Optimising GC-MS for Detecting Potential Metabolites in Plasma for Cancer Diagnostics

Lead supervisor: Dr Samrein Ahmed

Co-supervisor(s): Dr Caroline Dalton

School/Institute: Biosciences and Chemistry

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Project summary

Aim: Establish a standardised metabolite detection protocol using samples from healthy and diabetic individuals, with the goal of identifying potential metabolites in diabetic breast cancer patients.

Diabetes is increasingly prevalent in the UK, with 4.3 million diagnosed cases annually, and numbers are expected to rise. One key metabolic alteration in diabetes is elevated blood glucose, a major factor in diabetes-associated comorbidities, including cancer. Recent studies suggest a link between diabetes and breast cancer. Dr. Ahmed's lab investigates this connection at the molecular level, using an in vitro model to study how high glucose levels influence various breast cancer cell lines. The goal is to identify metabolites associated with tumour growth.

This research aims to determine whether differential metabolites can be detected in patient plasma for potential use in screening, diagnosis, or monitoring. A reliable detection protocol is essential for this purpose. The intern will optimise metabolite detection using gas chromatography-mass spectrometry (GC-MS) in healthy and diabetic individuals as proof of concept. Before applying for ethical approval to collect samples from breast cancer patients.

GC-MS is a well-established technique for detecting trace compounds in plasma in both research and clinical settings. An untargeted approach will be used to identify differential metabolites, with data processing steps to remove background noise and set a cut-off based on metabolite levels and disease relevance.

The intern will focus on optimizing a GC-MS protocol for plasma metabolite detection, gaining hands-on experience in sample handling, biohazard safety, data acquisition, quality control, and fine-tuning key parameters, such as sample volume and preparation methods, to ensure accurate and reproducible results.

Specific skills and experience required for this project
Please also refer to the advert on our jobs pages for the person specification for these internships

We are seeking a student with a bioscience background to undertake the internship.
Basic laboratory skills such as pipetting, weighing, and making solutions with different dilutions and concentrations.
Essential skills:
- Understanding of general lab safety and handling of chemicals.
- Ability to interpret and analyse scientific data.

- Logical problem-solving skills to troubleshoot experimental issues.
- Basic understanding of chromatography, or mass spectrometry principles.
- Ability to document findings clearly in written form.
- Confidence in presenting progress and results to the team.

Desirable Skills:
- Experience with Instrumentation: Prior exposure to equipment such as HPLC, spectrophotometers, or basic analytical tools (even at an introductory level).
- A demonstrated curiosity about biomedical research, metabolomics, or cancer studies, shown through academic projects or coursework.
- Strong organisational skills to manage a structured timeline.
- Commitment to scientific integrity and ethics.

Project location

City Campus

Project delivery

This project is available on a full-time basis