



**PROJECT:** Development and Optimisation of a PCR-Based Assay for Study of Gut Microbiota-Derived Bile-Metabolising Enzymes

*'I am absolutely thrilled to have been awarded this essay prize, and grateful to Dr Falk and Core for this opportunity. I would like to thank my supervisors Professor Julian Marchesi, Dr Julie McDonald and Dr Benjamin Mullish for their ongoing support and guidance.'*

*'This award has encouraged and inspired me to develop my skills in laboratory research, and I feel motivated to further pursue a career in academic medicine within gastroenterology.'*

*Diya Kapila has nearly completed her fifth year at Imperial College School of Medicine.*

'Clostridium difficile infection (CDI) holds a pronounced healthcare burden worldwide. The need for novel treatment options is evident: community acquired CDI incidence has risen dramatically; there has been a recent emergence of virulent strains, and there are notable limitations to current treatment. Faecal Microbiota Transplantation (FMT) is now a well-recognised, cost-effective treatment for recurrent CDI. It involves the transfusion of healthy, screened donor's faeces into the gastrointestinal tract of an infected patient. It has been shown to have great efficacy as a therapeutic modality, yet its exact pathogenesis remains unknown.

'One postulation is that it restores certain gut microbiota that secrete bile-metabolising enzymes to the infected patient. These enzymes may have a vital role in *C. difficile* spore germination. The aim of this study was to develop and optimise a PCR-based assay for these certain bile metabolising enzymes in healthy donor stool samples. I spent time optimising this assay, trialling numerous parameters for enhanced PCR results. Now this assay can be used using faeces from a *C. difficile* infected patient, analysing its bile-metabolising enzyme content before and after FMT, thereby hopefully illustrating the re-establishment of microbiota-derived bile-metabolising enzymes after FMT. Eventually this will allow us to refine FMT as a therapeutic option.

'Exploring the microbiota as the nexus between health and disease fascinates me; this coupled with the opportunity to work in a lab enticed me towards this particular project. Furthermore, this assay has vast potential use in a variety of other disease states where our microbiota-derived bile-metabolising enzymes are integral to disease pathogenesis.'

***Ms Kapila's Supervisor Professor Julian Marchesi comments:***

'The work carried out by Diya was integral to us being able to further develop our understanding of how gut bacteria are involved in controlling the pool of bile salts in the human body. Diya was able to develop a set of molecular tools which now allow us to profile the gut microbiome and assess the gene dose of bile salt hydrolases therein. Hence I believe that when a BSc project can make a significant contribution to the larger projects going on around it has to be a worthy winner of this prestigious prize.'