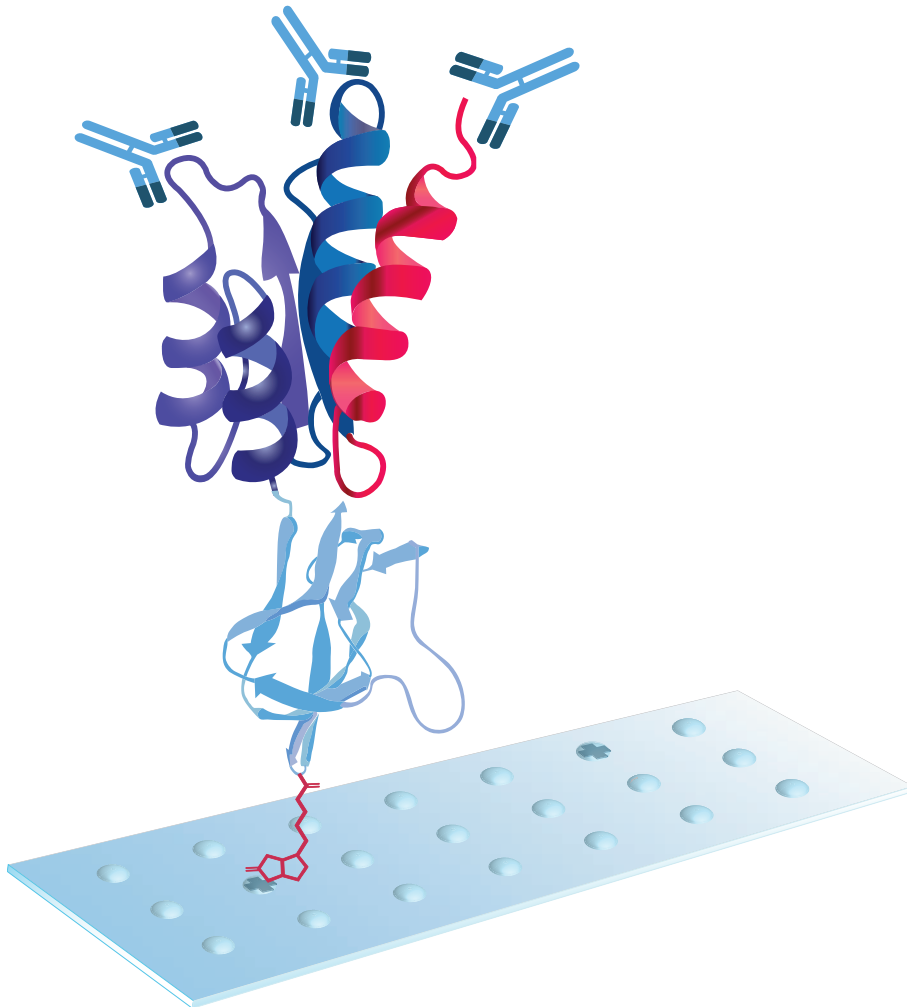




Unleashing the Power of Autoantibodies to Advance Precision Medicine

Driving discovery of next gen biomarkers with novel seromics technologies and services.



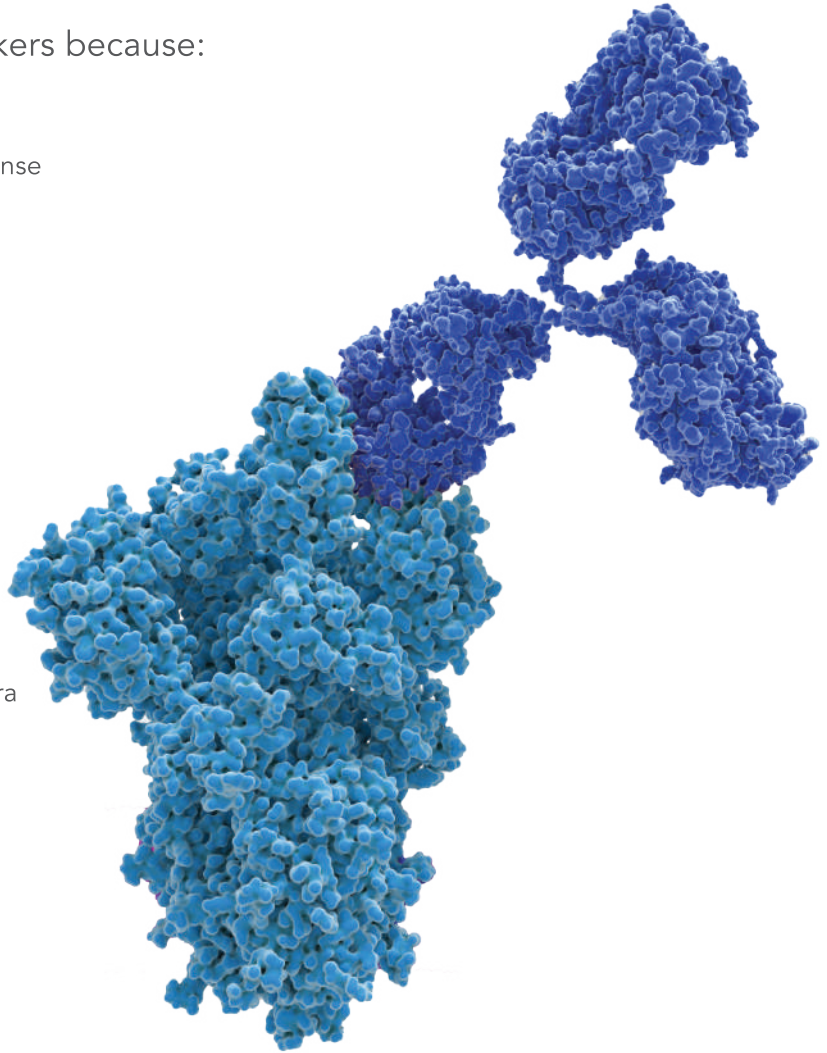
Our highly specific and reproducible protein microarray platform enables autoantibody profiling against thousands of antigens simultaneously.

Autoantibodies: Biomarkers Directly Correlated with Disease Status

Autoantibodies are typically associated with autoimmune disease but are often overlooked as a means of gaining a deeper understanding of a patient's immune state in many different diseases. As biomarkers, they hold tremendous promise for patient stratification, response prediction and the development of diagnostics and companion diagnostics.

Autoantibodies are excellent biomarkers because:

- MANIFEST IN DISEASE**
Produced as the result of an immune response
- APPEAR EARLY**
Produced early in disease progression
- TARGET SPECIFIC**
Highly specific antibody/epitope binding
- STABLE**
Easy to store and work with
- ABUNDANT**
Found at high concentrations in patient sera
- ACCESSIBLE**
Blood sample

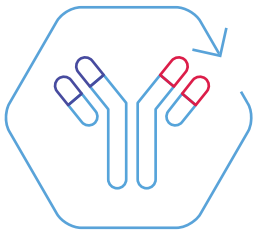


Autoantibodies arise in disease for several different reasons. Aberrant gene expression and mutation in disease tissues results in a unique set of proteins. These self-proteins can be immunogenic if they are over or inappropriately expressed, produced from variant genes, aberrantly post-translationally modified or proteolyzed or contain mutated epitopes. The result is mirrored in peripheral fluids because the humoral immune system is constantly surveilling and identifying disease-associated changes in the host proteome through the production of autoantibodies.

Applications

Tapping the power of autoantibodies to differentiate patient groups

Profiling autoantibodies can provide a deeper understanding of a patient's immune state, offering great promise for assessing disease and predicting treatment outcome. Autoantibody biomarkers validated using Sengenics protein arrays have shown utility in early disease detection, patient stratification, response prediction and the development of companion diagnostics.



Biomarker Discovery & Validation

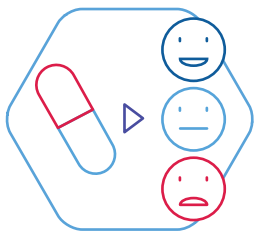
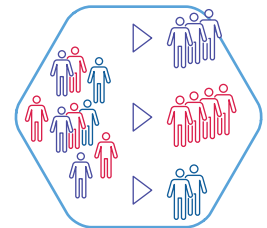
Identification of autoantibody biomarker signatures

High density protein microarray assays enable highly specific and reproducible detection of disease relevant autoantibodies directly from patient serum.

Patient Stratification

Intra-disease stratification, identification of cohorts and clinical trial patient enrichment

Predictive autoantibody biomarker signatures facilitate identification of drug responders and non-responders, and biologically relevant sub-cohorts. These insights drive more efficient and economical study designs and clinical trial patient enrichment.



Response Prediction

Predict responders, non-responders and those at risk for adverse events

Autoantibody biomarkers can be used to establish signatures for predicting if patients are likely to respond to treatment. Predictive signatures can also be used to identify patient populations likely to experience adverse events.

Diagnostics & CDx Development

Establish biomarker signatures for companion diagnostic development


Autoantibodies appear early in the course of disease and can be used to establish disease-specific signatures for early detection. Autoantibody signatures can play a role in the development of companion diagnostics to ensure patients receive the right treatments.

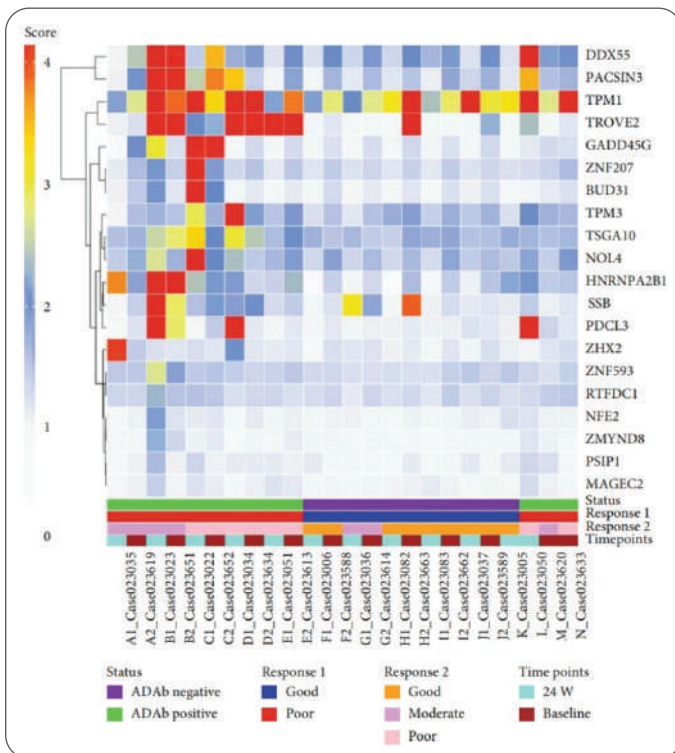
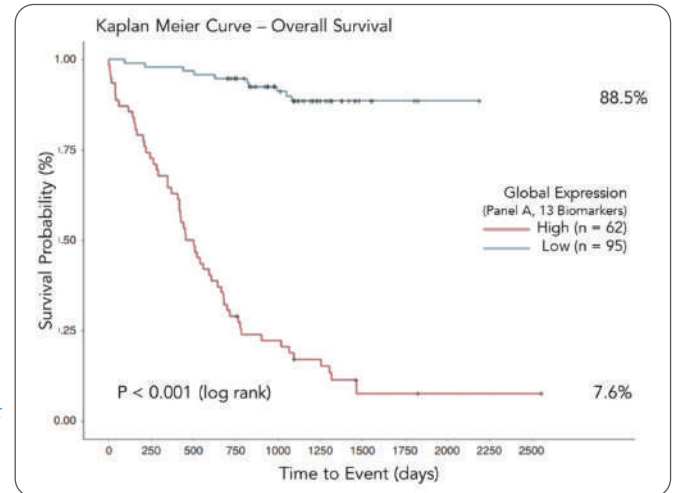


Case Studies

Predictive Autoantibody Biomarker Panel in Non-small Cell Lung Cancer


Kaplan Meier curve showing overall survival of patients with high and low expression of a 13-autoantibody biomarker signature in non-small cell lung cancer (NSCLC) patients who have undergone lung resection. Poor survivorship is demonstrated in patients with high expression of the signature with an overall 5-year survival rate of 7.6%.

 Patel, A.J., et al. *A Highly Predictive Autoantibody-based Biomarker Panel for Prognosis in Early-stage NSCLC with Potential Therapeutic Implications, British Journal of Cancer (2021).*



Candidate Autoantibody Biomarkers for Anti-drug Antibodies in Rheumatoid Arthritis Patients

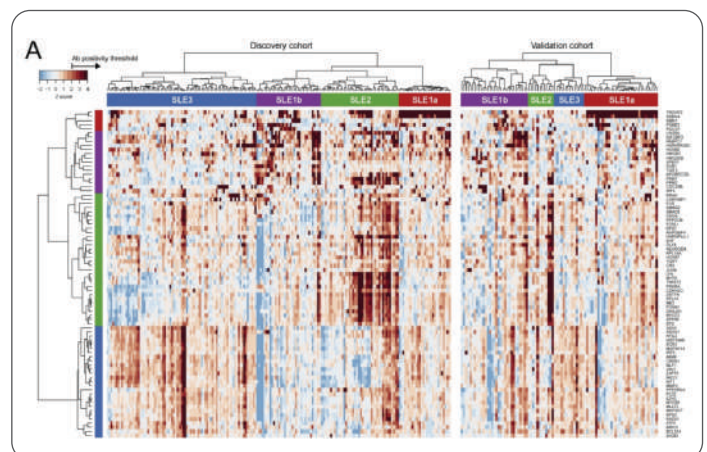
Candidate autoantibody biomarkers for the prediction of anti-drug antibody (ADAb) development in adalimumab treated rheumatoid arthritis patients. Heat map of autoantibody presence and hierarchical clustering for the presence or absence of anti-drug antibody and clinical response. Plasma samples were taken at baseline and post 24 weeks of adalimumab therapy. Autoantibody levels were measured in RFU and are represented on a color scale.

 Chen, P., et al., *Anti-TROVE2 Antibody Determined by Immune-Related Array May Serve as a Predictive Marker for Adalimumab Immunogenicity and Effectiveness in RA, Journal of Immunology Research (2021).*

Patient Stratification in Systemic Lupus Erythematosus

Heatmap of unsupervised hierarchical clustering of 79 validated autoantibodies in SLE patients from discovery (n = 186) and validation (n = 91) cohorts. Autoantibodies cluster into four distinct groups. These clusters plausibly represent distinct molecular sub-types of SLE, with different disease trajectories and different responses to treatment.

 M.J. Lewis, et al., *Autoantibodies Targeting TLR and SMAD Pathways Define New Subgroups in Systemic Lupus Erythematosus, Journal of Autoimmunity (2018).*



Services & Products

Sengenics offers services and products that enable identification and validation of autoantibody signatures to advance your biomarker programs.

Our experts will collaborate with you to optimize study power and design and provide experienced bioinformatic analysis with every service project.

Autoantibody Profiling: *Discover and validate autoantibody biomarker signatures*

i-Ome® Panel

1,600+ autoimmune and cancer related antigens

CTA Panel

Over 200 clinically relevant cancer antigens

Pan-Autoimmune Panel

Curated collection of 100+ antigens relevant in a variety of autoimmune diseases

Oncology Drug Screening: *Fast and efficient screening of immuno-oncology drug targets*

OncoREX p53 Panel

Over 100 wild type and mutant variants of the p53 protein

Systems Serology: *Dive deeper into the humoral immune response*

Ig Isotype Profiling

Distinguishing antibody isotypes and subtypes provides valuable insight into patient immune status

PTM Profiling

PTMs create neo-epitopes that can drive the generation of novel autoantibodies

Vaccine Development: *Antibody profiling to support vaccine development*

ImmuSAFE COVID - 19

Determine Ab levels and neutralization capability against different spike and nucleocapsid proteins as well as response to key cytokines

Custom Arrays: *Flexible formats for high throughput screening*

Custom Arrays

Our technical sales consultants, scientists, and bioinformaticians collaborate with you to design tailor-made arrays and assays to meet your exact project needs

Products: *Accelerate biomarker research in your own lab*

i-Ome® Protein Array Kit

Profile against 1,600+ autoimmune & cancer related antigens

Protein Arrays

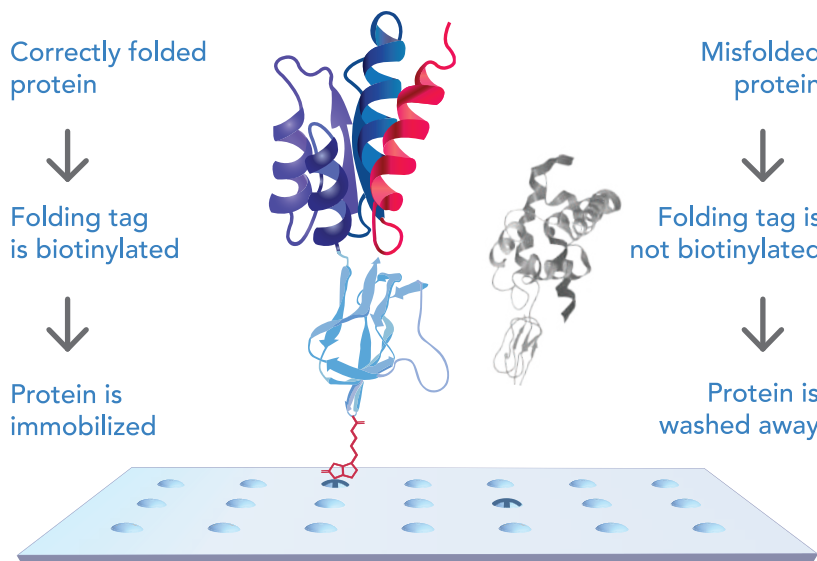
Get in touch to explore array sales for large scale projects

KREX[®] Protein Folding Technology

Our patented KREX[®] protein-folding technology accelerates discovery of autoantibody biomarkers by enabling expression of functional proteins to create high-density arrays. It provides a simple and rapid way to immobilize and purify correctly folded proteins for the detection of autoantibodies.

How does it work?

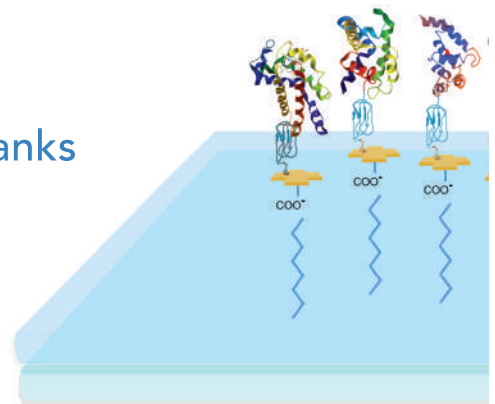
- KREX ensures that only correctly folded proteins are immobilized on the array surface.
- Misfolded proteins are prevented from attaching and are washed away.
- Immobilized proteins retain their folded structure, behaving as if they are in free solution on the hydrogel-coated array surface.
- This ensures each assay is run on correctly folded, full-length, functional proteins—crucial for autoantibody-based assays where more than 90% of antibodies recognize conformational epitopes that are only available if the protein is correctly folded.



Check out our explainer video to see the technology in action

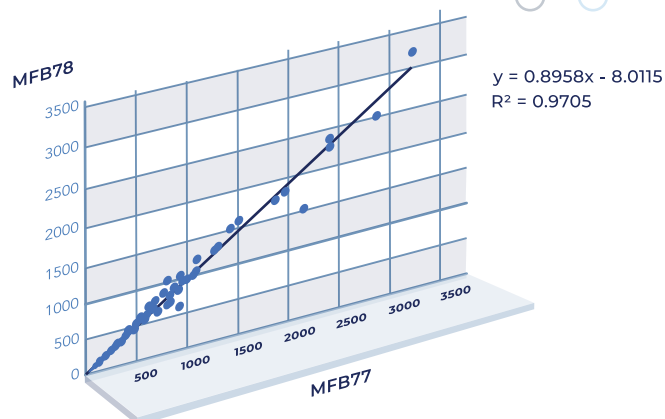
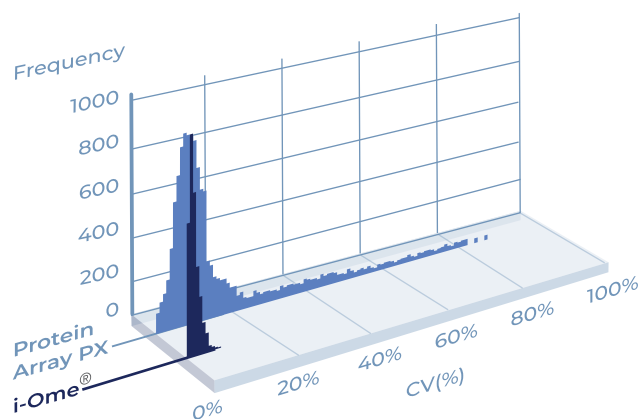
Proteins behave as if they are in free solution thanks to proprietary surface chemistry

- Proteins are immobilized onto a streptavidin-coated hydrogel.
- Proteins retain their folded structure and function in the aqueous environment.
- Proteins are projected from the glass surface and attach at a single point ensuring consistent orientation on every array.



Running assays on correctly folded, full-length, functional proteins enables biologically relevant results. Protein functionality relies on three-dimensional structure. Drug-binding interactions, protein-protein interactions and protein-ligand interactions all require the correctly folded structure of the protein. This is critical to autoantibody-based assays, where interactions between antibody and antigen are highly specific. Antibodies typically recognize discontinuous, 3-dimensional shapes and charges on a protein surface, rather than a specific linear peptide sequence. If proteins are not correctly folded, the remaining linear sequence may not be a biologically relevant epitope. The discontinuous epitopes that provide the physiological selectivity and the specificity of antibody recognition are only present when the protein is folded correctly.

Technical Performance



Exceptional Consistency

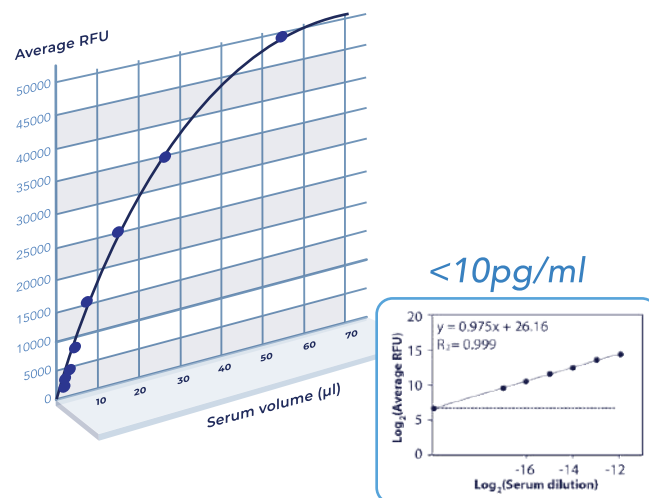
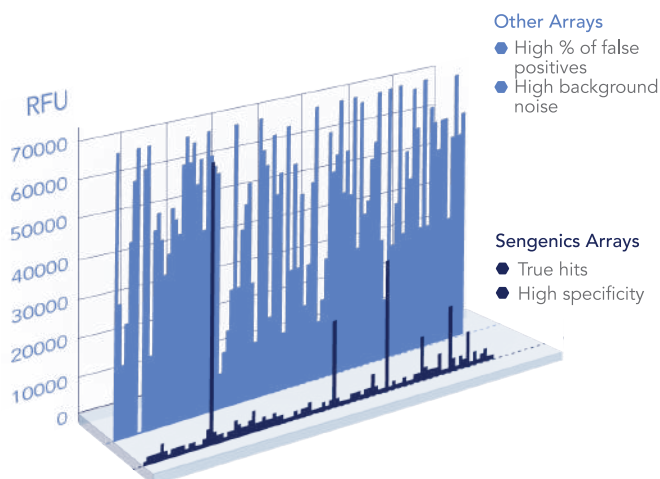
Sengenics KREX[®] protein folding technology is used to create protein arrays with exceptional consistency.

The graph above shows the coefficient of variation percentage (CV%) of intra-protein replicates on the Sengenics i-Ome[®] protein array compared to another marketed protein array. The mean CV% for i-Ome[®] was 7.2% whereas the CV% for Protein Array PX was 37%.

Highly Reproducible

Sengenics protein arrays use multiple positive and negative controls to measure reproducibility within, and across, studies and batches.

The graph above shows an almost perfect Pearson correlation of above 0.97 when comparing autoantibody levels across 6,524 protein data points in two different batches.



Superior Specificity

The correct folding of proteins on Sengenics protein arrays ensures that conformational epitopes are available for autoantibody binding (90% of antibody epitopes are non-linear). This results in specific hits and low background noise compared to other arrays that display a low signal-to-noise ratio.

Picomolar Sensitivity

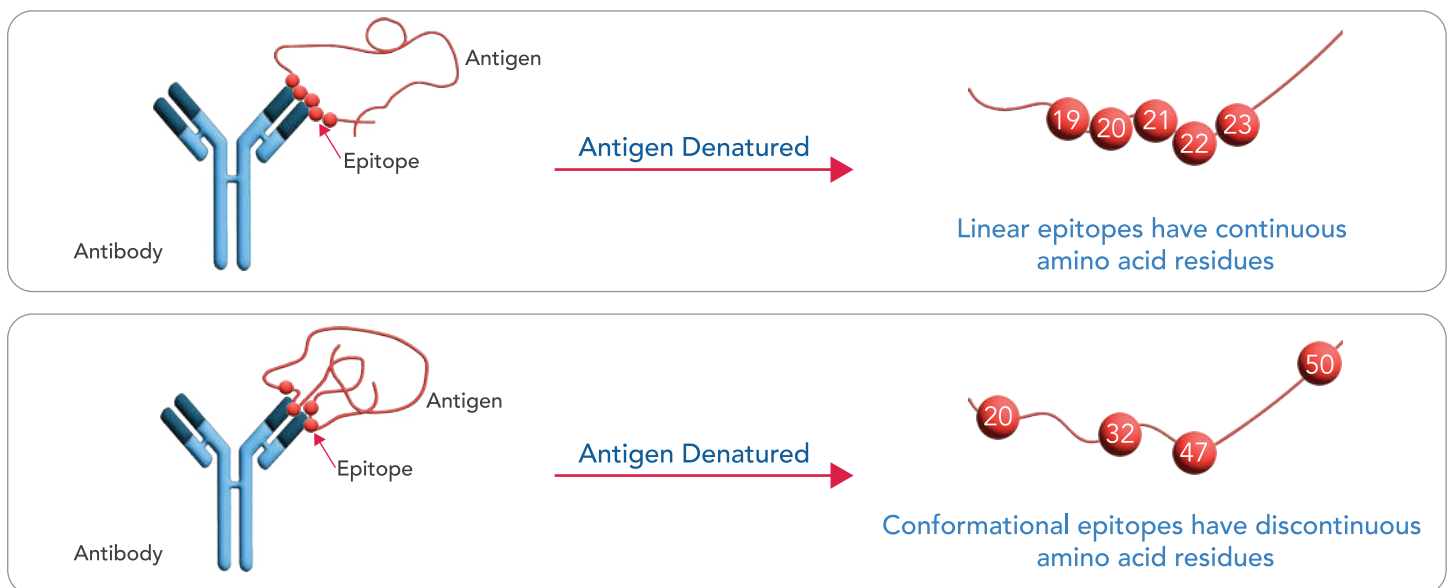
Sengenics protein arrays can be used to detect autoantibodies at very high sensitivity, only 1 - 10 μl of serum is required. The detection limit is in the 10 pg/ml range, with a linear dynamic range of at least 5 orders of magnitude.

Overcoming a Common Challenge

Over 90% of antibody epitopes are conformational; antibodies recognize the shape, not the amino acid sequence of the epitope.

Traditional array platforms use protein fragments, incorrectly folded or denatured proteins. Peptides and protein fragments are missing conformational epitopes and typically have exposed hydrophobic surfaces, resulting in non-specific antibody binding. This produces non-specific hits with a low signal-to-noise ratio.

Using our patented KREX[®] protein folding technology, Sengenics arrays feature full-length, correctly folded proteins. Conformational epitopes are preserved, resulting in highly specific hits with low background noise and reproducible results.



About Sengenics

Sengenics is a precision medicine company working to improve patient outcomes through physiologically relevant, data-guided decision making. Our solutions enable the discovery and validation of autoantibody biomarker signatures for patient stratification, therapeutic response prediction and development of companion diagnostics.

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