Nucleic acid aptamers are selected from a random pool of oligonucleotides by an iterative process called SELEX (Systematic Evolution of Ligands by Exponential Enrichment Analysis), based on the principle which is similar to that of natural selection in evolution proposed by Charles Darwin over 150 years ago. These specific aptamers can be exploited for theranostic applications. Aptamers can easily be chemically synthesized and modified. Specific oligonucleotide aptamers can be screened against small toxic molecules like mycotoxins, pesticides and heavy metals which futher can easily be conjugated with methylene blue or ferrocene for the development of elctrochemical aptasensors. Thiol modified aptamers can be easily conjugated with gold nano particle (GNP) for label free detection of small molecules based on LSPR of GNPs. There are a specific class of aptamers which can bind with some fluorogen molecules like DFHBI, thiazole orange, thioflavin T and give rise to fluorescence enhancement. They are termed as "Light up aptamers". We can engineer the small-molecules specific aptamers to light up aptasensors for label free sensitive detection of plethora of targets.

Biography:
Arghya Sett completed his PhD on development of Aptamers against Breast cancer Protein biomerker from IIT Guwahati, India. During his postdoctoral research at

University of Bordeaux, he is involved in development of light up aptasensors for small molecules detection. He already published 9 peer-reviewed articles and a few more in process of communication. He is an associate member of American Association for Cancer Research and life-member of Indian Science Congress Association, Kolkata, India. He has been also nominated as a reviewer of a peer-reviewed journal.

Recent Publications:

1. Tuerk C, Gold L. 1990. Systematic evolution of ligands by exponential enrichment: RNA ligands to bacteriophage T4 DNA polymerase. Science 249: 505– 510.

2. Ellington AD, Szostak JW. 1990. In vitro selection of RNA molecules that bind specific ligands. Nature 346: 818.

3. Sett A, Das S, Bora U. 2014. Functional Nucleic-Acid-Based Sensors for Environmental Monitoring. Appl Biochem Biotechnol 174: 1073–1091.

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