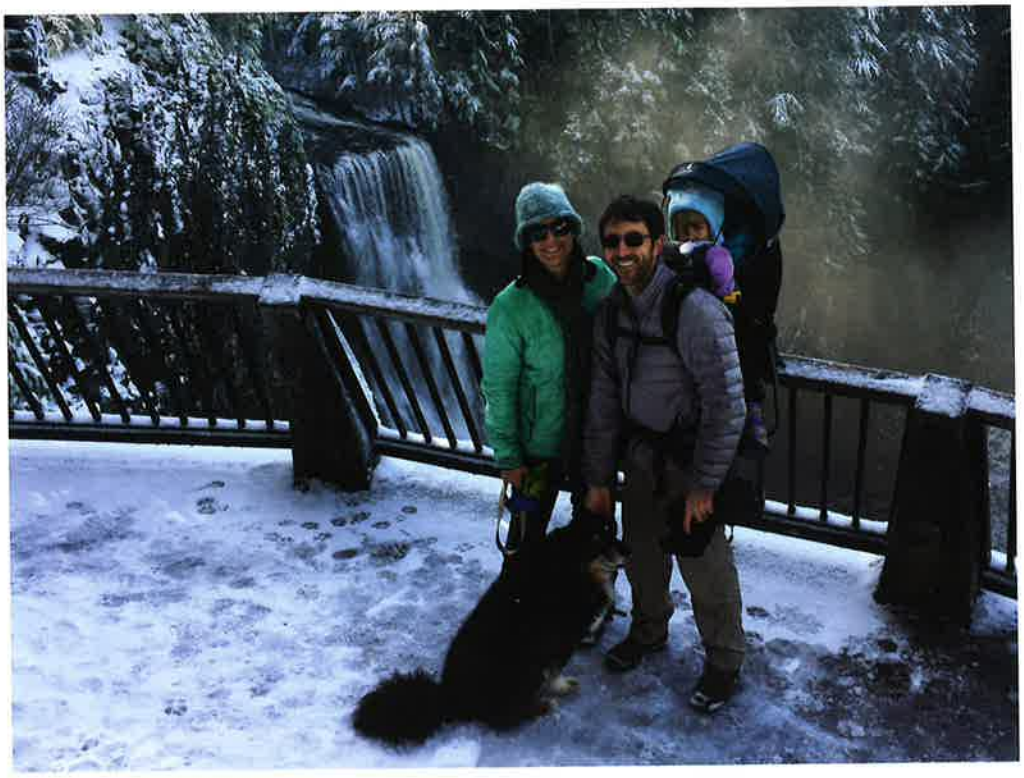
PROVIDER PROFILE

(Meet Ian Greenhouse, PhD and Nicole Swann, PhD.)

(Contributed by Libby Kennard)

Note from Libby: I connected with Dr. Swann and Dr. Greenhouse as they were doing outreach to support their research at the University of Oregon. I'm pleased to share excerpts of our interview here. If you are interested in reaching out to one or the other of them directly, we have included a link to their websites below.



(Nicole & Ian)

Tell me how it happens that both of you are doing research on Parkinson's disease?

During graduate school at UC San Diego we were introduced to models of the basal ganglia that suggest these deep brain structures are important for controlling a range of motor and non-motor behaviors. Nicki began addressing key questions concerning the manner in which information is transmitted through the basal ganglia using electrophysiology. Ian began addressing questions about overlap between motor and non-motor functions within basal ganglia circuits.

You're both at the University of Oregon now. Where did you meet and what brought you here?

We met during graduate school at UC San Diego. We were in the same lab, but in different PhD programs. Ian was in Psychology and Nicki was in Neuroscience. Both of us did some work with Parkinson's DBS patients as part of our graduate studies. We also fell in love.

We were lucky enough to find post-graduate positions at UC Berkeley (Ian) and UCSF (Nicki). While at Berkeley Ian worked in a motor control laboratory that included work with Parkinson's patients. Nicki worked in the laboratory of Philip Starr, a DBS neurosurgeon at UCSF. We never imagined we'd find faculty positions in the same location, but somehow we got lucky again!

We were excited to join the Department of Human Physiology at UO because of the clinical relevance of the research conducted in laboratories within the department. Both of us have maintained our interest in movement disorders and Parkinson's in particular, and we are very happy to be able to continue that line of research at UO.

Why is Parkinson's so intriguing?

Early breakthroughs in understanding Parkinson's disease shed light on some of the fundamental mechanisms of the brain that govern motor control and non-motor functions. However, much about the disease is still unknown. This is intriguing from the standpoint that we still have lots to learn, but it is also representative of how challenging progressive diseases can be to treat and cure.

Given that a definitive diagnosis can take a while and still sometimes the diagnosis changes, does this present challenges for research?

We study humans with Parkinson's disease as well as healthy people and people with other movement disorders. Sometimes uncertainty related to diagnosis or heterogeneity in the disease can present a challenge. For that reason, we sometimes will only study patients with specific symptoms or who have been diagnosed for a certain number of years. For other questions though, studying people in early stages is important and we just need to keep in mind some of the uncertainty associated with their recent diagnosis. Occasionally even when studying more advanced patients we will learn that the diagnosis was not what we thought.

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Ian, your department is called The Action Control Lab. Can you tell us more about that?

"Action Control" captures the broad scope of our work. One of the principle research questions we target is how humans transition between rest and movement. In a healthy nervous system, we can think about moving without actually moving until we decide to do so. Parkinson's disease and other movement disorders impair this ability. We also study how we stop an ongoing movement, a motor behavior that is also impaired in Parkinson's disease. We aim to help the patient populations we work with and also achieve a better understanding of the basic neural mechanisms that allow the nervous system to perform these essential motor functions.

Nicole, can you tell us more about your work on brainwaves?

When we record electrical activity from large populations of neurons the signals look kind of like squiggly lines. Sometimes we see this line start to go up and down in a periodic way like a wave. This is what people mean when they say a "brain wave". We see these patterns emerge in healthy people and Parkinson's disease patients.

Waves that go up and with a certain speed (13-30 cycles a second) seem to be especially important for movement. Research suggests that in Parkinson's disease these waves may be excessively synchronized within and between parts of the brain that control movement. This could mean that the activity is locked in a particular pattern, which may be associated with increased difficulty in moving. One question in my lab is how best to detect this excessively synchronized activity in Parkinson's disease patients using safe (non-invasive) recording techniques, and if we can use this kind of measure as a "biomarker" for the disease. We hope that with future research this kind of marker could be used to help monitor disease progression, customize or adjust therapies, and maybe even for diagnosis.

Do you have future projects in the works?

One nice thing about working at a University is that we can really let our own interests drive our research questions. The downside is, besides some startup funds the University provides us to start our labs, we are mostly responsible for securing our own funding. We both are interested in pursuing future work in Parkinson's disease and are applying for funding to support this work.

What kind of impact do you hope to make?

Ian - I hope to develop new brain imaging methods for predicting Parkinson's disease onset and for tracking disease progression. These tools may provide insight into early disease mechanisms and improve treatment efficacy. I also hope to work on new methods of non-invasive brain stimulation that hold potential for treating Parkinson's symptoms.

Nicki - I am hoping to better understand how brain activity differs in PD patients and investigate 1) what this can tell us about the mechanisms of the disease and 2) if these signatures (or "biomarkers") can be leveraged to improve treatments.

Tell me why you get up and go do the work you do every day?

We have a 2 year-old daughter who is absolutely incredible. It's safe to say that she keeps us both motivated. One fun thing about our jobs is that we have no excuse for ever being bored.

We get to learn new things all the time and even discover new things. We also get to work with a diverse set of people. The undergraduate and graduate students at UO are very bright and hard working. We spend a large amount of time mentoring trainees in the lab and teaching them about the research process. These students also broaden our perspectives on the way we think about our own research. We also get to teach courses that fit nicely with our research. Finally, we both get satisfaction from the idea that our work might help people - even if a long way off.