

## *IBEC INTERNATIONAL PhD PROGRAMME*

### **PHD POSITIONS OFFER FORM**

#### **Position**

1. Project Title/ Job Position title:  
**Organ-on-Chip for Rapid and Real-Time Rhabdomyosarcoma Profiling and Drug Validation (ORCHID)**
2. Research project/ Research Group description (max. 2.000 characters)

Cancer treatment remains a formidable challenge due to the significant biological and clinical diversity among tumour types, complicating the development of effective therapies and highlighting the need for patient-specific approaches. This is especially true for rare cancers like rhabdomyosarcoma (RMS), an aggressive skeletal muscle tumour affecting both children and adults. Despite its impact, progress in RMS treatment has stagnated for over two decades, with few new drugs developed. Current preclinical models fall short of accurately mimicking RMS biology and supporting drug development due to low predictivity, inadequate subtype coverage, limited insight into the tumour microenvironment, scarcity of patient samples, and slow experimental timelines.

The project addresses these gaps by developing an organ-on-chip (OoC) model that closely replicates RMS biology, including interactions between the tumour, healthy muscle, and the tumour microenvironment. This model integrates advanced sensing technologies, such as meta-plasmonic biosensors, to generate clinically relevant, real-time data. By enabling personalised OoC models and drug screening platforms, this project aims to deepen understanding of RMS subtypes, accelerate therapy validation, and enhance precision in oncological decision-making.

Dr. César Serrano, a leading oncologist and Group Leader of the Sarcoma Translational Research Program at VHIO/Vall d'Hebron University Hospital, brings extensive expertise to the project. His team, comprising researchers and clinicians, focuses on unravelling sarcoma biology to advance therapeutic strategies. Their achievements include the clinical translation of a heterogeneity-targeting TKI strategy and contributions to the FDA approval of key therapies for GIST.

Leveraging VHIO's prominence in sarcoma research and drug development, Dr. Serrano's leadership ensures a robust connection between scientific innovation and patient advocacy. Recognised with numerous awards for his research, Dr. Serrano exemplifies excellence in oncology and translational science, furthering progress in rare cancer treatments.

### 3. Job position description

**Position Overview:** We seek a highly motivated and talented PhD student to join our interdisciplinary research team for the ORCHID project. This position focuses on developing an innovative OoC platform for studying RMS and integrating advanced sensing, bioengineering, and artificial intelligence technologies. The selected candidate will contribute to groundbreaking research to improve disease modelling, therapy selection, and understanding of RMS pathophysiology.

**Project Goals:** The AI-POC project combines cutting-edge bioengineering, AI-driven data analysis, and microfluidics to create a robust RMS OoC platform. This platform incorporates healthy skeletal muscle tissue, patient-derived samples, and tumour microenvironments to provide realistic biological responses.

Key project features include:

- Integration of miniaturised metaplasmonic biosensors for real-time biomarker monitoring.

#### Key Responsibilities

As a PhD candidate, you will:

1. **OoC Platform Development**
  - Design and build a microfluidic OoC system incorporating biosensors and dynamic bio-platform technologies.
  - Establish protocols for skeletal muscle differentiation and tissue engineering to replicate physiologically relevant environments.
2. **Biological Characterization**
  - Use RMS cell lines and patient biopsies to validate the platform, ensuring long-term tissue viability and responsiveness to chemotherapeutics, endocrine factors, and inflammatory signals.
  - Compare on-chip tissue architecture and cellular phenotypes with in vivo data.
3. **Data Analysis**
  - Collaborate on correlating real-time biosensor data with microscopy imaging and RNA sequencing (RNAseq).
4. **Therapeutic Validation**
  - Test therapeutic predictions in vivo using patient-derived xenograft (PDX) models to validate the platform's predictive accuracy and identify effective treatments.

#### Required Qualifications

- Master's degree in bioengineering, biomedical sciences, or related fields.
- Strong background in tissue engineering, microfluidics, or organ-on-chip systems.
- Proficiency in molecular biology techniques and cell culture.
- Excellent communication skills and the ability to work collaboratively in a multidisciplinary team.

### **Desirable Skills**

- Familiarity with metaplasmonic biosensors or real-time data collection systems.
- Knowledge of cancer biology, particularly sarcomas or RMS.
- Programming experience in Python, R, or MATLAB.
- Prior experience with RNAseq data analysis or computational modelling.

### **Expected Outcomes**

The successful candidate will contribute to the following milestones:

1. Development of a functional RMS OoC platform.
2. Validation of therapeutic efficacy.
3. Creation of a personalised RMS disease model for preclinical testing.
4. Publication of high-impact research articles and presentations at international conferences.

### **Impact of the Role**

This PhD position offers a unique opportunity to contribute to innovative oncology research. ORCHID's outcomes will significantly advance precision medicine, enabling better therapeutic decision-making and improved patient outcomes.

### **Group Leader at IBEC**

1. Title: Professor
2. Full name: Javier Ramon
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4. Research Group: Biosensors for Bioengineering

### **Collaborator in the other institution**

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4. Institute: Vall d'Hebron Instituto de Oncología (VHIO)
5. Research group: Sarcoma Translational Research Group