

To explore the fascinating world of glycobiology and the crucial role of glycans (sugars) in cell signaling, we'll take a closer look at the work of Dr. Michael (Mike) Boyce. Mike is an Associate Professor in the Department of Biochemistry at Duke University's School of Medicine, where he researches the roles of glycosylation in human health and disease. Abnormal glycosylation is a hallmark of numerous human diseases, including cancer, neurodegenerative disorders, and diabetes. Boyce's lab investigates how glycosylation influences signaling pathways involved in cytoskeleton dynamics, protein stability, and vesicle trafficking, and the biosynthesis of airway mucins and mucin-type glycans, with the goal of deepening our understanding of both healthy cellular function and disease development. By decoding the sugar signals of life, Dr. Boyce is unraveling the complex roles of glycans in wellness and illness, paving the way for new insights and therapeutic possibilities in the field of glycobiology.

Learn more about Mike's journey in this interview with him:

Did you always want to be a scientist? How did you get interested in glycoscience in particular? Funny enough, a student asked me this exact question just yesterday, so I'm repeating myself a bit! No, I did not always know I wanted to be a scientist. I've heard stories of people having a single "aha" moment that set them on this path, but that wasn't me. My journey was gradual. No one in my family is a scientist. My mom was a French teacher and my dad a tax lawyer. To this date, they still don't fully understand what I do, but they have always been really supportive of my interests. As a kid, I liked science classes and science fairs, but it was just one of many interests. At each stage of my academic career, I kept pursuing science but also asking myself, "Do I still like this?" because I figured I could pivot to a different field or career if science didn't feel right. In college, I thought I might enjoy biochemistry, so I majored in it, and I liked it. I joined an undergraduate lab, enjoyed the research, and decided to pursue a PhD. I followed that same logic through my postdoc and eventually applied for faculty jobs. I figured if I didn't find a faculty position that I liked, I would go into industry. Academia was never the only path I saw. So, it wasn't a grand plan, it was more about continuing to choose what felt right at each stage. And it's turned out to be a great fit. I really enjoy what I do now.

In terms of the second part of the question, my PhD work focused on cell-based studies of programmed cell death, which can occur both in normal development and in response to some kinds of tissue damage. My project looked at pathways downstream of stressors happening in the endoplasmic reticulum or ER, such as when proteins are incorrectly glycosylated, which then slows down their processing in the ER, causing cell dysfunction. That part really caught my interest and nudged me towards glycobiology. When I started looking for postdocs, I thought glycobiology could be a good direction for me, because there were still open questions in the field, and it felt like a space where I could make real contributions in the long term. That led me to applying to Carolyn Bertozzi's glycoscience lab. So, while my interest in glycoscience started indirectly during my PhD, my postdoc choice was intentional.

Can you tell me a bit about your journey? Were there any unexpected twists? No, my journey has not had major unexpected twists, actually. I have been fortunate working hard and having luck along the way. As a cisgender white man, I am also aware that this privilege has made things easier for me. I haven't experienced overt discrimination or toxic colleagues, but like everyone, I've faced failed projects, demoralizing periods, and plenty of setbacks. When it comes to dealing with failure, one important thing to remember is that you don't have to stay in experimental science if it's not for you, there are many other excellent career paths for PhDs where failure of experiments isn't part of the daily routine. But if you choose to stay, building resilience is essential. Failure is an inherent part of science, and it is hard and unavoidable. Imposter syndrome is common. It can help to adopt a growth mindset. Instead of thinking "I don't know what I'm doing," try thinking "I don't know how to do this *yet*." This way you can see failure as a natural part of learning and growth, which it is for everyone. It's also important to tap your people – including mentors, colleagues, family, and friends – they can be an important source of support and validation when times get tough. Finally, spend time doing things other than science (or work in general!) – hobbies can help us relieve stress and put things in perspective.

How did you know that glycoscience was the right field for you? There's a lot of fascinating biology in glycoscience and still so much left to discover, which made me feel like I could really contribute in the long run, for my whole independent career. Historically, the field was largely driven by researchers with chemical or biochemical training, rather than those from cell biology or physiology backgrounds. That was partly due to real technical challenges and limitations in available tools. Coming from a cell biology background, I saw an opportunity. Protein glycosylation and cell signaling aren't solved problems – they felt like open terrain I could explore. That was a big part of what drew me in.

Is there anything else you think is important for people to know about glycoscience or being a glycoscientist? For those who are curious or unfamiliar, I would just say don't be afraid to explore it. The glycoscience community is friendly, which is great, but it can feel a bit insular at times. We have our own language, deal with funny symbols, and tend to gather at the same conferences or are saturated in locations like Georgia or San Diego. That could make it harder for newcomers to engage. We could do more to build bridges to other disciplines. When someone says, "I just found out my favorite protein is glycosylated," or "my RNA-seq results flagged glycosylation, but I don't know anything about it," that's a moment of opportunity. These are exactly the scientists we should be welcoming into the field. Not just to help them publish a one-off paper, but to engage them as long-term collaborators and partners in advancing glycoscience. When I tell people I work on glycobiology, they don't dismiss it. More often, they say, "I don't know anything about that," or "That's a tough field." So, I think the challenge is not convincing people that it matters – it's making it easier for them to step in.

Could you tell me about some hobbies or interests you have outside of the lab?

I am married, and my partner and I love cooking, eating, and traveling together. When we go on vacation, we prioritize great restaurants and exploring the local food and drink scenes. I'm also really into art history. Before settling on biochemistry in college, I even considered majoring in art history. It's been an interest of mine for over 25 years, so I always seek out the best museums and galleries wherever we go. I also exercise religiously, partly for physical health and partly for mental well-being. I treat it as a serious commitment, so I'd count that as a hobby too!