INPhINIT
"la Caixa" Fellowship Programme

IBEC
Institute for Bioengineering of Catalonia

EXCELENCIA SEVERO OCHOA

IBEC participates in INPhINIT, "la Caixa" Doctoral Fellowship Programme with a set of stimulating PhD projects and excellent research groups to host the fellows

Biomaterial for regeneratives therapies group

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Promoting cardiac regeneration by instructive microenvironments

Research in the Biomaterials for Regenerative Therapies group is devoted to the development of basic science and knowledge transfer to industry of innovative biomaterials and scaffolds for tissue regeneration. We work on the design, fabrication and characterization of scaffolds by using different techniques such as electrospinning, 3D printing or nanoparticles, but we also elucidate the effect of the produced scaffolds on stem cell activation or cell reprogramming towards regeneration of a specific tissue. Thus, the group works both on material engineering and cell biology and, more important, at the interface of biomaterials and cells.

Regarding the cardiac tissue, the mammalian heart has always been considered a post-mitotic terminally differentiated organ, in which cardiomyocytes present at birth would persist, without further division, throughout the life of the organism. Additionally, when an injury appears at the cardiac tissue, such as the one produced by a myocardial infarction, this organ is not able to regenerate and forms a scar that interferes with the normal functioning of the heart, finally leading in organ failure.

The recent identification and characterization of resident cardiac stem cells (CSCs) changed completely the classic view of the heart as a postmitotic organ. Other authors support that the activation of the molecular machinery can result in cardiomyocyte dedifferentiation and improved heart functionality. These findings open the possibility of the heart self-healing in response to specific stimuli after a heart infarction.

Given the prospect of true myocardial regeneration, the quest for potential strategies to induce in situ cell activation sources with myogenic and angiogenic properties is a great opportunity for myocardial tissue regeneration. InsBiomat aims the application of a new process for biomaterials fabrication (Organogels) as an in situ tissue engineering scaffold that due to its physicochemical properties is believed to have chemotactic attraction for cells and promote vascularization at the infarcted tissue. The project will explore the capability of these scaffolds as an in vivo cardiomyocytes reprogramming system.

Job position description

The person involved in this project will have the opportunity to be immersed in the field of tissue engineering by working on the design and fabrication of a novel scaffold with the requirements needed for promoting heart regeneration. Innovative technologies based on 3D printing will be the core of his/her research to produce appropriate scaffolds that will create a specific environment to control scar formation and cardiac tissue regeneration after ischemia. Cell culture and biochemistry techniques will also be part of his/her work, in order to characterize the obtained scaffold and better define its properties. Thus, the student will both learn about material science and biology, as well as the indispensable interaction between both fields. Scientific papers writing as well as conference attendance will be highly encouraged. International stays in other research centers are offered. Thus, a thorough formation in different skills (scientific writing, oral communication, IP protection, etc) will also be offered by the institution.

The selected candidate will take part of a highly multidisciplinary team that combines bioengineers, chemist, cell biologists, and biotechnologist. This is a young team that highly collaborates in the group research trying to transform the health and wellness in our society by developing new treatments for diseases.

The projects are fully applied and our aim is to promote technology transfer in science and into society.
Come and join a very dynamic team that will give you opportunity to make a change in our society.

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