Conference report: New frontiers at the Interface of Immunity and Glycobiology, Lake Louise, Alberta, Canada. 6-11 March, 2011.

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In March 2011 I have participated in the Keystone meeting: New frontiers at the Interface of Immunity and Glycobiology. The theme of this meeting perfectly fitted with the subject of my PhD project, namely the functional relevance of glycosylation for immune responses. The conference started with a talk of James C. Paulson who discussed the role of siglecs in the internalization of ligands besides the already well described signaling role of these receptors.

The next day continued with a talk of Brain A. Cobb. In his presentation he discussed the ability of a special type of sugar (the group of the zwitterionic polysaccharides to which polysaccharide A (PSA) belongs) to be taken up and presented directly in the MHCII molecule; leading to activation of $CD4^+$ T cells. In addition they investigated in which fashion the PSA molecule was presented in the MHCII molecule and showed that the binding of PSA to MHCII was dependent on the N-linked glycosylation patterns of the MHCII protein. In addition Mitchell Kronenberg showed that the glycans on the lipids are important for their presentation in CD1d and subsequent activation of NKT cells. Linda G Baum explained how Galectin (Gal)-ligand interactions can lead to different functional outcomes. Binding of CD43 on T cells to Gal1 results in apoptosis, while binding to CD45 on T cells does not. Although CD45 can bind Gal1 as well

Furthermore, the research of Paul R. Crocker revealed that SiglecE, the mouse homologue of the human siglecs 7 and 9 has a role in the influx of neutrophils during inflammatory responses. In the Siglec E knockout mice they created, an increased neutrophil influx was observed after LPS stimulation. Contrary; no effect on macrophages or B cells was observed. Two other carbohydrate receptors Dectin-1 and Dectin-2 were shown by Caetano Reis e Sousa to be both involved in the activation of SYK kinase.

On Monday and Tuesday evening poster sessions were held, in which I also presented my poster. I had a lot of useful discussions and suggestions. One of the ideas will probably result in a collaboration.

On Tuesday a workshop of High-Throughput Screening in Glycomics of the Immune Response was given by Anne Dell, Ten Feizi and Michael Pierce. In this workshop the role of Mass Spectrometry in analyzing the glycosylation patterns of different ligands, the ability to test binding of receptors to glycans with the use of a neoglycolipid based microarray platform and the use of different glycomic technologies to screen the expression of glycogenes and the glycan expression on the surface were discussed. When we know the carbohydrate ligands of receptors present on the cells of the immune system we can make use of this knowledge for the generation of effective vaccines. My promoter Yvette van Kooyk talked about improving the vaccine targeting to DCs by using glycans which can bind C-type lectins present on DCs.

Richard Cummings started the Wednesday with a session about the host-pathogen interactions. Eukaryotes and prokaryotes express different glycan patterns. The human body exploits this by binding these pathogen-specific glycans. Galectins for example can bind glycans on bacteria and directly kill them. The glycans expressed on the virus HIV can bind to DC-SIGN; research performed in the group of Teunis B.H. Geijtenbeek revealed that this binding was also essential for the initiation of HIV transcription, which is necessary for the replication and transmission of HIV.

After lunch a workshop about the involvement of glycans in the development of a HIV vaccine was held. Talks from James Arthos, Heather Desaire, Chris N. Scanlan and Galit Alter discussed the difficulties of the development of a vaccine for HIV, since the glycosylation of HIV may differ between different strains, thus affecting the host immune responses towards the virus.

The third session was about the hematopoiesis and lymphocyte development, which involved the role of fucosylation in T cell development (talks by Pamela Stanley and John B. Lowe). A decrease in circulating thymocytes is seen when fucose is removed from the diet. Also decreased fucosylation of Notch results in defects in the T cell development.

On Thursday the role of glycans in autoimmunity was discussed. Gabriel A. Rabinovich showed that Gal1 administration results in decreased autoimmunity and inflammation. In Gal1 knockout mice more demyelination is seen in the EAE model. In rheumatoid arthritis the glycosylation of collagen is essential for the T cell reactivity against the collagen which results in rheumatoid arthritis (Rikard Holmdahl).

The meeting ended with a session on tumor immunity in which glycans are an important player as well. The role of endothelial heparan sulfate in the recruitment of lymphocytes and dendritic cells to the lymph nodes and inflammatory tissues by controlling the chemokine presentation was discussed by Minoru Fukuda. Mutations in the glycan machinery result in the same deficiency as mutations in heparan sulfate. Olivera J. Finn investigated the glycosylation of the model tumor antigen MUC1. Decreased glycosylation of MUC1 in malignancy results in the capability of DCs to take up the MUC1 and subsequently present it to T cells. This can be used for the development of vaccines against cancer. Finally, James W. Dennis discussed the role of the glycosylation machinery in the regulation of the protein expression4195387. The aberrant glycosylation in cancer cells enhances the expression of proteins beneficial for cancer cell growth.