

Using autoantibody biomarker panels for improved disease diagnosis

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Molecular biomarkers that define a particular state or condition are a powerful tool used to diagnose disease, highlight patients with a pre-disposition towards a given disease and to identify those who would benefit from a given therapy. Until now, most diagnostic tests have focused on single biomarkers. However, the use of panels of multiple biomarkers increases diagnosis sensitivity and specificity. In a new whitepaper, experts at Oxford Gene Technology (OGT) discuss the issues surrounding the detection and utilisation of novel biomarkers for disease diagnosis.

Using autoantibodies

Developing practical and robust panels of diagnostic biomarkers requires a dependable system for detecting and measuring them. Antibodies are ideal biomarkers, as assays using these molecules tend to exhibit high sensitivity and specificity, while their large abundance in blood makes them easy and cost-effective to collect and detect.

'Autoantibodies' that target 'self-proteins' are produced by the host immune system in direct response to many pathological processes, often via unregulated over-expression, mutations that cause irregular protein folding or function, or the accidental release of proteins into the blood stream from damaged tissues. Autoantibodies can be detected early during disease development and used for diagnosis and treatment planning.

Identifying new biomarkers

In order to facilitate the development of more accurate and efficient diagnostic tests such as those using panels of multiplexed biomarkers, it is necessary to identify and characterise a range of biomarkers associated with a given disease of interest. High-throughput processing is the optimal



approach, as it provides the opportunity to screen a large number of candidates over a short time. However, the characterisation of autoantibodies in serum using traditional methods such as ELISA can be slow, requires substantial amounts of purified antigen and depends on the use of large volumes of serum.

The power of biomarker microarrays

With the ability to provide high throughput using low sample volumes, protein microarrays are the ideal platform for the identification of autoantibody biomarkers. Such arrays enable immediate identification of the cognate binding partners for specific autoantibodies in sera and can be

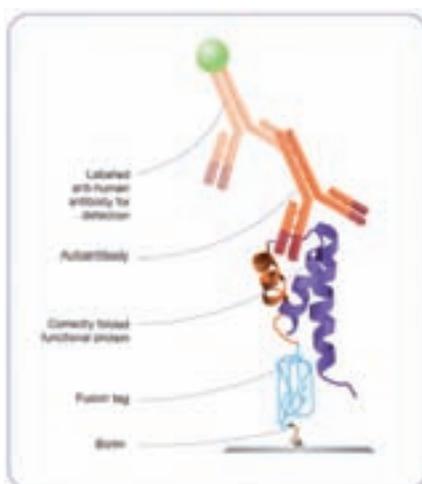


Figure 1: The unique BCCP tag conserves the native protein conformation enabling the discovery of autoantibody biomarker panels exhibiting maximum sensitivity and specificity

used to screen thousands of antigens using as little as 5µl of undiluted serum. However, while this approach is very powerful, the successful design and utilisation of these arrays can be challenging and requires significant expertise. For example, as proteins are by nature diverse in size, structure and function, immobilisation on a solid support such that they retain their native structure is not a simple task.

An innovative solution to the challenge of attaching proteins to the array surface is the use of a unique BCCP tag, as employed as part of OGT's unique 'functional protein' array technology (Figure 1). This tag ensures that the correct three-dimensional structure of discontinuous epitopes is maintained and prevents the type of non-specific binding that is frequently the source of false positive results.

Experts in protein biomarker discovery

The discovery of novel biomarkers and the subsequent development of new disease diagnostics can be complex and costly. In order to maximise the effectiveness of a biomarker discovery programme, OGT offers its extensive expertise in study design, array processing and data analysis to maximise the insight provided by your precious clinical samples. Using its experienced team, innovative technology and purpose-built facilities, your biomarker discovery programme is designed and carried out to the highest standards – from concept to completion.

The issues, challenges and solutions surrounding biomarker discovery using antibodies are discussed in more depth as part of a new whitepaper from OGT. For more expert insights, download the full version now by visiting www.ogt.co.uk/autoantibody, or use your smartphone to scan the QR code below.

