

**Final report ESF funded workshop *Increasing the Impact of Glycoscience through New Tools and Technologies* ; San Sebastian, Spain 19th-21st of July 2012**

Organizer:

Niels Reichardt,

group leader at CICbiomaGUNE,

Paseo Miramon 182, 20009 Donostia/San Sebastian, Spain

[nreichardt@cicbiomagune.es](mailto:nreichardt@cicbiomagune.es)

**Summary**

During the 19<sup>th</sup> and 21<sup>st</sup> of July 2012 we held the first edition of the glycomics symposium titled *Increasing the Impact of Glycoscience through New Tools and Technologies* in San Sebastian. The workshop was primarily focused on new tools, recent technological developments, and applications that have changed the face of glycoscience in the last decade and will continue doing so in the years to come was held.

The idea of this 3-day meeting was to bring together experts from diverse backgrounds, to showcase the technological progress to interested outsiders and to nurture future collaborations and initiatives in Glycoscience.

Presentations by of several companies active in glycoscience demonstrated some of the multiple commercial opportunities the field currently offers. A special session to discuss future alliances and joint project proposals in the field of glycoscience or in relation with other research areas was held on Friday evening.

**Description of the scientific content of and discussion at the event**

Glycans are involved in nearly all biological processes, are major structural biomaterials and play a part in most all major human diseases, a detailed picture of glycan function and structure is however far less complete than that of proteomics or genetics. A lack of dedicated methods and tools for the high-throughput analysis of glycan structure and function is often given as a main cause for the delayed development of the field of glycomics. A stronger investment into the development of enabling technologies directed towards the elucidation of glycan function within a systems biology approach would help to exploit the many opportunities and increase the impact of glycoscience in health, energy and industry. In this line our meeting gathered over 110 scientists from 17 countries and a covering a large number of scientific disciplines to discuss recent developments in the development of new tools and technologies and their application to glycomics. The symposium had been

organized and promoted as a satellite meeting to the most important international meeting of glycoscientists, the international carbohydrate symposium, which was celebrated in Madrid directly after our workshop in San Sebastian. Obviously this helped putting together a panel of internationally very reputed keynote speakers and at the same time assuring a very good participation for the first conference edition. The workshop had been announced via e-mail mailing list and websites specialized in glycoscience related content. The conference was entirely held at the auditorium of the Technological Park in San Sebastian, a very comfortable and modern conference space for events of this size. All breaks and lunches had been organized with the adjacent in-house catering service thereby avoiding time-consuming transfers.

A dedicated website had been set up and continuously updated with information regarding the workshop program and important technical information regarding the participation. Funding had been secured via the European Science Foundation, CICbiomagune, the Euroglycoarrays and Carmusys ITN networks and the Basque Regional Government. A modest registration fee of 200 Euros which included all meals, coffee breaks, workshop material, shuttle buses and the conference dinner had been raised. The scientific program was organized in the following eight sessions: Glycan Synthesis, Glycotechnology, Glycobioinformatics and Molecular Modelling, Commercial Opportunities in Glycoscience, Round-Table and Future projects, carbohydrate-protein interactions, Glycan Analysis and Glycobiology. This rather broad scope was necessary to include and organize most of the received contributions either oral or poster. A total of 92 scientific contributions was included in the final scientific program, seven keynote lectures of 45 minutes, 35 oral communications of 20 minutes each, 18 flash communications of 10 minutes duration. The program was held entirely in a plenary format allowing the participants to take part in the entire program. Nearly all oral presentations were followed by a lively round of discussions which were professionally managed by senior chairmen/women. The intense scientific program was interrupted by frequent coffee breaks and a daily lunch, in which the workshop attendees found ample time to discuss and digest the large number of short lectures and explore the more than 32 scientific posters which were available during the entire conference. Due to the small size of the symposium networking was easy and the attendees made many new contacts. The symposium was covered intensively by the local media: A press note and video introducing the conference had been sent out in advance and had attracted the interest of several local newspapers and radio stations. Three radio interviews were broadcasted and 4 newspaper articles were printed on the conference with direct participation of the organizer and two keynote speakers. Out of multiple private discussions and e-mail correspondence the organizers gained that the workshop had been a full success both scientifically and organizational. This had been the first conference our small team had organized and the very good feedback has stimulated us to evaluate the possibility of a follow-up conference for the coming year.

## Impact

The impact of the conference is difficult to estimate, but a large number of discussions with workshop participants allows to draw at least some conclusions: The conference topic was found to be very timely and fitted well in more global efforts to define the future of glycomics and glycoscience in general. The quite broad range of topics and techniques covered was very informative and educative and reflected well the multi-disciplinary nature of glycoscience as a research area. It also stimulated new collaborations especially amongst younger scientists who are entering the field without a large pre-existing network. New techniques in array design and readout, solid-phase synthesis or mass spectrometric analysis of glycans to name just a few examples of the large number of high quality contributions were introduced and eagerly discussed by potential applicants. Generally the scientific level was very high, the presence of world class researchers stimulated the younger members of the community to present the very best of their research and engage in fruitful discussions.

In a session dedicated to future collaborations and initiatives in glycoscience participants discussed the need for concerted efforts in the field of glycoscience rather than a further fragmentation into diverse subfields. The specific toolset of glycoscience covering new synthetic and analytical approaches was found to be vital to tie different areas like energy, biomedicine or materials together. Practical tips in European funding opportunities and for organizing European Research consortia were given by Serge Perez from CERMAV in Grenoble and the two Carmusys and Euroglycoarrays network coordinators, Sabine Flitsch, Manchester University and Javier Rojo, CSIC, Seville. In this sense the ongoing discussion on future joint efforts in glycoscience on a European or even global level including major new funding opportunities was well reflected and enriched during our symposium.

Of particular interest was the participation of various glycoscience companies who had the opportunities to talk about the many commercial possibilities glycoscience currently offers. This was especially of importance for the younger audience who learnt of interesting and rewarding job opportunities outside academia where the unique skill-set of broadly trained glycoscientists is asked for. The workshop character of the symposium was vital to promote the participation of a large number of young scientists who all excelled in presenting their most interesting research in a professional atmosphere to a large and knowledgeable audience.

## Scientific Program for the International Glycomics Symposium

*Increasing the Impact of Glycoscience through New Tools and Technologies*

San Sebastian July 19-21

Venue: Auditorium Tech Park Miramón, Mikeletegi 53, Central Building

Thursday, 19 <sup>th</sup> July			
11:00-13:00		Registration	
13:00-13:55	L-1	Pintxo Lunch and Posters	
13:55-14:00		Welcome Niels Reichardt, Sabine Flitsch, Javier Rojo	
<b>Keynote Session 1</b> Chair: Sabine Flitsch			
14:00-14:45	P-1	Sugars and Proteins	Ben Davis, U. Oxford, UK
14:45-15:30	P-2	From Sugars to Glycoproteins-Challenges for Synthesis and Application	Carlo Unverzagt U. Bayreuth, DE
15:30-16:00	B-1	Coffee break and posters	
<b>Glycan Synthesis Session 1</b> Chair: Carlo Unverzagt			
16:00-16:20	OC-1	Automated Solid Phase Synthesis of Anionic Oligosaccharides	Jeroen Codee, U. Leiden, NL
16:20-16:40	OC-2	Chemical Methods to Access Homogeneous Fluorinated Glycoproteins and their Elaboration Using Endoglycosidases	Omar Boutureira, U. Rovira i Virgili, Tarragona, ES
16:40-17:00	OC-3	Synthesis of Multivalent Glycopeptides to Study Mucin Binding Events	Ulrika Westerlind, ISAS, Dortmund, DE
17:00-17:10	F-1	New Divalent Inhibitors with Rigid Spacers for the <i>Pseudomonas aeruginosa</i> Lectin LecA	Francesca Pertici, U. Utrecht, NL
17:10-17:20	F-2	Synthetic and Structural Study of Glycopeptide Containing C-Mannosyltryptophan in Human Erythropoietin Receptor	Hiroshi Hinou, U. Hokkaido, JP
17:20-17:30	F-3	Synthesis of Sialoside Derivatives and their Incorporation into Microarrays	Julia Bauer U. Reading, UK
17:30-17:50	B-2	Coffee break and Posters	
<b>Glycan Synthesis Session 2</b> Chair: Geert-Jan Boons			
17:50-18:10	OC-4	Synthetic Glycophosphatidylinositol Anchors as Tools for Diagnostic and Development Against Infection Diseases.	Daniel Varon Silva, MPI Golm, DE
18:10-18:30	OC-5	Novel Strategies for Assembly of GPI Anchors and GPI-Anchored Proteins	Ivan Vilotijevic, MPI Golm, DE
18:30-18:50	OC-6	Towards the Solid-Phase Synthesis of Glycosaminoglycan Oligosaccharides	Niels Reichardt, CICbiomaGUNE, ES
19:00-20:00		Euroglycoarrays Management Meeting	Network PIs and fellows

Friday 20 <sup>th</sup> July Morning			
<b>Keynote session 2</b> Chair: Javier Rojo			
09:00-09:45	P-3	Animal Models to Study the Role of Sialic Acid in Organ Development and Function	Rita Gerardy-Schahn U. Hannover, DE
09:45-10:30	P-4	Toward Fully Automated Glycomics by Glycoblotting Method	Shin-Ichiro Nishimura U. Hokkaido, JP
10:30-11:00	B-3	Coffee break and Posters (	
<b>Glycotechnology Session 1</b> Chair: Shin-Ichiro Nishimura			
11:00-11:20	OC-7	Glycomics-Driven Discovery of Parasite Glycans as Vaccine Targets and Immune Modulators	Cornelis Hokke, Leiden Medical C., NL
11:20-11:40	OC-8	Comparison of PGA, ELISA, and Suspension Array	Nicolai Bovin, Russian Academy of Sciences, Moscow, RU
11:40-11:50	F-4	Detection of Glycosyltransferase Activity on Glycan Microarrays by Tritium Imaging	Sonia Serna, CICbiomaGUNE, ES
11:50-12:00	F-5	Anti-Glycan Antibody Responses in Schistosoma Mansoni Infected Patients Studied by Shotgun Glycan Microarray	Angela van Diepen, Leiden Med. Center, NL
12:00-12:10	F-6	Glycan Arrays for MALDI-ToF MS, Fluorescence and Optical Readout	Ana Beloqui, CICbiomaGUNE, ES
12:10-12:20	F-7	Polymerization of Sugars by Levansucrases of <i>Pseudomonas</i> Bacteria: Traditional and High-Throughput Studies	Triinu Visnapuu, U. Tartu, EE
12:20-12:40	B-4	Coffee break and Posters	
<b>Glycotechnology Session 2</b> Chair: Nicolai Bovin			
12:40-13:00	OC-9	Functionalisation and MALDI-ToF MS Analysis of Glycoarrays on Gold and Glass	Martin Weissenborn, U. Manchester, UK
13:00-13:20	OC-10	Glycoarrays: New Methods for Carbohydrate Immobilization	Valentin Wittmann U. Konstanz, DE
13:20-13:40	OC-11	Nanodiamonds as New Tools in Glycomics: Sensing and Inhibition of Bacteria	Aloysius Siriwardena, CNRS, Amiens, FR
13:40-13:50	F-8	Glyco Goldnanoparticles: New Tool for Glycoimmunology Studies	Fabrizio Chiodo, CICbiomaGUNE, ES
13:50-14:00	F-9	Glycobiorecognition Based on Surface Plasmon Resonance and Microarray Biochips	Jaro Katrlík Slovak Academy of Sciences, Bratislava, SK
14:00-14:10	F-10	Lectin Arrays Demonstrate the Changes in Glycosylation of Bovine Milk Lactoferrin over Lactation	Noelle O`Riordan, NUIG, Galway, IR
14:10-14:20	F-11	The Generation and Selection of Lectin Biomimics	Stephen Cunningham NUIG, Galway, IR
14:20-15:10	L-2	Pintxo Lunch and Posters	

Friday 20 <sup>th</sup> July, Afternoon			
<b>Glycobioinformatics and Molecular Modeling</b> Chair: Reinhard Schwartz-Albiez			
<b>15:10-15:30</b>	OC-12	Biologo: a 3D Structural Database for Bioactive Oligosaccharides	Anita Sarkar, CERMAV, CNRS, Grenoble, FR
<b>15:30-15:50</b>	OC-13	Monosaccharide Notation in Glycoinformatics: Problems, Pitfalls, and solutions	Thomas Lueteteke, U. Giessen, DE
<b>15:50-16:10</b>	OC-14	Screening the Binding of Oligosaccharides to Human Galectin-8-C domain by Molecular Dynamics Simulations	Sonu Kumar, DKFZ, Heidelberg, DE
<b>16:10-16:30</b>	OC-15	Conformational Studies of the O-Antigenic Polysaccharide of <i>E. coli</i> O5 Using NMR and Molecular Modeling	Carolina Fontana, U. Stockholm, SE
<b>16:30-16:50</b>	B-5	Coffee break and Posters	
<b>Commercial Opportunities in Glycoscience</b> Chair: Niels Reichardt			
<b>16:50-17:10</b>	OC-16	Glycosciences – Perspectives for Start Ups and SMEs	Juergen Kuballa, GALAB, Geesthacht, DE
<b>17:10-17:30</b>	OC-17	Transbuccal Insulin-Glyconanoparticles: An Alternative to Injectable Insulin	Africa G. Barrientos, Midatech-biogune, Bilbao, ES
	OC-18	Nanoproximity Assay Platform for Studying Carbohydrate Interactions in High Throughput ( Canceled)	Sergei Swarowsky, Affinonano, Carlsbad, US
<b>17:30-17:50</b>	OC-19	From the Laboratory to the Clinic: Development of a New Diagnostic Test for Lactose Intolerance	Alfonso F.-Mayoralas, CSIC, Madrid, ES
<b>17:50-18:10</b>	OC-20	Ludger Ltd: A Glycoprofiling Bridge Between Academia and Biopharma	Daniel Spencer, Ludger Ltd., Oxford, UK
<b>18:10-18:25</b>	B-6	Break and refreshments	
<b>Round Table-Future Projects</b> Chair: Serge Perez			
<b>18:25-18:35</b>	OC-21	Carmusys Network Presentation	Javier Rojo, CSIC Sevilla , ES
<b>18:35-18:45</b>	OC-22	Euroglycoarrays Network and other Networks	Sabine Flitsch, U. Manchester, UK
<b>18:45-19:25</b>	OC-23	Overview of Current Actions Aiming at Promoting Glycoscience in Europe, followed by Open Discussion	Serge Perez, CERMAV, CNRS, Grenoble, FR

<b>Saturday 21<sup>th</sup> July, Morning</b>			
<b>Keynote Session 3</b> Chair: Ana Bernardi			
<b>09:00-09:45</b>	P-5	Fully Synthetic Vaccines and Immune Modulators	Geert-Jan Boons U. Georgia, US
<b>09:45-10:30</b>	P-6	Synthetic Glycoconjugates: A Tool for Exploring and Exploiting the Molecular Recognition in Medicine.	Vicente Verez Bencomo, U. Havana, CU
<b>10:30-11:00</b>	B-7	Coffee break and Posters	
<b>Carbohydrate-protein Interactions</b> Chair: Goeran Widmalm			
<b>11:00-11:20</b>	OC-24	Glycodendritic Structures as Tools in Chemical Biology	Javier Rojo, CSIC, Sevilla, ES
<b>11:20-11:40</b>	OC-25	DC-SIGN and Langerin C-type lectin: Dendritic Cells Receptor as Target in Host-Pathogen Interaction and Immune Modulation	Franck Fieschi, CNRS, Grenoble , FR
<b>11:40-12:00</b>	OC-26	NMR in the Characterization of DC-SIGN Interactions with Carbohydrates	Pedro Nieto, CSIC, Sevilla, ES
<b>12:00-12:20</b>	OC-27	Glycomimetic Glycoconjugates as Lectin Antagonists	Anna Bernardi, U. Milan, I
<b>12:20-12:40</b>	OC-28	Insight the Interaction between Blood Group Determinants and Cholera Toxin: Opportunity to design a New Class of Cholera Toxin Antagonists	Jose Reina, U. Milan, I
<b>12:40-13:00</b>	B-8	Coffee break and Posters	
<b>Glycan Analysis Session</b> Chair: Anne Dell			
<b>13:00-13:20</b>	OC-29	Human Seminal Plasma Glycoproteins Binding to DC-SIGN Lectin	Paola Grassi, Imperial College, UK
<b>13:20-13:40</b>	OC-30	Conformational Changes as Key Factors in Glycosyltransferase-Mediated Reactions	Marcelo Guerin, CSIC, Bilbao, ES
<b>13:40-14:00</b>	OC-31	Genome Wide Association Studies of the Human Plasma and IgG glycomes	Gordan Lauc, U. Zagreb, HR
<b>14:00-14:10</b>	F-12	Effective Approaches to Glycan Analysis based on Liquid Chromatography and Liquid Chromatography-Mass Spectrometry	Oscar Potter, NIBRT, Dublin, IR
<b>14:10-15:00</b>	L-3	Pintxo Lunch and Posters	



<b>Saturday 21<sup>th</sup> July, Afternoon</b>			
<b>Keynote Session 4</b> Chair: Cornelis Hokke			
<b>15:00-15:45</b>	P-7	Glycomics in Health and Disease	Anne Dell, Imperial College London, UK
<b>Glycobiology Session 1</b> Chair: Rita Gerardy-Schahn			
<b>15:45-16:05</b>	OC-32	Identification of Novel C-Type Lectin Receptor Ligands: From Glycans Arrays to Murine Studies	Bernd Lepenies, MPI Golm, DE
<b>16:05-16:25</b>	OC-33	From Glycan Array to in Vivo Targets of Nematotoxic Fungal Lectins	Therese Wohlschlager, ETH Zürich, CH
<b>16:25-16:35</b>	F-13	Designer Microarrays for Glycosciences	Maria Asunción Campanero-Rhodes, CSIC, Madrid
<b>16:35-17:00</b>	B-9	Coffee break and Posters	
<b>Glycobiology Session 2</b> Chair: Ben Davis (TBC)			
<b>17:00-17:20</b>	OC-34	A Natural Mucin Microarray for Profiling Biologically Relevant Glyco-epitopes	Michelle Kilcoyne, NUIG, IR
<b>17:20-17:30</b>	F-14	Comparative Analysis of Protein Glycosylation in CHO-K1, BHK-21, HEK293, COS-7, 3T3, and NS0 Cell Lines	Zhang Peiqing, BTI, SG
<b>17:30-17:40</b>	F-15	Glycan Alterations of Serum Prostate Specific Antigen (PSA) as a Prostate Cancer Marker	Esther Llop, U. Girona, ES
<b>17:40-17:50</b>	F-16	Glycosaminoglycans as Regulators of Stem Cell Differentiation	Catherine Merry, U. Manchester, UK
<b>17:50-18:00</b>	F-17	Lectin Profiling of Bacterial Exopolysaccharides using Microarrays Technology	Marie Le Berre, NUIG, IR
<b>18:00-18:10</b>	F-18	Molecular Mechanism of Protein O-Fucosylation	Ramón Hurtado, BIFI, Zaragoza, ES
<b>18:10-18:30</b>	OC-35	An Hts Method for Directed Evolution of Glycosynthases Independent of Substrate Specificity	Antoni Planas, U. Ramón Llull, ES
<b>18:30-18:40</b>	Symposium Closure		
<b>21:00</b>	D-3	Symposium Dinner at Real Club de Tenis Ondarreta Paseo de Eduardo Chillida 9 20008 Donostia-San Sebastián Tfn: 943 311150 / 943 314118	

<b>Sunday 22<sup>th</sup> July</b>	
<b>10:00</b>	Departure of shuttle bus to International Carbohydrate Symposium 2012, Madrid
<b>15:00</b>	Expected arrival at Hotel Sol Melia, ICS venue, Madrid