Lipid antigens in evanescent field biosensor detection of antibodies: Application in Guillain Barré Syndrome

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Guillain-Barré syndrome (GBS) provides a well-characterised model to study auto-immunity. The disease is triggered by bacterial LPS that closely mimics the structure of membrane gangliosides (eg G_{M1}) of peripheral nerves. As a consequence, antibodies recognize not only the invading bacteria but also the peripheral neuronal cells and launch a response against it that leads to muscle paralysis that is often fatal. To determine the properties of GBS patient antibody binding to the G_{M1} antigen, an IAsys biosensor was employed. G_{M1} liposomes were coated on the IAsys cuvette surface. A G_{M1} specific protein ligand, cholera toxin, was used to determine the quantitative binding properties. This allowed insight into how the IAsys biosensor compares with other devices that measure biomolecular interactions between lipid antigens and protein ligands in real-time. We conclude that a cuvette based device (eg IAsys) may be better suited than a flow cell device (eg BIAcore) for the purpose of measuring low affinity interactions. G_{M1} coated cuvettes were subsequently applied to demonstrate clear differences in anti-G_{M1} antibody binding in a GBS patient in comparison to a healthy control. In contrast to cholera toxin, considerable interference of non-specific binding in serum samples may complicate the quantitative interpretation of the binding properties of anti-G_{M1} antibodies in GBS patients.