

IBEC-VHIR INTERNATIONAL PhD PROGRAMME

Position

1. Project Title/ Job Position title:

Creating Microenvironments for Heart Regeneration and Protection

2. Research project/ Research Group description

After injury, the heart gradually gains a renewal capacity that may replace necrotic Cardiomyocytes (CM), offering therapeutic potential for myocardial infarction (MI). Recent evidence indicates that targeting cell fate plasticity could provide a promising strategy for cardiac regeneration. In lower vertebrates and mammals has been demonstrated that CM turnover comes from preexisting CMs rather than from cardiac stem cells, shifting the focus towards understanding CM proliferation mechanisms, and how the environmental changes can alter its phenotype.

Lactate has been gaining a lot of attention as a metabolite that can modify cell fate by changing cell metabolism.

VHIR and IBEC teams have been jointly working on the effect of lactate on acute ischemia-reperfusion injury, showing a reduction on infarct size and parameters related to cardiac protection. These findings support a cardioprotective role for L-lactic acid in both short- and long-term contexts, mediated in part by its uptake through the MCT1 transporter, induction of metabolic reprogramming, and gene expression modulation. The aim of the project is to validate the effect of lactate in vivo by means of lactate releasing biomaterials, demonstrating in situ cardiac dedifferentiation in adult hearts. Our approach combines biomaterials, metabolomics, cell culture and in vivo validations to provide valuable mechanistic insights on how a metabolic shift recapitulating development stages can promote adult CM proliferation. This will provide valuable insights on how metabolic fluxes are closely related to phenotype changes.

3. Job position description

The candidate will work in an interdisciplinary environment, under the supervision of the two PIs from both groups. Tasks and responsibilities:

Materials design and fabrication methods (electrospinning, 3D printing) Materials characterization. Group Leader at IBEC

Designing and executing *in vitro* experimental procedures: Cell culture, PCR, Immunofluorescence and western blot.

Execution of experiments in both *ex vivo* and *in vivo* animal models, ranging from isolated rodent hearts to the *in situ* rat and pig models of myocardial infarction.

Requirements for candidates:

Degree and master in Bioengineering, biotechnology, Biologist, Biomedicine. English level of B2.

High motivation and ability to be involved in an international multidisciplinary team
Excellent team working and communication skills.

It will be valuable:

Experience in biomaterials fabrication, and Polymers science will be valuable.

Accreditation for the use of animals in research

Group Leader at IBEC

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Group Leader at VHIR

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