PhD in BIOINGEGNERIA / BIOENGINEERING - 39th cycle

PNRR 118 PA Research Field: USE OF COMPUTATIONAL METHODOLOGIES FOR A BETTER DECISION MAKING PROCESS IN CLINICAL ENVIRONMENT: APPLICATION TO VASCULAR SURGERY

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	
Methods and techniques that will be developed and used to carry out the research	The research will develop a computational framework to analyze pre- and post-operative scenarios in presence of aneurysms/dissections and TEVAR, respectively. Fluid-structure Interaction (FSI) methods will be used in combination with simulations of the graft deployment. Data coming from medical images (geometries from MRI or CT, flow rate from 4DFlow-MRI, graft displacement from cineMRI) will be used to build the computational geometries and to calibrate the FSI models, which allow us to give new therapeutic indications about TEVAR. Moreover, virtual scenarios depicted from real cases will be designed in order to create the pre-operative map allowing to link aortic characteristics and drug forces, with the aim of providing new diagnostic indications.
Educational objectives	The PhD student involved will acquire competences about the use of FSI Finite Elements software, the creation of virtual scenarios by manipulating existing real data, the use of codes for the graft deployment. Moreover, she/he will develop knowledge about the model calibration (minimizing discrepancies with measures) and the managing of data in view of creating maps scenarios/diagnostic-and-therapeutic answers (statistical correlation). Finally, she/he will the opportunity to interact with clinicians, exchanging with them medical data and

	outputs of the computational/statistical analyses. She/He will also gain knowledge on regulatory issues and data protection regulation either at national and international level.
Job opportunities	Many jobs opportunities will be at disposal of the student after her/his PhD due to the multi-sectorial competences acquired during the PhD: employment in biomedical companies for research (e.g. computational analyses) or advance usage of medical machines; employment in hospitals as engineering supervising the use of diagnostic machines or of software assisting clinicians during interventions; academic opportunities as post-doc fellows.
Composition of the research group	2 Full Professors 0 Associated Professors 1 Assistant Professors 2 PhD Students
Name of the research directors	Prof. Francesco Migliavacca

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	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico – Reparto di Chirurgia Vascolare
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	University Medical Center Utrecht
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
The PhD student will be involved in educational activities along with teaching assistantship. A

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shared desk and computer will be given to the student for the time needed to carry out the research.