

Tema: Image-based optimization of 3D cultures enabling stem cell differentiation to hepatocytes

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Duração da componente experimental: 1 ano lectivo

Human hepatocytes are scarce and valuable cells for both pre-clinical drug development and as the biological component for bioartificial liver (BAL) devices. In this project, we propose to go beyond the current state of the art and design a bioreactor-based bioprocess enabling the expansion and differentiation of human embryonic stem cells (hESC) to commercial and clinically relevant numbers. This will be done by taking advantage of our lab's expertise in 3D stem/ primary cells 3D bioprocessing, confocal imaging and bioreactor technology to optimize the bioreactor culture process using our hESC dual fluorescent reporter cell lines for hepatic differentiation.

In this Master thesis project, the student is expected to design a culture screening method based on image analysis (epifluorescence and confocal microscopy) of our dual fluorescent reporters. The goal of the screen will be to find the best culture conditions (small molecules, adhesion substrate, co-culture with other cell types, etc) for hESC differentiation to mature hepatocytes. This work proposal is integrated in a FCT funded project running at the lab.

Main techniques used: Fluorescence microscopy, qRT-PCR, 3D cell culture, flow cytometry