AFFINITY REAGENTS TO REPLACE ANIMAL-DERIVED ANTIBODIES

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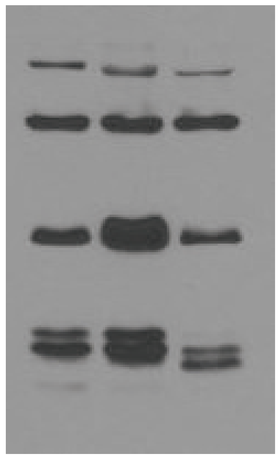
INTRODUCTION

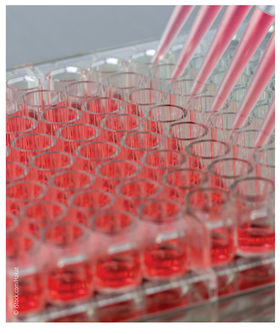
Affinity reagents, such as antibodies, are essential tools used in research to bind to a molecule to identify it or influence its activity. Researchers report a growing concern about the lack of quality and reproducibility of animal-derived antibodies, which often show poor specificity or fail to recognize their targets. Non-animal tools, including recombinant antibodies and aptamers, offer scientific, economic and time-saving advantages. These technologies can be used in all applications in which traditional antibodies are used.

APPLICATIONS OF RECOMBINANT ANTIBODIES AND APTAMERS



BASIC RESEARCH

- Identification and detection of the concentration of molecules, biological compounds, viruses, residues in food or diseased cells by conjugation with peptide tags, proteins or nanoparticles that give them fluorescent properties
- Commonly-performed assays, such as immunofluorescence microscopy, microarrays, immunocytochemistry, immunohistochemistry, flow cytometry, ELISA and blotting assays



REGULATORY TESTING

- Safety and efficacy testing for regulatory purposes (e.g., in an assay to determine vaccine potency, in quality control testing of therapeutic proteins, or in detection of environmental contaminants)

CLINICAL APPLICATIONS

- Imaging, including for treatment monitoring and cancer detection
- Therapeutics, by altering target activity or by delivery of therapeutic agents to target cells via conjugation to antibiotics, RNA interference, toxins, enzymes or drugs

RECOMBINANT ANTIBODIES

Recombinant antibodies are protein-based reagents that are selected from libraries of genes encoding slightly different antibody proteins for their affinity to bind to target antigens.

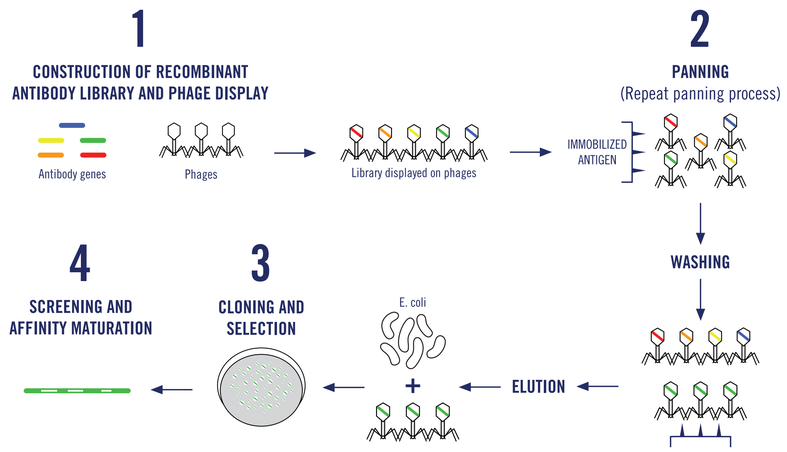


Figure: Recombinant antibody generation in phage

APTAMERS

Aptamers are short single-stranded DNA or RNA oligonucleotides and are similar to antibodies in that they can detect and characterize their targers and modify their activity. The process of screening large nucleic acid libraries to devlop aptamers is called SELEX.

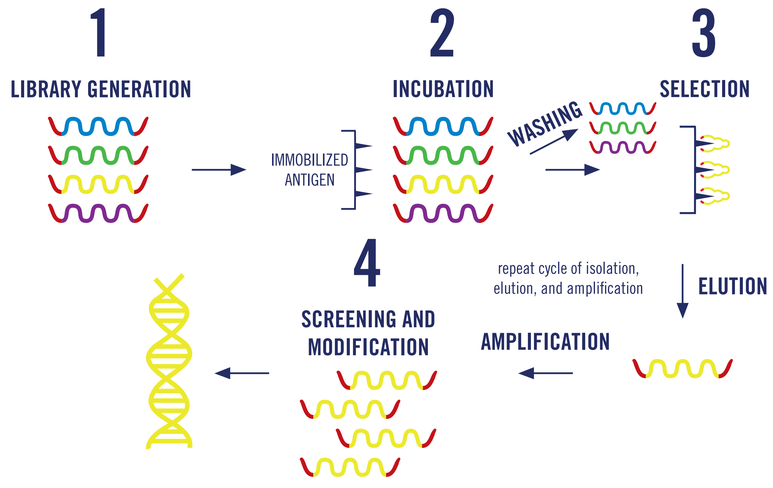


Figure: Basic concept of SELEX, of which there are various modifications

RECOMBINANT ANTIBODIES AND APTAMERS CAN:

- be produced more rapidly and with higher affinity levels and binding specificity.
- exhibit greater versatility allowing, for example, the ability to generate antibodies and aptamers against toxic or non-immunogenic antigens.
- limit batch-to-batch variation because the sequences are known and because their generation does not rely on biological processes.
- detect smaller amounts of antigen.
- elicit a reduced immune response compared to animal-derived antibodies when used in therapeutic applications because they are free from animal contaminants.
- be made without using animals.

RECOMMENDATIONS

- Researchers should become familiar with and use non-animal affinity reagents.
- Funding incentives should be made available for researchers to develop non-animal affinity reagents.
- Universities should establish core recombinant antibody or aptamer facilities in-house, generating their own human-derived antibody libraries or nucleic acid libraries.
- To facilitate the development of alternatives, a list of ascites produced antibodies used in research and testing and the justification for using the ascites method of production should be made publicly available.
- The US National Institutes of Health should commission an updated review of the 1999 National Research Council report Monoclonal Antibody Production and include ananalysis of non-animal affinity reagents.

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For more information, please see **PISCLtd.org.uk/Antibodies**