

Identifying and quantifying new peptide biomarkers of intestinal and metabolic disease using mass spectrometry

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Department/Institute: Wellcome - MRC Institute of Metabolic Science

Industrial Partner: Drug Development Solutions Limited

Research area: Mass spectrometry, method development, peptide hormones, metabolic diseases

Project outline:

This project aims to develop and optimise methods for extracting and analysing peptides and small proteins in plasma using LC-MS/MS technologies. Our laboratory has a particular interest in identifying and measuring peptide hormones involved in the gut-brain-pancreatic axis, which controls post-prandial nutrient homeostasis, blood glucose control and appetite regulation. A number of gut peptides have already formed the basis for new treatments for type 2 diabetes, obesity and short bowel syndrome, and new drugs based on gut hormone combinations are under development.

The student will be involved in developing state of the art extraction methods, aiming to detect compounds that only circulate in the low picogram per millilitre concentration range in plasma. Advanced nano-flow capable instrumentation will be used to push the limits of sensitivity in plasma. Training will be given in the use of Orbitrap and triple quadrupole mass spectrometers, together with peptidomics and proteomics bioinformatics packages for identifying unknown and known peptides in a sample. For any potential biomarkers or bioactive peptides of particular interest, we will develop bespoke quantitative assays using a triple quadrupole system, to enable higher throughput analyses in larger cohorts. Developed methods will be applied to plasma samples from clinical studies in diabetes and obesity research.

BBSRC DTP main strategic theme: Transformative technologies

BBSRC DTP secondary strategic theme: Bioscience for an integrated understanding of health