POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: NOVEL IMAGING BIOMARKERS IN PRECLINICAL STUDIES OF LUNG DISEASE

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	In preclinical studies of pulmonary disease, the assessment tools are currently terminal and primarily based on labor-intensive histology and quantitative assessment of biochemical biomarkers. Nevertheless, these parameters are highly variable among animals and do not provide information about the temporal and spatial distribution of the disease over the course of the study. These shortcomings hamper the successful translation of the results to the clinic. In this context, micro-computed tomography (micro-CT) is being increasingly used to investigate lung disease in small animals and has already demonstrated its potential as a suitable tool for longitudinal studies. It is therefore necessary to define and validate novel functional respiratory parameters capable of longitudinally and quantitatively profiling disease progression and response to therapy, and to support their translation from preclinical studies to the clinical setting. 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 DESTINATIAD INIZIATIVE DI RICERCA PER TECNOLOGIE E PERCORSI INNOVATIVI INAMBITO SANITARIO E ASSISTENZIALE” da finanziare nell’ambito

	del PNC
Methods and techniques that will be developed and used to carry out the research	The main activity of the project will therefore consist in developing algorithms for micro-CT image analysis in animal models of lung disease. Also, novel image-based biomarkers to quantitatively profile disease progression and response to therapy in different animal models will be defined and validated with histomorphological endpoints. Translational studies from the preclinical to the clinical setting will be explored to evaluate these novel biomarkers in human subjects. Methods based on artificial intelligence will be also exploited to explain the relationship between imaging-based features and quantitative histology.
Educational objectives	During the PhD project the candidate will have to attend educational courses provided by the PhD school of Bioengineering and Politecnico di Milano. Participation to national and international conferences is also foreseen.
Job opportunities	After the PhD, different job opportunities will be available as Post-Doc or Research Scientist in national or international institutions. Careers in medical image processing are recently evolving in many enterprise organizations, including job opportunities such as data scientists, big data engineers and machine learning engineers.
Composition of the research group	1 Full Professors 1 Associated Professors 0 Assistant Professors 5 PhD Students
Name of the research directors	PROF. ANDREA ALIVERTI

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

The research group will be composed by 1 full professor, 1 assistant professor of Politecnico di Milano, along with other PhD students involved in collateral projects. Collaboration with Chiesi Farmaceutici S.p.A. (Parma, Italy) and Department of Medicine and Surgery, University of Parma (Parma, Italy) is also foreseen for the implementation of the research.Scientists and medical doctors of collaborating institutions will also cooperate in the project.

The PhD student will be involved in educational activities along with teaching assistantship covering topics of imaging in small animal models and bioengineering of the respiratory system. A shared desk and computer will be given to the student at the Lares for the time needed to carry out the research.

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