

Yes, the basic training I received (including examining biological samples under a microscope and learning how diseases make animals sick) and the skills I have learned (such as examining healthy and diseased animals, diagnosing illnesses, and seeing first hand how epidemics occur in animal populations) gives me insights into my current work. I am working on emerging infectious diseases that originate as diseases that are transmitted from animal to human populations, for which understanding the biology and ecology of the diseases and how they affect animals are very important. My past training and experience stand me in good stead.

What is the current demand for individuals with an M.Sc. or PhD in your field? Do you see the demand for this position increasing in the future? If you could offer advice to new M.Sc. or PhD graduates and emerging researchers in your field, what would it be?

I think there is an increase in the demand for individuals with M.Sc. or PhDs, especially during infectious disease outbreaks. There is no better example than the time we are living in right now – the COVID-19 outbreak. We need individuals who have graduate degrees in ecology and epidemiology, who can understand the animal, human, and ecosystem aspects of the story, to help better control and prevent the emergence of infectious diseases. These qualified and skilled individuals can be found working for international organizations such as the World Health Organization, to national organizations such as PHAC, to educational institutions. There is always a need for people who have deep expertise in the specific fields of microbiology, bacteriology, virology, epidemiology, and genomics. But we need both specialized and generalist individuals to put the pieces together. A piece of advice that I would offer is to read widely and deeply. It is important to have knowledge of the scientific literature but also the spirit of critical inquiry. With that knowledge, you attain the position to develop hypotheses, leading to research ideas that you can explore with rigorous studies.

At the intersection of mental health and drug addiction

Q&A with Jibran Khokhar, biomedical science researcher and assistant professor at the University of Guelph

BY MADISON PEREIRA

Jibran Khokhar completed his B.Sc. from Queen's University, and subsequently earned his PhD in pharmacology and toxicology under the supervision of Rachel Tyndale at the University of Toronto and the Centre for Addiction and Mental Health. After completing his degree, he pursued a post-doctoral fellowship with Dr. Alan Green in the department of psychiatry at Dartmouth College. During this time, he worked to develop new and safer therapies for co-occurring schizophrenia and alcohol use disorder. Today, Khokhar is an assistant professor in the department of biomedical sciences at the University of Guelph. His research continues to focus on the development of new medications for co-occurring schizophrenia and substance use disorder, and the effects of adolescent drug use on mental illness and addiction.

How has graduate school prepared you for your faculty role at the University of Guelph?

My mentor, Rachel Tyndale, allowed me to focus on the research aspect which helped me learn specific techniques, but she also helped me work on other skills including critical thinking, scientific writing and oral presentation skills. During my graduate studies, a lot of my



Jibran Khokhar

experiments went wrong or didn't work and it's similar to being faculty and a principle investigator. Often times my grant applications are rejected and not funded. From my graduate studies, I've learned that it's important to be able to keep your chin up while taking hits and it's helped me persevere with whatever obstacles are thrown my way in terms of my career.

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Your research focuses on schizophrenia and drugs of abuse. What sparked your interest in these topics?

When I was a graduate student, I had to take a course called, “tobacco control from cells to society,” for one of the scholarships that I received. As a basic neuroscientist, it was my first real experience into seeing all of the different aspects in tobacco control. There was a statistic from one of the presentations that stood out to me: how 80 per cent of all cigarettes sold are used by less than 5 per cent of the population - those with co-occurring mental illnesses. I found this shocking and it was something that I had never heard before, but it sparked my interest. Somehow my other post-doctoral fellowship options fell through and I ended up at Dartmouth College in a lab where co-occurring schizophrenia and substance use disorder was the focus. I ended up taking a fond liking to this research and I am continuing that in my role now.

Are there any particular drugs of abuse that your research is focused on?

In our lab, we are currently studying many drugs of abuse including cannabis, alcohol, and nicotine. We also examine different forms of drug delivery in our research, including drinks, vaporizers, and edibles.

Are there any recent discoveries/projects ongoing that you're really proud of?

All of the graduate students that are in our lab are doing a phenomenal job on their own projects. In one, we are looking at the effects of cannabis use on the brain in terms of behavior as well as changes in brain circuits. In another project, we're looking at the effects of e-cigarettes on adolescent versus adult brains, and we're seeing that adolescents are in fact more vulnerable and find the vapours to be a lot more rewarding than adults do. We've also taken some findings from genome wide association studies and brought them into animal models by using transgenic animals. In doing so, we are seeing some interesting differences in genes that have been implicated in cannabis use.

Do you get to interact with community members as part of your job?

Yes, interacting with community members is something that I try to do. I have been invited to go to various schools to talk about vaping. Being able to do this is really important to me in terms of both improving science literacy in the communities that we live in, but also giving back to our community.

Since marijuana has recently been legalized in Canada, do you think that has influenced where your research has been directed? How do you envision the future of healthcare research will go?

Going back to when I was at Dartmouth College, the reason that I started to explore cannabis was because I knew that the legalization of marijuana was coming up in Canada. I wanted to carve out a little niche for myself in this field and become a cannabis researcher in Canada. We need to remember that our funding is coming from everyday taxpayers and improving life for them should be at the forefront of our research. I think we need to move towards more translationally impactful research. There is definitely room for basic research, but I think having more defined translational outcomes can only

help us scientists and researchers keep our eyes on the prize.

Is there anything that you know now that you wish you knew in graduate school?

If I could go back to when my experiments weren't working during my PhD degree, I would tell myself that it will all work out. We worry and it's normal to worry, but everything works itself out in the end.