DC8: Investigation of the role of CypD in the mtRNA metabolism

Host institution: University of Udine, Department of Medicine, Udine, Italy

Supervisor: Dr. Carlo Vascotto

Co-supervisors: Prof. Barbara Uszczynska-Ratajczak, Institute of Bioorganic Chemistry, Polish Academy of Sciences (Academic); Dr. Alexander Jackson, Nanovery Ltd. (Industrial).

Project description: This PhD project investigates the role of Cyclophilin D (CypD), a mitochondrial matrix protein with peptidyl-prolyl isomerase (PPIase) activity, in mitochondrial RNA (mtRNA) metabolism. While CypD is well known for regulating the mitochondrial permeability transition pore (mPTP), emerging evidence from our laboratory suggests it may also contribute to the post-transcriptional regulation of mitochondrial gene expression. This project aims to elucidate the functional interactions between CypD and mtRNAs, offering new insights into mitochondrial biology and potential therapeutic targets for diseases associated with mitochondrial dysfunction.

The research will adopt a multi-step technical strategy. First, a novel protocol will be developed for the immunoprecipitation of CypD–RNA complexes from mitochondrial fractions. These complexes will then be subjected to high-throughput RNA sequencing to identify and classify the bound mtRNA species. Bioinformatic analyses will enable the characterization of RNA families and potential regulatory motifs associated with CypD binding. To assess CypD's functional relevance, its expression will be modulated in cell models via shRNA-mediated knockdown and overexpression systems. Subsequent analyses will include qPCR, Western blotting, and mitochondrial functional assays to measure changes in mtRNA abundance, stability, and overall organelle physiology.

Overall, the project seeks to uncover a previously unexplored layer of mitochondrial RNA regulation mediated by CypD.

Host laboratory: Research activities in the group of Dr. Vascotto are focused on the study of DNA repair mechanisms, mitochondrial RNA processes, and the role of mitochondria in tumour progression and resistance. The laboratory has full access to laboratories for handling mammalian cell cultures and primary human cells under normal and hypoxic conditions; flow cytometry facility; microscopy facility equipped with state of the art microscopes for confocal and nanoscope analyses, and *in vivo* fluorescence microscopy; instruments for monitoring cell parameters (e.g. viability, apoptosis, mitochondrial respiration, and more).

Secondments: This project is carried out in strong collaboration with the following groups, and visits to their laboratories are expected during the project. A willingness to travel and spend time abroad is therefore essential:

- Prof. Barbara Uszczynska-Ratajczak, Institute of Bioorganic Chemistry, Polish Academy of Sciences, Poland;
- Dr. Alexander Jackson, Nanovery Ltd., United Kingdom.

Eligibility conditions:

- Master's degree in Biology, Biotechnology or related field.
- Applicants must be doctoral candidates, i.e. not already in possession of a doctoral degree.
- Mobility rule: researchers must not have resided or carried out their main activity in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.

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Required skills:

- Research experience (e.g. through Master thesis work or research internships) in cellular and molecular biology techniques are required. Experience in mitochondrial biology and/or RNA biology will be a strong advantage.
- Proficiency in the English language is required, as well as good communication skills, both oral and written. Successful candidates will need to provide an English test (e.g. IELTS, TOEFL, Cambridge English). You may be exempt if you are a national of a majority native-English speaking country, or have qualifications / degree that has been taught and assessed in English. The supervisor can also confirm that a candidate has the required level of English.

Enquiries

For general information about the INT2ACT Doctoral Network visit the visit the project website (www.int2act.eu) or send an email to int2act@gmail.com.
For additional information on this project please contact Dr. Carlo Vascotto (carlo.vascotto@uniud.it).

How to apply

To learn more about the application process, visit the INT2ACT recruitment web page (https://int2act.eu/open-positions/).

Required documents:

1. Statement of interest (limit of 2,500 characters) explaining why you wish to be considered for the fellowship and which qualities and experience you will bring to the role.
2. Curriculum vitae et studiorum.
3. A certificate of University examinations taken (with marks).
4. A final degree certificate translated in English. If, at the time of application, candidates should not be yet in possession of a degree certificate, they can submit it at the time of the examination.

All documents must be merged into a single PDF file, in the order listed above.
A limited number of applicants will be invited for an interview and will be required to provide contact information of up to two contact person for reference letters.

Application deadline

The closing date for applications is **January 31 2026.**