POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 39th cycle

THEMATIC Research Field: INTEGRATION OF TECHNOLOGICAL PLATFORMS AND IN VITRO TISSUE MODELS FOR PRECLINICAL TESTS IMPLEMENTATION

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 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 recapitulating the complexity of the human cell/tissue microenvironment for physiopathological studies and assessment of new substances/drugs/treatments, has driven the development of a new class of devices, the Micro Physiological Systems (MPSs), having the potential to revolutionize the pharmaceutical industry. MPSs and miniaturized bioreactors provide reliable in vitro models able to replicate key structures and functions of specific human tissues, with greater predictive power with respect to traditional cell cultures. The research team has been working on technological advanced fluidic culture systems hosting membranes, scaffolds and bioptic samples. The systems are empowered by additional features as live imaging and cell retrieval for molecular mechanism studies. The research activity will be aimed at the development of new in vitro microphysiological system (MPS) for replication of in vitro models of barrier tissues and their validation in relevant biological scenarios.In particular, the research activities will be devoted to the development of dynamic culture systems enabling the cultures of complex tissue barriers and the exploitation of these integrated systems in preclinical tests for the evaluation of drugs/molecule/compounds.

Methods and techniques that will be developed and used to carry out the research	- study of the state of the art of bicomparmental microphysiological systems (MPS), miniaturized bioreactors, and in vitro models used in preclinical tests - development and production and of new versions or newly conceived of dynamic bicompartmental culture system with specific physical stimulation features - engineering and integration of the culture system in a multichamber platform with controlled actuation and with features suitable for enabling the preclinical testing within the systems - experimental biological validation of the developed system in Lab- training focused on preclinical tests and in vitro models used for preclinical testing - collaboration to the development of an in vitro tissue barrier models within the developed culture systems - evaluation of possible repercussions in terms of intellectual property- scientific dissemination activities
Educational objectives	Owing to the intrinsic multidisciplinary nature of this project, bioengineering studies on this topic require the candidate to be prepared to a strong educational commitment on design and realization of microphysiolofical systems and miniaturized bioreactors, their biological characterization and their use to implement preclinical testing of drugs/compounds.
Job opportunities	The candidate will have the opportunity to cooperate with a company (VitroScreen Srl and MatTek Laboratories) working in the field of in vitro models for preclinical tests boosting his/her teamwork experience with personnel from the biotech industrial world, thus developing 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 2 PhD Students
Name of the research directors	PROF. MONICA SONCINI

Contacts
Monica Soncini *monica.soncini@polimi.it*

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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

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.

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 Vitroscreen Srl and will be also boosted by a period abroad at the MatTek Laboratories

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