

MATERIALS SCIENCE AND TECHNOLOGY

PNRR/PNC Salute - 3D barrier models: bioactive constructs for biological twin development

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Context of the research activity	This research will be made in the frame of the PNRR project “Digital Driven Diagnostics, prognostics and therapeutics for sustainable Health care”, acronym: D3-4Health; Spoke 4: “Biological and bioengineered in vitro models for care through Digital Twin approaches”. The PhD research will focus on the design, selection of the proper materials, development and characterization of bioactive constructs to recapitulate the normal and pathological states of physiological barriers present in the human body. Progetto finanziato nell'ambito del PNC Salute - Avviso n. 931 del 6/6/2022 - PNC0000001 Digital Driven Diagnostics, prognostics and therapeutics for sustainable Health care (D3 4 Health) - CUP B53C22005980001
Objectives	The research program of the PhD candidate is in line with the research topics covered by the Spoke 4 on the development of biological and bioengineered in vitro models, and more specifically it is expected to contribute directly or indirectly to TK4.3 - Organ-On-Chip, TK4.4 - Microfluidic barrier models, and/or TK4.5 - 3D Bioprinting. Several types of physiological barriers are present in the human body exerting a crucial role in both normal and pathological states. The establishing of the proper experimental conditions - in terms of materials and cell components to be used - is pivotal for 3D model generation of different types (e.g., Organ-On-Chip, microfluidic and bioprinted models) and represents the main aim of the PhD research activity. The main research objectives of this PhD thesis include (not necessarily all): i) design and preparation of bioactive constructs considering one or more types of physiological barriers (e.g., simple and specialized endothelial barriers, the tumor microenvironment barrier, the intestinal barrier) whose activity is known to be crucial in the context of several diseases of high social impact (such as cancer and other degenerative diseases); ii) model characterization through different laboratory techniques (e.g., biochemical

and biomolecular methods, imaging and omics), iii) model testing in terms of response to the administration of drugs/other treatments.

**Skills and
competencies
for the
development of
the activity**

Candidates should have a solid bioengineering background and strong motivation to learn through advanced research. In particular the knowledge of the main current bioengineering approaches for the development of advanced 3D biological models as well as proven practical experience in laboratory activity are required.

Knowledge in material science, microfluidics, chemistry, biochemistry and cell biology as well as problem solving ability are preferred. Desirable attitude to work in team as well as independently.