

## *IBEC-SJD INTERNATIONAL PhD PROGRAMME*

### **Position**

1. Project Title/ Job Position title:

**Exploration of Potential Therapies for Pediatric Oncology Treatment-Induced Cardiotoxicity**

2. Research project/ Research Group description:

This project aims to explore potential therapies for pediatric oncology treatment induced cardiotoxicity through the innovative use of bioengineered 3D heart tissues and minipig models. Cardiotoxicity is a serious side effect of chemotherapy in children, potentially leading to long-term cardiac complications such as heart failure, arrhythmias, or myocarditis. The mechanisms underlying this cardiotoxicity are not fully understood, which hinders the development of effective interventions. Our research focuses on using 3D heart tissue models to investigate the cellular and molecular pathways involved in chemotherapy-induced cardiac damage. These models offer a physiologically relevant platform to study heart function and response to toxic agents in a controlled environment. We will also employ minipigs, whose cardiovascular systems closely resemble humans, to validate the findings and assess the efficacy and safety of potential therapeutic interventions in a preclinical setting. In collaboration with clinical experts in cardiovascular diseases and pediatric oncology from Sant Joan de Déu Hospital (SJD) and the Biosensors for Bioengineering group at the Institute for Bioengineering of Catalonia (IBEC), this multidisciplinary project integrates cutting-edge biomedical engineering, molecular biology, and drug development. By elucidating the mechanisms of cardiotoxicity and testing adjunct therapies, our goal is to pave the way for safer cancer treatments and effective cardioprotective strategies, ultimately improving the quality of life for pediatric cancer survivors.

#### **Main Objectives:**

**Objective 1:** Engineer functional 3D heart tissues derived from induced pluripotent stem cells (iPSCs) to create a physiologically relevant model for studying cardiac function and disease.

**Objective 2:** Characterize the cardiotoxic effects of chemotherapy agents on human functional 3D heart tissues, focusing on identifying cellular and molecular mechanisms underlying cardiac damage.

**Objective 3:** Design and evaluate adjunct therapies aimed at preventing pediatric oncology treatment-induced cardiotoxicity, utilizing insights gained from 3D heart tissue models.

**Objective 4:** Validate the efficacy and safety of the proposed adjunct therapies in a minipig model of cardiotoxicity.

### 3. Job position description:

The Biosensors for Bioengineering group (IBEC) is seeking an Early-Stage Researcher to join as a PhD student in our multidisciplinary project. The project focuses on developing potential therapies for pediatric oncology treatment-induced cardiotoxicity using 3D heart tissues and minipigs. This role offers an exciting opportunity to work at the intersection of heart biology, tissue engineering, and therapeutic development. The PhD student will work in the Biosensors for Bioengineering group (IBEC) and the Cardiovascular Diseases and Child Development group (SJD). Both groups have experience in the topic and experience working together in other projects.

#### Main Tasks and Responsibilities:

- Develop and characterize 3D Heart tissues from iPSC cells.
- Characterize cardiotoxicity induced by pediatric oncologic treatment in 3D tissues.
- Design and test potential therapies in vitro.
- Test potential therapies in minipigs.

#### Requirements for Candidates:

##### Essential:

- Degree in Biology, Biomedicine, Biomedical Engineering, or a related field.
- Experience in cell culture and molecular biology.
- High level of English.
- Competencies and skills: Communication, teamwork and collaboration, commitment, proactivity, integrity, critical and analytical thinking.

##### Desirable:

- Experience in heart research.
- Experience in drug testing.
- Experience in microphysiological systems and tissue engineering.
- Experience in animal research.

### Group Leaders at IBEC

1. Title: ICREA Professor
2. Full name: Javier Ramón Azcón
3. Email: jramon@ibecbarcelona.eu
4. Research Group: Biosensors for Bioengineering

### Group Leader at SJD

1. Title: Principal investigators
2. Full name: Georgia Sarquella Brugada and Joan Sanchez Toledo
3. Email: georgia.sarquella@sjd.es and joan.sanchez@sjd.es
4. Research group: Cardiovascular Diseases and Child Development