

COLLABORATIVE IBEC INTERNATIONAL PhD PROGRAMME

Position

1. Project Title:
Exploring Glioblastoma-TAM Metabolic Interactions with Patient-Derived Models and Advanced NMR methods
2. Research project/ Research Group description

Glioblastoma (GBM) is the most common brain cancer, and one of the most devastating diseases. Novel therapies are desperately needed to improve the life of GBM patients. The metabolic state of GBM cells has been considered a potential therapeutic target since it differs from the one in the healthy tissue. The GBM metabolism is adapted to unique tumor microenvironments such as hypoxic and acidic environments. Tumor-associated macrophages (TAMs) have been described to be crucial players in cancer metabolism establishing a metabolic symbiosis with the tumor cells. Still, the actual molecular mechanisms involved in this phenomenon are not fully understood mainly due to the lack of reliable patient-derived models and sensitive technologies. Our proposal aims at **discerning the characteristics of the GBM metabolism with a particular interest in the interaction between TAMs and tumor cells**. Our studies will be performed using innovative **patient-derived models** that we have recently developed and that can recapitulate the complexity of the human GBM microenvironment, including patient-derived xenografts (PDX), tumoroids and patient-derived tumor tissue cultures (PDTTCs) (Fig. 1). These models will be studied with state-of-the art metabolic imaging tools, including **hyperpolarisationenhanced magnetic resonance (HP-MR) and deuterium molecular imaging**.

→ **In summary, our proposal aims at identifying novel therapeutic targets involved in the TAM-tumor cell metabolic interaction that could be further developed into potential pharmacological compounds to treat this dismal disease.**

Research groups: This project comprises a collaboration between the “Molecular Imaging for Precision Medicine” group at IBEC led by Dr. Irene Marco-Rius (<https://ibecbarcelona.eu/molecular-imaging-for-precision-medicine>) and Joan Seoane's research group at VHIO (<http://www.seoanelab.com>).

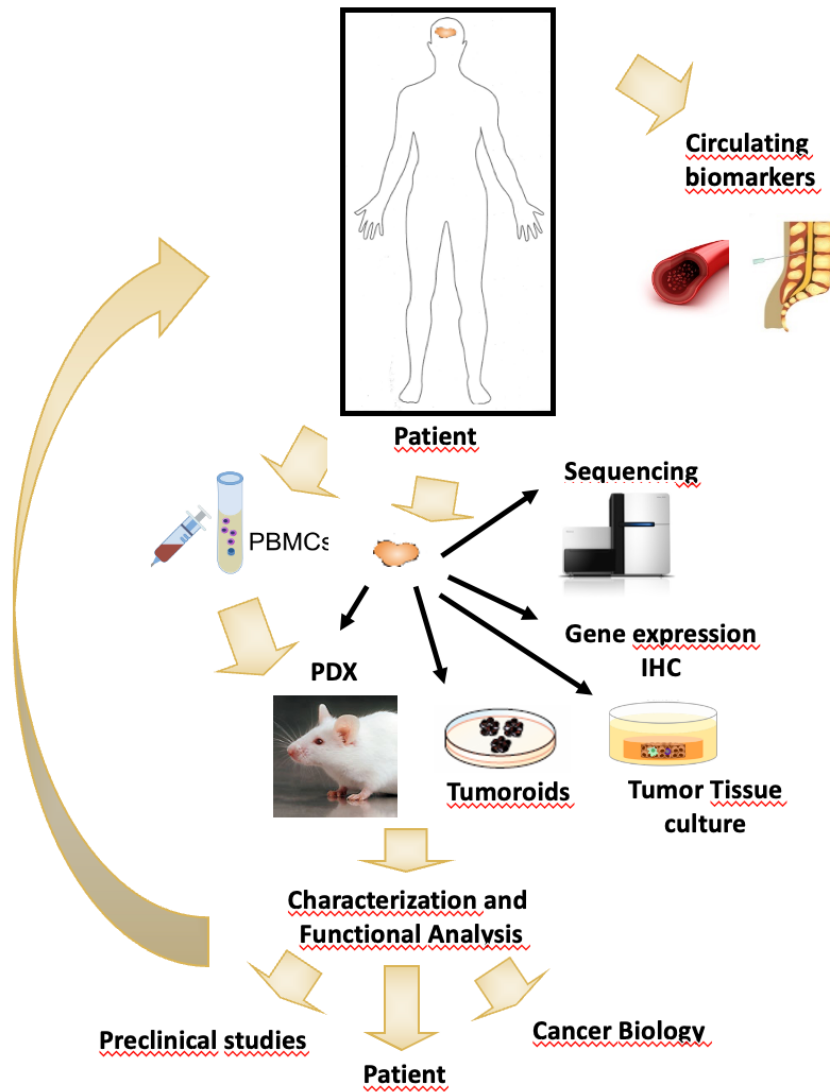


Figure 1. Scheme of the characterization of patient-derived samples and generation of patient-derived models.

3. Job position description

This PhD project involves experimental research using advanced patient-derived models to investigate the metabolic interactions between tumor-associated macrophages (TAMs) and glioblastoma (GBM) cells. The research will involve the development and application of cutting-edge molecular imaging techniques based on magnetic resonance imaging (MRI) to probe metabolic pathways. The candidate will therefore employ state-of-the-art NMR and biochemical techniques to analyze the mechanisms underlying TAM-GBM interactions. Collaboration with multidisciplinary teams at IBEC and VHIO is an integral aspect of the position, allowing for a synergy of expertise in molecular imaging, cancer biology, and therapy development. Furthermore, the PhD student will be expected to prepare and present their research findings in team meetings, publications, and conferences, contributing to the academic and scientific community.

Applicants should hold a Master's degree in Biochemistry, Molecular Biology, Biomedical Engineering, or a related field. A strong foundation in cancer biology, molecular imaging, or metabolic studies is essential, alongside practical experience in cell culture techniques, with a preference for candidates experienced in patient-derived models. Hands-on expertise in magnetic resonance or imaging technologies is highly desirable, as is proficiency in data analysis tools such as MATLAB, Python, or R, for interpreting complex biological datasets. Candidates must demonstrate excellent communication skills and the ability to thrive in a collaborative and interdisciplinary research environment.

The position offers integration into leading research groups at IBEC and VHIO, providing training in cutting-edge technologies, including HP-MR imaging and patient-derived cancer models. The candidate will have opportunities for international collaboration and professional development, along with a competitive PhD stipend aligned with institutional and national guidelines.

Group Leader at IBEC

1. Title: Junior Group Leader
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Collaborator in the other institution

1. Title: ICREA Professor
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