

Aryn Gittis, Ph.D.  
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## 2012 Finalist: Aryn Gittis, Ph.D.

Dr. Gittis is an Assistant Professor in the Department of Biological Sciences and the Center for the Neural Basis of Cognition at Carnegie Mellon University. She received her Ph.D. from the University of California, San Diego where she studied intrinsic firing mechanisms of vestibular nucleus neurons with Sascha du Lac. In 2008, she moved to San Francisco as a postdoctoral fellow in the laboratory of Anatol Kreitzer at the Gladstone Institute of Neurological Disease where she studied inhibitory circuits involved in movement disorders such as Parkinson's disease and dystonia. Her laboratory at Carnegie Mellon University uses electrophysiology, optogenetics, and anatomy to study how neural circuits in the basal ganglia control movement in health and disease.

### **Striatal Interneurons: Causes or Cures for Movement Disorders?**

The motor symptoms of Parkinson's disease arise from the dysfunction of neural circuits in the striatum, specifically over-activity of the movement arresting 'indirect pathway'. Current therapies for Parkinson's disease fail over time because they do not target the indirect pathway with sufficient precision. The work of Dr. Gittis has established fast-spiking interneurons (FSIs) as promising neuronal candidates to achieve pathway-specific modulation of basal ganglia output. Pharmacological disruption of FSI activity destabilized striatal output and produced dystonia-like motor impairments in mice, establishing FSIs as central players in this poorly understood disease. In a mouse model of Parkinson's disease, she discovered that pathological synchronization in the indirect-pathway is exacerbated by FSIs that undergo pathway-specific plasticity triggered by low dopamine. Dr. Gittis' current work seeks to harness the circuit-regulating power of FSIs to convert them from destabilizers of network activity into therapeutic control knobs to restore basal ganglia function in a variety of human diseases.