How would you explain the main findings of your paper to non-scientific family and friends?
For decades, it’s been understood that patients with a disease called primary ciliary dyskinesia (PCD), which affects the cells that line the passages of the lung and causes recurrent infections, also have problems with the cells of their immune systems. This paper is the first to make the link between a protein required for proper motile cilia function and myeloid cell migration capacity.

What are the potential implications of these results for your field of research?
It is our hope that this work provides new insights into the unique mechanisms by which the cells of the innate immune system move through tissues. With respect to CCDC103 in particular, our data also complement existing biochemical work suggesting that this protein forms the scaffolding for previously uncharacterized complexes of microtubule-binding proteins that may play a critical role in cellular dynamics. In the future, we plan to further probe the implications of this CCDC103-nucleated complex, to determine not only how it affects microtubule dynamics directly, but what downstream effector functions depend on this complex.

“[…] this work provides new insights into the unique mechanisms by which the cells of the innate immune system move through tissues.”

What have you the most surprised you the most while conducting your research?
My background is in myeloid cell and cancer biology. I began my training as an undergraduate in the lab of Dr Michael Caligiuri at Ohio State University, where I built a strong foundation in NK cell biology and myeloid leukaemias, and continued studying myeloma and skin cancer in the lab of Dr Kathleen DeCicco-Skinner at American University in Washington, DC. I fully expected that the transition to working with zebrafish in a developmental biology graduate program would be a jarring one, but in fact the opposite was true, and I found that zebrafish were an excellent platform for answering many of the questions I had always had about how myeloid cells proliferated and moved through tissue. I’ve relished the opportunity to integrate so many different live-imaging techniques and genetic manipulation approaches to my existing interests in myeloid biology.

Describe what you think is the most significant challenge impacting your research at this time and how will this be addressed over the next 10 years?
I think the most urgent task for us to tackle as a community is determining how to fast track bench-to-bedside approaches for the treatment of individual patients. The explosion in new technologies for conducting research has in many ways made it exponentially easier to generate data to answer individual scientific questions, but I think the true test of our work lies in its translatability to the realm of patient care.
What changes do you think could improve the professional lives of early-career scientists?
As a trainee in an MD/PhD program who plans on incorporating a significant amount of clinical practice in my career, I would like to see new organizational and operational mechanisms be introduced to allow the role of the physician-scientist to adapt to rapidly changing scientific and clinical environments. Both the practice of medicine and the pursuit of scientific knowledge have undergone revolutionary changes in the last few decades, but the job description of the physician-scientist has not. While accelerating time to research independence forms an important part of those necessary changes, I think we can take some cues from the clinical research space, with its deeply collaborative character, to guide some of these changes.

“[…] the true test of our work lies in its translatability to the realm of patient care.”

What’s next for you?
After completing my final year of graduate school and defending my thesis next spring, I will return to complete years 3 and 4 of my medical school education. After that, I hope to complete a residency in paediatrics or internal medicine with a fellowship in either human genetics or haematology/oncology, and continue my investigations in rare diseases of the haematological and immune systems.

Reference

Zebrafish neutrophils migrating towards a wound site, captured mid-time lapse and colour coded by position and sphericity index.