Beyond the Microscope: A Closer Look at the Work of Dr. James Reynolds

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Dr. James Reynolds is a professor in the Department of Biomedical Sciences at Queen's University. He also boasts an extensive, successful career in the field of pharmacology and neurotoxicology, and for the past 25 years, his central research focus has been the effects of alcohol on brain function. In particular, his current research project focuses on utilizing eye movement patterns to detect brain abnormalities predictive of developmental delays and brain injury in children. This work serves to revolutionize the treatment of these vulnerable populations.

Can you tell me a little bit about your education and background?

I am a Life Sciences graduate from Queen's University and did my Ph.D here [as well], in pharmacology and toxicology. After that, I did a post-doctoral fellowship at University of Toronto and Toronto Western Hospital. [This was] before I took my first faculty job, which was as an assistant professor…at Memorial University in St. John's, Newfoundland. It was a great place to start out, [and] I was there for 6 years before an opportunity came up for me to come back to Queen's in 1995. I've been here [ever] since.

What led you to pursuing a career in the field of neurosience?

I did my Ph.D research in neurotoxicology, [and] my thesis was on the mechanisms by which mercury compounds can injure the brain. I think [neuroscience] really took hold for me while doing my post-doctoral work. There, I… [was] introduced to cellular electrophysiology, and just how powerful a technique it could be for investigating how drugs interact with neurotransmitter receptors. [Later], I worked with another really brilliant scientist in Toronto who gave me the opportunity to learn more advanced techniques. Those experiences really set me on the path, partly because you actually get to see the results of the experiment unfold as you're watching. Seeing that process of discovery science was what really convinced me that I had made the right career choice.

Why have you chosen to focus your research on FASD?

It started during my post-doctoral training. During that period, I was investigating… how alcohol affects the brain at the cellular level. My first research grants were focused on studies of the molecular pharmacology of alcohol interacting with neurotransmitter receptors. I have been in the field of alcohol research and how alcohol affects the brain for… 30 years. [Things] really started to take off when I came back to Queen's, because there was a colleague here whose research program focused on prenatal alcohol exposure. [He used] an animal model to study the effects on offspring at the fetal level. We looked at the mechanisms by which alcohol is affecting the developing brain, leading to cognitive behavioural deficits in offspring. That's where my initial foray into clinical research in FASD came from. This has really stimulated me as a scientist, but also made me aware of how broad these problems are.

What has been the most exciting finding of your career thus far?

The most exciting finding of my career was the first one- the first time as a researcher you're doing research and something unexpected happens. That actually happened to me in my fourth year research project as a Life Science student, and that's when I became hooked on science. You can discover unexpected things, and when you do, that thrill of discovery is really like no other feeling. Also, being able to explain what's going on in the brain when a child exhibits a certain behaviour, in a way that [families] can understand, has probably been the most exciting advance that I've been able to bring to the field.

What recent projects have you been working on?

For a number of years, I've collaborated with a colleague at Queen's, who is [an] expert in using eye movement control as a way of assessing brain function. One of the projects that I think has tremendous potential is a collaboration I have with the Children's Aid Society in Toronto. [We're] looking at infants and [are] collecting eye movement behaviour, and starting to understand what's happening in typical development. We're also starting to see the potential for identifying a child with brain injury or developmental delay at much younger ages. I think it is going to be a really valuable tool for identifying kids who are in need of intervention or environmental enrichment because they're lagging behind. If we can get at that in the first few years of life, that's the most critical point where the brain is at its most plastic, and is most likely

to respond to therapeutic interventions. These are also kids who are … at risk for poor health outcomes, so it's our opportunity to changing those trajectories. This is one of the things that gets me out of bed in the morning; the fact that our science is moving to the point where it can have a direct impact on a kid's life, and on the health of the brain.

What challenges have you had to face over the course of your career?

I have to say I've been very fortunate that the people I've been able to work with and the places where I've been able to do that work have been incredibly supportive environments for me. One of the main challenges in this field is being able to sustain funding for research programs. [It's] a serious problem if you lose funding for a particular research program, because what often happens is that you lose the people… who really are the major drivers for the work. I've been very fortunate to pretty much maintain a consistent level of funding for the past 26 years, but I know some of my grant applications, which I thought had fantastic ideas, just didn't make the cut. You have to develop something of a thick skin [in this field], because people are going to say no to you more than they say yes.

What do you enjoy the most about your job?

Certainly, I've enjoyed being in this … university environment, where you're constantly surrounded by a new generation of young people who are thirsty for new knowledge and are developing themselves into independent thinkers. That's a really great environment to work in… [it] just really keeps me young. Seeing a student who did their graduate training with you go off and be successful on their own… it's a great feeling to know you're a part of the development of that individual. Also, I'm a scientist at heart, so when we make a new discovery, there's a great deal of satisfaction that goes along with that.

What advice would you have for prospective scientists looking to pursue a career in research?

One piece of advice [is] to be open to collaboration, to be open to the idea that there are other types of expertise, or other people with expertise that you don't have. If you seek them out and listen to them, you can actually do better science yourself. [When we] bring different types of expertise together… it's where they connect that really exciting discoveries are being made. [Also], just being open to ideas coming from different directions. You never know when you're going to come across something that's going to resonate with you, and you suddenly see a way forward that you didn't recognize before. It's when you do that that you often find the unexpected rewards.