

# An interview with a Forbes 30 Under 30 scientist: Kaitlyn Sadtler



Kaitlyn Sadtler works at the National Institute of Biomedical Imaging and Bioengineering (NIBIB) as an Earl Stadtman Tenure-Track Investigator and Chief of the Section for Immunoengineering. She completed a postdoctoral fellowship at the Massachusetts Institute of Technology (MIT) focusing on the molecular mechanisms of medical device fibrosis. During her time at MIT, Dr Sadtler was awarded an NRSA Ruth L. Kirschstein Postdoctoral Fellowship and was listed on BioSpace's 10 Life Science Innovators Under 40 to Watch. She has also been named as a TED Fellow (2018), delivering a TED talk listed as one of the 25 most viewed talks in 2018, and was named in the Forbes 30 Under 30 list in Science in 2019. Recent work includes leading the National Institute of Health's (NIH) coronavirus serologic survey, which aims to determine the undetected extent of immunity (to the virus) from across the USA. *The Biochemist* spoke to Kaitlyn about her broader work on the immune system and its reaction to traumatic injury.

## Can you tell our readers a bit about your research?

When everyone thinks of the immune system, they think of infectious diseases. Our immune cells being the soldiers of our body defend it from attack from pathogens. Now, of course, this is an absolutely critical role for the immune system, but, at the same time, it takes on many other roles in every organ of our body. Specifically, I research the way that our immune cells react to traumatic injury and how we could modify those responses to help guide tissue regeneration. Immune cells can secrete proteins and molecules that change the way our stem cells behave and develop; so, if we target these early actors in response to injury, we can change the way that the environment around our stem cells acts, thereby changing regenerative potential. Our approach involves both understanding how our immune system reacts to biomaterials, medical device implants and trauma and then leveraging this knowledge to develop new materials that help promote regeneration while preventing excessive inflammation or scar tissue.

## What implications could your research have?

First and foremost, we are learning about materials that are already being used in the clinic: we can study the way that our body responds to reconstructive implants, or other medical devices; we can understand how we might modify these to promote their acceptance. In the short term, it is about seeing potential complications and being able to engineer materials to counteract or prevent those

mediated by the immune system. Beyond that, those of us working in immunoengineering and regenerative medicine believe that we will start seeing materials that leverage our body's own natural immune responses to help wounds heal and remodel faster, decreasing the presence of scar tissue and preventing inflammatory complications with medical devices.

## What made you want to study immunology and regenerative medicine?

In general, I think the immune system is absolutely fascinating. Massive numbers of cells float through our blood, in our bones, and are embedded in every tissue in our body. This network is as extensive and widespread as our nerves and our circulatory system. At the same time, I was very interested in engineering. This intersection of immunology and engineering, with applications in regeneration, just sounded super cool!

## What do you find most rewarding about your work?

Those 'aha' moments. When you discover something and, for a moment, you're one of the first people to know it, or one of the first people to know that much about something. It's an exciting time when you discover something new or when something you designed works. Science is so much to do with resilience, and accepting failures, so those moments of success and discovery are amazing.

**What has been the greatest challenge in your career so far – how did you overcome it?**

I'd say it's probably something that a lot of people can relate to – imposter syndrome and failure. The idea that I shouldn't be in a certain position or have gotten certain recognition; that I am an imposter. Though I'd love to say that I have figured out a way to overcome this, the answer is I still deal with it almost every day. I think, like many scientists, we have a fear of failure, but we are surrounded by it and, eventually, get used to some level of it, regardless of what you do: sometimes things just don't work out. I go by the words of the great Captain Jean-Luc Picard: "It is possible to commit no mistakes and still lose. That is not a weakness, that is life".

**Do you have any future projects you can share with us that you're excited about?**

Over the next year, we will begin working with colleagues at Walter Reed National Military Medical Center to develop materials for point-of-care devices in the field to prevent infection, but keep the injury site available for downstream therapeutics to promote tissue regeneration and inhibit excessive scarring.

Right now, our lab is helping out with the testing effort in understanding the spread of the SARS-CoV-2 pandemic through a national serosurvey. We are collecting blood samples from 10,000 donors across the USA to evaluate serum antibodies and evaluate the spread and prevalence of SARS-CoV-2 infection.

**Do you have advice for anyone interested in pursuing a career in the molecular biosciences?**

One big thing is to get involved in the lab early. I personally couldn't do any unpaid internships (I needed a paycheck in college); so I thought I had no options, but wound up finding a place that I worked at during the summer and was paid enough for rent and to save a bit of money for the rest of the year. Get started doing science in the lab; it will help you learn, help the courses you take make more sense and get you kick-started on laboratory skills and connections. Those connections and the laboratory experience will help you get into graduate school (if you want to go to grad school) and really give you a kick-start to your career.

**What do you like to do in your spare time?**

I love being outside. One of my hobbies that I wish I could do a bit more is backpacking. Getting out into the wilderness and spending a week or so on a trail, sleeping out in a tent and really being able to see the stars. I grew up in a rural area and am really at home out in the woods and out in nature. Living on the East Coast of the USA, luckily, we are really close to the Appalachian Trail, which is an amazing escape from the day-to-day. I also get my best scientific ideas when I'm out hiking or biking. Alone with your thoughts, often you give yourself that break you need to see past problems you might be facing. "And into the forest I go, to lose my mind and find my soul" – John Muir. ■