Seminars

On Thursday the 16th of June 2022 at 11 am

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Organ-on-chip models for medical applications

Organ-on-chip (OoC) platforms are currently considered as the next-generation in vitro models for various fields of applications such as drug and toxicity screening, disease modeling, tissue regeneration, metabolic studies, etc. Key advantages offered by these models compared to standard alternatives like 3D cell culture, are, for instance: (i) the possibility to accurately control the cellular microenvironment; (ii) to implement dynamic culture conditions in a microfluidic format; (iii) to emulate the architecture and/or the function of targeted organs by combining specific microfabricated structures with cells; and (iv) to stimulate the cells in the device, e.g., chemically, mechanically, and electrically, with an excellent spatiotemporal control.

In the last years and current research, the AMBER group has been developing OoC models for cancer research, in the field of assisted reproductive technologies (ART) and for evaluating the impact of plastic environment pollution on human health. Furthermore, we have designed an innovative mechanical actuation unit for OoC application to apply appropriate mechanical cues on 3D cell models.

In my presentation I will focus on work related to cancer research and the inclusion of biomechanical actuation in OoC models. For the first topic, I will present efforts from our group to create tumor-on-chip models to evaluate the delivery of nanomedicines using flow-based approaches and microbubbles actuated by ultrasound into multicellular tumor spheroids, and to introduce a vascular system. For the second topic, I will present the design of our mechanical actuation unit, initially developed to create a cartilage-on-chip platform, and discuss the impact of various types of mechanical stimulation scenarios on chondrocytes (specialized cartilage cells) to re-create an in vivo-like microenvironment in terms of extra-cellular matrix production. In current work, we are exploring different applications for this mechanical actuation units to create other disease models.

See you all in zoom!

For the ONCOLille Animation Committee
Chann Lagadec

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