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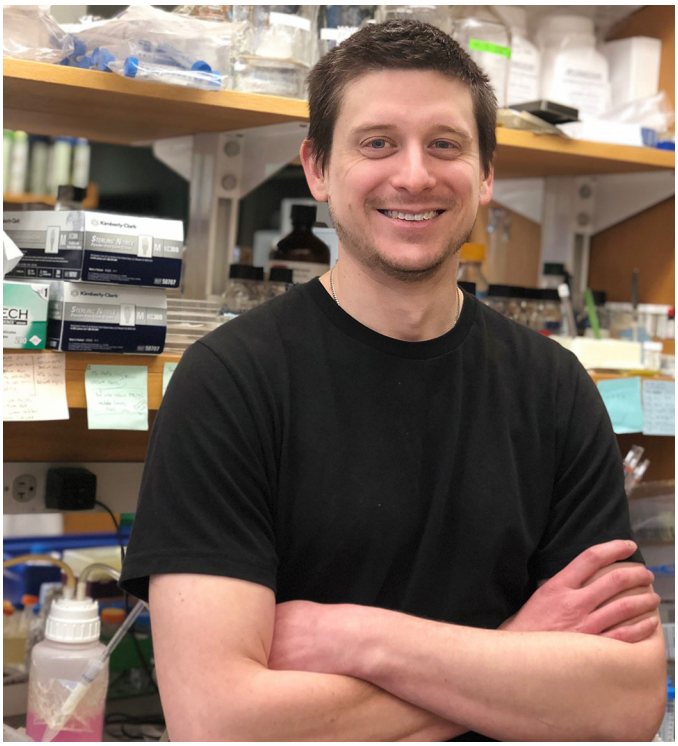
FIRST PERSON

# First person – Nathan Roy

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Nathan Roy is first author on 'LFA-1 signals to promote actin polymerization and upstream migration in T cells', published in JCS. Nathan is a postdoctoral fellow in the lab of Janis Burkhardt at the Children's Hospital of Philadelphia, Philadelphia, PA, investigating signaling events that drive immune cell migration in both normal and pathological conditions.



Nathan Roy

**How would you explain the main findings of your paper in lay terms?**

Unlike most cells in the body, which are relatively stationary, immune cells are constantly on the move. In order to defend against invading pathogens or eliminate nascent tumors, they must be able to access almost every tissue in the adult organism. To enter inflamed tissue, immune cells (such as T cells) must exit the blood by crossing the vascular endothelial barrier. This process, called extravasation, is a key control point in the inflammatory response and is largely regulated by chemokines and adhesion molecules. In this study, we closely examined how two adhesion molecules expressed on inflamed endothelia (ICAM-1 and VCAM-1) govern T cell migratory responses. Building on previous work, we found that ICAM-1 and VCAM-1 support completely different migratory behaviors in T cells. Importantly, we showed that ICAM-1 engagement triggered a unique set of signaling events in the interacting T cell that ultimately leads to cell spreading, actin polymerization and migration against the direction of shear flow. This work highlights the importance of integrins as signaling receptors in T cells. In the future, it will be important to determine how integrin signaling influences immune cell trafficking *in vivo*, as a greater understanding of these events will guide the rational design of therapeutics to alter immune cell migration in autoimmunity, inflammatory diseases and cancer.

**When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?**

There was not one single eureka moment with this project, but if I were to pick one, it would be the initial biochemical analysis of T cells interacting with ICAM-1 or VCAM-1. I knew that there were likely going to be differences in downstream signaling, simply due to the fact that the T cells looked so different under the microscope when migrating on the different ligands. But I was not prepared for how obvious and clear the signaling differences were, especially when I first saw them on the Odyssey imager. I immediately thought that this finding was important and may help explain the odd upstream–downstream phenotype of migrating T cells under shear flow.

**Why did you choose Journal of Cell Science for your paper?**

I have always held Journal of Cell Science in high regard due to its dedication to publishing solid cell biological studies. Even though our study focuses on T cells, we believed our findings were of interest to the broad cell biology readership of JCS, as opposed to a more specialized immunology journal.

**Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?**

I have been blessed in my young career with outstanding mentors that have helped me in and out of the lab. Early in graduate school, Dimitry Krementsov was instrumental in helping me navigate the lab while constantly reminding me that there was much more to life than just the next experiment. More recently, Jan Burkhardt has been indispensable for my growth as a scientist and as a person. She is always there for me, offering an encouraging voice when needed and a calming voice during moments of uncertainty. I truly believe I would not be where I am today without the dedication of my mentors, and I hope to be able to channel what I have learned as I begin to mentor the next generation of talented young scientists.

**What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?**

My motivation to pursue a career in science came initially from my fascination with nature. From an early age I always wondered how life on this planet worked. Luckily, I had amazing biology teachers, such as Richard Grant and Cliff Lerner, who nurtured my curiosity and showed me that a career in science was a viable option. In addition, my parents instilled in me the confidence that I could tackle anything – support that helped motivate me to take a chance on a career in science.

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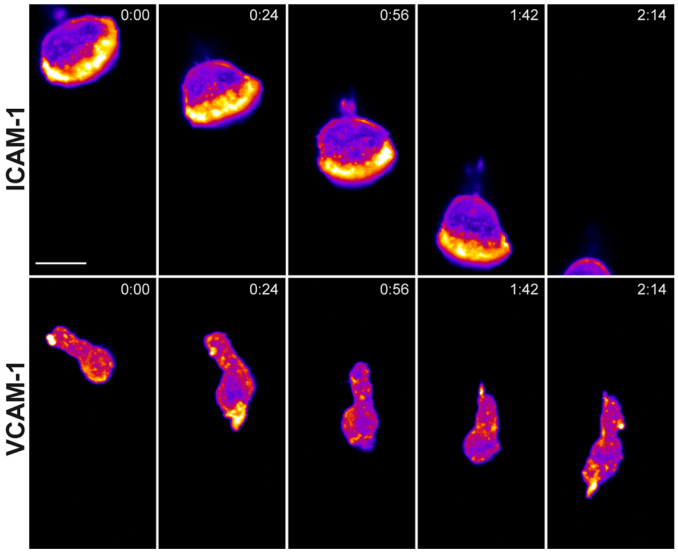


**Time-lapse confocal microscopy of primary mouse T cells expressing Lifeact–GFP migrating on surfaces coated with ICAM-1 (top) or VCAM-1 (bottom).** Images are a projection of a 2 µm stack starting at the cell–coverslip interface. Lifeact–GFP intensity is displayed as a heat map, where warm colors indicate higher intensity values. Scale bar: 10 µm.

### Who are your role models in science? Why?

It is difficult to narrow down my list because I have a great respect for the scientists who have come before me. But one that stands out is Barbara McClintock. During a time of fervent biological discovery, her careful microscopy-based analysis made it possible to link genes with phenotypes, providing unprecedented context for understanding modern genetics. Looking back, it is completely obvious why she was ridiculed and attacked by her contemporaries (this was at a time when few women held professorships), but she was unfazed and continued to push her science forward. Her discoveries proved to be some of the most important in biology, and to this day she is a true inspiration and a worthy role model for all scientists.

### What's next for you?

After I finish my postdoc at the Children's Hospital of Philadelphia, I hope to start my own group aimed at understanding how migrating immune cells convert mechanical forces into biochemical signaling events.

### Tell us something interesting about yourself that wouldn't be on your CV

I'm a huge football fan (American football…) and have been known to consume unhealthy amounts of chicken wings on Sundays.

#### Reference

**Roy, N. H., Kim, S. H. J., Buffone, A., Jr, Blumenthal, D., Huang, B., Agarwal, S., Schwartzberg, P. L., Hammer, D. A. and Burkhardt, J. K.** (2020). LFA-1 signals to promote actin polymerization and upstream migration in T cells. *J. Cell Sci.* **133**, jcs248328. doi:10.1242/jcs.248328