Post-doctoral Position, CNRS Ingénierie
Biofabrication of functional organoids

Laboratoire Biomécanique et Bioingénierie (BMBI)
UMR CNRS 7338, Université de technologie de Compiègne
Compiègne, France

Scientific context

The « Cells Biomaterials Bioreactors » CBB team at UMR CNRS 7338 Biomechanics and Bioengineering is involved in tissue biofabrication with organoids generated from stem cells and complex biomaterials. In this way, the group will continue the study of mechanotransduction phenomena and their effect on the guided differentiation of stem cells. This work will strengthen the laboratory's international collaborations, for example with LIMMS (CNRS/University of Tokyo).

Indeed, personalized medicine requires the manufacture and characterization of *in vitro* tissue avatars that can be exploited in regenerative and/or predictive medicine. Our goal is to create 3D patient-specific microtissues obtained from stem cells, integrating the desired architecture and mechanical characteristics from the design. This requires implementing innovative methods in the laboratory for the 4D (space and time) arrangement of materials and cells, exploiting the progress of additive manufacturing and/or microfabrication. These reconstructed objects may be inspired by embryogenesis, or knowledge of the multi-scale structure of native tissue (in connection with the C2MUST team in the case of the musculoskeletal system). On the scientific level, they will improve the understanding of biological, but above all mechanical phenomena involved in the differentiation of stem cells, the formation of tissues with extracellular matrix neosynthesis, the regeneration of tissues or the disorganization of these tissues due to a pathology (genetic, cancerous or degenerative). From bench to bedside, these reconstructed tissues based on patient stem cells will be used: (i) to evaluate the effectiveness of therapeutic solutions (medicinal, genetic); ii) to propose alternatives to organ transplantation, without immunosuppressive treatment.

Missions

The CBB team is working on several complex tissue models (e.g. liver, tendon, adipose tissue, lung, skin). Depending on skills and interests, the person recruited will participate in projects that are under development, or are under review for funding applications. For example, the MSY-OOC project (Multi-organ-on-chip coupling for the monitoring of metabolic syndrome), coordinated by the BMBI laboratory within the MED-DOC PEPR, aims to develop different organ-on-chip coupled together in order to reproduce the dialog existing between the liver, adipose tissue and blood vessels (healthy situation and metabolic disease). In this context, the recruited person may participate in the bioconstruction of these tissues, or in other tissues such as the components of the musculoskeletal system or the skin, and then consider multi-tissue/organ cocultures.

The reconstructed tissues should be characterized biologically, mechanically and functionally, using different laboratory methods or other expertise.

Scientific Environment

is recognized for its original approaches to tissue engineering, which combine different bioinspired strategies to achieve its goals: mimicking the organization or disorganization of tissues, in order to produce bioartificial organs for organ replacement or advanced *in vitro* models for the evaluation of the effects of molecules on these reconstructed tissues (New Approach Methodologies).

The recruited person will have access to the meta-platforms INGESYSBIO (allowing the reconstruction and characterization of biological tissues, description below) and CARMOD (for the mechanical characterization of biological samples).

The candidate will also be accompanied by the laboratory to apply to the CNRS researcher competition (section 28 for example).

Desired profile

Education : PhD in tissue engineering, bioengineering or cellular biology.

Technical skills : experience in cell culture and organoid fabrication ; knowledge of biomaterials

Soft skills : ability to work in a team and collaborate with academic and clinical partners ; project management skills and scientific report / article writing ; proficiency in written and spoken English.

Work environment

The postdoctoral researcher will work in BMBI CNRS lab (CBB team), université de technologie de Compiègne. The laboratory is equipped with two thematic Meta-Platforms dedicated to training, research and development activities based on the laboratory's expertise in the healthcare field. These Meta-Platforms include technical platforms and associated equipment (https://bmbi.utc.fr/recherche/meta-plateformes-bmbi/). **I**NGESYSBIO**:** L1 and L2 laboratories, histology, immunostaining, Airyscan confocal microscopy, qPCR, additive manufacturing equipment (3D printers, electrospinning), microfluidics and cellular microsystems.

Duration : 1 year

Starting Date: September 1st, 2024

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