



PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: DEVELOPMENT OF IN VITRO MODELS AND TECHNOLOGICALLY ADVANCED CULTURE SYSTEMS FOR CARDIO-RESPIRATORY APPLICATIONS

Monthly net income of PhDscholarship (max 36 months)

€ 1325.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

The ever-increasing need for complex and reliable in vitro models able to replicate key structures and functions of specific human tissues has driven the development of new technologies, such as bioreactor and biophysiological systems (MPS), for cell and tissue cultures recapitulating the complexity of the human cell/tissue microenvironment. MPS and bioreactors can be used to properly replicate in vitro models of different tissues, tissue barriers, and also graft/scaffold tissue interactions, in line with the 3R principles. The research team has been working on technological advanced fluidic culture systems hosting different kind of supports such as membranes, scaffolds and bioptic or biological tissue samples. Such systems are generally empowered by additional features as live imaging and cell retrieval for molecular mechanism studies, accurate controls of the actuating/sensing systems, and user-friendly interface and usage. The research activity will be aimed at the identification of the design strategies for the development of a versatile compartmental/dynamic culture system for in vitro models of barrier tissues (e.g., lung barrier) and their validation in relevant biological scenarios. In particular, the research activities will be devoted to the development and engineering of the multicompartamental devices and their integration into an all-in-one culture platform for advanced therapies.



	<p>This project research is in the framework ANTHEM: AdvaNced Technologies for Human-centrEd Medicine Codice PNC0000003 CUP B53C22006720001 PIANO NAZIONALE COMPLEMENTARE (PNC) Decreto Direttoriale n. 931 del 6giugno 2022 AVVISO PER LA CONCESSIONE DI FINANZIAMENTI DESTINATI AD INIZIATIVE DI RICERCA PER TECNOLOGIE E PERCORSI INNOVATIVI IN AMBITO SANITARIO E ASSISTENZIALE da finanziare nell'ambito del PNC</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<ul style="list-style-type: none"> - study of the state of the art of bicomparmental microphysiological systems (MPS), miniaturized bioreactors, and in vitro models. Analysis of possible strategies enabling multicompartimentalization and its control - development and production of new versions or newly conceived devices (single chamber) with specific physical stimulation features on the tissue (e.g., lung, vascular) - engineering and integration of multicompartimental platform with controlled actuation/sensing enabling multi-organ cross-talk - integration of the multicompartimental platform in a all-in-one logic- experimental biological validation of the developed system in Lab - development of in vitro tissue barrier models and their cross-talk within the developed culture systems - evaluation of possible repercussions in terms of intellectual property- scientific dissemination activities
<p>Educational objectives</p>	<p>The proposed project is highly multidisciplinary. Bioengineering studies on this topic require the candidate to be prepared to a strong educational commitment on design and realization of culture systems, their biological characterization and their use to obtain in vitro models of different tissue barrier, their cross-talk and a preliminary physiopathological in vitro model.</p>
<p>Job opportunities</p>	<p>The candidate will have the opportunity to cooperate with research groups of the Anthem consortium working in the</p>



	field of cardio-respiratory in vitro models. The competences matured during the project in the technological and biological field will increase his/her attractiveness as a professional bioengineer also in the job market.
Composition of the research group	0 Full Professors 2 Associated Professors 0 Assistant Professors 3 PhD Students
Name of the research directors	PROF. GIANFRANCO FIORE - PROF. MONICA SONCINI

Contacts	
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	662.5 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>A shared desk and computer will be given to the student for the time needed to carry out research. Short periods of teaching assistantship are foreseen during the program.</p> <p>The candidate will work within the biomechanics research group of the DEIB department at PoliMI, especially at the ATTIC Lab www.biomech.polimi.it. Part of the candidate activities will be supported by the collaboration with Research groups of the ANTHEM PNC Project, that will be explored at the beginning of the PhD project</p> <p>This project research is in the framework ANTHEM: AdvaNced Technologies for Human-centrEd Medicine Codice PNC0000003 CUP B53C22006720001 PIANO NAZIONALE COMPLEMENTARE (PNC) ? Decreto Direttoriale n. 931 del 6giugno 2022</p>



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