

# INNOGLY Final Report

## WG2 Report

According to Deliverable 3 in the INNOGLY MoU, activities related to Working Group 2 (WG2) during months 36-48, including the extension period, are listed below. Citations on the specific Objectives (Obj) and Tasks of INNOGLY Action and WG2 are also indicated.

During the reporting period, Objectives and Tasks of WG2 have been addressed by collaborations, publication of co-authored papers, co-authored grant applications, and organization of a Training School.

## Month 36 (April 2021-April 2022)

### Publications

**Obj 1:** Develop a collaborative effort to achieve a common ground on the topics 1) Glycan profiling in health and disease, and 2) Glycan-based diagnostics and therapeutics, as well as the related subtopics.

**Obj 3:** Foster progress in existing research projects.

**Obj 10:** Bridge the gap between scientific communities with complementary knowledge and common interests in glycan-related topics.

- **Title: Molecular dynamics studies reveal different modes of receptor clustering by Gb3-binding lectins.**
- DOI: 10.1021/acs.jctc.0c01145
- name of all authors and their corresponding countries (of affiliation)  
Kociurzynski R (Germany), Makshakova ON (Russia), Knecht V (Germany), Römer W (Germany)
- are there Action participants from outside academia among the authors? NO
- the paper is published
- Open Access? NO
- COST is cited/acknowledged in the publication? YES
- COST funds are implicated in the publication? NO
- Is it peer-reviewed? YES
- Impact factor of the journal: 6.578
  
- **Title: Glycans in autophagy, endocytosis and lysosomal functions**
- DOI: 10.1007/s10719-021-10007-x
- Name of all authors and their corresponding countries (of affiliation)  
Reggiori F (Netherlands), Gabius HJ (Germany), Aureli M (Italy), Römer W (Germany), Sonnino S (Italy), Eskelinen EL (Finland)
- Are there Action participants from outside academia among the authors? NO
- the paper is published
- Open Access? YES
- COST is cited/acknowledged in the publication? YES
- COST funds are implicated in the publication? NO
- Is it peer-reviewed? YES

- Impact factor of the journal: 3.009
- **Title: The two sweet sides of Janus lectin drive crosslinking of liposomes to cancer cells and material uptake**
- DOI: 10.3390/toxins13110792
- Name of all authors and their corresponding countries (of affiliation)
- Suikstaite L (Germany), Rosato F (Germany), Mitrovic A (Germany), Müller PF (Germany), Kraus K (Germany), Notova S (France), Imberty A (France), Römer W (Germany)
- Are there Action participants from outside academia among the authors? NO
- the paper is published
- Open Access? YES
- COST is cited/acknowledged in the publication? YES
- COST funds are implicated in the publication? NO
- Is it peer-reviewed? YES
- Impact factor of the journal: 5.075

## Research proposals and projects on the topic of the Action resulting from Action activities, involving at least one Action participant

**Obj 1:** Develop a collaborative effort to achieve a common ground on the topics 1) Glycan profiling in health and disease, and 2) Glycan-based diagnostics and therapeutics, as well as the related subtopics.

**Obj 10:** Bridge the gap between scientific communities with complementary knowledge and common interests in glycan-related topics.

- **Title of the project/proposal: The importance of the Gb3/CD59-enriched plasma membrane nanodomain for lectin-driven bacterial invasion in host cells**
- Name and country of main proposer: Winfried Römer (Germany) and Olga Makshakova (Russia)
- Number of proposers: 2
- INNOGLY participants listed among the proposers (Name and Country)  
Winfried Römer (Germany) and Olga Makshakova (Russia)
- Are there action participants from outside academia among the proposers: NO
- Funder, to be selected among: H2020-HORIZON EUROPE; Other EU; Trans-national; National; Industry; Other: National: DFG and RSF (Trans-national)
- Amount requested / granted: 200.000 € from German side, 84.000 € from Russian side
- Call identifier: Joint DFG-RSF research proposal
- Year of submission: 12/ 2021
- Result, to be selected among: Under evaluation; Under negotiation; Funded; Not funded; Other Not funded, evaluation was stopped because of Ukrainian war
- **Marie Skłodowska-Curie ITN Actinetwork**

## Outputs / Achievements: Collaborations

**Obj 1:** Develop a collaborative effort to achieve a common ground on the topics 1) Glycan profiling in health and disease, and 2) Glycan-based diagnostics and therapeutics, as well as the related subtopics.

**Obj 3:** Foster progress in existing research projects.

**Obj 10:** Bridge the gap between scientific communities with complementary knowledge and common interests in glycan-related topics.

- Fulvio Reggiori (Denmark) has ongoing collaboration with Fabrizio Chiodo (Netherlands) in which his lab is testing autophagic flux in cells exposed to bacterial capsules.
- Winfried Römer (Germany) has started a collaboration with Sèrge Pérez (France) and Olga Makshakova (Russia) about the enzymatic glyco-modification of synthetic membrane systems.
- Vladimír Mastihuba (Slovakia) has ongoing collaboration with Rita Ventura (Portugal) in development of enzymatic modification to provide building blocks for glycan syntheses

## Action Successes

- Fulvio Reggiori's collaboration with Fabrizio Chiodo
- Winfried Römer's collaborations with Sèrge Pérez and Olga Makshakova

## Month 48 including granted extension (May 2022-October 2023)

### Meetings and workshops

**Obj 1:** Develop a collaborative effort to achieve a common ground on the topics 1) Glycan profiling in health and disease, and 2) Glycan-based diagnostics and therapeutics, as well as the related subtopics.

**Obj 10:** Bridge the gap between scientific communities with complementary knowledge and common interests in glycan-related topics.

**Obj 11:** Set up a platform for early career researchers.

**Obj 12:** Help early career researchers to access and build new networks.

**Obj 13:** Disseminate the results to foster new researchers (with a special focus on Inclusiveness Target Countries) to join the glycoscience community.

- **Closing Meeting of the INNOGLY COST Action, 2-3rd May 2023, Heraklion, Crete, Greece**

In the WG2 session, WG2 leader Eeva-Liisa Eskelinen presented a summary of the work done in WG2, followed by presentations by WP2 members:

*Inmaculada Cuchillo-Ibáñez*: Glycosylation study of the soluble amyloid precursor protein (APP) in cortex and cerebrospinal fluid in Alzheimer disease.

*Eirini Maria Giatagana*: Biglycan-mediated signaling regulates osteosarcoma cell growth and chemoresistance.

*Joseph P. Byrne*: Carbohydrate-functionalised metal complexes: targeting pathogens

*Niclas G. Karlsson*: Towards clinical O-glycomics: Application to osteoarthritis.

*Winfried Römer*: Novel lectin-based approaches to target and kill Gb3-positive cancer cells.

*Mattan Hurevich & Shlomo Yitzchaik*: Developing Synthetic and Electrochemical Tools to Study the Effect of Modifications on Glycans Binding Preferences

- **Training School THE GLYCOBIOLOGY OF CELL METABOLIC PROCESSES AT THE NANOSCALE IN HUMAN PATHOLOGY**, Erice, Sicily, Italy, July 19-24, 2023.

<https://innogly.eu/innogly-wg2-the-glycobiology-of-cell-metabolic-processes-at-the-nanoscale-in-human-pathology>

<https://nanomedicineschool.wixsite.com/nanomedicineschool>

The event was organized by Massimo Aureli and Ole-Kristian Greiner-Tollersrud, and supported by the INNOGLY Cost Action INNOGLY, Ettore Majorana Foundation and Centre for Scientific Culture, and Nanomedicine Center, University of Milano Bicocca.

Teachers:

- Anna Pistocchi (Università degli Studi di Milano, Italy)
- Winfried Römer (University of Freiburg, Germany)\*
- Domenico Garozzo (CNR IPCB, Catania, Italy)\*
- Giovanni D'angelo (Institute of Bioengineering (IBI) and Global Health Institute, Lausanne, Switzerland)
- Michela Deleidi (German Center for Neurodegenerative Diseases, Tübingen, Germany)
- Luigi Lay (Università degli Studi di Milano, Italy,)\*
- Ten Feizi (Imperial College, London, United Kingdom)
- Gritti Angela (IRCCS San Raffaele Scientific Institute, Milan, Italy)
- Henrik Clausen (University of Copenhagen, Denmark)
- Alexey V Pshezhetsky (University of Montréal, Canada)
- Alessandra D'azzo (University of Tennessee, USA)
- Taniguchi Naoyuki (Osaka International Cancer Institute, Japan)
- Massimo Aureli (Università degli Studi di Milano, Italy,)
- Ole Kristian Greiner-Tollersrud (The Arctic University of Norway, Tromsø, Norway)

\*Financially supported by INNOGLY Cost Action

Topics covered:

- *Zebrafish as a model to study autophagy*
- *Glycans in lysosomes*
- *MS of glycoproteins*
- *MS-imaging of glycolipids and*
- *Glycans in neurodegenerative disorders*
- *Chemistry of glycoconjugates*
- *Glycans array*
- *Lysosomal storage disorders and gene therapy*
- *Lysosomal storage disorders*
- *Lysosomes and inflammation*

Participants: 24 ESRs financially supported by INNOGLY Cost Action

## Publications

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- **Title: The choanoflagellate pore-forming lectin SaroL-1 punches holes in cancer cells by targeting the tumor-related glycosphingolipid Gb3**
- DOI: 10.1038/s42003-022-03869-w
- Name of all authors and their corresponding countries (of affiliation)  
Notova S (France), Bonnardel F (France), Rosato F (Germany), Siukstaite L (Germany), Schwaiger J (Germany), Lim JH (France), Bovin N (Russia), Varrot A (France), Ogawa Y (France), Römer W (Germany), Lisacek F (Switzerland) and Imberty A (France)
- **Title: Neutralizing the impact of the virulence factor LecA from *Pseudomonas aeruginosa* on human cells with new glycomimetic inhibitors**
- DOI: 10.1002/anie.202215535
- Name of all authors and their corresponding countries (of affiliation)  
Zahorska E (Germany), Rosato F (Germany), Stober K (Germany), Kuhadomlarp S (Germany), Meiers J (Germany), Hauck D (Germany), Reith D (Germany), Gillon E (Germany), Rox K (Germany), Imberty A (France), Römer W (Germany), Titz A (Germany)
- **Title: Extending Janus lectins architecture: characterization and application to protocells**
- DOI: 10.1016/j.csbj.2022.11.005
- Name of all authors and their corresponding countries (of affiliation)  
Notova S (France), Siukstaite L (Germany), Rosato F (Germany), Vena F (France), Audfray A (France), Bovin N (Russia), Landemarre L (France), Römer W (Germany), Imberty A (France).

- **Title: A bispecific, crosslinking lectibody activates cytotoxic T cells and induces cancer cell death**
- DOI: 10.1186/s12967-022-03794-w
- Name of all authors and their corresponding countries (of affiliation)  
Rosato F (Germany), Pasupuleti R (Austria), Tomisch J (Germany), Meléndez AV (Germany), Kolanovic D (Austria), Makshakova ON (Russia), Wiltschi B (Austria), Römer W (Germany)
  
- **Title: Dimeric lectin chimeras as novel candidates for Gb3-mediated transcytotic drug delivery through cellular barriers LecA transcytosis**
- DOI: 10.3390/pharmaceutics15010225
- Name of all authors and their corresponding countries (of affiliation)  
Xu M (Germany), Atonova M (Russia), Salavei P (Germany), Illek K (Germany), Meléndez AV (Germany), Omidvar R (Germany), Thuenauer R (Germany), Makshakova ON (Russia), Römer W (Germany)
  
- **Title: Enzymatic Glyco-Modification of Synthetic Membrane Systems**
- DOI: 10.3390/biom13020335
- Name of all authors and their corresponding countries (of affiliation)  
Jabeguero D (France), Siukstaite L (Germany), Wang C (UK), Mitrovic A (Germany), Pérez S (France), Makshakova ON (Russia), Richter RP (UK), Römer W (Germany), Breton C (France)
  
- **Title: Genetic code expansion in E. coli enables production of a functional ‘ready-to-click’ T cell receptor-specific scFv**
- DOI: 10.1016/j.nbt.2023.05.007
- Name of all authors and their corresponding countries (of affiliation)  
Pasupuleti R (Austria), Rosato F (Germany), Kolanovic D (Austria), Makshakova ON (Russia), Römer W (Germany), Wiltschi B (Austria)
  
- **Title: A Shiga toxin B-subunit-based lectibody boosts T cell cytotoxicity towards Gb3-positive cancer cells**
- DOI: 10.3390/cells12141896
- Name of all authors and their corresponding countries (of affiliation)  
Tomisch J (Germany), Busse V (Germany), Rosato F (Germany), Makshakova O (Russia), Salavei P (Germany), Lataster L (Germany), Melendez V (Germany), Römer W (Germany)

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**Obj 11:** Set up a platform for early career researchers.

**Obj 12:** Help early career researchers to access and build new networks.

**Obj 14:** Facilitate engagement between key players and stakeholders of the glycoscience community across Europe.

**Obj 15:** Enhance public communication to boost promotion of glycoscience within the mainstream of biological sciences.

- Fulvio Reggiori (Denmark) is a participant (beneficiary) in a granted Marie Curie ITN (called *Actinetwork*) in which Luigi Lay (Italy) is the coordinator.

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- Winfried Römer (Germany) has started a collaboration with Romain Vives (France) about the reconstitution of glycosaminoglycans on giant unilamellar vesicles.

## Action Successes

- Marie Skłodowska-Curie ITN Actinetwork
- Training School THE GLYCOBIOLOGY OF CELL METABOLIC PROCESSES AT THE NANOSCALE IN HUMAN PATHOLOGY