The AptaReport

Newsletter

SUMMER 2017

High-Resolution Fingerprint Apta-Reporter

Fingerprints are often used in forensic investigations, but there are typically problems with resolution when trying to visualize them. Identifying a specific individual requires that the fingerprint be imaged with a high level of detail. Zhao et al. have developed a method to visualize fingerprints using an aptamer to lysozyme, an enzyme universally present in sweat and therefore in fingerprints. This method uses surface-enhanced Raman spectroscopy (SERS) to determine the position of a probe that is conjugated to lysozyme aptamers.

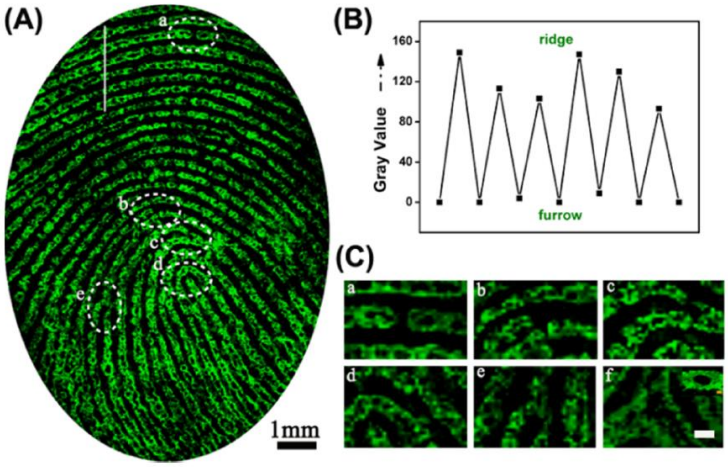


*Figure (adapted)**
A: High resolution imgae of a fingerprint formed from SERS data.
B: Example of SERS data.
C: Close-up of regions of fingerprints, often used in identification methods.

The aptamers bind to the lysozyme and hold the SERS probes in place on the fingerprint. A microspectrometer is then used to shine a laser at the fingerprint and measure the scattering caused by the probes. By measuring the level of scattering at certain areas, a high-resolution image of the fingerprint can be formed. More scattering or a higher gray value indicates a ridge in the fingerprint while a low value indicates a furrow.

-A.P.

*Reference: Apta-Index™ ID #623

Aptamer Mediated Niasomal Drug Delivery

Currently the effectiveness of cancer treating drugs is limited by two factors: penetration into tumor tissue and side effects due to the non-specific targeting of cells. Seleci et al. have developed a potential solution to these problems using an aptamer. MUC1 is a transmembrane protein that is over expressed in glandular cancers, which include pancreatic, breast, prostate, and ovarian cancer. By adding a MUC1 aptamer to a drug delivery system, the specificity and cytotoxicity of the system were increased.

Nonionic surfactant based vesicles called niosomes were PEGylated to form a delivery structure known as a PEGNIO. The cancer drug DOX was then loaded into PEGNIOs which were then modified by the addition of an aptamer peptide conjugate. The MUC1 aptamer was modified with an amine group on its 5′ end

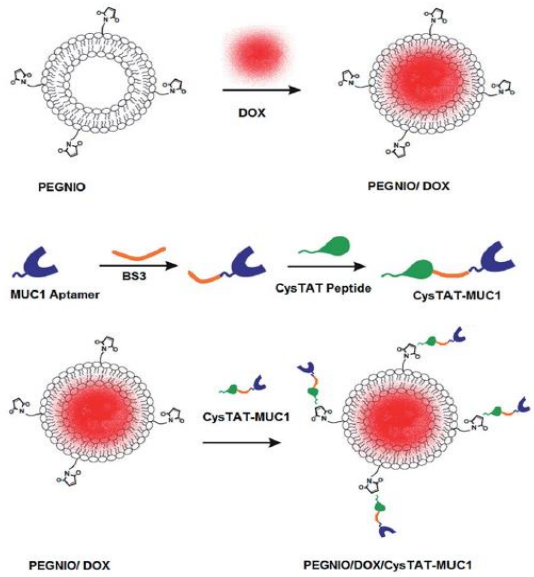


Figure (adapted) Diagram depicting preparation of PEGNIO construct used to deliver DOX.*

which was conjugated to TAT, a cell penetrating peptide, with the cross-linking agent BS3. The aptamer peptide conjugate was then attached to the surface of the PEGNIO by a thioether linkage. This resulted in a construct that would specifically bind to cells overexpressing MUC1 and then deliver DOX across the cell membrane.

-A.P.

*Reference: Apta-Index™ ID #622

The AptaReport

High-Efficiency Binding Aptamers for Wide-Range Bacterial Agents

Sepsis, a condition where the body's immune response injures its own tissues and organs, is often caused by bacterial infection. Sepsis has a high fatality rate due primarily to delays in diagnosis. Previously, the most sensitive method for the detection of sepsis involves conducting a bacterial culture of the patient's blood over several days. Grazianai et al. have developed aptamers which may result in a much quicker method with high sensitivity.

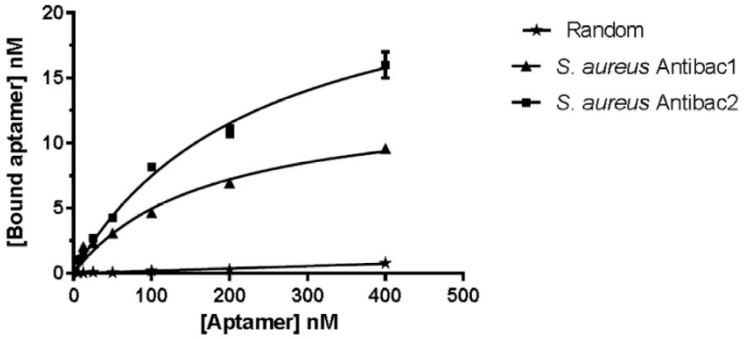


Figure (adapted) Graph depicting the amount of aptamers bound to sequences after a 45 minute incubation. Antibac1, Antibac2, and random sequences were compared.*

SELEX produced two different aptamers by selecting for sequences that bind to peptidoglycan, a polymer of sugars and amino acids that form the plasma membrane of most bacteria. Both candidates, Antibac1 and Antibac2, show high affinity binding to several different types of both Gram positive and Gram-negative bacteria. Using these aptamers and some form of reporter or bio-sensor probe, it is possible to make an assay to quickly check for the presence of bacteria in blood

-A.P.

*Reference: Apta-Index™ ID #624, #625

DEK-Targeting Therapeutic DNA Aptamers

Aptamers can serve as therapeutics by binding and inhibiting the activity of a protein target. In individuals with juvenile idiopathic arthritis (JIA), a buildup of neutrophil extracellular traps (NETs) in the synovia contributes to the inflammation characteristics of the disease. These NETs are extracellular structure excreted by neutrophils and formed around a nuclear chromatin protein called DEK, also secreted by neutrophils. The formation of NETs normally occurs as part of an immune response to infection, as they bind and kill microbial agents. Mor-Vaknin et al. have shown that injecting DTA 64, an aptamer against DEK, into the joints of mice with JIA reduces NET formation and inflammation. The same was shown with human neutrophils in-vitro in a comparative test between a random DNA sequence and DTA 64.

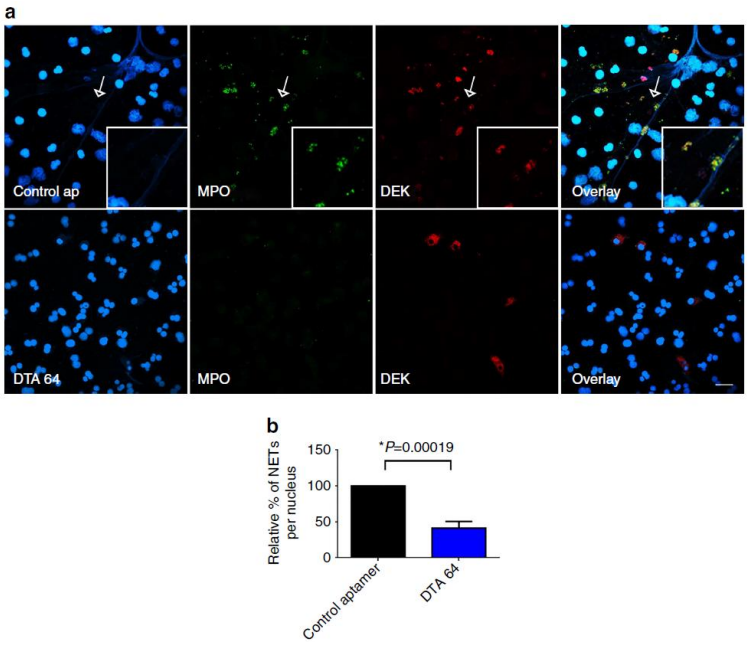


Figure (adapted) Showing strained aptamer, NETs, DEK, and an overlay for neutrophils exposed to either a random sequence or DTA-64. Note the DEK binding and blocking in DTA-64 exposed neutrophils.*

Human neutrophils were exposed to either DTA 64 or a control sequence, the amount of DEK binding was determined and NET formation was determined by staining with myeloperoxidase (MPO). It was shown that DTA 64 binds to and blocks, reducing the amount of NETs that can form.

-A.P.

*Reference: Apta-Index™ ID #626

Visit our online Apta-Index™

500+ available sequences

See the APTA-BEACON™ Difference

NO CAPTURING. NO WASHING. JUST READ....IN MINUTES!

Aptagen's "No Capturing. No Washing. Just READ" assay is a radical advancement in diagnostic technology. Aptagen, LLC has developed a sensitive diagnostic platform that can detect virtually any target or antigen (from small molecules to protein biomarkers and cells) in a variety of sample matrices. Unlike current diagnostic formats, such as the traditional ELISA method and the more recently popular Luminex® approach, Aptagen's Apta-Beacon™ assay eliminates the need for multiple target manipulation steps.

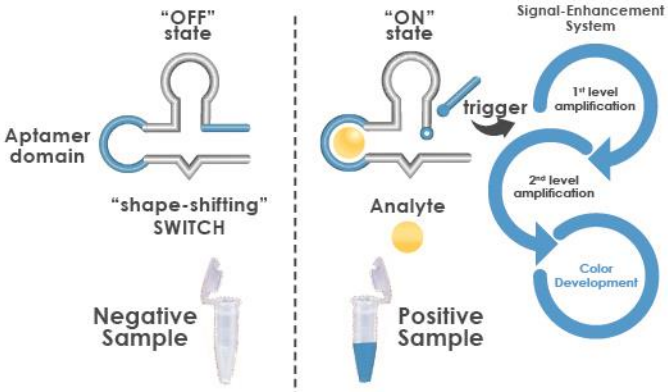
The Apta-Beacon™ platform requires neither capturing nor washing of sample(s), streamlining the analysis to quickly provide results with higher sensitivity.

Actual Results

Contact Us To Order The Apta-Beacon™ Demonstration Kit!

No More "Sandwich" Assays

Apta-Beacon™ Diagnostic Assay



Distinguish just a few atoms, free in-solution!

Technology Comparison Chart

	Antibodies	Aptamers	Apta-Beacons™
Stability/ Refolding		++++	++++
HIGH Affinity	++++	++++	++++
HIGH Selectivity	+	++++	++++
Unknown Biomarkers		++++	++++
Small Target Selectivity	+	++++	++++
Difficult Target Selectivity		++++	++++
One-Step Detection			++++
In-Solution Detection			++++

717-APTAGEN | 717-278-2436 | www.aptagen.com

Aptagen

"Forget Antibodies. Use Aptamers!"™

Aptagen
250 North Main Street
Jacobus, PA 17407

PRSRT STD
U.S. Postage
PAID
Aptagen, LLC

- COMPANY CONTACT –
- COMPANY NAME -
- COMPANY ADDRESS -
- COMPANY ADDRESS -

Antibody problems? Have difficult targets to develop effective ligands or antibodies?
What if an antibody doesn't exist for your target or antigen? No problem. Let Aptagen provide you with an alternative - the next evolution of an aptamer. You've heard about this new technology. Now, try it.

HIGH Affinity. HIGH Specificity.
Contact Us today for details.

Apta-Beacon™ Advantages:
- Large dynamic range of sensitivity.
- Binding to target analyte produces an output signal (fluorescent or colorimetric)
- No need for the cumbersome multi-step approach of ELISA assays.

Advancements at Local Biotechnology Company

Aptagen, LLC is a biotechnology company offering DNA and RNA, R&D services for use in diagnostics, drug discovery and therapeutics.

Aptagen was formed in 2004. Operations began in 2006. Aptagen is located in Jacobus, PA, a suburb of York, beautifully surrounded by Lake Redman and conveniently situated off of Interstate 83. The facility is a forty minute drive from Johns Hopkins University and Hershey Medical Center.

www.aptagen.com

Aptagen

Aptagen, LLC
250 North Main Street
Jacobus, PA 17407

717-APTAGEN
717-278-2436