

Interdisciplinary Approach to Studying Nicotine Addiction

Ryan Drenan, PhD, associate professor of Pharmacology



Studying nicotine addiction and its affects on the brain has led [Ryan Drenan, PhD](#), associate professor of [Pharmacology](#), to uncover new information on nicotine receptors, called receptor nicotinic acetylcholine receptors.

By using a combination of behavioral, electrophysiological and biochemical techniques, he hopes to better understand this receptors' activity and how they are linked to not only addiction, but also neurological diseases such as Parkinson's, schizophrenia and depression.

Before coming to Northwestern in 2016, he was an assistant professor at Purdue University. Drenan earned his PhD from Washington University and completed postdoctoral training at the California Institute of Technology. He is the principal investigator on two National Institutes of Health R01 grants and has published more than 26 peer-reviewed journal articles.

Q&A

What are your research interests?

We study how the brain sends and receives signals by examining a particular receptor/neurotransmitter pair. Acetylcholine is an evolutionarily ancient yet crucial transmitter system important for muscle movement, cognitive function, attention, mood/affect and motivated behaviors. We study this transmitter's action, along with the action of nicotine, at nicotinic acetylcholine receptors to gain a better understanding of this important system.

What is the ultimate goal of your research?

We want to uncover that which is still unknown about the brain. We hope to add to the knowledge base related to our areas of interest, which could lead to better drugs or treatment strategies to treat brain disorders/diseases.

What types of collaborations are you engaged in across campus and beyond?

We are a very collaborative lab. At Northwestern, we collaborate with the labs of [Yevgenia Kozorovitskiy, PhD](#), in the Department of Neurobiology and [Anis Contractor, PhD](#), (Department of [Physiology](#)) in our studies of the detailed molecular and cellular aspects of cholinergic neurotransmission.

We also collaborate with Alfred George, MD, in Department of [Pharmacology](#) on one of his projects that seeks to understand the molecular basis of a severe neurological disorder of childhood. We have external collaborations with investigators at Janelia Farm Howard Hughes Medical Institute Research Campus, California Institute of Technology and Purdue University.

How is your research funded?

Our work has been continuously funded by the National Institute on Drug Abuse for the past 11 years. We have also received prior funding from the Brain & Behavior Research Foundation, as well as other public and private organizations.

Which honors are you most proud of and why?

I'm most proud of the achievements of my students, as it is a joy to see successful careers launched. I've had several great students so far in my career, each of which has been successful at publishing papers and obtaining external recognition through fellowships and other awards/distinctions. I had great support from my graduate and postdoctoral mentors, so I am very happy to pay it forward to my students and postdocs.

What resources at Northwestern have been helpful for your research?

Northwestern has an unusually large number of talented investigators applying advanced imaging and physiology methods to questions related to brain science. These intellectual resources have been extremely valuable to us as we seek to apply these advanced techniques to our research questions.

[Watch a video](#) about Drenan's research.