



GLYCOPHARM

The Sugar Code:

from bio(chemical) concept to clinics

Newsletter

December 2014 - Issue 6

<http://www.glycopharm.eu>

Marie Curie Initial Training Network

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Newsletter

December 2014
Issue 6

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EDITORIAL

Welcome

Dear Reader,

Welcome to the sixth issue of the GLYCOPHARM newsletter.

GLYCOPHARM is a Marie Curie Initial Training Network devised to offer training to thirteen young researchers in the interdisciplinary field of glycosciences.

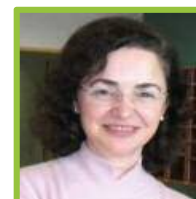
Very recently, the termination of the participation of USP-CEU in the consortium has been officially agreed by the REA, due to the incorporation of the scientist-in-charge of this partner to CSIC. All remaining tasks of USP-CEU have been transferred to CSIC, so the project continues progressing successfully, having already completed its first half.

Numerous scientific and technological results have been obtained since the beginning of the project and many of them have been presented in over 60 scientific meetings, congresses and seminars. Of note, thirteen of these communications have been co-authored by the recruited researchers. In addition, a growing number of scientific publications are deriving from the work undertaken within the project, with thirteen individual and twenty-two joint publications materialized in the first two years. In this issue you will find information on the most recent publications.

Besides scientific and technological breakthroughs, this issue also reports on dissemination and outreach activities jointly carried out by several network members. In particular, I want to thank all the young researchers that participated in the FOTCIENCIA contest. Impressive work, congratulations!

Finally, you will also find information on GLYCOPHARM upcoming events. And if you want to know more, please visit our website!

Dr. Dolores Solís
Coordinator of GLYCOPHARM



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GLYCOPHARM CONSORTIUM

Partners



CSIC - Spain (Coordinator)

Agencia Estatal Consejo Superior de Investigaciones Científicas

<http://www.csic.es>



USP-CEU - Spain

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 München

<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

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>



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

PUBLICATIONS

New publications

- **Bacteria microarrays as sensitive tools for exploring pathogen surface epitopes and recognition by host receptors**

Campanero-Rhodes M.A., Llobet E., Bengoechea J.A. and Solís D.

Journal Article: **Epub** 2014 Dec

Rsc Advances 5(10):7173-7181

- **Delineating binding modes of Gal/GalNAc and structural elements of the molecular recognition of tumor-associated mucin glycopeptides by the human macrophage galactose-type lectin**

Marcelo F., García-Martín F., Matsushita T., Sardinha J., Coelho H., Oude-Vrielink A., Koller C., André S., Cabrita E.J., Gabius H.-J., Nishimura S., Jiménez-Barbero J. and Cañada F.J.

Journal Article: 2014 Dec

Chemistry 20(49):16147-16155

- **Methodologies to generate, extract, purify and fractionate yeast ECM for analytical use in proteomics and glycomics**

Faria-Oliveira F., Carvalho J., Belmiro C., Martínez-Gomariz M., Hernáez M., Pavao M., Gil C., Lucas C. and Ferreira C.

Journal Article: 2014 Oct

BMC Microbiol 14(1):244

- **Human osteoarthritic knee cartilage: fingerprinting of adhesion/growth-regulatory galectins in vitro and in situ indicates differential upregulation in severe degeneration IF**

Toegel S., Bieder D., André S., Kayser K., Walzer S.M., Hobusch G., Windhager R. and Gabius H.-J.

Journal Article: 2014 Oct

Histochem Cell Biol 142(4):373-388



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PUBLICATIONS

New publications

- **Mimicking biological membranes with programmable glycan ligands self-assembled from amphiphilic Janus glycodendrimers**

Zhang S., Moussodia R.O., Sun H. J., Leowanawat P., Muncan A., Nusbaum C.D., Chelling K.M., Heiney P.A., Klein M.L., André S., Roy R., Gabius H.-J. and Percec V.

Journal Article: 2014 Oct

Angew Chem Int Ed Engl 53(41):10899-10903

- **Impact of sodium butyrate on the network of adhesion/growth-regulatory galectins in human colon cancer in vitro**

Katzenmaier E.M., André S., Kopitz J. and Gabius H.-J.

Journal Article: 2014 Oct

Anticancer Res 34(10):5429-5438

- **Rho GTPase Rac1: molecular switch within the galectin network and for N-glycan alpha2,6-sialylation/O-glycan core 1 sialylation in colon cancer in vitro**

André S., Singh T., Lacal J.C., Smetana K., Jr. and Gabius H.-J.

Journal Article: 2014

Folia Biol (Praha) 60(3):95-107

- **NMR and molecular recognition. The application of ligand-based NMR methods to monitor molecular interactions**

Unione L., Galante S., Díaz D., Cañada F.J. and Jiménez-Barbero J.

Journal Article: 2014 Sep

Medchemcomm 5(9):1280-1289

- **gem-Difluorocarbadisaccharides: restoring the exo-anomeric effect**

Xu B., Unione L., Sardinha J., Wu S., Ethève-Quellejeu M., Pilar Rauter A., Blériot Y., Zhang Y., Martín-Santamaria S., Díaz D., Jiménez-Barbero J. and Sollogoub M.

Journal Article: 2014 Sep

Angew Chem Int Ed 53(36):9597-9602



GLYCOPHARM

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

PUBLICATIONS

Selected publication

Delineating binding modes of Gal/GalNAc and structural elements of the molecular recognition of tumor-associated mucin glycopeptides by the human macrophage galactose-type lectin

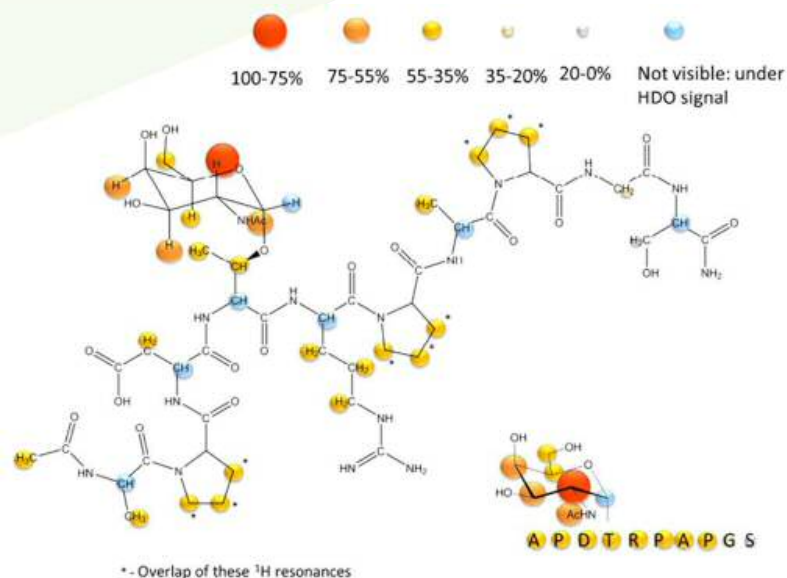
Marcelo F., García-Martín F., Matsushita T., Sardinha J., Coelho H., Oude-Vrielink A., Koller C., André S., Cabrita E.J., Gabius H.-J., Nishimura S., Jiménez-Barbero J. and Cañada F.J.

Journal Article: 2014 Dec

Chemistry 20(49):16147-16155

ABSTRACT:

The human macrophage galactose-type lectin (MGL) is a key physiological receptor for the carcinoma-associated Tn antigen (GalNAc- α -1-O-Ser/Thr) in mucins. NMR and modeling-based data on the molecular recognition features of synthetic Tn-bearing glycopeptides by MGL are presented. Cognate epitopes on the sugar and matching key amino acids involved in the interaction were identified by saturation transfer difference (STD) NMR spectroscopy. Only the amino acids close to the glycosylation site in the peptides are involved in lectin contact. Moreover, control experiments with non-glycosylated MUC1 peptides unequivocally showed that the sugar residue is essential for MGL binding, as is Ca^{2+} . NMR data were complemented with molecular dynamics simulations and Corcema-ST to establish a 3D view on the molecular recognition process between Gal, GalNAc, and the Tn-presenting glycopeptides and MGL. Gal and GalNAc have a dual binding mode with opposite trend of the main interaction pattern and the differences in affinity can be explained by additional hydrogen bonds and CH- π contacts involving exclusively the NHAc moiety.



Epitope mapping obtained for glycopeptide APD[T]RPAPGS with MGL.

The signal of the anomeric proton of GalNAc as well as the H_α protons of the amino acids could not be analyzed in the STD spectra due to their close distance to the HDO signal. Some proton signals, namely those from prolines, appeared in the same region of the spectrum.



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PUBLICATIONS

Selected publication

NEW METHODOLOGIES

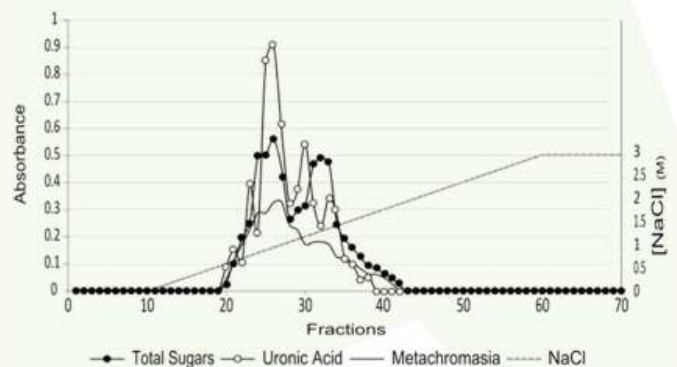
Methodologies to generate, extract, purify and fractionate yeast ECM for analytical use in proteomics and glycomics

Faria-Oliveira F., Carvalho J., Belmiro C., Martínez-Gomariz M., Hernáez M., Pavao M., Gil C., Lucas C. and Ferreira C.

Journal Article: 2014 Oct
BMC Microbiol 14(1):244

SUMMARY: This work presents a protocol to produce *S. cerevisiae* and *C. albicans* extracellular matrix in an equally highly reproducible manner. Additionally, methodologies for the extraction and fractionation into protein and glycosidic analytical pure fractions were improved.

Anionic exchange fractionation of *S. cerevisiae* extracellular matrix

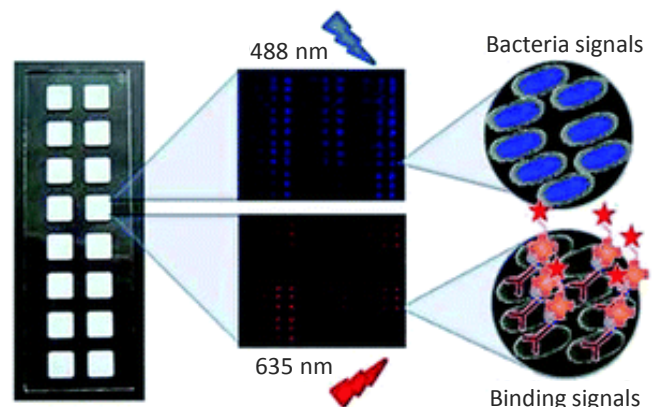


Bacteria microarrays as sensitive tools for exploring pathogen surface epitopes and recognition by host receptors

María Asunción Campanero-Rhodes, Enrique Llobet, Antonio Bengoecheabe and Dolores Solís

Journal Article: 2014 Dec 16 (Epub)
RSC Adv 5(1): 7173-7181

SUMMARY: A readily adaptable microarray technology for high-throughput screening of pathogen-binding biomolecules and inhibitors of pathogen-counter-receptor interactions is developed, based on the generation of bacteria microarrays.





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DISSEMINATION ACTIVITIES

9th International Conference of Anticancer Research

The International Institute of Anticancer Research organized the 9th International Conference of Anticancer Research from 6 to 10 October, 2014 in Sithonia, Greece, under the auspices of 19 societies and organizations. The purpose of this conference is to exchange scientific information worldwide and to discuss recent advances in both broad and specialized areas of experimental and clinical cancer research. International scientific and medical societies participated in the conference by organizing specialized sessions. This initiative presented a forum for inter-society communication allowing the organization and coordination of international activities on cancer.

Two GLYCOPHARM members, Hans-Joachim Gabius (LMU) and Karel Smetana (CUNI), participated in the organizing committee, and Hans-Joachim Gabius organized the symposium "The sugar code in tumour biology: principles and examples", in which he Karel Smetana and Jürgen Kopitz (UKL-HD) participated, together with Klaus Kayser, from the Institute of Pathology, Charite (Berlin, Germany). In addition, Karel Smetana participated as speaker in the symposium "Targeting the tumour microenvironment".

The abstracts of the conference are published in Anticancer Research 34: 5761-6258 (2014).

THE SUGAR CODE IN TUMOR BIOLOGY / PATHOLOGY: PRINCIPLES AND EXAMPLES

Symposium Organized by H.-J. Gabius

- Introduction to the sugar code in tumor biology / pathology: principles and examples
Hans-Joachim Gabius, LMU
- A primer to the function of glycoproteins and glycolipids in tumor biology
Juergen Kopitz, UKL-HD
- How human lectins translate the sugar code
Hans -Joachim Gabius, LMU
- Galectins in squamous cell carcinomas
Karel Smetana, CUNI
- Structural entropy and lectins: partners in analyzing biological information at the cellular level
Klaus Kayser, Institute of Pathology, Charite

TARGETING THE TUMOUR MICROENVIRONMENT

Symposium organized by I.P. Witz and Y. Keisari

- Galectin-1 in crosstalk between cancer cells and cancer-associated fibroblasts
Karel Smetana, CUNI



H.-J. Gabius, J. Kopitz, K. Kayser and K. Smetana during the conference in Sithonia



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OUTREACH ACTIVITIES

GLYCOPHARM participated in FOTCIENCIA12

FOTCIENCIA is a science photography contest organized by the Spanish National Research Council (CSIC) and the Spanish Foundation for Science and Technology (FECYT) which aims to bring science and technology closer to people through an artistic and aesthetic vision suggested by scientific images and a written commentary on the scientific fact they illustrate. Furthermore, at the end of the contest, a series of images (and their respective texts) are selected by a committee to elaborate a catalogue and also to be part of a traveling exhibition.

The last edition of the contest, FOTCIENCIA12, began on September 16 and ended on October 30. This time, the young researchers of GLYCOPHARM took their cameras and used their wit and imagination to capture in a shot a bit of science and, why not, part of their scientific work. The GLYCOPHARM ESRs and ERs participated in the two main categories of the contest: General and Micro, and of course, they also accompanied their pictures with cool and didactic texts explaining their pictures.

With this activity, the GLYCOPHARM young researchers tried to do their bit to bring closer science to society.

You can see all the pictures and texts that have participated in this contest in the website of FOTCIENCIA:

http://www.fotciencia.es/Publico/Galeria/Galeria.aspx?edicion=12&Anno_Galeria=2014

Get surprised with amazing pictures and enjoy reading the texts!



FOTCIENCIA12





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UPCOMING EVENTS

5th GLYCOPHARM meeting

As it was already announced in the previous newsletter, this meeting will be hosted by CIC bioGUNE in Bilbao, Spain. The meeting will be held from 2 to 4 of February, and the 5th Supervisory Board meeting will take place on February 3. During the ESRs and ERs meeting, two researchers will be elected as annual representatives of the young researchers at the Supervisory Board.

There will be a shuttle bus from Bilbao centre to CIC-bioGUNE to attend the meeting and to return to Bilbao centre at the end of each day.

Below you can see the preliminary agenda of the meeting.

PRELIMINARY AGENDA

FEBRUARY 2, 2015

- 13:00 – 14:30 *Welcome Lunch (Atrio 801)*
- 14:30 – 18:00 **Workshop: Molecular Recognition. Session I**
NMR, ITC, SPR, CD, Fluorescence Spectroscopy,
Molecular Modelling
- 16:30 – 17:00 *Coffee-break*
- 17:00 – 18:00 **Workshop: Molecular Recognition. Session II**
NMR, ITC, SPR, CD, Fluorescence Spectroscopy,
Molecular Modelling
- 18:00 *Shuttle bus to Hotel Abando in Bilbao*

- 13:00 – 13:30 **Lecture:** IMMUNOSHAPE, an ETN network for the Development of Selective Carbohydrate Immuno-modulators Targeting C-type Lectin Receptors on Antigen Presenting Cells. (Invited speaker: Niels Reichardt, CIC biomaGUNE)
- 13:30 – 15:00 *Lunch (Restaurant in hotel Laia)*
- 15:00 – 16:30 **5th Supervisory Board Meeting**
- 16:30 – 17:30 **Visit to CIC bioGUNE**
- 17:30 *Shuttle bus to Hotel Abando in Bilbao*
- 21:00 *Informal Dinner (Restauran Txoko Bilanda)*

FEBRUARY 3, 2015

- 08:30 *Shuttle bus from Hotel Abando to CIC bioGUNE*
- 09:00 – 09:30 **Seminar: Scientific Writing & Communication**
- 09:30 – 11:00 **ESRs and ERs' presentations. Session I**
10 minutes /presentation
- 11:00 – 11:30 *Coffee-break*
- 11:30 – 12:30 **ESRs and ERs' presentations. Session II**
10 minutes /presentation
- 12:30 – 13:00 **ESRs and ERs' meeting**
Meeting where the ESRs and ERs can share experiences, exchange views and consult doubts. Furthermore, they must choose 2 new ESRs and ERs representatives for S.B. meetings held on 2015 and decide if they wish communicate any questions and / or opinion in the 5th SB meeting.

FEBRUARY 4, 2015

- 08:30 *Shuttle bus from Hotel Abando to CIC bioGUNE*
- 09:00– 13:30 **Course in Chemical Glycobiology & Biomedicine. Module III: Lectins. Session I**
 - The history of lectinology
 - Animal and human lectins
- 11:00 – 11:30 *Coffee-break*
- 11:30 – 14:00 **Course in Chemical Glycobiology & Biomedicine. Module III: Lectins. Session II**
 - The galectin family
 - Lectins mimetics
- 14:00 – 15:30 *Lunch (Restaurant in hotel Laia)*
- 15:30 – 17:00 **Open Discussion:** Time to share and discuss scientific results, establish work lines, etc.
- 17:00 *Shuttle bus to Hotel Abando in Bilbao*



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UPCOMING EVENTS

Intensive Workshop: Career development and proposal writing

As it was also made public in the previous newsletter, an intensive workshop on Career Development and Proposal Writing will be held as satellite event to the 5th GLYCOPHARM meeting. The workshop will be held on 5 and 6 of February in Bilbao and it will be mainly taught by Innarima Consulting, a consultancy firm whose main activity is focused on identifying potential sources of funding at regional, national and international level for research and development activities. In addition, CIC bioGUNE will also organise some interesting lectures during the workshop.

It must be pointed out that this workshop is specially addressed to young researchers, but not only for those recruited at GLYCOPHARM; any young researcher interested in attending the workshop can contact the Project Manager (bmorales@iqfr.csic.es).

The topics indicated below will be covered in the workshop.



Career development and proposal writing INTENSIVE WORKSHOP

February 5-6, 2015 at CIC BioGUNE

Parque Científico Tecnológico de Bizkaia
Building 801A, 48160 Elexalde Derio, Biscay, Spain



MAIN CONTENTS

- Scientific grant proposal writing
- Overview of European research funding programmes
- Job opportunities for young scientists
- Career opportunities
- Research Management and Policy

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<http://www.glycopharm.eu>