



GLYCOPHARM

The Sugar Code:
from bio(chemical) concept to clinics

Newsletter

December 2015 - Issue 9

<http://www.glycopharm.eu>

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Newsletter

December 2015
Issue 9

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EDITORIAL

Welcome

Dear Reader,

Welcome to the ninth issue of the GLYCOPHARM newsletter.

GLYCOPHARM is a Marie Curie ITN offering training to young researchers in the interdisciplinary field of glycosciences. Besides the nine ESRs planned in the project, another young researcher, Beatriz Fernández de Toro, joined the network from September to December. On the other hand, two of the GLYCOPHARM ERs, Peter Kisfali and Michelle Yegres, completed their contracts during this period. We wish all of them the best for their scientific careers.

As in previous issues, we report on publications and dissemination activities of network members. Two publications co-authored by three GLYCOPHARM partners have been selected as relevant examples of multidisciplinary and intersectoral collaboration within the network. The participation in different scientific events of the ESRs Alessandra Lacetera and Cecilia Romanò, who received the prize to the best poster presentations, is also highlighted.

Network-wide training activities have continued with the 6th network meeting, hosted by the Centre of Molecular and Environmental Biology (UMINHO), and a successful GlycoBiology Summer School in collaboration with three other ITN/ETNs of the glycobiology field, Immunoshape, GastricGlycoExplorer and GlycoPar. This Summer School was a joint learning event, with the participation of lecturers from the four networks, and served to establish and promote inter-Glyco-ITN connections.

In this newsletter you will also find information on the next network meeting. And if you want to know more, please visit our website!

Dr. Dolores Solís
Coordinator of GLYCOPHARM



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GLYCOPHARM CONSORTIUM



CSIC - Spain (Coordinator)
Agencia Estatal Consejo Superior de Investigaciones Científicas
<http://www.csic.es>



USP-CEU - Spain Terminated on 05-06-2014
Fundación Universitaria San Pablo - CEU
<http://www.ceu.es>



NUID-UCD - Ireland
National University of Ireland at Dublin - University College Dublin
<http://www.ucd.ie>



LMU - Germany
Ludwig-Maximilians Universität Muenchen
<http://www.en.uni-muenchen.de>



UMINHO - Portugal
Universidade do Minho
<http://www.uminho.pt>



CUNI - Czech Republic
Univerzita Karlova V Praze
<http://www.cuni.cz>



UKL-HD - Germany
Universitätsklinikum Heidelberg
<http://www.klinikum.uni-heidelberg.de>



IAB - Czech Republic
Institute of Applied Biotechnologies a.s.
<http://www.iabio.cz>



TBM - Italy Terminated on 01-05-2015
Toscana Biomarkers Srl
<http://www.toscanabiomarkers.com/en>



We Innovate Healthcare

ROCHE - Germany
Roche Diagnostics GMBH
<http://www.roche.com>



HokU - Japan (Associated partner)
Hokkaido University
<http://www.oia.hokudai.ac.jp>



CIC bioGUNE - Spain (Associated partner) Added on 02-02-2014
Centro de Investigación Cooperativa en Biociencias
<http://www.cicbiogune.es/>



EspiKem SRL- Italy (Associated partner) Added on 01-06-2015
<http://www.espikem.com/en/index.asp>



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NEWS

Three young researchers have completed their training

Beatriz Fernández de Toro has been hired as Early Stage Researcher by Ludwig-Maximilians Universität Muenchen (LMU) for a 3.5-month period aimed to specific training in pseudo-contact-shift NMR for describing glycan's conformation at high sensitivity using lanthanides, directly connecting the cooperative LMU-CSIC program.



ESR

Beatriz Fernández de Toro Ronda

Ludwig-Maximilians Universität Muenchen

Supervisor: Hans-Joachim Gabius.

Started on 16/09/15 – Ended on 30/12/15

Peter Kisfali, Experienced Researcher at the Institute of Applied Biotechnologies, has completed his 20-month Marie Curie contract. Peter has been actively involved in all training activities of the GLYCOPHARM meetings in Munich, Bilbao and Braga, and has also participated in several dissemination activities. His research project has been focused on the study of the expression of different genes in surgical sections of tumours and surrounding tissues. Some genes were found to be specific for the carcinoma tissue, emerging as possible markers for the development of diagnostic kits.



ER

Peter Kisfali

Institute of Applied Biotechnologies a.s.

Supervisors: Milan Press and Petr Kvapil.

Started on 01/02/14 – Ended on 30/09/2015

Finally, Michelle Yegres, Experienced Researcher at Roche, has also completed her 20-month contract. Her research project has targeted the identification of galectin-derived carbohydrate-binding peptides, detection of possible modification hotspots of the galectin-related protein Griffin, and the characterization of the glycan profile of integrins from pancreatic carcinoma cells. Michelle has very actively participated in the training activities of the GLYCOPHARM Meetings in Munich, Bilbao and Braga, as well as in the GlycoBiology Summer School, and has also performed several dissemination and outreach activities, including a talk in Tedx Munich to present the "Sugar Code".



ER

Michelle Yegres

Roche Diagnostics GMBH

Supervisor: Dietmar Reusch

Started on 01/03/14 – Ended on 31/10/2015



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PUBLICATIONS

New publications

- **Network Monitoring of Adhesion/Growth-Regulatory Galectins: Localization of the Five Canonical Chicken Proteins in Embryonic and Maturing Bone and Cartilage and Their Introduction as Histochemical Tools**

Kaltner H., Singh T., Manning J.C., Raschta A.S., André S., Sinowatz F. and Gabius H.J.

Journal Article: 2015 Dec

Anat Rec (Hoboken) 298(12): 2051-70

- **Fluorinated Carbohydrates as Lectin Ligands: (19)F-Based Direct STD Monitoring for Detection of Anomeric Selectivity**

Ribeiro J.P., Diercks T., Jiménez-Barbero J., André S., Gabius H.J. and Cañada F.J.

Journal Article: 2015 Nov 13

Biomolecules 5(4): 3177-92

- **Merging carbohydrate chemistry with lectin histochemistry to study inhibition of lectin binding by glycoclusters in the natural tissue context**

André S., Kaltner H., Kayser K., Murphy P.V. and Gabius H.J.

Journal Article: 2015 Nov 9 **Epub**

Histochem Cell Biol

- **Functional interplay between ganglioside GM1 and cross-linking galectin-1 induces axon-like neuritogenesis via integrin-based signaling and TRPC5-dependent Ca²⁺ influx**

Wu G., Lu Z.H., André S., Gabius H.J. and Ledeen R.W.

Journal Article: 2016 Feb (**Epub** 2015 Dec 28)

J Neurochem 136(3): 550-563

- **Quantitative differential proteomics of yeast extracellular matrix: there is more to it than meets the eye**

Faria-Oliveira F., Carvalho J., Ferreira C., Hernáez M.L., Gil C. and Lucas C.

Journal Article: 2015 Nov 25

BMC Microbiol 15(1): 271



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PUBLICATIONS

New publications

- **The Quest for Anticancer Vaccines: Deciphering the Fine-Epitope Specificity of Cancer-Related Monoclonal Antibodies by Combining Microarray Screening and Saturation Transfer Difference NMR**

Coelho H., Matsushita T., Artigas G., Hinou H., Cañada F.J., Lo-Man R., Leclerc C., Cabrita E.J., Jiménez-Barbero J., Nishimura S., Garcia-Martín F. and Marcelo F.

Journal Article: 2015 Oct 7

J Am Chem Soc 137(39): 12438-41

- **Structural Insights into the Binding of Sugar Receptors (Lectins) to a Synthetic Tricyclic Tn Mimetic and Its Glycopeptide Version**

Ardá A., Bosco R., Sastre J., Cañada F.J., Sabine A., Gabius H.J., Richichi B., Jiménez-Barbero J. and Nativi C.

Journal Article: 2015 Oct

European J Org Chem 2015(31): 6823-31

- **Engineering a Therapeutic Lectin by Uncoupling Mitogenicity from Antiviral Activity**
- Swanson M.D., Boudreaux D.M., Salmon L., Chugh J., Winter H.C., Meagher J.L., André S., Murphy P.V., Oscarson S., Roy R., King S., Kaplan M.H., Goldstein I.J., Tarbet E.B., Hurst B.L., Smee D.F., de la Fuente C., Hoffmann H.H., Xue Y., Rice C.M., Schols D., Garcia J.V., Stuckey J.A., Gabius H.J., Al-Hashimi H.M. and Markovit D.M.

Journal Article: 2015 Oct 22

Cell 163(3): 746-58

- **Glycodendrimersomes from Sequence-Defined Janus Glycodendrimers Reveal High Activity and Sensor Capacity for the Agglutination by Natural Variants of Human Lectins**

Zhang S., Xiao Q., Sherman S.E., Muncan A., Ramos Vicente A.D., Wang Z., Hammer D.A., Williams D., Chen Y., Pochan D.J., Vértesy S., André S., Klein M.L., Gabius H.J. and Percec V.

Journal Article: 2015 Oct 21

J Am Chem Soc 137(41): 13334-44



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PUBLICATIONS

New publications

- **Combining Crystallography and Hydrogen-Deuterium Exchange to Study Galectin-Ligand Complexes**

Ruiz F.M., Gilles U., Lindner I., André S., Romero A., Reusch D. and Gabius H.J.

Journal Article: 2015 Sep 21

Chemistry 21(39): 13558-68

- **Synthesis of four (4"-, 2"-, 2'-, and 6-) monodeoxy analogs of the trisaccharide α -D-Glcp-(1 \rightarrow 3)- α -D-Manp-(1 \rightarrow 2)- α -D-ManpOMe recognized by Calreticulin/Calnexin**

Glinschert A. and Oscarson S.

Journal Article: 2015 Sep 23

Carbohydr Res 414: 65-71

- **Regulatory Impact of Amniotic Membrane Transplantation on Presence of Adhesion/Growth-Regulatory Galectins-1 and -7 in Corneal Explants from Acanthamoeba Keratitis Patients: Clinical Note**

Smorodinova N., Kaltner H., Jirsová K., Hrdličková-Cela E., André S., Kučera T., Smetana K. Jr. and Gabius H.J.

Journal Article: 2015 Sep

Curr Eye Res 4: 1-7

- **Glycoclusters as lectin inhibitors: comparative analysis on two plant agglutinins with different folding as a step towards rules for selectivity**

André S., O'Sullivan S., Gabius H.J. and Murphy P.V.

Journal Article: 2015 Sep 23

TETRAHEDRON 71(38): 6867-80

- **Pharmacological activation of estrogen receptors- α and - β differentially modulates keratinocyte differentiation with functional impact on wound healing**

Peržel'ová V., Sabol F., Vasilenko T., Novotný M., Kováč I., Slezák M., Ďurkáč J., Hollý M., Pilátová M., Szabo P., Varinská L., Čriepoková Z., Kučera T., Kaltner H., André S., Gabius H.J., Mučaji P., Smetana K Jr. and Gál P.

Journal Article: 2016 Jan (**Epub** 2015 Sep 21)

TETRAHEDRON 71(38): 6867-80



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PUBLICATION

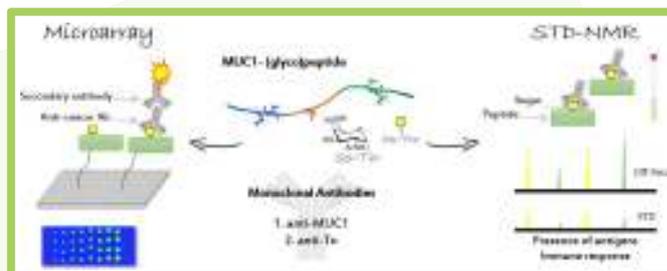
Selected publications

The Quest for Anticancer Vaccines: Deciphering the Fine-Epitope Specificity of Cancer-Related Monoclonal Antibodies by Combining Microarray Screening and Saturation Transfer Difference NMR

Coelho H., Matsushita T., Artigas G., Hinou H., Cañada F.J., Lo-Man R., Leclerc C., Cabrita E.J., Jiménez-Barbero J., Nishimura S., Garcia-Martín F. and Marcelo F.

J Am Chem Soc 137(39): 12438-41; 2015 Oct 7

SUMMARY: The identification of MUC1 tumour-associated Tn antigen has boosted the development of anticancer vaccines. In this work, the fine-epitope mapping of a MUC1 chemical library toward two families of cancer-related monoclonal antibodies was characterized using microarrays and STD NMR.



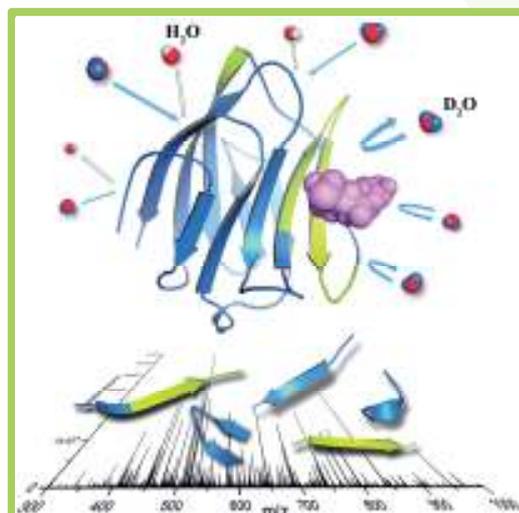
The reported strategy can be employed, in general, to unveil the key minimal structural features that modulate antigen-antibody recognition, with particular relevance for the development of Tn-MUC1-based anticancer vaccines.

Combining Crystallography and Hydrogen-Deuterium Exchange to Study Galectin-Ligand Complexes

Ruiz F.M., Gilles U., Lindner I., André S., Romero A., Reusch D. and Gabius H.J.

Chemistry 21(39): 13558-68; 2015 Sep 21

SUMMARY: This work reports on the characterization of carbohydrate recognition by the N-terminal domain of chicken galectin-8. Cell binding assays using glycosylation mutants revealed binding to α -2,3-sialylated and galactose-terminated glycan chains. Cocrystals with lactose and its 3'-sialylated derivative disclosed Arg58 as a key contact for the carboxylic acid. In addition, monitoring of hydrogen-deuterium exchange by MS revealed a reduction of deuteration after ligand binding. Evidence for changes beyond the contact area was obtained, highlighting the sensor capacity of this technique.





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DISSEMINATION ACTIVITIES

MGMS Young Modellers' Forum 2015

In order to encourage young molecular modellers at the beginning of their careers, the Molecular Graphics and Modelling Society (MGMS) celebrated the 2015 Young Modellers' Forum on 27 November in Greenwich, UK.

The GLYCOPHARM Early Stage Researcher Alessandra Lacetera, recruited at the Agencia Estatal Consejo Superior de Investigaciones Científicas, attended the Forum and presented the poster entitled "From the Computer to the Bench: Novel Selective Glycomimetics Take Life". She was awarded the prize to the best poster presentation.



Debrecen Colloquium on Carbohydrates

Cecilia Romanò, the GLYCOPHARM Early Stage Researcher recruited at the University College Dublin, attended the Debrecen Carbohydrate Symposium, held on 6-8 November in Debrecen, Hungary. The colloquium was celebrated in honour of the well-known carbohydrate chemist András Lipták, an outstanding member of the Debrecen Carbohydrate School and rector of the University of Debrecen. The conference covered all aspects of modern basic and applied glycosciences, centred around the main research fields of A. Lipták, *i.e.* synthetic carbohydrate chemistry, carbohydrate–protein interactions, and cyclodextrins.

Cecilia participated with the poster entitled "Synthetic approaches towards the preparation of fluorinated ligands for galectins" and was awarded with the prize to the best poster presentation.



Cecilia picking up her prize

Recent Advances in Synthesis and Chemical Biology XIV Symposium

The Centre for Synthesis and Chemical Biology (CSCB) held its 14th annual symposium on December 11 at the Royal College of Surgeons in Ireland, Dublin. Cecilia Romanò attended the symposium and won a prize for her poster entitled "Synthetic approaches towards the preparation of fluorinated ligands for galectins".



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PAST EVENTS

6th GLYCOPHARM meeting

The 6th GLYCOPHARM Network Meeting was organized by Cândida Lucas and hosted by the Centre of Molecular and Environmental Biology (CBMA, UMINHO) at the School of Sciences of the University of Minho, on September 21-22.

GLYCOPHARM ESRs and ERs reported on the progress of their research projects and also had the opportunity to meet for discussing relevant issues, specially those to be put forward by the elected ESR/ER representatives at the 6th Supervisory Board meeting. A session for open discussions was also held with the main objective of exploring collaboration opportunities among network members.



The recruited researchers were particularly encouraged to consider synergies and complementarities of their research skills and how they could be exploited, with the double perspective of benefiting from other partner's competencies and of complementing and strengthening running projects of other ESR/ERs and possible future collaborative projects.





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PAST EVENTS

6th GLYCOPHARM meeting – Cont.

The GLYCOPHARM meeting also included a Workshop on Structural Glycobiology, organized by CSICc and imparted by experts from this partner. The first part of the workshop consisted in a series of lectures covering the fundamentals of X-ray crystallography, key points for successful protein crystallization, including protein expression and purification, an introduction to the phasing problem and structure refinement, and a review of X-ray structures of different galectins solved to date by CSICc.

A second practical session was dedicated to the use of graphic programs for the analysis of PDB files. The ERs and ESRs worked in groups under the supervision of the CSICc experts, with the objectives of checking structures and finding possible mistakes, mutations, deletions, bad rotamers, potential double conformations, etc, and fixing errors when possible. Checking interactions and distances between protein and ligand as well as looking at solvent molecules were other aspects covered in this practical session, together with an introduction to refinement and validation protocols.



The pictures show A. Romero, M. Spínola, F.M. Ruiz, F.J. Medrano and E. Santillana (CSICc) during their presentations, and several groups working on the analysis of PDB files during the practical session.



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PAST EVENTS

GlycoBiology SUMMER SCHOOL

A GlycoBiology Summer School was organized by Cândida Lucas (CBMA, UMINHO) in Braga during September 23-25. This Summer School was a joint learning event with the participation of lecturers from four ITNs/ETNs: GLYCOPHARM, GlycoPar, Immunoshape and GastricGlyco Explorer, together with invited speakers. The school was focused on glycobiology of cancer, carbohydrate immunomodulators, structural glycopharmaceutics, and parasite glycobiology. Key aspects of lectin-ligand interactions and glycan's shape and dynamics, as well as different examples of glycoimmunology, were also covered.



Lecturers

- Francisco Corzana – *Universidad de La Rioja, Spain* – Invited Guest Speaker: Molecular dynamics simulations and NMR to study flexible molecules in solution
- Angelina Palma – *NOVA University of Lisbon, Portugal* – Invited Guest Speaker: Glycan microarrays as tools for glycobiology: current applications and future challenges
- Dolores Solís – *CSIC, Spain* – GLYCOPHARM: Essentials of lectin-ligand interactions: A galectins' perspective
- Niels Reichardt – *CIC Biomagune, Spain* – Immunoshape: Chemical glycobiology of N-glycans: Tools and applications
- Christine Neupert – *Malcisbo AG, Switzerland* – Glycopar: Novel vaccines for veterinary use,
- Filipa Marcelo – *NOVA University of Lisbon, Portugal* – Invited Guest Speaker: An NMR guided approach to decipher carbohydrate-protein interactions,
- Ana Preto – *UMINHO, Portugal* – GLYCOPHARM: Unveil the role of mutated KRAS signaling in colorectal carcinoma: towards identification of new molecular targets
- Celso Reis – *University of Porto & Instituto de Investigação e Inovação em Saúde, Portugal* – GastricGlyco Explorer: Glycans and carbohydrates in cancer. Molecular functions and biomarker applications
- Alvaro Acosta-serrano – *Liverpool School of Tropical Medicine, United Kingdom* – Glycopar: Glycobiology of neglected tropical diseases: New lessons from old problems
- Cândida Lucas – *UMINHO, Portugal* – GLYCOPHARM: Glycoside structure of extracellular matrix from yeast
- João Rodrigues – *University of Lisbon, Portugal* – Glycopar: Sweet parasites: Insights from functional glycomics



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PAST EVENTS

GlycoBiology SUMMER SCHOOL – Cont.

The Summer School also included a workshop on research management and intellectual property in an EU funding context, with lectures by Joana Santos, invited guest speaker from the National Institute for Intellectual Property (Portugal), Michelle Yegres, from the GLYCOPHARM partner Roche Diagnostics GMBH (Germany), and Simão Soares, from the Glycopar partner Silicolife (Portugal). Topics covered were “Patents on biotechnology”, “Monoclonal antibodies: From the bench to the market”, and “Glycopar: A company perspective of a glycobiology ITN”.

A final session chaired by Dolores Solís (GLYCOPHARM coordinator), Cândida Lucas (GLYCOPHARM), João Rodrigues (Glycopar coordinator), and Celso Reis (Gastric GlycoExplorer) was dedicated to openly discuss funding applications and opportunities for the career development of the recruited researchers. This and other networking activities carried out during the Summer School served to establish and promote inter-Glyco-ITN connections.





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UPCOMING EVENTS

7th GLYCOPHARM meeting

The next GLYCOPHARM network meeting will take place in Prague from Monday 15 to Wednesday 17 February 2016, and will be hosted by Univerzita Karlova V Praze (CUNI).



The program will include time for presentations of the ESRs and ERs on the progress of their research projects, modules V and VI of the course on Chemical Glycobiology & Biomedicine (organized by CUNI and ROCHE, respectively), a workshop on Immunocytochemistry and Glycohistochemistry, with theoretical and practical sessions (for ER/ESRs), the second part of the course on Entrepreneurship & Company Management, and a seminar on research management and policy (UCD-NUID).

SCHEDULED ACTIVITIES

FEBRUARY 15 (Monday)

- ESR/ERs presentations
- Entrepreneurship and Company Management Course
- ESR/ERs Meeting
- Supervisory Board Meeting
- City tour/Networking Dinner

FEBRUARY 16 (Tuesday)

- Course in Chemical Glycobiology & Biomedicine Module V: Biomedical implications (CUNI)
- Workshop on Immunocytochemistry and Glycohistochemistry (CUNI): Theoretical and practical sessions

7th GLYCOPHARM Meeting

15-17 Feb
2016, Prague

Hosted by



FEBRUARY 17 (Wednesday)

- Entrepreneurship and Company Management Course (cont.)
- Course in Chemical Glycobiology & Biomedicine Module VI: Challenges in glycosciences (ROCHE)
- Seminar on research management and policy (UCD-NUID)

GLYCOPHARM

Marie Curie Initial Training Network

PITN-GA-2012-317297

<http://www.glycopharm.eu>