BasePair Biotechnologies, Inc.

What is an Aptamer? – Aptamers and SELEX

What is an Aptamer?

The term “Aptamer” was coined by Andy Ellington. It stems from the Latin terms “aptus,” meaning to fit, and

Structure of aptamer developed by Base Pair Biotechnologies to IL-7

“meros,” meaning part. Aptamers are short, single-stranded DNA or RNA (ssDNA or ssRNA) molecules that can selectively bind to a specific target, including proteins, peptides, carbohydrates, small molecules, toxins, and even live cells. Aptamers assume a variety of shapes due to their tendency to form helices and single-stranded loops. They are extremely versatile and bind targets with high selectivity and specificity. Rather than primary sequence, aptamer binding is determined by its tertiary structure. Target recognition and binding involve three dimensional, shape-dependent interactions as well as hydrophobic interactions, base-stacking, and intercalation. **Aptamers bind because they “fit” their targets.**

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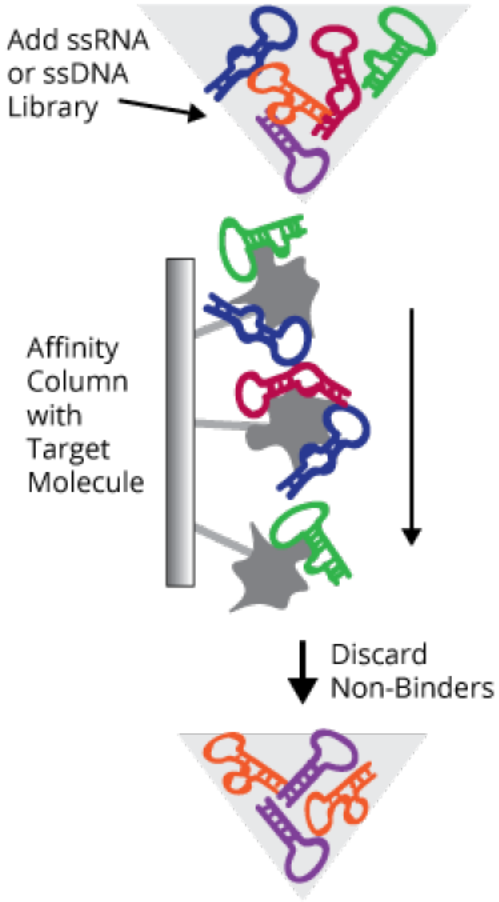
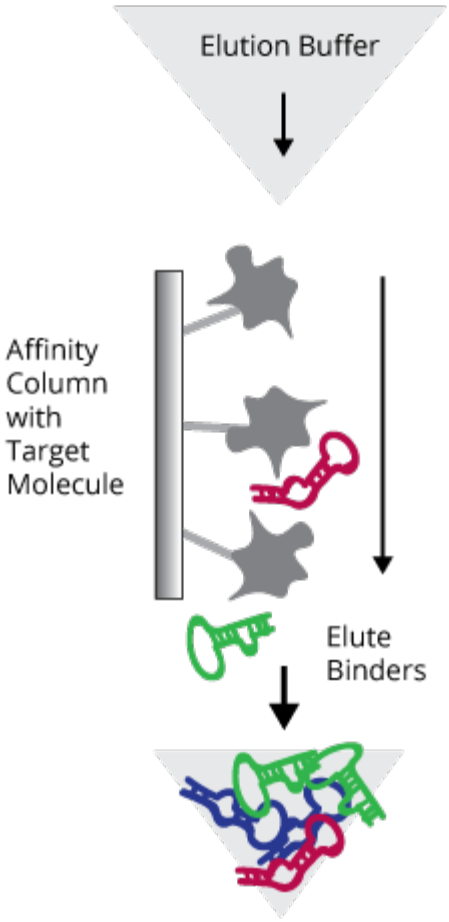
SELEX Aptamer Selection

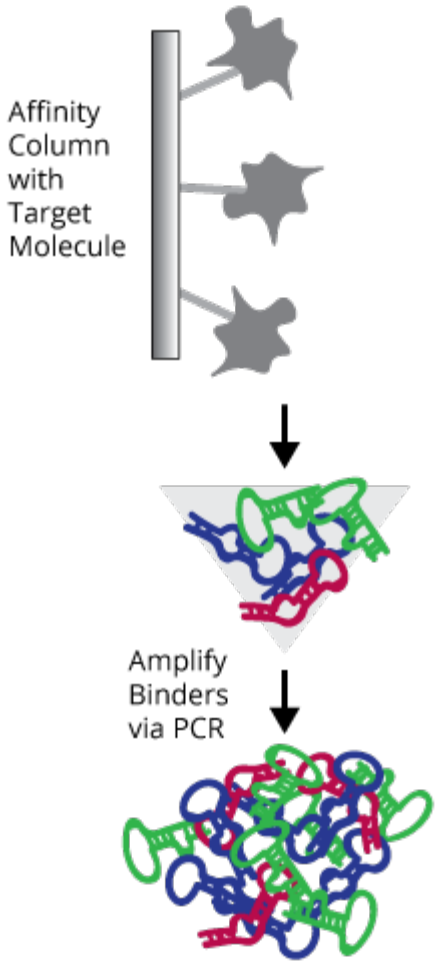
Aptamers with affinity for a desired target are selected from a large oligonucleotide library through a process called SELEX, which stands for Sequential Evolution of Ligands by Exponential Enrichment. Through an iterative process, non-binding aptamers are discarded and aptamers binding to the proposed target are expanded. Initial positive selection rounds are sometimes followed by negative selection. This improves the selectivity of the resulting aptamer candidates. Multiple rounds of SELEX are performed with increasing stringency to enhance enrichment of the oligonucleotide pool. Base Pair maintains several proprietary oligonucleotide libraries for use in aptamer selection. Base Pair has also patented a multiplex format of SELEX. **Learn more about multiplex SELEX**.

SELEX Step 1. Bind oligonucleotide library and discard non-binders

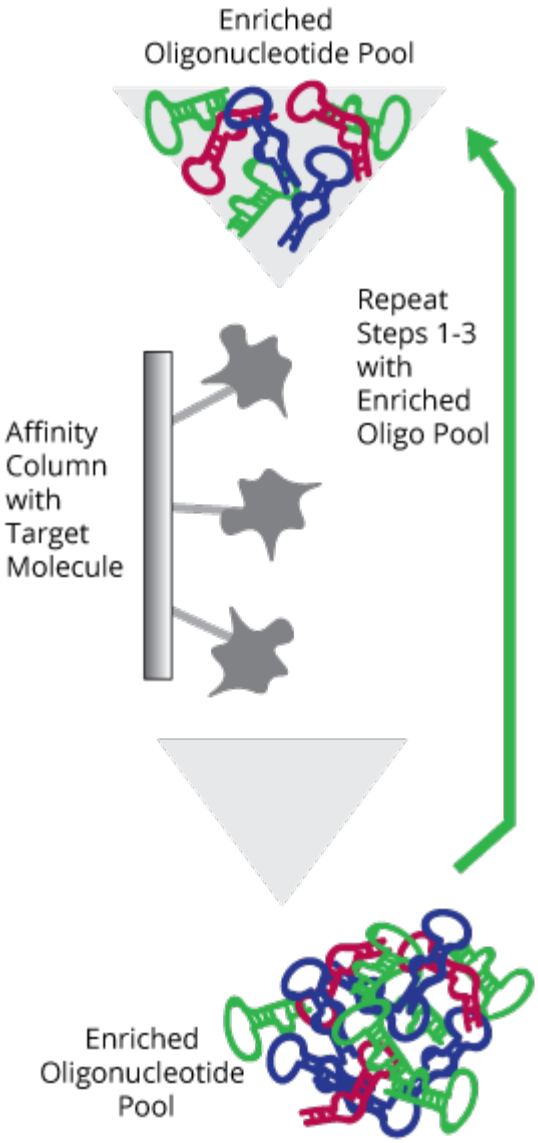




SELEX Step 3. Perform PCR to amplify eluted binders



SELEX Step 4. Repeat steps 1 through 3 using enriched oligonucleotide pool



Completion of SELEX Multiple rounds of SELEX (often 6 to 12) are typically performed. More challenging applications may require additional rounds. Alternate selection methods may be completed in fewer rounds. Selection design will vary based on the target of interest and end-use application.

Selection of Final Aptamer Sequences The SELEX process yields ~10^6 aptamer sequences. Identifying the best candidates is a specialized process employing a variety of analytical techniques at Base Pair. See the Custom Aptamer Discovery page for more information on aptamer characterization, optimization, and application.

Project-Specific SELEX Questions Base Pair aptamer

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