

DC2: Influence of mitochondrial metabolic alteration on mitochondria-nucleus crosstalk: a multi-omics study.

Host institution: Institute of Hematology and Transfusion Medicine, Department of Experimental Hematology, Warsaw, Poland.

Supervisor: Dr. Carlo Vascotto

Co-Supervisors: Dr. Ian Holt, Biodonostia Health Research Institute, Neurosciences department, San Sebastián, Spain, (Academic); Dr. Noa Sher, Minovia Therapeutics LTD, Haifa, Israel (Industrial).

Project description: Mitochondria are key cell organelles that play a prominent role in both energy metabolism and the maintenance of cellular homeostasis. Although mitochondria have their own genome encoding a limited number of proteins required for oxidative phosphorylation, their function and biogenesis are strictly dependent on the expression of nuclear genes. Tumorigenic processes are associated with profound alterations in energy metabolism, the so-called "reprogramming of energy metabolism", which is now considered one of the hallmarks of cancer. Moreover, a growing number of studies suggest that metabolic reprogramming plays an important role not only in the process of malignant transformation, but also in the growth and survival of tumor cells in hostile environments, such as the often limited nutrient and oxygen supply in solid tumors. Nuclear transcription controls mitochondrial function and ultimately coordinates organelle function and capacity in response to intrinsic and extrinsic signals. The ability of mitochondria to communicate and work synergistically with nuclear expression is essential for the maintenance of mitochondrial fitness. By using different types of stimuli commonly encountered during tumorigenesis and tumor progression (e.g., nutrient alteration, oxygen levels, induction of oxidative stress), we will identify the metabolic pathways activated during mitochondria-nucleus feedback. This multi-omics study is based on the use of proteomics and genomics approaches, followed by bioinformatics analysis to identify key proteins and their PTMs that occur as a consequence of mitochondrial metabolic alteration.

Host laboratory: Research activities in the group of Dr. Vascotto are focused on the study of DNA repair mechanisms, mitochondrial RNA degradation 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; flow cytometry facility; 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:

- Dr. Barbara Uszczyńska-Ratajczak;
- Dr. Ian Holt, Biodonostia Health Research Institute, San Sebastián, Spain;
- Dr. Noa Sher, Minovia Therapeutics LTD, Haifa, Israel.

Eligibility conditions

- Master's degree in Biology, Biotechnology or related field.

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 bioinformatics 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 MITGEST Doctoral Network visit the project website (www.mitgest.eu) or send an email to (info@mitgest.eu).
- For additional information on this project please contact Dr. Carlo Vascotto (carlo.vascotto@uniud.it).

How to apply

To complete your online application, visit the MITGEST recruitment web page (<https://www.mitgest.eu/open-positions/>).

Application deadline

The closing date for applications is **November 15th 2022**.



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