



PROJECT: Quantifying Intestinal Stem Cell Dynamics Using Microsatellite Sequencing

'I am very proud to have won the Dr Falk / CORE award: it is recognition of the hard work that I, and many members of the lab, have put into the success of this project.'

'Moving forward in my career, the award will carry weight when I am applying for jobs, particularly applying for academic and specialist training roles within the NHS.'

Dr Joseph Christopher completed a four year PhD at the Cancer Research UK Cambridge Institute in 2016. He has just completed his 5th year at medical school at University of Cambridge School of Clinical Medicine.

I have just completed a PhD as part of the University of Cambridge's MB/PhD programme. When choosing my PhD project, I knew that I wanted to pursue my academic interest in stem cell biology and my clinical interest in the diagnosis, treatment and care of patients with cancer. The project offered by Dr. Douglas Winton at the Cancer Research UK Cambridge Institute allowed me to do exactly that.

Intestinal stem cells are present throughout the gut; every day they give rise to millions of new specialised cells that carry out various functions required for normal gut function. Bowel cancers also require stem cells to grow and sustain function; these stem cells are known as 'cancer stem cells'. By understanding the way in which normal intestinal stem cells function, we can begin to understand the way cancer stem cells drive cancer growth.

I have been working on a novel technique aimed at understanding normal intestinal stem cell behaviour by observing the naturally occurring changes in the DNA of stem cells; a so-called 'unique barcode' within the DNA of each stem cell and all the specialised cells it gives rise to. We can read these barcodes using high throughput DNA sequencing technology.

By developing this technique, we will, for the first time, be able to observe the way in which normal human intestinal stem cells replace each other as well as give rise to specialised cells. This then allows us to infer the behaviour of cancer stem cells and cancer growth.

Through this gain of understanding of normal intestinal stem cell and cancer stem cell behaviour, it may be possible to target cancer stem cells with therapeutic drugs and shut down cancer growth.

Dr Christopher's Supervisor Dr Douglas Winton comments:

'Joe was very dedicated and hard working in his time here. Notably he had to master not only practical and very precise benchwork but also to learn quantitative and bioinformatics skills that were an essential part of the analysis.'

'In light of his contribution we now have a method to address fundamental and applied questions in both the homeostatic colon and in the steps leading to the development of cancer.'