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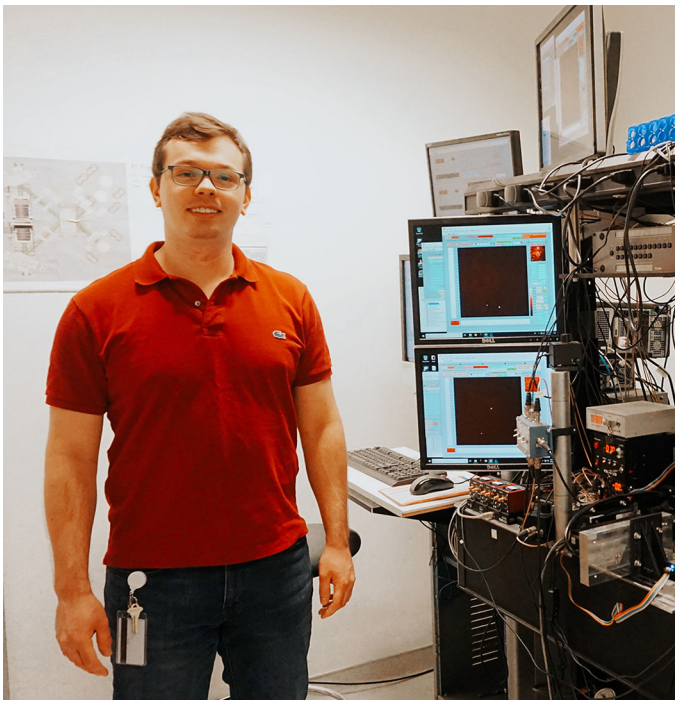
FIRST PERSON

# First person – Alexander Kiepas

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. Alexander Kiepas is first author on 'Optimizing live-cell fluorescence imaging conditions to minimize phototoxicity', published in JCS. Alexander is a PhD student in the lab of Dr Claire Brown and Dr Peter Siegel (co-supervised) at McGill University, Québec, Canada, investigating breast cancer metastasis and biophysical imaging tools.



Alexander Kiepas

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

Microscopy allows us to observe the behavior of living cells in real-time. Unfortunately, the process of imaging fluorescent molecules with light can cause toxicity. Many biological researchers are unaware that small changes to the way the sample is imaged can have a profound impact on the level of toxicity and thus cell health. The goal of the present study was to bring attention to this prevalent issue and help researchers create an imaging protocol that minimizes harm. The technique and the detailed workflow described in the paper will help researchers maximize the utility of microscopy platforms to image both slow and fast cellular processes without harming the cells and affecting the physiological processes they are studying. Overall, this paper will bring awareness to the issue of toxicity and help researchers develop imaging protocols that more accurately capture cellular events.

**Were there any specific challenges associated with this project? If so, how did you overcome them?**

Scientists have access to many different cell types and dyes with distinct properties that make them useful for specific applications. Since each dye is different with regard to how it might produce phototoxicity and each cell type might respond differently, the biggest challenge of the project was finding a way to measure cell health in any setting. To overcome these challenges, we surveyed researchers at our institution to get a better appreciation for the cell types, dyes, applications and systems being used. We then tested various cell types expressing commonly used fluorescent proteins and dyes that labeled diverse cellular structures. Ultimately, we found cell migration speeds and mitochondrial dynamics to be sensitive and easy ways of indicating phototoxic conditions.

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

Innovation and invention are often thought to be synonymous. However, there is an important distinction between the two; while invention refers to the creation of a new process or device, innovation describes the practical implementation and often refinement of an invention to enhance its impact. Thus, innovation may be the result of putting simple concepts together in a novel way to solve a problem. Phototoxicity is a well-known problem in the field of microscopy. Indeed, many different devices, approaches and methods have been invented to reduce phototoxicity and improve cell health. While working on the project, however, we realized that our initial hypothesis was inaccurate due to a flaw in the manufacturer's setup of the microscope. We became aware that these newer technologies must be implemented in a certain way to achieve the desired outcome and it can be difficult to verify that the system is working as expected. Therefore, the goal of our paper was to bring these issues to light and provide researchers with an innovative and accessible workflow to optimize imaging conditions and reduce phototoxicity on any system.

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

My parents have always encouraged me to work hard, think outside of the box and constantly strive to improve myself. Their own experiences growing up in a society with few resources have helped shape who I am today. I try to emulate their incredible work ethic every day by tackling challenging problems with enthusiasm and ensuring that work is completed to the highest standard. They have always been my greatest inspiration, and I know their unwavering support will be instrumental in the next step of my life.

**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 interest in science and medicine began at an early age. I still remember my first science fair project where I explored the impact of beverages on eggshell erosion. The idea was to determine what happens to a person's tooth enamel when they consume beverages.

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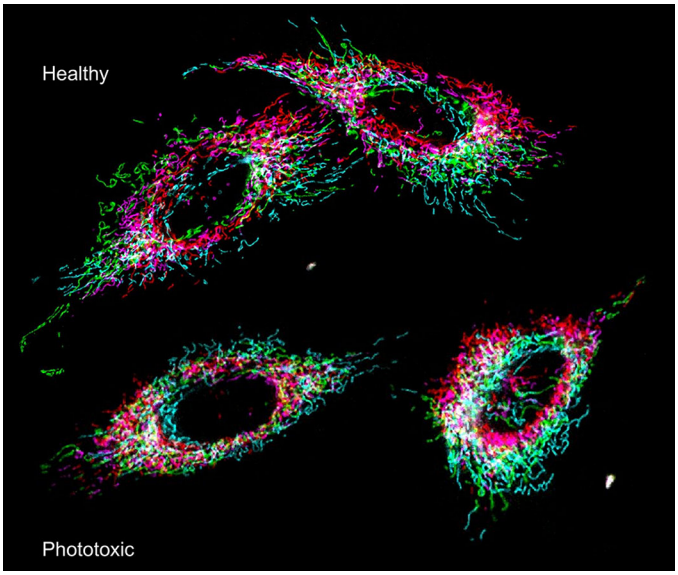


**CHO-K1 cells expressing paxillin–EGFP were stained with MitoTracker™ Red and imaged on a Zeiss AxioObserver with a PlanApo 63×/1.4 NA oil immersion objective.** Time lapse with healthy imaging conditions (top) and unhealthy imaging conditions (bottom).

During my undergraduate degree I became particularly interested in the pathophysiology of cancer. I had the unique opportunity to work in Dr Greg Stanisz's lab at the University of Toronto and Dr Linda Pilarski's lab at the University of Alberta. Both individuals were amazing mentors and inspired me to continue pursuing science. In addition to my scientific curiosity, I always wanted to help others, from coaching swimming at the Special Olympics to organizing an outreach project for South Africa. As researchers, our findings have the potential to impact many lives. We often lose sight of the fact that advancements in science help thousands of individuals every day. Even seemingly small discoveries have the potential to change treatment protocols and improve quality of life worldwide.

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

My supervisors Dr Claire Brown and Dr Peter Siegel are my biggest role models in science. It is amazing to see how they work together and complement each other's strengths. Dr Brown's tireless efforts to network with colleagues and share knowledge has resulted in an open research environment where many different students and professors work together to solve a problem. Her excitement for furthering microscopy techniques has also led to the development of interesting collaborative and interdisciplinary work. Dr Siegel's extensive knowledge about cancer never ceases to impress me. His door is always open for discussion, and he encourages thoughtful conversation and input from his students. His love for science is contagious, and it has motivated me to be independent and drive my own project with intellectual freedom.

### What's next for you?

One of my favorite aspects of science continues to be designing and running experiments. Troubleshooting is often challenging but the thrill of solving a problem is amazing. During my PhD studies, I also enjoyed mentoring undergraduate students. Going forwards, I am looking for a position where I can continue to expand my intellectual curiosity, solve challenging problems, educate students and help others.

**"Troubleshooting is often challenging but the thrill of solving a problem is amazing."**

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

I am always looking for ways to do things more effectively and efficiently. I often find myself venturing out of my comfort zone to tackle other problems in the lab. For example, I recently built and overclocked several custom computers to handle image analysis of large files. I also built a server to store files with easy access to all lab members. With regards to my own research, I initially found much of my analysis to be repetitive. As a result, I taught myself how to code in MATLAB and immensely increased my productivity with new codes. As an added benefit, these codes have made several microscopy techniques more accessible to other lab members that do not possess extensive microscopy knowledge.

**Reference**

**Kiepas, A., Voorand, E., Mubaid, F., Siegel, P. M. and Brown, C. M**. (2020). Optimizing live-cell fluorescence imaging conditions to minimize phototoxicity. *J. Cell Sci.* **133**, jcs242834. doi:10.1242/jcs.242834