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FIRST PERSON

First person – Corrine Kliment

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. Corrine Kliment is first author on 'Adenine nucleotide translocase regulates airway epithelial metabolism, surface hydration and ciliary function', published in JCS. Corrine conducted the research described in this article while a post-doctoral Fellow in Pulmonary and Critical Care Medicine in Doug Robinson, PhD's lab at Department of Cell Biology, Johns Hopkins University School of Medicine, Baltimore, MD, USA. She is now an Assistant Professor in her own lab at University of Pittsburgh School of Medicine, Division of Pulmonary, Allergy and Critical Care Medicine, Pittsburgh, PA, USA, investigating the role of mitochondrial proteins in epithelial cell homeostasis in lung diseases such as chronic obstructive pulmonary disease and pulmonary fibrosis.

Corrine Kliment. Image credit: Joshua Franzos, UPMC.

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

Chronic obstructive pulmonary disease (COPD) is a lung disease characterized by lung tissue destruction, airway dysfunction and inflammation. COPD affects millions of individuals each year with no therapy that prevents or reverses the damage, which is most commonly started by exposure to cigarette smoke. We used a model organism, *Dictyostelium discoidium*, as a comparative discovery tool to identify protective pathways against cigarette smoke. We found that adenine nucleotide translocase (ANT), a canonical mitochondrial ADP/ATP transporter, protects *Dictyostelium* and human airway cells from cell death due to cigarette smoke and promotes mitochondrial respiration, airway surface hydration and facilitating ciliary function. While exploring the localization of ANTs in human airway tissue, we made a fascinating observation that, in addition to mitochondrial localization, human ANTs localize to the plasma membrane of the ciliated airway cells. Hydration of the airway surface and adequate beating of the cilia ensures movement of particulates and mucous out of the lungs. Both of these normal airway functions are altered in COPD. Through functional studies in primary human airway cultures, we found that ANT2 enhances airway surface hydration and preserves ciliary beat frequency in the context of cigarette smoke exposure. Therapeutic manipulation of this core airway biology may allow us to drive cells to a healthier state.

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

Our studies traversed multiple model systems from *Dictyostelium* to primary human airway epithelial cell cultures, which presented inherent challenges in working with different models. Ultimately, this also became a strength of our studies by allowing us to describe core biological functions in the lung.

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

This research project started as a blank slate when I joined the Robinson lab. An exciting moment was taking the first images of human lung, where we discovered the presence of ANT at the plasma membrane of airway cells. Given that ANT is a canonical mitochondrial protein this was certainly surprising! Uncovering the functional role of ANT in the lung has generated so many new and interesting questions about the impact of mitochondrial proteins in lung diseases like COPD.

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

Journal of Cell Science is a top journal that reaches a broad scientific community with interests in dissecting the complex mechanisms of disease. JCS is extremely supportive of early-career scientists and ensures the utmost quality and rigor in the scientific discoveries presented.

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

Mentorship lays the foundation for young scientists and nurtures careers. One mentor in particular shaped my passion for medicine and science. Dr Debra Romberger, at the University of Nebraska Medical Center, welcomed me into her research laboratory through a summer undergraduate research internship and fostered my early skills as a scientist. She exposed me to the world of biomedical research and became a role model for me as a physician-scientist – something that at the time I did not realize was possible. It was also my first exposure to pulmonary and critical care medicine, as she brought me on clinical rounds with her in the intensive care unit. She encouraged and supported me to share the research we were doing at

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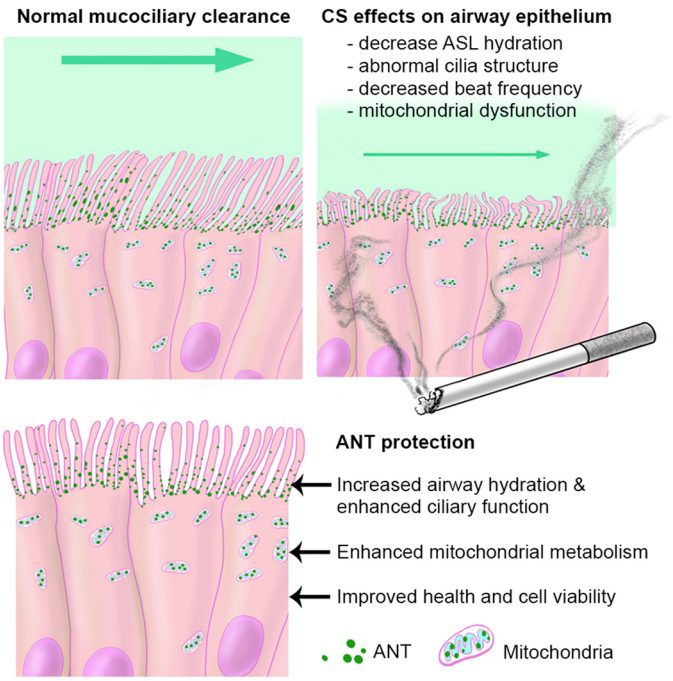

ANT localizes to motile cilia where ANT2 is utilized to regulate airway surface hydration and preserve ciliary function. Research image: Corinne Sandone, Johns Hopkins University.

an international conference as a sophomore undergraduate student. She encouraged me to pursue a combined MD/PhD training program, which I completed at the University of Pittsburgh. Throughout all of my training, she remained a strong mentor for all aspects of my career from science and clinical medicine to work–life balance.

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?

I had always been interested in medicine and found a love for science as well through the fantastic mentors I have had over the years. I was deeply influenced by shadowing my mentors that were physician-scientists and seeing how essential basic and translational science is to advancing patient care. Some of the most memorable and humbling experiences for me have been transitioning in one day from caring for a critically ill patient in the intensive care unit to finishing an experiment in the lab. My patient interactions motivate me scientifically to explore new questions and pursue science that may someday improve outcomes for our patients. The COVID-19 pandemic has brought this into the limelight, energizing the need for a strong scientific community.

Who are your role models in science? Why?

At each stage of my training, my mentors have been role models for me in many aspects of my overall career. One of the most challenging transitions has been from post-doctoral training to starting my own laboratory. My post-doctoral training mentor Dr Doug Robinson at Johns Hopkins had an instrumental role model in preparing me for this. He led by example, fostering independence, teamwork and community within his laboratory and outreach efforts. He challenged me to explore the power of new models and dream big about where the science and my career may go. This strong mentor–mentee relationship has made me a more well-rounded scientist, speaker and leader.

What's next for you?

Over the last year and a half, I have gotten the opportunity to set up my own laboratory, which is really exciting. Our research team is growing and we will go where the science takes us! I am passionate about mentoring students and trainees in biomedical science and will continue to do so. Their excitement about the work and the discoveries they are making motivates me each day. I also hope to contribute scientifically to therapies that will help my patients with lung disease.

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

As a mom of two kids, I love spending my time making memories with them and my husband, including sharing my love of cooking and playing the piano. I have found a new love in baking artisan bread.

Reference

Kliment, C. R., Nguyen, J. M. K., Kaltreider, M. J., Lu, Y., Claypool, S. M., Radder, J. E., Sciurba, F. C., Zhang, Y., Gregory, A. D., Iglesias, P. A. et al. (2021). Adenine nucleotide translocase regulates airway epithelial metabolism, surface hydration and ciliary function. *J. Cell Sci.* **134**, jcs257162. doi:10.1242/jcs.257162