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SELEX for identifying albumin binding DNA aptamers in a local setting – a preliminary study

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Aptamers are synthetic single-stranded DNA or RNA molecules which are capable of folding into defined 3-dimensional architectures and complex shapes thereby allowing for predictable and specific molecular interactions and complex formation with protein and small-molecule targets. This specific binding of aptamers with high affinity allows them to serve as antibody analogues paving the way for them to be used in a wide range of diagnostic and therapeutic domains. Systematic evolution of ligands by exponential enrichment (SELEX), the process of identifying aptamers is both time-consuming and a labor-intensive process. The current study aims to conduct SELEX in a local setting using a cost-effective approach to identify albumin-binding DNA aptamers. Eight SELEX cycles were conducted on a microtiter plate-based selection platform. Real-time amplification curve, melt curve and high-resolution melt curve were used as monitoring tools and the product of the final SELEX cycle was subjected to next-generation sequencing (NGS) analysis. Across the eight SELEX cycles, real-time PCR-based amplification curve analysis showed a gradual increase of bound fraction, while melt curve and high-resolution melt curve analysis showed a gradual reduction of aptamer pool diversity reflecting successful enrichment. The aptamer sequence with the highest frequency in the final SELEX pool was selected based on NGS results. The binding assay of this selected aptamer sequence with albumin revealed comparable binding affinities as compared to the control. Thus, the authors report successful attempts in the establishment of SELEX platform in the local setting with the potential to use this molecule in diagnostic platforms for the detection of albumin in future.

Keywords: Aptamer, SELEX, ssDNA, Monitoring, Real-time PCR

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