

UCD School of Medicine Scoil an Leighis UCD

Project title: Surfactant Metabolism and Airway Macrophage Function: Implications for Lung Health and Disease
PhD supervisors: Dr Cormac McCarthy, University College Dublin (UCD) & Dr Claire Healy Trinity College Dublin (TCD), Ireland
Start date: September 2025 – 4 year project
Locations: Conway Institute of Biomolecular and Biomedical Research, UCD
Stipend: €22,000 per annum
Application deadline: 30 June 2025

Project Summary

Airway macrophages (AMs) are innate immune cells that play a fundamental role in lung defence and homeostasis. These tissue-resident cells protect the lungs by patrolling and responding to inhaled microorganisms, allergens, and pollutants. Critically, AMs are essential for the recycling and catabolism of pulmonary surfactant—a complex, lipid-rich complex that lines the lower airways and is crucial for lung function. The precise composition of surfactant is tightly regulated, and any disruption to AM surfactant metabolism can have significant consequences. Such dysregulation can lead to serious lung pathologies and increase susceptibility to respiratory infections. Recognizing that macrophage phenotype and function is heavily influenced by their local environment, including the nutrients available to fuel their response to infection or insult, this project aims to comprehensively explore the role of surfactant metabolism on AM biology in the context of both health and disease.

This 4-year interdisciplinary PhD project will be based between two research groups: The Respiratory Research Group at UCD and Mycobacterial Pathogenesis and Host Interactions group at TCD. This will provide an interdisciplinary and dynamic environment for the PhD candidate to interrogate the impact of surfactant metabolism on AM function in the context of health and bacterial infection. The research will employ a multifaceted approach to interrogate AM biology, including: *in vitro* and *ex vivo* alveolar macrophage models, flow cytometry, gene expression analysis, animal infection models and translational studies using human primary airway macrophages.

Knowledge and Experience to be gained

The PhD researcher will be trained by both research groups at UCD and TCD to perform the laboratory techniques and data analyses required to achieve the goals of the project. The student will participate in written and oral presentations of their research at group lab meetings, journal clubs, local seminars and at conferences. The PhD researcher will also complete taught modules, provided by UCD, during the course of the PhD project (https://www.ucd.ie/graduatestudies/researchstudenthub/researchprogrammes/phdinanut

<u>shell/</u>). There also will be opportunities for teaching in undergraduate laboratory-based practical classes.

Candidate attributes

The PhD candidate should:

- Have/or expect to obtain a 2.1 grade (or equivalent) in an undergraduate or postgraduate degree in Biomedical Sciences, Microbiology, Immunology, Biochemistry, or related discipline.
- Be highly self-motivated and resilient
- Be comfortable with working independently and as part of a team
- Have strong communication skills written and oral

How to Apply

Please send a cover letter (1 page max), CV and academic transcripts to Assoc. Professor Cormac McCarthy (Cormac.mccarthy@ucd.ie).