# Applications of GlycoImmunology, Carbohydrate-Binding Proteins, Anti-Glycan Antibodies and Glycochip in Medicine and in Medical Research

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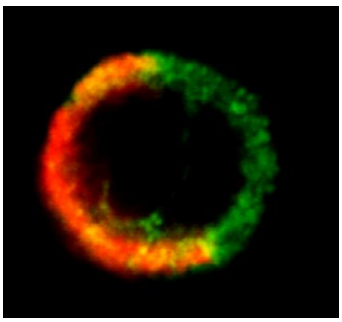

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**Centre of New Technologies,**
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Host: Dr Renata Solarska

Every cell is covered by a dense coat of complex glycans covalently attached to membrane proteins and lipids, and most of proteins in extracellular matrix and in circulation are glycosylated. There are thousands of gene products involved in coordinated and highly regulated synthesis and processing of complex glycans, and in cellular and systemic distribution of glycosylated proteins, lipids and other glycoconjugates. Therefore, human Glycome is immensely more extensive than the Genome and the Proteome.

Glycoconjugates together with glycan-binding proteins such as Galectins, Selectins, certain Complement components and Anti-Glycan Antibodies form vast and dynamic functional networks driving cell-cell interactions and inter-cellular signaling, and acting as on-off switches in multitude of biological processes often critical in human health, including immune recognition, infection, tissue repair and remodeling, and in pathological mechanisms underlying development of autoimmunity, malignancy and degenerative diseases. Practical understanding of the critical significance of glycoconjugates in immuno-compatibility is already applied in matching human tissues for transplantations and transfusions.

Printed Glycan Array (PGA), also called “glycochip” is a microarray composed of hundreds of mostly synthetic glycans, bio-identical with glycans present on surfaces of various types of human cells including stem cells, cancer cells, pathogen-infected cells and cells of the immune system, and on pathogenic and non-pathogenic micro-organisms. Human serum contains a vast selection of Anti-Glycan Antibodies (AGAs) many of which are natural antibodies. AGAs binding to glycan-probes on PGA form a distinct, person-specific “immunoprofile”. The combinations of AGAs within individual immunoprofiles of healthy individuals are relatively stable over time, but become quite dynamic during the development of the pathological process. This dynamics of AGAs can be captured on PGA and resolved using “ImmunoRuler” (IR), our patented PGA-dedicated bioinformatics software [Huflejt, Vuskovic, Pass]. IR has already revealed signatures of various pathological processes [Patent: Vuskovic, Huflejt] thus allowing early detection of disease and disease risk, and the development of preventive interventions.

Glycoconjugate-based clinical interventions, applications of glyco-immunoprofiling, and the future of glyco-biotechnologies will be discussed.