

COST Action CA18103 INNOGLY: INNOVation with Glycans new frontiers from synthesis to new biological targets.

WG1 Report

Report on the main advances in the field and developed activities related to WG1, the activities related to Working Group 1 (WG1 - Glycan-based correlations in developmental and cancer biology) have been listed and described below.

During this period the Objectives and Tasks of the WG1 have been addressed including publication of co-authored papers, organization of a workshop/meeting, short term scientific missions (STSM) and several dissemination activities as described below.

1) WG1 M 1.1: Workshop related to the topics of WG1.

- Obj1 INNOGLY: 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 INNOGLY: Foster progress in existing research projects.

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

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

INNOGLY Annual Meeting. May 4-6, 2022 in Lugano, Switzerland. The meeting was held in the East Campus, houses the Faculty of Computer Science and the new Faculty of Biomedical Sciences of the Università della Svizzera italiana (USI). The WG1 leader presented the results and outputs of the WG, including the future planned activities. Ten WG1 members delivered oral presentations during the meeting. In addition, several members of WG1 had the opportunity to display a poster sharing their scientific expertise and available research tools. This event was announced on the INNOGLY website and on twitter.

INNOGLY COST Action Closing Meeting, May 2-3, 2023, Heraklion, Crete, Greece The Closing Meeting of the INNOGLY COST Action will take place on May 2-3, 2023, in Heraklion, Crete, Greece. The conference was held at the Atlantis Aquila Hotel, 2, Ygias Street, GR – 71 202, Heraklion – Crete. The WG1 leader presented the results and outputs of the WG, including the future planned activities. Ten WG1 members delivered oral presentations during the meeting. This event was announced on the INNOGLY website and on twitter.

2) [Publications and conferences from WG1 members](#)

Anderluh M, Berti F, Bzducha-Wróbel A, Chiodo F, Colombo C, Compostella F, Durlík K, Ferhati X, Holmdahl R, Jovanovic D, Kaca W, Lay L, Marinovic-Cincovic M, Marradi M, Ozil M, Polito L, Reina JJ, Reis CA, Sackstein R, Silipo A, Švajger U, Vaněk O, Yamamoto F, Richichi B, van Vliet SJ.

Recent advances on smart glycoconjugate vaccines in infections and cancer. *FEBS J.* 2022 Jul;289(14):4251-4303.

Anderluh M, Berti F, Bzducha-Wróbel A, Chiodo F, Colombo C, Compostella F, Durlík K, Ferhati X, Holmdahl R, Jovanovic D, Kaca W, Lay L, Marinovic-Cincovic M, Marradi M, Ozil M, Polito L, Reina-Martin JJ, Reis CA, Sackstein R, Silipo A, Švajger U, Vaněk O, Yamamoto F, Richichi B, van Vliet SJ. Emerging glyco-based strategies to steer immune responses. *FEBS J.* 2021 Aug;288(16):4746-4772.

Sanz-Martinez I, Pereira S, Merino P, Corzana F, Hurtado-Guerrero R. Molecular Recognition of GalNAc in Mucin-Type O-Glycosylation. *Acc Chem Res.* 2023 Mar 7;56(5):548-560. doi: 10.1021/acs.accounts.2c00723. Epub 2023 Feb 23. PMID: 36815693; PMCID: PMC9996832.

Taleb V, Liao Q, Narimatsu Y, García-García A, Compañón I, Borges RJ, González-Ramírez AM, Corzana F, Clausen H, Rovira C, Hurtado-Guerrero R. Structural and mechanistic insights into the cleavage of clustered O-glycan patches-containing glycoproteins by mucinases of the human gut. *Nat Commun.* 2022 Jul 26;13(1):4324. doi: 10.1038/s41467-022-32021-9. PMID: 35882872; PMCID: PMC9325726.

Sanz-Martínez I, García-García A, Tejero T, Hurtado-Guerrero R, Merino P. The Essential Role of Water Molecules in the Reaction Mechanism of Protein O-Fucosyltransferase 2. *Angew Chem Int Ed Engl.* 2022 Nov 25;61(48):e202213610. doi: 10.1002/anie.202213610. Epub 2022 Nov 10. PMID: 36260536; PMCID: PMC9828666.

Venuto M.T., Decloquement M., Ribera M. J., Noel M., Rebl A., Cogez V., Petit D., Galuska S.P., Harduin-Lepers A. Vertebrate alpha2,8-sialyltransferases (ST8Sia): a Teleost perspective. *IJMS*, 2020, doi:10.3390/ijms21020513.

WAVELET-VERMUSE C., GROUX-DEGROOTE S., VICO GNE D., COGEZ V., VENTURI G., TRINCHERA M., BRYLSBAERT G., KREWINSKI-RECCHI M.-A., SCHULZ C., VINCENT A., VAN SEUNINGEN I., HARDUIN-LEPERS A. Analysis of the proximal promoter of the human colon-specific B4GALNT2 (Sda synthase) gene: B4GALNT2 is transcriptionally regulated by ETS1. *BBA GRM* (2021) 1864(11-12):194747. doi: 10.1016/j.bbagr.2021.194747. HAL-03345208

GROUX-DEGROOTE S., VICO GNE D., COGEZ V., SCHULZ C., HARDUIN-LEPERS A. B4GALNT2 controls Sda and sLex antigens biosynthesis in healthy and cancer human colon *ChemBioChem* (2021) 22(24):3381-3390 doi: 10.1002/cbic.202100363.

FLINIAUX I, MARCHAND G, MOLINARO C, DECLOQUEMENT M, MARTORIATI A, MARIN M, BODART J-F, HARDUIN-LEPERS A and CAILLIAU K Diversity of sialic acids and sialoglycoproteins in gametes and at fertilization *Frontiers in Cell and Developmental Biology* (2022) 10:982931. DOI 10.3389/fcell.2022.982931. HAL-03857419

COGEZ V, VICO GNE D, SCHULZ C, PORTIER L, VENTURI G, de RUYCK J, DECLOQUEMENT M, LENSINK M, BRYLSBAERT G, DALL'OLIO F, GROUX-DEGROOTE S, HARDUIN-LEPERS A. N-glycan on the non-consensus N-X-C glycosylation site impacts activity, stability and localization of the Sda synthase B4GALNT2. *IJMS* (2023), 24(4):4139. DOI: 10.3390/ijms24044139. HAL-04008107

DECLOQUEMENT M, VENUTO MT, COGEZ V, STEINMETZ A., SCHULZ C, LION C, NOEL M, RIGOLOTTI V, TEPPA RE, BIOT C, REBL A, GALUSKA SP and HARDUIN-LEPERS A. Salmonid polysialyltransferases to generate a variety of sialic acid polymers. *Sci. Rep.* (2023) 13, 15610. DOI.org/10.1038/s41598-023-42095-0. HAL-04220178

HARDUIN-LEPERS A. The vertebrate sialylation machinery: structure-function and molecular evolution of GT-29 sialyltransferases. *Glycoconj. J.* (2023) 40, 473–492. DOI: 10.1007/s10719-023-10123-w. HAL-04221332

Magalhães A, Duarte HO, Reis CA. The role of O-glycosylation in human disease. *Mol Aspects Med.* 2021 Jun;79:100964. doi: 10.1016/j.mam.2021.100964.

Faria-Ramos I, Poças J, Marques C, Santos-Antunes J, Macedo G, Reis CA, Magalhães A. Heparan Sulfate Glycosaminoglycans: (Un)Expected Allies in Cancer Clinical Management. *Biomolecules.* 2021 Jan 21;11(2):136. doi: 10.3390/biom11020136.

Marques C, Reis CA, Vivès RR, Magalhães A. Heparan Sulfate Biosynthesis and Sulfation Profiles as Modulators of Cancer Signalling and Progression. *Front Oncol.* 2021 Nov 11;11:778752. doi: 10.3389/fonc.2021.778752. PMID: 34858858

Matos R, Amorim I, Magalhães A, Haesebrouck F, Gärtner F, Reis CA. Adhesion of *Helicobacter* Species to the Human Gastric Mucosa: A Deep Look Into Glycans Role. *Front Mol Biosci.* 2021 May 7;8:656439. doi: 10.3389/fmolb.2021.656439

Marques C, Poças J, Gomes C, Faria-Ramos I, Reis CA, Vivès RR, Magalhães A. Glycosyltransferases EXTL2 and EXTL3 cellular balance dictates heparan sulfate biosynthesis and shapes gastric cancer cell motility and invasion. *J Biol Chem.* 2022 Nov;298(11):102546.

doi: 10.1016/j.jbc.2022.102546

Kurfířt, M.; Dračínský, M.; Červenková Šťastná, L.; Cuřínová, P.; Hamala, V.; Hovorková, M.; Bojarová, P.; Karban, J. Selectively Deoxyfluorinated N-Acetylglucosamine Analogues as ¹⁹F NMR Probes to Study Carbohydrate-Galectin Interactions. *Chem. Eur. J.* **2021**, 27 (51), 13040–13051. DOI: [10.1002/chem.202101752](https://doi.org/10.1002/chem.202101752)

Llop E, Ardá A, Zacco E, O'Flaherty R, García-Ayllón MS, Aureli M, Frenkel-Pinter M, Reis CA, Greiner-Tollersrud OK, Cuchillo-Ibáñez I. Proceedings of workshop: "Neuroglycoproteins in health and disease", INNOGLY cost action. *Glycoconj J.* 2022 Oct;39(5):579-586. doi: 10.1007/s10719-022-10078-4

Alshanski, I.; Sukhran, Y.; Unverzagt, C.; Yitzchaik, S.; Hurevich, M. Electrochemical Biosensor based on Complex Biantennary N-Glycan for Detecting Enzymatic Sialylation Processes *Biosensors and Bioelectronics* 2021, 172, 112762

Brunori, F.; Padhi, K. D.; Alshanski, I.; Freyse, J.; Dürig, J.-N.; Penk, A.; Vaccaro, L.; Hurevich, M.; Rademann, J.; Yitzchaik, S. Sulfation pattern-dependent Iron (III) mediated interleukin-8 glycan binding. *ChemBioChem* 2022, 23, e2021005.

Alshanski, I.; Shitrit, A.; Sukhran, Y.; Unverzagt, C.; Hurevich, M.; Yitzchaik, S. Effect of interfacial properties on impedimetric biosensing of sialylation process with biantennary N-glycan-based monolayer. *Langmuir* 2022, 38, 849–855.

Shitrit, A.; Alshanski, I.; Kikkeri, R.; Hurevich, M.; Yitzchaik, S. Profiling Heparan Sulfate-Heavy Metal Ions Interaction Using Electrochemical Techniques. *Chem. Eur. J.* 2022, e202202193;

Stern Bauer, T.; Yaakobi, R.; Hurevich, M.; Yitzchaik, S.; Hayouka, Z. Impedimetric bacterial detection using random antimicrobial peptide mixtures *Sensors* 2023, 23, 561.

Alshanski, I.; Shitrit, A.; Gordon, D.; Kikkeri, R.; Hurevich, M.; Yitzchaik, S. Biocatalysis versus molecular recognition in sialoside-neuraminidase biosensing and its use for evaluating inhibitors' efficacy. *ACS Chem. Biol.* 2023, 18, 605–614.

Bakhatan, Y.; Alshanski, I.; Chan, C. K.; Lo, W. C.; Lu, P. W.; Liao, P. H.; Wang, C. C.; Hurevich, M. Accelerated Solid Phase Glycan Synthesis: ASGS. *Chem-Eur J* 2023, 29, e202300897.

Conferences:

Communications and Presentations:

Hurevich, M. "Studying glycan interactions using electrochemical impedance spectroscopy" INNOGLY COST-mini-symposium, Zoom platform; June 21, 2021.

Hurevich, M. "Studying metal ion mediated interactions of sulfated glycans derived biosensors" GlycosAminoGlycans: What remains to be solved? Hybrid Symposium; Faculty of Medicine, University of Crete, Heraklion, Greece; September 27-30, 2021.

Hurevich, M. "Glycan and peptide nanolayer-based biosensors" the NANO.IL.2021 Conference - at ICC Jerusalem, Israel; October 5-6, 2021.

Hurevich, M. "Biocatalysis and molecular recognition in enzyme biosensing" Institute of Electronic Structure and Laser (IESL) of the Foundation for Research and Technology – Hellas (FORTH), Heraklion - Crete, Greece, October 19, 2022.

Hurevich, M. "Glycan based electrochemical biosensors for enzymes: catalysis vs. recognition" 2nd General INNOGLY Symposium; Lugano, Switzerland, from 4th to 6th May 2022.

Hurevich, M. "Catalysis vs. recognition in glycan-based electrochemical biosensors" The 15th Bratislava Symposium on Saccharides (15th BSS), Smolenice Castle, Slovakia. June 20 - 24, 2022.

Hurevich, M. "Catalysis versus molecular recognition in enzyme biosensing" Workshop on Antimicrobial Peptides - The University of Melbourne, Australia; February 1-3, 2023.

Hurevich, M. "Conformationally Responsive Electrochemical Biosensors" MSE NTU Bioengineering tools for next-generation cellular agriculture, Singapore; March 6, 2023.

Hurevich, M. "Biocatalysis versus binding in enzyme biosensing" NUS FST Seminar on Cellular Agriculture, Singapore.; March 8, 2023.

Hurevich, M. "Biocatalysis versus binding in enzyme biosensing" Global Summit on Pharmaceutical and Medicinal Chemistry (PMC2023) -Lisbon, Portugal; September 21-23, 2023.

Hurevich, M. "Automated and accelerated glycan synthesis" 15th Bratislava Symposium on Saccharides. June 2022, Bratislava, Slovakia.

Hurevich, M. "Automated and accelerated glycan synthesis" 5th Glycobasque symposium. November 2022, San Sebastian, Spain.

Hurevich, M. "Automated and accelerated glycan synthesis" ACS Spring 2023. March 2023, Indianapolis, USA.

Hurevich, M. "Accelerated solid-phase synthesis of post-translationally modified peptides" ACS Spring 2023. March 2023, Indianapolis, USA.

Hurevich, M. "Electrochemical strategies for studying the effect of modifications on glycans binding preferences" ACS Spring 2023. March 2023, Indianapolis, USA.

Hurevich, M. "Developing Synthetic and Analytical Tools to Study the Effect of Modifications on Glycans and Peptides on Binding Preferences" Eurocarb XXI, the 21st European Carbohydrate Symposium, July 2023, Paris, France.

Poster presentation: DECLOQUEMENT M.*, NOEL M., COGEZ V., LION C., RIGOLOT V., BIOT C. GUERARDEL Y., HARDUIN-LEPERS A. Innovative tools for the study of sialylation deficiencies: Glycosyltransferase engineering and use of unnatural sialic acid donors. 12th edition of the Young Researchers in Life Sciences Virtual Symposium 16-18 June, 2021. Paris, France

Oral presentation: DECLOQUEMENT M.*, NOEL M., COGEZ V., LION C., RIGOLOT V., BIOT C. GUERARDEL Y., HARDUIN-LEPERS A. Innovative tools for the study of sialylation processes: Glycosyltransferase engineering and use of unnatural sialic acid donors. Scientific CDG Symposium 2021, Virtual Euroglycan Symposium 23-24 June, 2021. Leuven, Belgium

Oral presentation: DECLOQUEMENT M.*, NOEL M., COGEZ V., LION C., RIGOLOT V., BIOT C. GUERARDEL Y., HARDUIN-LEPERS A. Innovative tools for the study of sialylation processes: Glycosyltransferase engineering and use of unnatural sialic acid donors. Congrès SFBBM, 1-2 Juillet 2021. Paris, France

Oral presentation: DECLOQUEMENT M.*, VENUTO M, COGEZ V., NOEL M., LION C., RIGOLOT V., BIOT C. GALUSKA S, HARDUIN-LEPERS A. Diversity of polysialylation machinery in fish species highlights exciting perspectives to generate original high therapeutic biomaterials. 21ième édition Journée André Verbert des doctorants. Sept. 22th, 2021. Lille, France

Oral presentation: DECLOQUEMENT M.*, VENUTO M, COGEZ V., NOEL M., LION C., RIGOLOT V., BIOT C. GALUSKA S, HARDUIN-LEPERS A. Diversity of polysialylation machinery in fish species highlights exciting perspectives to generate original high therapeutic biomaterials. Selected talk Innogly-ECI-WG3-2021 Young Glyco-Scientists on stage. 27th Sept, 2021. Visio. Firenze, Italy.

Oral presentation: DECLOQUEMENT M.*, VENUTO M, COGEZ V., NOEL M., LION C., RIGOLOT V., BIOT C. GALUSKA S, HARDUIN-LEPERS A. Diversity of polysialylation machinery in fish species highlights exciting perspectives to generate original high therapeutic biomaterials. 3-min thesis video. 6th Latin American Glycobiology Congress Oct. 5-8th, 2021 (Best presentation price). Mexico, Mexico.

Poster presentation: DECLOQUEMENT M.*, VENUTO M, COGEZ V., STEINMETZ A, LION C., RIGOLOT V., BIOT C. GALUSKA S, HARDUIN-LEPERS A. Diversity of polysialylation machinery in fish species highlights exciting perspectives to generate original high therapeutic biomaterials. Innogly COST Action CA18103. 4-6 May, 2022. Lugano, Switzerland. (Best poster presentation)

Poster presentation: HARDUIN-LEPERS A* COGEZ V, DECLOQUEMENT M, GROUX-DEGROOTE S, SCHULZ C, VICOONE D. Regulation of glycosyltransferases involved in terminal glycosylation. Innogly COST Action CA18103. 4-6 May, 2022. Lugano, Switzerland.

Poster presentation: DECLOQUEMENT M.*, VENUTO M, COGEZ V., STEINMETZ A, LION C., RIGOLOT V., BIOT C. GALUSKA S, HARDUIN-LEPERS A. Diversity of polysialylation machinery in fish species highlights exciting perspectives to generate original high therapeutic biomaterials. 28^{ème} journée du groupe français des glycosciences. 30 May- 3 Juin, 2022. Branville, France (Best poster presentation)

Oral presentation: A HARDUIN-LEPERS, Molecular and functional evolution of vertebrate α 2,8-sialyltransferases (ST8SIA); SialoGlyco meeting Sept. 5th – 8th, 2022, Nagoya Japan

Poster presentation: DECLOQUEMENT M.*, GALUSKA S, HARDUIN-LEPERS A. Salmonid polysialyltransferases to generate a variety of sialic acid polymers. Symposium 2023 FOR2953: Sialoglycans in Development and Immunity. Oct 9-11,2023 Hannover, Germany

Poster presentation: STEINMETZ A.*, DECLOQUEMENT M., HARDUIN-LEPERS A., GALUSKA S. Characterization of the autopolysialylation properties of ST8Sia IV from *Coregonus maraena*. Symposium 2023 FOR2953: Sialoglycans in Development and Immunity. Oct 9-11,2023 Hannover, Germany

Magalhães A., Freitas D., Balmaña M., Poças J., Campos D., Osório H., Konstantinidi A., Vakhrushev S.Y., Reis C.A. Cancer cell derived extracellular vesicles carry tumour associated glycan epitopes. 25th International Symposium on Glycoconjugates, Milan, Italy August 2019 (received the FEBS Letters Award)

Reis CA, Cellular glycosylation: Biosynthesis and functional implications in cancer. GLYCO XXV, the 25th International Symposium on Glyconjugates, 25th International Symposium on Glycoconjugates, Milan, Italy August 2019.

Duarte H.O., Rodrigues J., Gomes C., Mereiter S., Hensbergen P.J., Ederveen A.L.H., vanVeelen P., Polónia A., Wuhler M., Santos L.L., Gomes J, Reis CA, α 2,6-Linked Sialic Acid Regulates ErbB2 Biology and Gastric Cancer Cell Response to Trastuzumab in a Glycosite-Specific Manner. GLYCO XXV, the 25th International Symposium on Glyconjugates, 25th International Symposium on Glycoconjugates, Milan, Italy August 2019.

Magalhães A, O-glycans truncation shape cancer cell signalling and communication, 13th International Meeting of the Portuguese Carbohydrate group, Porto, Portugal, September 2019

Marques C, Exostosin-like 2 Abrogation Promotes Heparan Sulfate Biosynthesis and Switches Cancer Cell Signalling Towards an Invasive Phenotype, 2021 ASBMB (American Society for Biochemistry and Molecular Biology) Annual Meeting, online meeting, 2021.

Marques C, Exostosin-like 2 and Exostosin-like 3 Modulate Cancer Cells' GAGosylation and Malignant Phenotype, INNOGLY-ECI-WG3-2021: Young Glyco-Scientists on stage, online meeting, 2021.

Magalhães A, Translating the glycan code of extracellular vesicles in gastric cancer cell communication, First Meeting of the Portuguese Network on Extracellular Vesicles, Porto 2021.

Magalhães A, Deciphering the glycan code of extracellular vesicles in gastric cancer cell communication, 28th Porto Cancer Meeting. Porto 2022.

Marques C, Heparan Sulfate biosynthetic pathway: learning the GAGosylation road that leads to gastric cancer progression, 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR14, Caparica 2023.

Magalhães A, Mind the GAGs in gastric cancer, 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR14, Caparica 2023.

van Vliet S.J. Glycan-dependent signalling routes and transcriptional programs in human dendritic cells after triggering of the C-type lectin MGL. INNOGLY Cost Action Annual Meeting. 06/05/2022 Lugano, Switzerland.

van Vliet S.J. CRISPR-Cas9 generation of tumor glycovariants, impact on survival and immune recognition. Transferable skills course and workshop. 2nd Network Wide Event of the GLYTUNES consortium. 07/06/2022, Amsterdam, the Netherlands.

Van Vliet S.J. Tumor-associated glycan structures: friend or foe in immunity to cancer? INNOGLY & GLYCONanoPROBES Cost Actions – Young Investigators Meeting. 21/4/2023, Iasi, Romania.

Van Vliet S.J. Tumor-associated glycan structures: friend or foe in immunity to cancer? INNOGLY Closing Meeting. 03/05/2023, Heraklion, Crete, Greece.

Van Vliet S.J. Tumor-associated glycan structures: friend or foe in immunity to cancer? 15th Jenner Glycobiology and Medicine Symposium. 14/6/2023, Porto, Portugal.

Magalhães A. Translating the glycan code of extracellular vesicles in gastric cancer cell communication, First Meeting of the Portuguese Network on Extracellular Vesicles, Porto 2021.

Magalhães A. Deciphering the glycan code of extracellular vesicles in gastric cancer cell communication, 28th Porto Cancer Meeting. Porto 2022.

Magalhães A. Mind the GAGs in gastric Cancer. 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR 14, Lisbon, Portugal 2023.

Magalhães A. Mind the GAGs in Gastric Cancer. 29th Porto Cancer Meeting “Glycosylation in tumour biology and its clinical implications”. i3S, Porto, Portugal 2023.

Magalhães A. Syndecan-4 is a maestro of gastric cancer cell invasion and intercellular communication. 89th Harden Conference - Proteoglycans: Matrix Master Regulators 2023. UK 2023

Magalhães A. Syndecan-4 is a maestro of gastric cancer cell invasion and communication that underscores poor survival. Workshop Porto Comprehensive Cancer Center Raquel Seruca. Portugal 2023

Magalhães A. Syndecan-4 - a maestro of gastric cancer cell invasion and intercellular communication. Joint Meeting of the German Society for Matrix Biology and the Italian Society for the Study of Connective Tissues, Münster, Germany 2023

Magalhães A. Aberrant glycosylation in gastric cancer: novel molecular mechanisms controlling disease progression. 7th Latin American Glycobiology Congress. Mexico City – online 2023

C. Marques, J. Poças, C. Gomes, R. Ribeiro, I. Faria-Ramos, C. A. Reis, R. Vivès, A. Magalhães “Heparan Sulfate glycosyltransferases remodel the cell glycoproteome and shape gastric cancer aggressive features” Poster presented at the 15th Jenner Glycobiology and Medicine Symposium at i3S (Porto, Portugal), on June 14th-16th 2023.

C. Marques, J. Poças, C. Gomes, R. Ribeiro, I. Faria-Ramos, C. A. Reis, R. Vivès, A. Magalhães “Heparan Sulfate glycosyltransferases remodel the cell glycoproteome and shape gastric cancer

aggressive features” Poster presentation and flash talk at the 89th Harden Conference - Proteoglycans: Matrix Master Regulators De Vere Horsley Estate (Surrey, UK) on September 4th-7th 2023.

Oral online presentation. Rénio, M.; Murtinho, D.; Ventura, M. R. “Exploring thioureas versatility as organocatalysts” – IsySyCat 2021. Évora, 31 August-3 September 2021.

Oral online presentation. Rénio, M.; Murtinho, D.; Ventura, M. R. “Thioureas for stereoselective glycosylation reactions” - 6th CATSUS Workshop. Lisbon 14 November 2021.

Virtual event. Miranda, V.; Torcato, I.M.; Carrau, G.; Xavier, K. B.; Ventura, M. R. “Synthesis of AI-2 derived sugar prodrugs and chemical probes”. ESOC2021-European Symposium on Organic Chemistry 2021, July 5-6, 2021.

Oral communication. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, José Rodrigues, Margarida Archer, M. Rita Ventura, “Towards a novel functional assay for the discovery of membrane proteins involved in mycobacteria cell wall biosynthesis”. INNOGLY Annual Meeting 2022, COST Action CA18103, 4-6 May 2022, Lugano, Switzerland.

Poster. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, José Rodrigues, Margarida Archer, M. Rita Ventura, “Development of a new functional assay to study potential anti-tuberculosis drug targets – Arabinofuranosyltransferases”. 12th ITQB NOVA PhD Students' Meeting, 20-22 April 2022, Oeiras, Portugal

Poster. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, José Rodrigues, Margarida Archer, M. Rita Ventura, “Development of a new functional assay to study potential anti-tuberculosis drug targets – Arabinofuranosyltransferases”. 22nd Tetrahedron Symposium: Catalysis for a Sustainable World, 28 June-1 July 2022, Lisbon, Portugal.

Poster. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, José Rodrigues, Margarida Archer, M. Rita Ventura, “Synthesis of (oligo)arabinosides and development of a functional assay for the study of enzymes involved in mycobacteria cell wall biosynthesis”. BOSS XVII - 17th Belgian Organic Synthesis Symposium, 3-8 July 2022, Namur, Belgium.

Poster. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, José Rodrigues, Margarida Archer, M. Rita Ventura, “A novel functional assay for the discovery of new drug targets in mycobacteria”. EFMC-ISMIC 2022 - XXVII EFMC International Symposium on Medicinal Chemistry, 4-8 September 2022, Nice, France.

Poster. Cristiano A. Conceição, Vanessa T. Almeida, Federico Issoglio, Margarida Archer, M. Rita Ventura, New functional assay to study potential anti-tuberculosis drugs targeting arabinofuranosyltransferases. 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR 14, Caparica, Portugal, 16-18 January 2023.

Poster. Kis, P.; Miranda, V.; Rodrigues, V. M.; Xavier, B. K.; Ventura, M. R. Chemoenzymatic strategy towards new autoinducer-2 prodrugs. 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR 14, Caparica, Portugal, 16-18 January 2023.

Invited lecture. Ana Maranhã, Mafalda Costa, Jorge Ripoll-Rozada, José A. Manso, Vanessa Miranda, Vera M. Mendes, Bruno Manadas, Sandra Macedo-Ribeiro, M. Rita Ventura, Pedro José Barbosa Pereira, Nuno Empadinhas, Methylglucose vs methylmannose polysaccharides: biosynthesis, distribution, and proposed roles in mycobacterial adaptation to heat or cold. 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR 14, Caparica, Portugal, 16-18 January 2023.

Best prize for Flash presentation. Poster. Cristiano A. Conceição, Federico Issoglio, Vanessa T. Almeida, Margarida Archer, M. Rita Ventura, Identification of Novel Drug Targets in Mycobacterium Tuberculosis Using an Innovative Functional NMR Assay Targeting Arabinofuranosyltransferases. International Meeting of Young Researchers of Innogly and Glyconanoprobe, 20-21 April 2023, Iasi, Romania.

Poster. Conceição, C. A.; Almeida, V. T.; Issoglio, F.; Archer, M.; Ventura, M. R. Development of a ¹³C-NMR functional assay for the functional characterisation of arabinosyltransferases. Closing Meeting of the INNOGLY COST Action, 2-3rd May 2023, Heraklion, Crete, Greece.

Invited lecture. Conceição, C. A.; Issoglio, F.; Almeida, V. T.; Rodrigues, J.; Archer, M.; Ventura, M. R. Synthesis of (oligo)arabinosides and development of a functional assay for the study of enzymes involved in mycobacteria cell wall biosynthesis. 14th International Meeting of the Portuguese Carbohydrate Group – GLUPOR 14, Caparica, Portugal, 16-18 January 2023.

“Studying glycan interactions using electrochemical impedance spectroscopy” INNOGLY COST-mini-symposium, Zoom platform; June 21, 2021.

“Studying metal ion mediated interactions of sulfated glycans derived biosensors” GlycoAminoGlycans: What remains to be solved? Hybrid Symposium; Faculty of Medicine, University of Crete, Heraklion, Greece; September 27-30, 2021.

“Glycan and peptide nanolayer-based biosensors” the NANO.IL.2021 Conference - at ICC Jerusalem, Israel; October 5-6, 2021.

“Biocatalysis and molecular recognition in enzyme biosensing” Institute of Electronic Structure and Laser (IESL) of the Foundation for Research and Technology – Hellas (FORTH), Heraklion - Crete, Greece, October 19, 2022.

“Glycan based electrochemical biosensors for enzymes: catalysis vs. recognition” 2nd General INNOGLY Symposium; Lugano, Switzerland, from 4th to 6th May 2022.

“Catalysis vs. recognition in glycan-based electrochemical biosensors” The 15th Bratislava Symposium on Saccharides (15th BSS), Smolenice Castle, Slovakia. June 20 - 24, 2022.

“Catalysis versus molecular recognition in enzyme biosensing” Workshop on Antimicrobial Peptides - The University of Melbourne, Australia; February 1-3, 2023.

“Conformationally Responsive Electrochemical Biosensors” MSE NTU Bioengineering tools for next-generation cellular agriculture, Singapore; March 6, 2023.

“Biocatalysis versus binding in enzyme biosensing” NUS FST Seminar on Cellular Agriculture, Singapore.; March 8, 2023.

Keynote Lecture “Biocatalysis versus binding in enzyme biosensing” Global Summit on Pharmaceutical and Medicinal Chemistry (PMC2023) -Lisbon, Portugal; September 21-23, 2023.

“Automated and accelerated glycan synthesis” 15th Bratislava Symposium on Saccharides. June 2022, Bratislava, Slovakia.

“Automated and accelerated glycan synthesis” 5th GlycoBasque symposium. November 2022, San Sebastian, Spain.

“Automated and accelerated glycan synthesis” ACS Spring 2023. March 2023, Indianapolis, USA.

“Accelerated solid-phase synthesis of post-translationally modified peptides” ACS Spring 2023. March 2023, Indianapolis, USA.

"Electrochemical strategies for studying the effect of modifications on glycans binding preferences" ACS Spring 2023. March 2023, Indianapolis, USA.

"Developing Synthetic and Analytical Tools to Study the Effect of Modifications on Glycans and Peptides on Binding Preferences" Eurocarb XXI, the 21st European Carbohydrate Symposium, July 2023, Paris, France.

Research proposals/projects submitted by WG1 members are listed in the appropriate section of this final report.

Additional Outputs / Achievements

Patents

Yitzchaik, S., Hurevich, M., Shitrit, A.; Ben Abba Amiel, D.; "Glycosylated Amino Acids and Peptides as the Recognition Layer in Electronic Nose" US Provisional Application No.: 63/463,130; May 1, 2023.

Yitzchaik, S., Hurevich, M., Alshanski, I.; "Biosensors and Uses Thereof" – PCT Application No. PCT/IL2023/050634; June 19, 2023.