


PEOPLE & IDEAS

Stephanie Eisenbarth: Discovering the bigger picture

Stephanie Houston 

Stephanie Eisenbarth is an Associate Professor in the Immunology Faculty at Yale University. Her work has shown that the guanine nucleotide exchange factor Dock8 plays a role in the migration of a specific dendritic cell subset, and that when Dock8 is missing, some dendritic cells can no longer prime CD4⁺ T cells. Stephanie’s laboratory now focuses on understanding how T cell-driven pathology is initiated. We chatted with Stephanie to find out about her journey in science.

Where did you grow up?

I grew up all over the US, my dad moving for different faculty positions from the south-east, to the northeast, to the west, and some places in between. I have lived in New Haven longer than anywhere else, and so it is home.

When did your interest in science begin?

I was lucky to grow up seeing what it meant to be a physician-scientist. My dad was one of the early classes of MD/PhD students at Duke who found an incredible balance of taking care of patients with type 1 diabetes and trying to cure diabetes with scientific inquiry. He was incredible at both and truly loved both; that was infectious. We joked in my family that we knew when it had been a good data day in the laboratory when my dad came home singing—not something he was partially gifted at (which I inherited). As a child, I observed him loving his work and, despite challenges, never wavering from that intense desire to cure diabetes. However, once in college, I was not sure if I wanted to do science. I went to medical school to become a pediatrician, but fortunately, kept my mind open to also doing a PhD. Once in grad school, everything changed. I fell in love with science and pursued a combined career that allowed me to undertake mechanistic basic science studies while still staying connected to patients.

What was your first experience of science?

For my very first science fair in middle school, I (with some help from my dad) used an autolet and glucometer to test my blood sugar after eating a variety of foods. I stopped

after running out of unscathed fingers and plotted the data on a graph. I won third place, but more importantly, I realized how cool the interrogation of human physiology was.

Where and with whom have you studied (undergraduate, graduate, postdoc)?

In Bryn Mawr College, I was a chemistry major and worked on synthesizing a molybdenum pterin with Sharon Burgmayer. Although inorganic chemistry was not for me, I learned a lot from “Dr. B” in a college that was truly for women in STEM fields. I then went to Yale and never left. I did my graduate work with Kim Bottomly on Toll-like receptors in asthma pathogenesis (Eisenbarth et al., 2002). After residency, I did my postdoctoral training with Richard Flavell on the role of NOD-like receptors in shaping adaptive immunity (Eisenbarth et al., 2008).

What interested you about your current area of study?

The most recent focus of my laboratory has been on understanding how dendritic cells direct particular types of T cell responses. Since my days as a graduate student, I have been fascinated with how the innate immune system instructs adaptive immunity. As dendritic cells are the cellular translators between these two branches of the immune system, this naturally led to trying to understand their specialized functions (Calabro et al., 2016a; Krishnaswamy et al., 2017).

What are you currently working on? What is up next for you?

I have a long-standing interest in understanding allergy pathogenesis. For many years,



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this has focused on the study of allergic airway disease. More recently, some members of my laboratory and I have embarked on establishing a new direction for the laboratory focused on understanding such processes in the gut mediating food allergy. This has been a dramatic departure from the lung and has required performing some ground work; we are trying to establish murine models of food allergy that allow us to address particular questions of how food antigens are handled by the gut immune system. It has been a slow process but has yielded some really exciting findings and opened up a whole new area of study for us.

What kind of approach do you bring to your work?

I am not a tool builder, nor do I relish describing new genes/molecules. Instead, I

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2018 lab retreat.

love discovering how the immune response is orchestrated over space and time (Calabro et al., 2016b). This can be a difficult process, as “novelty” is often not considered the defining feature of this line of investigation as it would be for identifying a brand new cell type or function; however, silos of novel information require context in order to move our understanding of immunity forward. Figuring out how puzzle pieces fit together can be just as rewarding as discovering a new puzzle piece. Discovering the bigger picture of how cells and systems are connected often involves finding a missing piece of information or redefining the role of a partially understood molecule or cell, but then it requires some “out-of-the

box” thinking to discover potentially unexpected connections.

What did you learn during your PhD and postdoc that helped prepare you for being a group leader?

During my PhD, through patient mentorship from Kim, I learned how to write clearly and effectively. I also learned the impact of presenting your data well as an engaging story. During my postdoc, I learned from Richard how to focus on the important big-picture questions in immunology.

What were you unprepared for?

Trying to tailor my mentoring style to different trainee personalities. Everyone learns differently, and some trainees more readily accept guidance than others.

What has been the biggest challenge in your career so far?

At the end of my MD/PhD training, I realized that I loved basic science research. I also loved seeing patients. However, I saw that balancing those two careers could be antagonistic; trying to find a clinical practice that I loved and that synergized with a basic science research career was one of the biggest challenges I have faced. I was fortunate through a variety of mentors to find Clinical Pathology (also called Laboratory Medicine),

a mechanistic field of medicine that synergizes well with research and allows me to pursue both of these missions.

What is the best advice you have been given?

I have been fortunate over my career to have numerous mentors over a wide range of disciplines and walks of life. One of the most important pieces of advice that I received early on was, “there is no perfect time to have children.” Have them when you are ready. The rest you will make work.

What hobbies do you have?

I am an avid snowboarder. My family and I spend the winters outdoors chasing powder.

Any tips for a successful research career?

Enjoy it. This is a challenging and incredible career. Everyone finds their own way of doing it, but the thrill and satisfaction is what drives us.

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