GLYCOPHARM

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

Newsletter

October 2016 - Issue 11

http://www.glycopharm.eu

Marie Curie Initial Training Network
Duration: Nov 1st 2012–Oct 31st 2016
EU Contribution: 3,005,458.30 €
PITN-GA-2012-317297

MARIE CURIE ACTIONS

Newsletter

October 2016
Issue 11

SUMMARY

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Newsletter designed by Begoña Morales

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EDITORIAL

Welcome

Dear Reader,

Welcome to the final issue of the GLYCOPHARM newsletter.

GLYCOPHARM was designed to offer training to young researchers in the interdisciplinary field of glycosciences. After four years of intense activity, the project finished on October 31. In this newsletter you will find information on different accomplishments of the last six months, followed by a brief overview of the project goals and activities carried out along the project. Full details are available on the project website, which will be kept online and updated with the latest GLYCOPHARM news.

As in previous issues, we report on scientific publications of network members. As “Selected Publication”, we highlight the work on chicken galectin-related protein authored by three GLYCOPHARM young researchers, Gabriel García Caballero, Andrea Flores Ibarra and Malwina Michalak. Congratulations! The ITN Networking day held at the Biological Research Centre (CIB, CSIC) has been selected as dissemination activity. This meeting was intended to publicize the activities of six ITNs hosted by CIB, including GLYCOPHARM, and to promote inter-ITN connections.

In this newsletter you will also find information on the GLYCOPHARM Final Conference, held in Madrid on July 27-29. The conference counted with the participation of network and invited speakers, and it also gave the young researchers the opportunity to present their work. Overall, it was an excellent occasion to evaluate the overall performance of the GLYCOPHARM project.

To conclude, I want to thank all GLYCOPHARM partners for their work, and very specially the young researchers, who were the raison d'être of our training network. All the best to you!

Dr. Dolores Solís

Coordinator of GLYCOPHARM

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
Universitätklinikum 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

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

PUBLICATIONS

New publications

• **Detection of proteome changes in human colon cancer induced by cell surface binding of growth-inhibitory human galectin-4 using quantitative SILAC-based proteomics.**
Michalak M, Warnken U, André S, Schnölzer M, Gabius HJ, Kopitz J.
Journal Article: 2016 Nov 1 **Epub**
J Proteome Res.

• **Playing Modular Puzzle with Adhesion/Growth-Regulatory Galectins: Design and Testing of a Hybrid to Unravel Structure-Activity Relationships.**
Ludwig AK, Vértesy S, Michalak M, Manning JC, André S, Kübler D, Kopitz J, Kaltner H, Gabius HJ.
Journal Article: 2016 Sep 30 **Epub**
Protein Pept Lett.

• **Galectin-related protein: An integral member of the network of chicken galectins: 2. From expression profiling to its immunocyto- and histochemical localization and application as tool for ligand detection.**
Kaltner H, García Caballero G, Sinowatz F, Schmidt S, Manning JC, André S, Gabius HJ.
Journal Article: 2016 Oct
Biochim Biophys Acta;1860(10):2298-312.

• **Galectin-related protein: An integral member of the network of chicken galectins 1. From strong sequence conservation of the gene confined to vertebrates to biochemical characteristics of the chicken protein and its crystal structure.**
García Caballero G, Flores-Ibarra A, Michalak M, Khasbiullina N, Bovin NV, André S, Manning JC, Vértesy S, Ruiz FM, Kaltner H, Kopitz J, Romero A, Gabius HJ.
Journal Article: 2016 Oct
Biochim Biophys Acta;1860(10):2285-97.

• **Functional differences between neonatal and adult fibroblasts and keratinocytes: Donor age affects epithelial-mesenchymal crosstalk in vitro.**
Mateu R, Živicová V, Krejčí ED, Grim M, Strnad H, Vlček Č, Kolář M, Lacina L, Gál P, Borský J, Smetana K Jr, Dvořánková B.
Journal Article: 2016 Oct
Int J Mol Med;38(4):1063-74.

PUBLICATIONS

New publications

• **Chicken GRIFIN: A homodimeric member of the galectin network with canonical properties and a unique expression profile.**
García Caballero G, Kaltner H, Michalak M, Shilova N, Yegres M, André S, Ludwig AK, Manning JC, Schmidt S, Schnölzer M, Bovin NV, Reusch D, Kopitz J, Gabius HJ.
Journal Article: 2016 Sep-Oct
Biochimie.;128-129:34-47.

• **Intra- and intermolecular interactions of human galectin-3: assessment by full-assignment-based NMR.**
Ippel H, Miller MC, Vértesy S, Zheng Y, Cañada FJ, Suylen D, Umemoto K, Romanò C, Hackeng T, Tai G, Leffler H, Kopitz J, André S, Kübler D, Jiménez-Barbero J, Oscarson S, Gabius HJ, Mayo KH.
Journal Article: 2016 Aug
Glycobiology;26(8):888-903.

• **Simultaneous blocking of IL-6 and IL-8 is sufficient to fully inhibit CAF-induced human melanoma cell invasiveness.**
Jobe NP, Rösel D, Dvořánková B, Kodet O, Lacina L, Mateu R, Smetana K, Brábek J.
Journal Article: 2016 Aug
Histochem Cell Biol.;146(2):205-17.

• **Computational Approaches to Toll-Like Receptor 4 Modulation.**
Billod JM, Lacetera A, Guzmán-Caldentey J, Martín-Santamaría S.
Journal Article: 2016 Jul 30
Molecules;21(8). pii: E994. Review.

• **Galectin-8 enhances adhesion of multiple myeloma cells to vascular endothelium and is an adverse prognostic factor.**
Friedel M, André S, Goldschmidt H, Gabius HJ, Schwartz-Albiez R.
Journal Article: 2016 June 10 (Advance Access Publication Date)
Glycobiology;26(10):1048–58.

PUBLICATIONS

New publications

• **Galectin-8 enhances adhesion of multiple myeloma cells to vascular endothelium and is an adverse prognostic factor.**
Friedel M, André S, Goldschmidt H, Gabius HJ, Schwartz-Albiez R.
Journal Article: 2016 June 10 (Advance Access Publication Date)
Glycobiology;26(10):1048–58

• **Combined Bacteria Microarray and Quartz Crystal Microbalance Approach for Exploring Glycosignatures of Nontypeable Haemophilus influenzae and Recognition by Host Lectins.**
Kalograiaki I, Euba B, Proverbio D, Campanero-Rhodes MA, Aastrup T, Garmendia J, Solís D.
Journal Article: 2016 Jun 7
Anal Chem.;88(11):5950-7

• **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, Gabius HJ.
Journal Article: 2016 Jun
Curr Eye Res.;41(6):740-6.

• **Glycomimetics Targeting Glycosyltransferases: Synthetic, Computational and Structural Studies of Less-Polar Conjugates.**
Ghirardello M, de Las Rivas M, Lacetera A, Delso I, Lira-Navarrete E, Tejero T, Martín-Santamaría S, Hurtado-Guerrero R, Merino P.
Journal Article: 2016 May 17
Chemistry.;22(21):7215-24.

• **Multivalent Carbohydrate-Lectin Interactions: How Synthetic Chemistry Enables Insights into Nanometric Recognition.**
Roy R, Murphy PV, Gabius HJ.
Journal Article: 2016 May 13
Molecules.;21(5). pii: E629. Review.

PUBLICATIONS

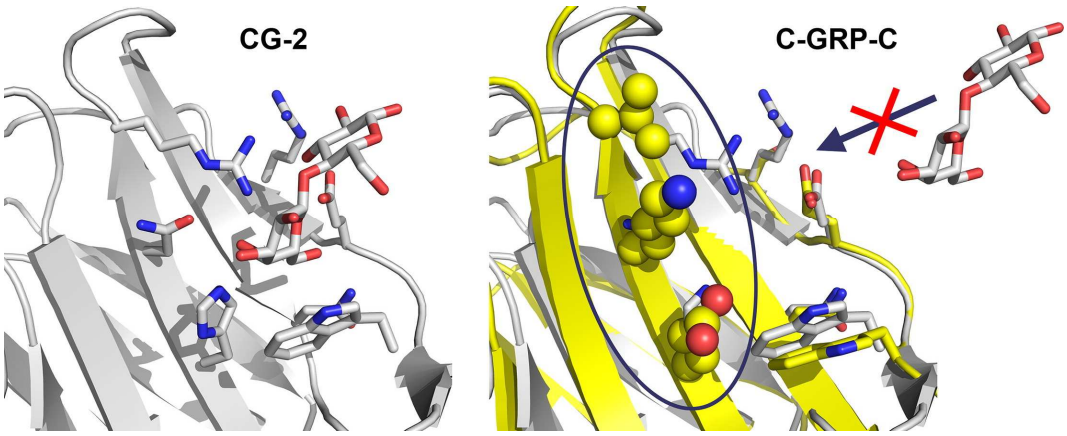
Selected publication

Galectin-related protein: An integral member of the network of chicken galectins 1. From strong sequence conservation of the gene confined to vertebrates to biochemical characteristics of the chicken protein and its crystal structure.

García Caballero G., Flores-Ibarra A., Michalak M., Khasbiullina N., Bovin N.V., André S., Manning J.C., Vértesy S., Ruiz F.M., Kaltner H., Kopitz J., Romero A., Gabius H.-J..

Biochim Biophys Acta. 2016 Oct;1860(10):2285-97. doi: 10.1016/j.bbagen.2016.06.001. Epub 2016 Jun 3.

SUMMARY: Database mining and computational data processing were applied to the detection of a gene coding for the galectin-related protein (GRP) in chicken, chromosomal location and sequence alignments. The gene is present exclusively in vertebrates with high-level sequence conservation and similar chromosomal positioning. Recombinant chicken GRP was characterized by mass spectrometry, electrophoresis, and gel filtration chromatography, and its binding activity was tested using haemagglutination, microarray and cell binding assays. The protein was found to be monomeric and to lack glycan-binding activity. The X-ray crystal structure of a shortened variant without the N-terminal 36-amino-acid extension (designated as C-GRP-C) provided a rationale for this lack of binding.



Comparison of the carbohydrate-binding site of chicken galectin CG-2 and the equivalent region of C-GRP-C. The left panel shows the binding site of CG-2 in complex with lactose. Residues making contact with the ligand (His45, Asn47, Arg49, Asn58, Trp65, Glu68 and Arg70) as well as lactose are shown in stick mode. The right panel shows a superposition of the CG-2 binding site with the structurally equipositioned region of C-GRP-C (in yellow). Only three of the residues (Asn62, Trp69, and Glu72) are maintained, noticeably reducing the set of possible contacts with galactose. Protrusion of Lys51 flanked by Glu49 and Val 53 (in CPK mode), also disfavors a tight fit of lactose.

DISSEMINATION ACTIVITIES

ITN networking at CIB

Several GLYCOPHARM members participated in the ITN networking day held at the Biological Research Centre (CIB, CSIC), Madrid, on 1 July 2016. This meeting was intended to publicize the activities of six Initial Training Networks in which CIB is currently, or has been recently, involved, *i.e.* GLYCOPHARM, EuroLeish, HEM_ID, MasstrplAn, TOLLerant, and DYNANO.

Sonsoles Martín-Santamaría (CSICd) chaired the Organizing Committee, and Andrea Flores-Ibarra (CSICc) collaborated in the organization of this event.

In representation of GLYCOPHARM, Antonio Romero (CSICc) introduced the network. In addition, Alessandra Lacetera (CSICd) and Andrea Flores-Ibarra (CSICc) presented results of their research projects in their talks entitled “Computational approaches in glycobiology. Some examples”, and “Structural characterization of galectin -3 and galectin-related protein by X-ray crystallography”, respectively.

Besides dissemination of the different ITN’s activities, a main objective of this networking event was to establish and promote inter-ITN connections, a goal also pursued in the DYNANO-GLYCOPHARM Summer School held at CIB in 2013, and the GlycoBiology Summer School (Braga, 2015), in which four networks, GLYCOPHARM GlycoPar, GastricGlycoExplorer, and Immunoshape, were involved.

PAST EVENTS

Final Conference

The GLYCOPHARM Final Conference was held on July 27-29 at the Institute of Physical Chemistry Rocasolano, in Madrid, hosted by the coordinator. All ER/ESRs attending the conference had the opportunity to present an overview of the progress achieved along their projects. The scientists-in-charge of different partners also described main scientific results and achievements. Overall, the Final Conference was an excellent occasion to evaluate the overall performance of the GLYCOPHARM project and to share personal experiences and views.

The programme also included three special lectures on cutting-edge research in the continuously evolving field of glycosciences. Shin-Ichiro Nishimura (HokU) focused on new trends in glycodrug discovery using chemical synthesis and nanotechnology. In addition, two invited renowned scientists, Manuel Martín-Lomas (CIC biomaGUNE, Spain) and Julie Bouckaert (Université des Sciences et Technologies de Lille 1, France), addressed aspects beyond those dealt with during the GLYCOPHARM research and training programme, *i.e.* the importance of glycosaminoglycans in the activation of growth factors, and the role of sugars in bacterial adhesion, further illustrating the functional diversity of the Sugar Code.

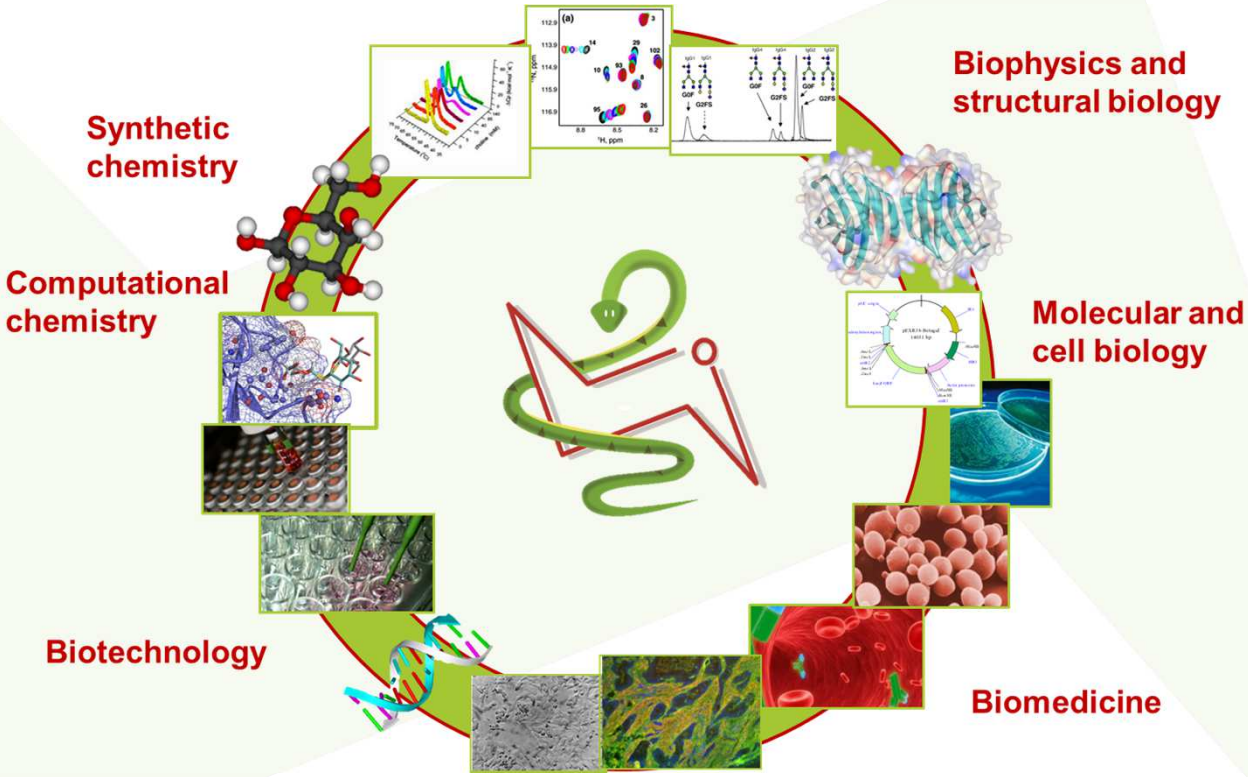
Pictures of the Special Lecturers Shin-Ichiro Nishimura, Manuel Martín-Lomas, and Julie Bouckaert, together with Sonsoles Martín-Santamaría and Dolores Solís (top panels, from left to right) and group picture of the GLYCOPHARM members attending the Conference and the invited speakers.

GLYCOPHARM

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

GLYCOPHARM OVERVIEW

The GLYCOPHARM network was designed to provide multidisciplinary training to young researchers in the evolving field of glycosciences, going from computational and synthetic chemistry to biophysics and structural biology, molecular and cell biology, biomedicine and biotechnology, and development of clinical approaches for diagnosis and therapy.



The training programme was based on three complementary actions: individual research projects of the young researchers, all of them contributing to the development of the overall research programme, local training at the host institutions, and network-wide training activities. The latter have included a core six-module course on Chemical Glycobiology & Biomedicine, several workshops on the approaches and methodologies used by the different partners, and two Summer Schools organized in collaboration with other ITNs (please see the section on Dissemination Activities).

In addition, network-wide training in transferable skills has been provided through a course on Entrepreneurship and Company Management, a series of career seminars, and an intensive workshop on Career Development and Proposal Writing.

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GLYCOPHARM OVERVIEW

Fulfilment of the GLYCOPHARM training programme has been possible thanks to the involvement of all partners in the organization and implementation of a rich diversity of training activities, as outlined before. Besides benefiting from the training provided, the recruited researchers have also contributed to the GLYCOPHARM events at different levels, from presentation of the progress of their research projects at network meetings to their active collaboration in different activities. The GLYCOPHARM Project Manager has also played a very important role along the project, helping in the organization of events and in the dissemination of GLYCOPHARM activities and results through the website and newsletters. Thus, all GLYCOPHARM members, from Principal Investigators to Early Stage and Experienced Researchers and the Project Manager, have contributed to the successful achievement of the project goals. Well done!

Principal Investigators

ESRs, ERs & Project Manager

GLYCOPHARM

Marie Curie Initial Training Network

PITN-GA-2012-317297

http://www.glycopharm.eu