POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 41st cycle

BORSE TEF Research Field: BRAIN-ON-A-CHIP PLATFORM FOR PRECISION MEDICINE OF BRAIN DISEASES

Monthly net income of PhDscholarship (max 36 months)
1800.0 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 *aim* is to deliver an engineered brain-on-a-chip platform based on human cell cultures and organ-on-a-chip devices, useful for predicting the response to a new drug for disabling brain diseases, considering the contribution of gender and individual genetic profile. The *motivation* lies in the fact that the genetic background, including also the gender factor “male/female”, can influence the individual response to a drug. The main *objectives* are: (a) evaluation at cellular level of the potential impact of selected drugs on blood-brain barrier and brain tissue; (b) increase in the predictability of the drug potential unwanted side effects and efficacy. The project is based on a bioengineering *approach* aimed at the development of an organ-on-a-chip device to be assembled in an engineered brain-on-a-chip platform to model the involved biological organs/systems.
Methods and techniques that will be developed and used to carry out the research	The proposed technological solution has to reproduce in vitro the connections among the main players involved in drug metabolism and pharmacological action with a focus on the brain, by emulating the blood-brain barrier and the brain tissue. A potential drug will interact first with the blood-brain barrier and then with the brain cells cultured in vitro in organ-on-a-chip devices assembled in an engineered platform. The project covers a period of 3 years and includes

	The project covers a period of 3 years and includes methods and techniques dedicated to: (a) optimization of the design, operating parameters and sensorization of the on-a-chip device, also thanks to numerical simulations; (b) development of the cellular models to represent the blood-brain barrier and brain tissue to be assessed once cultured in the platform with cell biology and molecular biology tests; (c) validation of the platform with drugs for selected brain pathologies
Educational objectives	The PhD student will get an interdisciplinary approach allowing him/her improving, his/her knowledge of the experimental protocols/techniques, team working, time management and data dissemination skill, also attending doctoral training courses and peer meetings.
Job opportunities	The expertise acquired by the PhD student at the end of the PhD program will increase his/her job opportunities as researcher in private companies and public institutions in Bioengineering and Pharmaceutical related fields.
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 1 PhD Students
Name of the research directors	PROF. CARMEN GIORDANO

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	900.0 €
By number of months	3

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activity: The student will be encouraged to attend courses at Politecnico di Milano or abroad in International Schools/Conferences. *Teaching assistantship*: The PhD student will be encouraged to take part in activities supporting the teaching practice, within the limits allowed by the regulations. *Computer and desk availability*: The PhD student will be allowed accessing facilities, research space, office equipment at the Department of Chemistry, Materials and Chemical Engineering “Giulio Natta” (DCMIC) of Politecnico di Milano *Period abroad*: The PhD student will spend a period of at least 3 months abroad In a hosting Institution to be defined. To the PhD student will be also offered the possibility to attend the laboratories of the Istituto di Ricerche Farmacologiche “Mario Negri” IRCCS in Milan (Italy), joining the neuroresearch group of Dr. Diego Albani.