**University of Leicester**

**MRC AIM Studentship Project 2025-6 entry.**

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| **Additional Supervisor** |  |

**Section 2 – *Project Information***

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| **Project Title** | Defining how aldehydes regulate human metabolism |
| **Project Summary**  |
| This project aims to define how biological aldehydes regulate human metabolism. To do this, we will combine aldehyde (bio)chemistry and metabolomics using nuclear magnetic resonance (NMR) spectroscopy to identify aldehyde-sensitive metabolic enzymes and to profile aldehyde-induced metabolism changes in live human cells.Aldehydes are chemically reactive and often toxic human metabolites but their biology is undefined. Proving that aldehydes regulate metabolism would be very exciting as it would identify new biological functions for aldehydes and would open up new ways to treat metabolic diseases. This multidisciplinary project, which is co-supervised by the Hopkinson and Harvey Groups at the Universities of Leicester and Nottingham respectively, involves the production of human metabolic enzymes (Hopkinson), biochemical studies with metabolic enzymes and aldehydes (Hopkinson), and deuterium NMR metabolomics in human cells exposed to aldehydes and aldehyde-modulating chemical tools (Harvey). While focused on cell models, the project is linked to ongoing clinical studies at the Sir Peter Mansfield Imaging Centre in Nottingham. The PhD candidate will receive hands-on training in all the required experimental methods, including in enzymology, biochemical and biophysical methods, and in NMR and magnetic resonance imaging.Collectively, the project will confirm aldehydes as metabolic regulators and will stimulate development of new therapies. |
| **References** |
| [1] Kamps *et al.*, *Commun. Chem.*, 2019, **2**, 126. [2] John *et al.*, *Chem. Sci.*, 2024, **15**, 2509–2517. [3] Emms *et al.*, *Chem. Sci.*, 2023, 14, 12498-12505. [4] Oliveira *et al.*, *J. Biol. Chem.*, 2021, **296**, 100180. [5] Smith, *Curr. Opin. Struct. Biol.*, 1998, **8**, 686-694. [6] Koch *et al.*, *J. Biol. Chem.*, 1996, **271**, 33110. |