

SELEX modifications and bioanalytical techniques for aptamer-target binding characterisation

Abstract

The quest to improve the detection of biomolecules and cells in health and life sciences has led to the discovery and characterization of various affinity bioprobes. Libraries of synthetic oligonucleotides (ssDNA/ssRNA) with randomized sequences are employed during Systematic Evolution of Ligands by Exponential Enrichment (SELEX) to select highly specific affinity probes called aptamers. With much focus on the generation of aptamers for a variety of target molecules, conventional SELEX protocols have been modified to develop new and improved SELEX protocols yielding highly specific and stable aptamers. Various techniques have been used to analyze the binding interactions between aptamers and their cognate molecules with associated merits and limitations. This article comprehensively reviews research advancements in the generation of aptamers, analyses physicochemical conditions affecting their binding characteristics to cellular and biomolecular targets, and discusses various field applications of aptameric binding. Biophysical techniques employed in the characterization of the molecular and binding features of aptamers to their cognate targets are also discussed.