Max-Planck-Innovation

Technology Offer

Novel glycan markers for diagnosis and vaccine against toxoplasmosis

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Background

Toxoplasmosis is the disease caused by infection with the parasite Toxoplasma gondii. A third to a half of the human population will have a toxoplasmosis infection in their lives, however primary infections often remain unnoticed. A latent form of toxoplasmosis can persist as cysts in nervous and muscle tissues. While harmless for most of the population, latent toxoplasmosis in immunocompromised individuals can lead to dangerous medical conditions such as toxoplasmic encephalitis. During pregnancy, primary infection may cause transmission of the parasite from the mother to the unborn child, leading to mental and physical retardation or to fetal death.
Diagnosis of acute toxoplasmosis relies on serological detection of IgG and IgM antibodies and determination of IgG avidity. IgM titers have the greatest diagnostic value, because absence of IgM antibodies can rule out a recently acquired infection. However, commercially available kits detect only one type of antibody and generate high rates of false positive test results that will cause treatment of pregnant women with chemotherapies potentially harmful to the fetus. More reliable, faster and cheaper means of diagnosis for toxoplasmosis are highly desirable. A vaccine against toxoplasmosis is not available so far.

Technology

Researchers from the Max-Planck-Institute of Colloids and Interfaces in Potsdam identified unique surface markers for diagnosis of acute and latent toxoplasmosis (1). These markers are specific Glycosylphosphatidylinositols (GPIs). GPIs are complex glycolipids found at the plasma membrane of all eukaryotic cells.
The GPI composition of any eukaryotic cell is specific but highly heterogeneous, therefore the researchers used chemical synthesis to obtain GPIs of the desired structure with high fidelity and purity. These GPIs were printed on glass slides to generate carbohydrate microarrays as a diagnostic tool (1). With this tool in hand, the researchers discriminated between sera of infected and non-infected individuals and between sera of acute and latent toxoplasmosis patients.
In a further development, conjugates of the synthetic glycolipids to magnetic beads proved to be an efficient method to detect toxoplasmosis serostatus using a Bead Based Mutiplex Assay (BBMA). This improved format is a high-throughput method enabling the simultaneous detection and quantification of multiple analytes and large-scale epidemiological studies with increased diagnostic value.
Finally, owing to their high selectivity and purity the synthetic glycolipids may even serve as antigens for vaccination strategies.

We are looking for a licensing partner for the further development of this technology.

Patent Information: A patent, owned by Max-Planck-Society, is granted in EP (DE, AT, CH, GB, FR) (EP2890703 (B1)) and US (US9802974 (B2)).

Literature: (1) Götze, S. et al., *Angew. Chem. Int. Ed.* **2014**, 53(50), 13701-13705, Doi: 10.1002/anie.201406706.