BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

DIMEAS - Experimental Characterization and Design of Next-Generation Cardiovascular Devices

Funded By	Dipartimento DIMEAS
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Context of the research activity	Bioengineering is a multidisciplinary field where engineering, medicine, physics, chemistry, and mathematics intersect. One of the main aims of this area of research is to advance knowledge and support the development of groundbreaking clinical devices or strategies. The research activity focuses on experimental biomechanics, aimed at studying medical devices in the cardiovascular field that feature unique characteristics, including both synthetic materials (e.g., Nitinol) and biological materials (e.g., bovine pericardium) among their components. The development of new structural and fluid dynamics experimental evaluation methodologies will enable the study, optimization, and verification of the functionality of these devices. The activities are well framed in resources present in the PolitoBIOMed Lab Interdepartmental Center: the experimental research will rely on a wide range of facilities, including an experimental fluid dynamics laboratory, several testing and analysis machines (uniaxial/biaxial static/dynamics) and facilities for the optical analysis of displacements, velocities, and deformations in the “solids and fluids” context.
Objectives	This PhD program will focus on research applied to the study and design of cardiovascular devices, with particular interest in a biological aortic valve and a semi-rigid ring for tricuspid valve repair. These devices present challenges related to the experimental evaluation of their performance, as they must be assessed in close correlation with the biological structures with which they interact. Therefore, experimental methodologies will be exploited to develop test benches and protocols, characterize and study the devices at the structural and fluid dynamics levels, understand their performances, and guide their optimization and validation.
Skills and	We are looking for talented and motivated candidates, preferably with skills/experience in: - Experimental mechanical testing of biologic material and medical devices;

competencies for the development of the activity	- Image and data post-processing; - Technical drawing. We desire a candidate with strong aptitude for teamworking and problem solving, open and able to work in multidisciplinary teams and having good communication skills. We require a good proficiency level in both Written and Spoken English.