Call for 14 PhD fellowships

A training network on glyconanomaterials as precision tools to unveil key insights on the triggering of the antigen presenting cells against cancer

ANNEX A

GENERAL DESCRIPTION

CanGoNano is a European Training Network funded in the framework of HORIZON Marie Skłodowska-Curie Doctoral Networks (DN). It is a glycoscience-oriented DN focusing on GlycoNanoMaterials (GNM) as precision tools to unveil key insights on the triggering of the antigen presenting cells against cancer. CanGoNano assembles an international, multidisciplinary & intersectoral DN of complementary experts on nanotech, glycoscience & immunology to train the next-generation of glyco-nano-scientists on the relevance of understanding the molecular mechanisms of immune system activation at the molecular level to approach the rational design of next-generation cancer vaccines.
The credibility and high quality of CanGoNano are ensured by top-level glycoscientists from 12 academic institutions and 6 industrial partners which encompass complementary and intersectoral expertise, and unique state-of-the-art technological tools to train 14 doctoral candidates (DCs). The unique combination of scientific excellence in interdisciplinary fields and industry know-how will cover the entire process from obtaining fundamental insights to the implementation of innovative solutions. CanGoNano aims at creating a critical mass of uniquely skilled graduates in glycan-based therapies. To this aim, we will equip DCs with a thorough multifaceted knowledge of the potential of glycoscience in the discovery of cancer precision therapeutics and the necessary transferable skills. This will put DCs in an advantageous position for job opportunities in both academia and industry. Deciphering the glycome expands the frontiers of knowledge and discovery and enables addressing fundamental challenges in cancer. Therefore, CanGoNano DN will strengthen the European innovation capacity by bringing new glycoscience concepts in the development of cancer precision therapeutics to market and policy stakeholders.

CONSORTIUM

Beneficiary partner

- Università Degli Studi Di Firenze (UNIFI) - Italy
- Carbohyde Zartkoruen Mokudo Reszvenytarsasag (CaH) - Hungary
- Centre National de la Recherche Scientifique (CNRS) - France
- RiboPro B.V. (RIB) - Netherlands
- Università degli Studi di Milano (UMIL) - Italy
- Asociacion Centro de investigacion cooperativa en biomateriales (CIC) - Spain
- EnGenes Biotech GmbH (EnG) – Austria
- Universidade Nova de Lisboa (UNL) – Portugal
- Stichting Amsterdam UMC (AUMC) – Netherlands
- Aptuit (Verona) Srl (APT) – Italy
- Universidad Internacional de La Rioja SA (UNIR) - Spain

Associated partner
- Tuscan Organization of Universities and Research 4 Europe (TOUR4EU) – Belgium
- GlycoSelect LTD (GlyS) – Ireland
- Istituto Europeo di Oncologia Srl (IEO) – Italy
- Vaxine Pty Ltd (VAX) - Australia
- Eötvös Loránd University (ELTE) - Hungary
- Universidad del País Vasco/ Euskal Herriko Unibertsitatea (UPV/EHU) - Spain
- Stichting Radboud Universitair Medisch Centrum (RDD) - Netherlands
- Universidad Autonoma de Madrid (UAM) – Spain
- Universität für Bodenkultur Wien (BOKU) – Austria
- Université de Strasbourg (UNISTRA) - France
- Stichting VU (VU) - Netherlands

RESEARCH PROJECTS

CanGoNano will provide comprehensive training to 14 DCs connecting academic and industrial sectors through excellent research aimed at addressing the ambitious goal of deciphering the molecular mechanisms that rule the APC machinery.

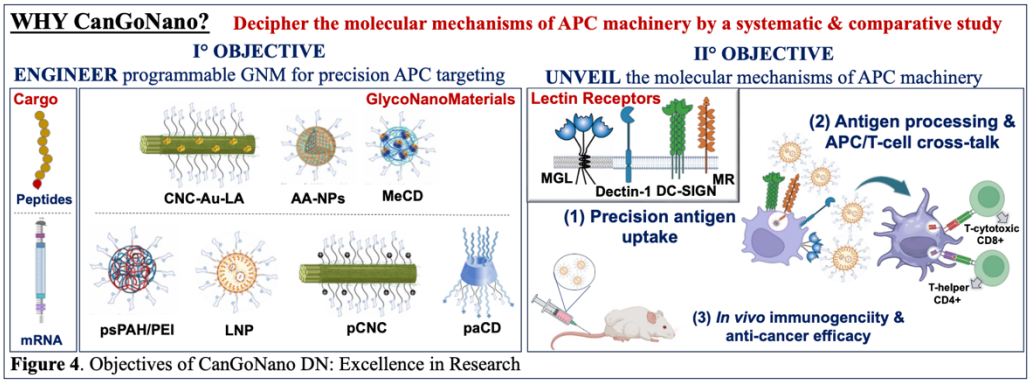

Figure 4. Objectives of CanGoNano DN: Excellence in Research

CanGoNano research & training programme envisions approaching the core goal using GlycoNanoMaterials (GNM) as robust and reliable chemical tools to perform such a systematic and comparative study. Thereby, CanGoNano encompasses a stepwise approach to support and mentor DCs, which consists of two interconnected objectives where DCs will have a global overview of the ambitious research and innovation programme they are involved in.

I Objective: DCs will be trained on methodologies and cutting-edge techniques to ENGINEER programmable GNM for precision APC targeting. CanGoNano will focus on: (A) enzymatic/chemical synthesis of the cancer associated antigens encompassing peptides recognized by MHC-I/II, and the corresponding encoding mRNAs; (B) selection (i) of the appropriate nanomaterial according to the chemical nature of the cargo (peptide vs mRNA) and (ii) of carbohydrates for the targeting of lectins at APC surface.

II Objective: DCs will be trained on how to identify strategies for UNVEILING the molecular mechanisms of APC machinery (in vitro & *in vivo*) triggered by engineered GNM. CanGoNano will focus on: (A) the study of the biomolecular interactions between GNM and lectins on APC; (B) the validation of immunogenicity and anti- cancer efficacy of GNM in in vitro and in vivo models.

CanGoNano designed the following **14 cutting-edge individual projects**:

- **DC1**: Glycosylated polyallylamine (PAH) and polyethyleneimine (PEI) for precision delivery of mRNA to antigen presenting cells (host institution and PhD enrolment: University of Florence, Florence, ITALY).
- **DC2**: Glycosylated cellulose nanocrystals/gold nanoparticles hybrid for the precision delivery of antigenic peptides to antigen presenting cells (host institution PhD enrolment: University of Florence, Florence, ITALY).
- **DC3**: Glycosylated polycation cellulose nanocrystals and mRNA polyplexes for the precision delivery of genetic material to antigen presenting cells (host institution PhD enrolment: University of Florence, Florence, ITALY).
- **DC4**: Multifunctional cyclodextrins as versatile tools for the delivery of different antigen formats to antigen presenting cells (host institution: CarboHyde Zartkoruen Mukodo Reszvenytarsasag, Budapest, HUNGARY; PhD enrolment: Eötvös Loránd University, Budapest, HUNGARY).
- **DC5**: Amino acid-based nanoparticles as precision carriers for the delivery of antigen peptides to antigen presenting cells (host institution: Centre National de la Recherche Scientifique Strasbourg, FRANCE; PhD enrolment: Université de Strasbourg, Strasbourg, FRANCE).
- **DC6**: Synthesis and optimization of mRNA and Glyco-Lipid NanoParticles for targeted mRNA delivery (host institution: RiboPro B.V., Oss, THE NETHERLANDS; PhD enrolment: Stichting Radboud Universitair Medisch Centrum, Nijmegen, THE NETHERLANDS).
- **DC7**: Synthesis and characterization of breast cancer antigenic peptides and O-glycosides for targeting antigen presenting cells (host institution PhD enrolment: Department of Chemistry, Università degli Studi di Milano, Milan, ITALY (https://phdchemistry.unimi.it/)).
- **DC8**: Advanced physicochemical methods for the study of glyconanomaterials-lectin bio-interactions at the molecular level and cellular fate (host institution: Asociacion Centro de investigacion cooperativa en biomateriales, Donostia / San Sebastiàn, SPAIN; PhD enrolment: Universidad del Pais Vasco/ Euskal Herriko Unibertsitatea, Donostia / Sebastián, SPAIN).
- **DC9**: Radiochemistry applied to glyconanomaterials engineering for molecular imaging in vivo (host institution: Asociacion Centro de investigacion cooperativa en biomateriales, Donostia / San Sebastiàn, SPAIN; PhD enrolment: Universidad del Pais Vaso/ Euskal Herriko Unibertsitatea, Bilbao, SPAIN).
- **DC10**: Development of site-specific recombinant lectins toolbox and plasmids for their expression at living cells surface (host institution: enGenes Biotech GmbH, Wien, AUSTRIA; PhD enrolment: Universität für Bodenkultur Wien, Wien, AUSTRIA).
- **DC11**: Molecular comparison of peptide/mRNA loaded glyconanomaterials on antigen presenting cells phenotype and activation (host institution PhD enrolment: Biology Program, Department of Life Sciences, Universidade Nova de Lisboa, PORTUGAL (lhttps://www.fct.unl.pt/ensino/curso/doutoramento-em-biologia).
- **DC12**: Unveiling the potency of the immune response induced by peptide/mRNA loaded glyconanomaterials in terms of APC antigen presentation to T-cells (host institution: Amsterdam UMC, Amsterdam, NETHERLANDS; PhD enrolment: VU University, Amsterdam, NETHERLANDS).
- **DC13**: Immunogenicity of glyconanomaterials as platforms for the precision delivery of cancer-associated antigens (host institution: Aptuit Srl, Verona, ITALY; PhD enrolment: University of Florence, Florence, ITALY).

- **DC14:** Glyconanomaterials for the delivery of peptide antigens or mRNA in breast cancer models: formulation and anti-cancer efficacy (host institution: Universidad Internacional de La Rioja SA, Logroño, SPAIN; PhD enrolment: Universidad Autonoma de Madrid, Madrid, SPAIN).

Each of the 14 DCs will be enrolled in the PhD programme of the Beneficiary's organization (the beneficiaries which do not award PhD will establish agreements with local and international universities that can provide the degree) and will participate in the network's training activities and work placements at the laboratories of the participating academic and industrial partners. In addition, the training programme of the recruited DCs will be supplemented by regular meetings and workshops within the CanGoNano Doctoral Network. CanGoNano is under the condition of the Grant Agreement n. 101226412, **People interested in any of these DC positions can apply through the website cangonano.eu**

TRAINING PROGRAMME

CanGoNano will provide an international, intersectoral & interdisciplinary educational programme allowing DCs to obtain skills and knowledge necessary for their successful career development. CanGoNano involves academic, industrial, and clinical trainers who will provide knowledge on the multidisciplinary scientific areas of the research programme. DCs will be trained in glycoscience & nanotechnology & cancer cell biology & immunology. By the active support of the non-academic partners, DCs will be also trained in transferable and complementary soft skills relevant for their future careers.
CanGoNano training programme is scheduled in 4 sections, which are planned to ensure DCs the opportunity to become skilled researchers, thus putting them in an unique position for innovative job opportunities both in industry and in academia.
1. Training driven by the Individual Research Project. By the execution of their individual project, DCs will acquire interdisciplinary practical and technical skills/knowledge on: (i) organic synthesis; (ii) the synthesis of diversified, multifunctional and modular GlycoNanoMaterials (GNM); (iii) Methodologies for the screening of GNM; (iv) radiolabeling for the investigation of the biological fate and pharmacokinetics of GNM by clinically used imaging techniques; (v) bioprocess engineering for the expression of recombinant lectins; (vi) stepwise methodologies for the fully characterization of the immunogenicity of the cargo delivered by the GNM.
The supervisor and a local laboratory trainer (DC Internal Team) will support day-to-day DCs: i) providing the basic practical and theoretical knowledge on the topic of his/her PhD project, *i.e.* sharing relevant articles, methodologies & protocols; ii) coaching on the good laboratory practices; iii) providing tips and promoting discussion on daily scientific and practical issues. DCs will contribute to the management of the research group by their commitment to support the supervision of undergraduate students.
2. Training driven by the local PhD schools. Supervisors will support DCs on the preparation of the Personal Career Development Plan (PCDP) including a balanced selection of complementary courses offered by the Doctoral School and the network-wide ones, ensuring a comprehensive research and soft skills training. According to the secondment schedule and the PCDP, each DC will draft a yearly attendance plan to local courses (to reach ECTS requested by the local PhD Schools) and network-wide courses.
3. Training driven by the network-wide activities. CanGoNano activities include periodic conferences where DCs will have the opportunity to attend scientific lectures delivered by the academic, industrial, and clinical partners and invited external experts in the field. The lectures will provide DCs both basic and advanced knowledge on the multifaceted topics of

the cutting-edge CanGoNano research programme. A comprehensive plan of soft skills courses delivered by experts at the local institutes and by non-academic partners (beneficiary & associated), and two round tables are also included thus providing DCs skills relevant for their future careers. Of note, the soft skills course on Writing scientific papers will be delivered by an outstanding scientist and Editor-in-Chief of high impact journals in the field of nanomaterials.

4. Training driven by secondments. Interdisciplinary & intersectoral secondments have been planned for each DC. Each DC will have one secondment in a SME to guarantee the industrial relevance of each research project and one secondment in another beneficiary/associated academic partner with interdisciplinary expertise.

ELIGIBILITY RULES

Eligibility criteria for MSCA-DN researchers:

https://marie-sklodowska-curie-actions.ec.europa.eu/actions/doctoral-networks

The DC positions are open to candidates of any nationality, provided they strictly fulfil the **eligibility requirements** established for the enrollment through the Marie Sklodowska-Curie Action-Doctoral Network (MSCA-DN). Equal opportunities policy without distinction on the grounds of gender, racial or ethnic origin, religion or belief, disability, age or sexual orientation will be applied. Each DC will be employed according to the financial and eligibility rules reported in the EU document accessible to the following link:
https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf

Experience

Eligible applicants must be doctoral candidates, *i.e.* not already in possession of a doctoral degree. 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

Eligible applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting organization for more than 12 months in the 3 years immediately prior to the recruitment date.

Additional eligibility criteria required by the CanGoNano consortium

Admission to the programme is open to applicants who hold a Master's Degree or equivalent, suitable for admission to doctoral studies at the date of enrollment.

APPLICATION PROCEDURE

Applications will be submitted online via the dedicated website www.cangonano.eu. Any other form of application or incomplete application will not be considered.

Applicants can apply for up to 2 projects within the consortium, indicating the order of preference. All applications will be checked for eligibility. Incomplete applications will be

ignored. Applications will be in English. The applicant must fill the documents/data included in the website.

ASSESSMENT CRITERIA

Supervisors will pre-select candidates for each position, based on the information included in the application procedure that will be evaluated 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 the CanGoNano research programme.

Shortlisted candidates will be invited for an interview with multiple supervisors from the network (online or in-person). A good level of English proficiency (understood, spoken and written) will be considered. Candidates will be notified of the outcome via the website.

STARTING DATE

Start of employment is foreseen between March 2026/ February 2027. The starting date of each PhD contract shall be set according to local rules of the Beneficiary institution and in agreement with the local supervisor of the selected DC project.
Doctoral candidates must be enrolled in a doctoral programme leading to the award of a doctoral degree in at least one EU Member State or Horizon Europe Associated Country.

Information also available at: https://euraxess.ec.europa.eu/