**University of Leicester**

**BBSRC MIBTP Studentship Project 2024-5 entry.**

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| **Project Reference** |  |

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**Section 2 – *Project Information***

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| **Project Title** | Understanding centrosome function in the human airway  |
| **Project Summary**  |
| Breathing sustains our life and is also important for our quality of life. Inside the lung, billions of hair-like structures called cilia beat a million times a day to promote a process called mucociliary clearance. Mucociliary clearance protects the airway from pollution and infectious agents. Defects in airway cilia are associated with a growing number of diseases, and thus understanding cilia biology is important for human health.  In our lab we seek to understand the assembly and function of centrosomes – microtubule-based subcellular organelles that form the base of cilia. We are offering a unique opportunity for a PhD student to join our efforts to understand the functions of centrosomes in the human airway. In this exciting project, you will use a mix of both wet lab experimental biology and dry lab computational analysis, to unravel the mysteries of how centrosome structure and function is important for respiratory physiology. We will use combined advanced imaging technologies including expansion microscopy, super resolution imaging and electron microscopy to image centrosomes at unprecedented resolution. With genome editing mediated fluorescent tagging and live-cell imaging we will study the activity of centrosomal proteins directly inside living cells. In parallel, we will use in silico analysis to discover how individuals in human populations have differing genetic variation that influences centrosome structure. This will allow us to create mutant in vitro lung models to understand the effects of this genetic variation. The project will provide training in a diverse set of skills, including state-of-the-art fluorescence imaging, organoid and air-liquid interface culture, and analysis of genomic structural variation. It is an exciting opportunity to discover fundamental biological processes associated with cilia function, and you will contribute to publications in general interest journals. The project will also provide a strong foundation of transferable skills that are essential in different future scientific careers. Techniques that will be undertaken during the project* Live-cell time-lapse imaging
* Expansion microscopy
* Super-resolution microscopy (SIM, STORM)
* Air-liquid interface and organoid culture
* In silico analysis of genomic structural variation
* Molecular cloning and genome editing (CRISPR Cas9, prime editing)
* Electron microscopy
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| **References** |
| Mahen, R. cNap1 bridges centriole contact sites to maintain centrosome cohesion. PLOS Biology. 2022. 20(10). Mahen, R. The structure and function of centriolar rootlets. Journal of Cell Science. 2021. 134(16).  |

**To apply please refer to**

[**https://le.ac.uk/study/research-degrees/funded-opportunities/bbsrc-mibtp**](https://le.ac.uk/study/research-degrees/funded-opportunities/bbsrc-mibtp)