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## Dr Falk/Guts UK Awards 2023

### MEDICAL STUDENT PRIZE WINNER: **Ms Radhika Shah**

**PROJECT:**  
The role of matrix metalloproteinases in metabolic syndrome and non-alcoholic fatty liver disease



*Ms Shah undertook this research project whilst intercalating for a MMedSc degree at the Faculty of Medicine, University of Southampton. In September she will return to her fourth year studies at the University of Southampton Medical School.*

**Ms Shah explains:**

'Globally and in the UK, non-alcoholic fatty liver disease (NAFLD) affects approximately 32% of adults. Worryingly, these numbers are continuing to rise, bringing with it a potentially huge burden to healthcare system.

NAFLD is a major consequence of metabolic syndrome. This was a lab-based project looking at how matrix metalloproteinases (MMPs) might interact with each other in the development of NAFLD, as a consequence of metabolic syndrome.

'The mechanisms underlying the development of NAFLD from metabolic symptoms are complex. One of the structures implicated in NAFLD is the extracellular matrix (ECM), which has to be remodelled to allow inflammation to spread, and tissue to grow. The ECM is heavily regulated by MMPs, but if these are differently expressed, it can lead to ECM dysfunction and support disease progression.

'In our research group, some genetically modified mice were bred without one of the MMPs known as Mmp28 (Mmp28KO mice). Surprisingly, even though these mice had a normal diet they developed the metabolic syndrome. In my project, I used histology and immunohistochemistry to determine whether Mmp28KO male mice showed any signs of NAFLD. I also looked at the gene expression of other Mmps and Timps, relevant to NAFLD, to see if Mmp28 deletion changed this.

'I found that Mmp28KO mice had more fat and inflammation in their livers - an indication that they NAFLD - compared to wildtype mice. I also found that there were gene expression changes in Mmp28KO mice compared to

wildtype mice, which were indicative of increased inflammation occurring.

'Therefore, my project successfully managed to identify NAFLD in Mmp28KO mice and show that changes in Mmp mechanisms may be impacting the development of NAFLD and metabolic syndrome. With further research into these mechanisms, hopefully some day they may be used as therapeutic targets for drugs against metabolic syndrome and NAFLD.'

'This project complemented the career I want to pursue, which hopefully will include a combination of clinical and research responsibilities in internal medicine, with a focus on preventative medicine.'

**Ms Shah's Project Supervisor Dr Sylvia L. F. Pender PhD Associate Professor (Reader) In Mucosal Immunology, Faculty of Medicine, Academic Unit of Clinical and Experimental Sciences University of Southampton comments:**

'The novel animal model has been established in my lab, and Radhika designed and planned her project online. Radhika is conscientious and meticulous in her molecular biology skills, volunteering to do trial runs to test her research techniques before she used the valuable samples. Radhika is now very skilful and obtains consistent readings.

'Radhika gets on well and interacts professionally with other research scientists in the laboratory. She is an A-star model student who proved highly motivated, independent and eager to learn new skills.'

**Ms Shah states:**

'This was my first experience of lab work and it really opened my eyes to the almost endless diversity of medical research. Additionally, it was incredibly rewarding to be part of a project on a subject that affects so many people now and will continue to do so in the future. I am grateful to GUTS UK and Dr Falk Pharma for recognising the potential of my work; this prize has encouraged me to keep seeking out new opportunities in research alongside clinical medicine.'



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