Special Lecture

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The Human Glycome Project – Exploring the New Frontier of Personalized Medicine

Monday , December 10th

Seminar Room, Institute of Clinical Biochemistry, I3, Level 4, Block B

11.00 am s.t. (strict!)

Host: Prof. Dr. Gerardy-Schahn, Phone: 0511/532-9801

Abstract

The majority of proteins are glycosylated and their glycan parts have numerous structural and functional roles. This essential posttranslational modification is generated by a complex biosynthetic pathway comprising hundreds of glycosyltransferases, glycosidases, transcriptional factors, ion channels and other proteins. Since glycans are created without the genetic template, alternative glycosylation creates an additional layer of protein complexity by combining genetic variability with past and present environmental factors. Individual variability in glycome composition is very large, but glycosylation of an individual protein seems to be under strong genetic influence, with heritability being up to 80% for some glycans. Structural details of the attached glycans are of great physiological significance and many pathological conditions are associated with various types of glycan changes. For example, glycans attached to the Fc part of immunoglobulin G are important modulators of IgG effector functions. Slight modifications in the composition of the IgG glycome significantly tune IgG towards binding to different Fc receptors and can convert IgG from a pro-inflammatory effector into an anti-inflammatory agent.

Since the onset of genome wide association studies, thousands of genetic loci have been associated with different diseases and traits. However, in the last few years it is becoming increasingly clear that variations in a DNA sequence are only a beginning of the understanding of complex human diseases. Genetic polymorphisms have to be put in the context of complex biology of life and a more elaborate approach that combines different ‘omics phenotypes is needed to understand disease mechanisms and perform patient stratification that transcends genomics. Glycomics, as by far the most complex epiproteomic modification, has an immense potential in this respect, which is only beginning to be investigated.

Gordan Lauc is Professor of Biochemistry and Molecular Biology at the University of Zagreb, founder and CEO of Genos Glycoscience Research Laboratory and co-director of the Human Glycome Project. His research is focusing at the intersection of glycomics and complex genetics by using high throughput glycomic analysis to generate quantitative data about the composition of the individual glycomes. By combining glycomic with extensive genetic, epigenetic, biochemical and physiological data in a systems biology approach his laboratory is trying to understand the role of glycans in normal physiology and disease.