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Synthesis and Characterization of Anti-Psychotic Drugs Based DNA Aptamers

Authors : Shringika Soni, Utkarsh Jain, Nidhi Chauhan

Abstract : Aptamers are recently discovered ~80-100 bp long artificial oligonucleotides that not only demonstrated their applications in therapeutics; it is tremendously used in diagnostic and sensing application to detect different biomarkers and drugs. Synthesizing aptamers for proteins or genomic template is comparatively feasible in laboratory, but drugs or other chemical target based aptamers require major specification and proper optimization and validation. One has to optimize all selection, amplification, and characterization steps of the end product, which is extremely time-consuming. Therefore, we performed asymmetric PCR (polymerase chain reaction) for random oligonucleotides pool synthesis, and further use them in Systematic evolution of ligands by exponential enrichment (SELEX) for anti-psychotic drugs based aptamers synthesis. Anti-psychotic drugs are major tranquilizers to control psychosis for proper cognitive functions. Though their low medical use, their misuse may lead to severe medical condition as addiction and can promote crime in social and economical impact. In this work, we have approached the in-vitro SELEX method for ssDNA synthesis for anti-psychotic drugs (in this case 'target') based aptamer synthesis. The study was performed in three stages, where first stage included synthesis of random oligonucleotides pool via asymmetric PCR where end product was analyzed with electrophoresis and purified for further stages. The purified oligonucleotide pool was incubated in SELEX buffer, and further partition was performed in the next stage to obtain target specific aptamers. The isolated oligonucleotides are characterized and quantified after each round of partition, and significant results were obtained. After the repetitive partition and amplification steps of target-specific oligonucleotides, final stage included sequencing of end product. We can confirm the specific sequence for anti-psychoactive drugs, which will be further used in diagnostic application in clinical and forensic set-up.

Keywords : anti-psychotic drugs, aptamer, biosensor, ssDNA, SELEX
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