



**Horizon Europe (HORIZON)
Marie Skłodowska-Curie Actions
Doctoral Networks (MSCA-DN)**

GLYCOprotein N-glycosylation from non-life to eukaryotes:

**a Doctoral Network to expand the knowledge on a ubiquitous
posttranslational
modification of proteins**

GLYCO-N



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GLYCO-N

Call for 9 PhD fellowships within the MSCA DN project GLYCO-N:

GLYCOprotein N-glycosylation from non-life to eukaryotes a Doctoral Network to expand the knowledge on a ubiquitous posttranslational modification of proteins.

Offer Description

- Introduction:

The GLYCO-N training network aims at training Doctoral Candidates (DCs) to acquire the skills to develop different innovative strategies to **1) understand the diversity and structural complexity of archaeal, microalgal and viral N-glycosylation and 2) harness this knowledge for new solutions in biomedicine and biotechnology.**

Protein N-glycosylation, or the attachment of oligo- and polysaccharides at specific asparagine residues, is conserved throughout life, and is now observed even in the viral world. In contrast to most of eukaryotes, whose well-studied N-glycosylation machineries are relatively simple, archaea, microalgae, viruses and bacteria utilize a wide variety of monosaccharides to create a wealth of structurally diverse N-glycans. Because protein N-glycosylation occurs far downstream of protein synthesis the complexity and diversity in N-glycan structures are poorly understood in detail. This holds true specifically for N-glycosylation events that are the subject of the GLYCO-N program: those in archaea, microalgae and viruses.

Understanding of the N-glycosylation processing and its regulation in archaea, microalgae and viruses will open up many possibilities ranging from drug discovery (antimicrobials) to biotechnology (biologics, glycoprotein and glycoprocessing enzyme engineering for materials and life sciences).

The GLYCO-N network brings together a diverse group of glycobiology researchers with world-leading expertise in carbohydrate chemistry, microbiology, (bio)organic chemistry, computational and structural (glyco-)biology, bioinformatics and chemical biology. The GLYCO-N DCs will have their own individual project with one GLYCO-N expert and will, through research internships, be exposed to complementary Glycoscience.

The selected PhD candidates will experience an international and interdisciplinary training and participate in a series of scientific, technical and complementary skills training events, and secondments to other participating institutions. The position will allow the students to participate in an exciting multidisciplinary research and training programme, enhancing their career perspectives.

- The Glyco-N Consortium

Beneficiaries

The following institutions will directly recruit the DCs:



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UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II (UNINA), NAPOLI, Italy, Department of Chemical Sciences, Prof. Antonio Molinaro (Coordinator of the GYCO-N project)

UNIVERSITEIT LEIDEN (UL), LEIDEN, Netherlands, Leiden Institute of Chemistry, Prof. Hermen Overkleeft

ASOCIACION CENTRO DE INVESTIGACION COOPERATIVA EN BIOCIENCIAS (BIOGUNE), DERIO BIZCAYA, Spain, Prof. Jesús Jiménez Barbero

UNIVERSITAT DE BARCELONA (UB), BARCELONA, Spain, Department of Chemistry, Prof. Carme Rovira

DANMARKS TEKNISKE UNIVERSITET (DTU), KONGENS LYNGBY, Denmark, Department of Biotechnology and Biomedicine, Prof. Bernard Henrissat

▶ **UNIVERSITE DE ROUEN NORMANDIE (URN)**, MONT SAINT AIGNAN, France, Laboratory GlycoMEV, Prof. Muriel Bardor, Dr Elodie Rivet

UNIVERSITAET DUISBURG-ESSEN (UDE), ESSEN, Germany, Faculty of Chemistry, Prof Bettina Siebers and Prof. Markus Kaiser

[Associated Partners with national fundings](#)

The following institution will directly recruit the DCs:

IMPERIAL COLLEGE LONDON (UL), LONDON, UK, Chemistry, Prof. Benjamin Schuman

[Associated Partners](#)

The following Institutions and companies are part of the consortium and will contribute to training activities, including secondments:

Atlas Molecular Pharma S.L. (AMP), Spain, Dr. Oscar Millet

Zelula Biopharma SL (ZB), Spain, Dr. Asis Palazon

Alga Biologics (AB), France, Dr. Catherine Gallot

Samabriva (SAM), France, Dr. Marina Guillet

Isuschem Srl (IC), Italy, Prof. Vincenzo Benessere

Universidad del Pais Vasco (UPV/EHU), Spain, Prof. Dr. Jesús Jiménez Barbero

Innovation Acta Srl (INN-ACTA), Italy, Dr. Paola Cesaroni



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- **Research Projects:**

Position	Project title	Host Institution	Reference tutor(s) for PhD application and email
DC1	N-glycosylation in the extremophile archaeae	UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II, Italy	Prof. Antonio Molinaro; Prof. Cristina De Castro molinaro@unina.it ; decastro@unina.it
DC2	Study of the glycosylation machinery of archaea: a new perspective to unravel the evolutionary history of the tree of life	DANMARKS TEKNISKE UNIVERSITET, Denmark	Prof. Bernard Henrissat; bernard.henrissat@gmail.com
DC3	Study of the function of glycosyltransferases in the crenarchaeal model organism <i>Sulfolobus acidocaldarius</i> to unravel their potential for biotechnological application	UNIVERSITAET DUISBURG-ESSEN, Germany	Prof Bettina Siebers; Bettina.siebers@uni-due.de
DC4	Structure and molecular recognition of viral N-glycoproteins	ASOCIACION CENTRO DE INVESTIGACION COOPERATIVA EN BIOCIENCIAS, Spain	Prof. Jesús Jiménez Barbero; jjbarbero@cicbiogune.es
DC5	Designer molecules to interfere with host and viral N-glycosylation processing	UNIVERSITEIT LEIDEN, Netherland	Selection closed
▶▶ DC6	Unraveling the xylosylation pathway of N-glycoproteins in microalgae	UNIVERSITE DE ROUEN NORMANDIE (France)	Prof. Muriel Bardor; muriel.bardor@univ-rouen.fr Dr Elodie Rivet; elodie.rivet@univ-rouen.fr
DC7	Modeling of mechanisms in wild type and engineered archaeal and microalgal glycoprocessing enzymes for the efficient synthesis of (neo)-glycans	UNIVERSITAT DE BARCELONA, Spain	Prof. Carme Rovira; c.rovira@ub.edu
DC8	Inhibitors and activity-based probes targeting host and viral glycosyltransferases	UNIVERSITEIT LEIDEN, Netherland	Selection closed



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DC9	Mining chlorovirus PBCV-1 genome to decipher the N-glycosylation biosynthetic pathway	UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II, Italy	Prof. Cristina De Castro; Prof. Antonio Molinaro; decastro@unina.it ; molinaro@unina.it
DC10	Development of chemical probes for studying N-glycosylation from bioactive metabolites	UNIVERSITAET DUISBURG-ESSEN, Germany	Prof. Markus Kaiser; markus.kaiser@uni-due.de
DC11	Unraveling how viral glycosylation machineries affect host glycoproteins	Imperial College London, UK	Prof. Benjamin Schumann; ben.schumann@crick.ac.uk

Additional details on the individual research projects can be found at www.glyco-n.eu or directly asked by email to the reference tutors for the PhD application.

Scientific Requirements for applicants

Research Field: Chemistry, Organic chemistry, Carbohydrate chemistry, Biochemistry, Structural Biology

Education Level: Master Degree or equivalent

Skills/Qualifications

- Applicants must have good knowledge and interest in Carbohydrate chemistry, microbiology, (bio)organic chemistry, computational and structural biology, bioinformatics and chemical biology
- Research experience on these topics is considered an advantage but not mandatory
- Applicants must speak and write fluently in English

Additional Information

- Benefits

- GLYCO-N DCs will be employed according to the rules for doctoral candidates in MSCA-DCs (https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-2-msca-actions_horizon-2021-2022_en.pdf) and the general regulations of each host institution.
- The financial package will include the monthly researcher allowances subdivided into 1) **a living allowance of €3,400** (country correction coefficient applies), 2) **a mobility allowance of €600** and, 3) **a family allowance (€660)**, if applicable*. Employer costs and other deductions depend on recruiting host.



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**If the recruited doctoral candidate has or acquires family obligations during the action duration, i.e. persons linked to him/her by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognised by the legislation of the country or region where this relationship was formalised; or (iii) dependent children who are actually being maintained by the researcher, the family allowance must be paid to him/her as well.*

- Doctoral candidate will be given an employment contract for 36 months by their host institution and will be entitled to full employee benefits and inclusion in social security schemes of the host country.

- **Eligibility criteria**

- **Supported researchers:** applicants must be doctoral candidates, i.e., not already in possession of a doctoral degree at the date of recruitment. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.
- **Mobility rule:** researchers must not have resided or carried out their main activity (e.g., work, studies) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.
- Other eligibility criteria may apply depending on the recruiting beneficiary.

- **Selection process**

GLYCO-N will select Doctoral Candidates through a 2-step recruitment process (Step 1: evaluation of received documents; Step 2: interviews).

The selection procedure will be open, transparent, and merit-based, fully aligned with the Code of Conduct for the Recruitment of Researchers. Although the selection will be based on the quality of applications, gender balance will also be considered.

Candidates can apply for **maximum three PhD projects** and the applications need to be submitted separately. All applications will be checked for eligibility. Ineligible or incomplete applications will not be considered.

- **Application Procedure**

Applications (in English) must include the following documents **in a single PDF file**:

- **Letter of motivation** addressed to the contact specified under each project in the Offer Description, including a statement why you are suited for this position;
- **Curriculum vitae** in EU format, including a photo of the candidate;
- **Transcripts** of B.Sc and M.Sc. courses, including grades.
- Copy of **master's thesis** (if available). In case the Master's Degree has not been obtained yet at the closing date for application, the candidate has to submit a declaration signed by their supervisor or University official stating that the degree will be obtained by the time of PhD enrolment.



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- **Two references letters** from former supervisors, including names, affiliations and email addresses.

Application documents in a **single pdf file** should be sent by email to the contact specified under the list of each research project in the Offer Description. The subject line of the email must be in the following format: *“GLYCO-N: application for Project #_Title of PhD project”*.

The candidates will be evaluated on the basis of the received documents (Step 1) **against the following criteria:**

- Educational record
- Scientific quality of the applicant’s CV
- Expected individual impact and benefit to the fellow and to the project
- Previous experience in the subject of GLYCO-N research programme

After the Step 1 evaluation, the best 3-4 candidates will be invited for an online interview (Step 2) that will take place in June 2024.

A rejection letter will be sent to candidates not selected for the interviews.

The closing date for applications is May 15th

Planned start date for the doctoral candidates: October, 2024



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Fellow DC6	Host institution URN	Enrollment in the doctoral school URN
<p>Project Title: Unraveling the xylosylation pathway of N-glycoproteins in microalgae.</p>		
<p>Supervisor: Prof. Muriel Bardor</p>		
<p>Relation to the GLYCO-N program: DC6 will conduct an interdisciplinary doctorate on biochemical Glycoscience and glycan-related biotechnology. The project fits within the multidisciplinary scope of the program through connections with structural and computational Glycoscience.</p>		
<p>Objectives: N-glycans from <i>Chlamydomonas reinhardtii</i>, a green microalga, are matured in the Golgi apparatus by multiple xylosyltransferases (XylT) to give rise to methylated N-glycans carrying xylose residues on different mannose including one linked in $\beta(1,2)$ to the core of the N-glycans. Five genes encoding for putative XylT candidates are predicted in the <i>Chlamydomonas</i> genome while only scarce information regarding their activity is available. In this context, the first objective of the doctoral project is to biochemically decipher the function of these XylT candidates in the N-glycan pathway of <i>Chlamydomonas</i>. This will be achieved by 1) the expression of soluble XylT candidates in tobacco leaves, their purification and the monitoring of their XylT specificity by testing various glycan substrates; 2) the complementation of plant mutants impaired in N-glycan xylosylation with <i>Chlamydomonas</i> XylT candidate genes; and 3) jointly with BIO perform structural studies on candidate proteins. In addition, the cell localization in the <i>Chlamydomonas</i> secretory system will be performed by expressing, in <i>Chlamydomonas</i>, the XylT candidates fused to a reporter fluorescent protein and analysis by confocal microscopy and Transmission Electron Microscopy (TEM). Finally, as soon as the specificity and cell localization of XylT candidates will be established, bioinformatic identification of orthologous XylT in the microalga kingdom will be carried out in order to understand how xylosylation of N-glycans evolved within the different phyla of the tree of life.</p>		
<p>Expected Results: <i>Training:</i> Recombinant protein production and purification; enzyme activity assay development; protein structural biology, correlated light and electron microscopy (CLEM). <i>Research:</i> Structure and function of N-glycoprocessing enzymes essential for <i>Chlamydomonas</i>, filling in gaps in the microalgae N-glycosylation map.</p>		
<p>Planned secondments: BIO. Timing: M8; duration 4M. Purpose: structural analysis of microalgae glycans; AB, Timing, M20, duration, 2M, Purpose: large scale algae protein production</p>		



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