



Research Project Proposal
Academic year 2018-2019

Project Nº 36

Title: *3D printing to bioengineer the hematopoietic stem cell niche*

Department/ Laboratory *Regenerative Medicine and Oncohematology Programs, Labs 101 and 102*

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Summary The hematopoietic bone marrow niche is a dynamic environment whose main role is to tightly control the numbers and activity of hematopoietic stem cells (HSCs). HSCs give rise to all phenotypes in the blood and are, through their response to different stimuli, ultimately responsible for providing feedback to the needs if the organism. In this task, the niche is a crucial integrator of input signals and their transmission to HSCs. At the same time, it is now known that a defective niche can induce HSC malfunction and that a malignant HSC can alter the niche.

So far, animal models have constituted the most advanced option to study the human bone marrow niche. In spite of their usefulness, the incapability of replicating human conditions and of allowing a high throughput workflow constitute severe drawbacks that impede the advancement of the field. Additionally, being able to produce blood cells in the lab is a pending challenge of modern biomedicine, whose main culprit is the lack of an efficient *in vitro* niche.

This project aims to evaluate the adequacy of 3D printed hybrid hydrogel-scaffold systems to function as bioartificial HSC niches. The candidate will gain theoretical and practical knowledge in 3D printing via Melt Electrospinning Writing (MEW), hydrogel photopolymerization and bioartificial niche generation. He/she will gain advanced insight in healthy and diseased bone marrow niche and HSC function analysis. Bone marrow extraction, RNA extraction, RT-qPCR as well as multicolor fluorescent staining will also be part of the candidate's training, thus gaining a wide multidisciplinary array of new capacities.

yes	<input checked="" type="checkbox"/>
no	<input type="checkbox"/>

Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?