BIOGRAPHICAL SKETCH

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NAME: Gu, Bon-Mi

eRA COMMONS USER NAME (credential, e.g., agency login): BMGU15

POSITION TITLE: Assistant member; Assistant Professor of Neurology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Seoul National University	BS	02/2005	Biological Science
Seoul National University	MS	08/2007	Neuroscience
Duke University	PHD	05/2014	Psychology and Neuroscience
University of Michigan, Ann Arbor	Postdoctoral	05/2016	Psychology
University of California, San Francisco	Postdoctoral	03/2021	Neurology

A. Personal Statement

I am an assistant member at Hackensack Meridian Health Center for Discovery and Innovation and an assistant professor of the Department of Neurology at Hackensack Meridian School of Medicine. My laboratory is dedicated to unraveling how basal ganglia circuit dysfunctions lead to behavioral alterations in clinical models, with a special emphasis on movement disorders.

My research has focused on the role of basal ganglia circuits in behavioral control, including timing, action initiation, and inhibition. I have characterized neural population activity within the basal ganglia during movement initiation and inhibition using electrophysiology in freely moving rats. More recently, my laboratory has investigated the role of basal ganglia in respiratory control and how basal ganglia circuits interact with respiratory rhythms across various behavioral states. To address these questions, we employ a broad array of modern neuroscience approaches in mice, including electrophysiology, optogenetics, fiber photometry, cardiorespiratory recording and analysis, neural population dynamics, and pharmacological manipulations. I also have a strong background in human clinical studies, including neuroimaging and behavioral studies in patients with basal ganglia disorders. I aim to contribute to building a solid foundation for translational research, bridging basic and clinical studies to advance understanding of basal ganglia function and dysfunction.

Key publications:

1. **Gu BM**, Schmidt R, Berke JD (2020) Globus pallidus dynamics reveal covert strategies for behavioral inhibition. *eLife* 9:e57215. PMID: 32519952
2. **Gu BM**†, Berke JD (2022) Altered basal ganglia output during self-restraint. *eLife*. 11:e82143. PMID: 36321810
3. **Gu BM*,** Kim JG*, Hossain A, Cron GO, Lee JH (2025) Substantia nigra modulates breathing rate via locus coeruleus. *iScience*. 28(5):112423. PMID: 40343266
4. Dehdar K, Neuberg E, **Gu BM**† (2025) Dynamic respiration-neural coupling in substantia nigra across sleep and anesthesia. *J Neurosci*. 2025 Nov 17:e1154252025. PMID: 41249057

†Corresponding author *Co-first authors

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2026 – Present	Assistant Member, Hackensack Meridian Health Center for Discovery and Innovation, NJ
2024 – Present	Assistant professor, Department of Neurology, Hackensack Meridian School of Medicine, NJ
2023 – 2025	Research Scientist, Neuroscience Institute, HMH JFK University Medical Center, NJ
2021 – 2023	Life Science Research Professional, Department of Neurology and Neurological Sciences, Stanford University, CA
2016 – 2021	Postdoctoral Researcher, Department of Neurology, UCSF, CA
2014 – 2016	Postdoctoral Researcher, Department of Psychology, University of Michigan, MI
2009 – 2014	Graduate Student/ Teaching Assistant, Psychology and Neuroscience, Duke University, NC
2008 – 2009	Research Assistant, SMG-SNU Medical Center, Seoul, Korea
2004 – 2008	Research Assistant, Clinical Cognitive Neuroscience Center, SNU, Seoul, Korea

C. Contributions to Science

1. Investigating the relationship between substantia nigra (SN) and respiration using electrophysiology and optogenetics**:** I combined acute electrophysiology with optogenetic manipulation to probe specific neuronal subgroups within the SN and defined their role in breathing modulation. In addition, I revealed state-dependent coupling between respiration and SN neural activity by measuring SNr local field potentials and respiration across sleep, anesthesia and wakefulness.
    a. **Gu BM*,** Kim JG*, Hossain A, Cron GO, Lee JH (2025) Substantia nigra modulates breathing rate via locus coeruleus. *iScience*. 28(5):112423. PMID: 40343266
    b. Dehdar K, Neuberg E, **Gu BM**† (2025) Dynamic respiration-neural coupling in substantia nigra across sleep and anesthesia. *J Neurosci*. 2025 Nov 17:e1154252025. PMID: 41249057

2. Researching basal ganglia circuits underlying behaviors using electrophysiology**:** I investigated neural activities across multiple basal ganglia structures, including the striatum, globus pallidus externa, and substantia nigra reticulata. Using electrophysiological recordings in freely moving rodents, I characterized neural population dynamics during timing and behavioral inhibition tasks.
    a. **Gu BM,** Kukreja K, Meck WH (2018). Oscillation patterns of local field potentials in the dorsal striatum and sensorimotor cortex during the encoding, maintenance, and decision stages for the ordinal comparison of sub- and supra-second signal durations. *Neurobiology of Learning and Memory*, 153, 79-91. PMID: 29778763
    b. **Gu BM**, Schmidt R, Berke JD (2020) Globus pallidus dynamics reveal covert strategies for behavioral inhibition. *eLife* 9:e57215. PMID: 32519952
    c. **Gu BM†,** Berke JD (2022) Altered basal ganglia output during self-restraint. *eLife.* 11:e82143. PMID: 36321810

3. Investigating abnormal timing behaviors in basal ganglia disorders: I researched timing behaviors within the context of basal ganglia disorders, examining timing behaviors in a rodent model of obsessive-compulsive disorder and in the patients with Parkinson's disease. For instance, I employed Bayesian modeling to explain the abnormal timing behaviors observed in Parkinson's patients under the context of dopamine loss.
    a. **Gu BM**, Cheng RK, Yin B, Meck WH (2011). Quinpirole-induced sensitization to noisy/sparse periodic input: Temporal synchronization as a component of obsessive-compulsive disorder. *Neuroscience*, 179, 143-150. PMID: 21284954
    b. **Gu BM**, Jurkowski AJ, Shi Z, Meck WH (2016). Bayesian optimization of interval timing and biases in temporal memory as a function of temporal context, feedback, and dopamine levels in young, aged, and Parkinson's disease patients. *Timing & Time Perception*, 4, 315-342.
    c. **Gu BM**†, Kukreja K. (2011). Obsessive-compulsive disorder and memory-mixing in temporal comparison: Is implicit learning the missing link? *Frontiers in Integrative Neuroscience*, 5:38. PMID: 21887132

4. Examining basal ganglia activities in human clinical populations: Through the utilization of neuroimaging methods and various behavioral task paradigms within clinical populations, I showed different basal ganglia activities between healthy individuals and those in clinical groups.
    a. **Gu BM**, Park JY, Kang DH, Lee SJ, Yoo SY, Jo HJ, Choi CH, Lee JM, Kwon JS (2008). Neural correlates of cognitive inflexibility during task-switching in obsessive-compulsive disorder. *Brain*, 131,155-164. PMID: 18065438
    b. Jung WH, **Gu BM**, Kang DH, Park JY, Yoo SY, Choi CH, Lee JM, Kwon JS (2009). BOLD response during visual perception of biological motion in obsessive-compulsive disorder: An fMRI study using the dynamic point-light animation paradigm. *European Archives of Psychiatry and Clinical Neuroscience*, 259(1), 46-54. PMID: 18587523
    c. Jung WH, Kang DH, Han JY, Jang JH, **Gu BM**, Choi JS, Jung MH, Choi CH, Kwon JS (2011). Aberrant ventral striatal responses during incentive processing in unmedicated patients with obsessive-compulsive disorder. *Acta Psychiatrica Scandinavica*, 123(5), 376-386. PMID: 21175552
    d. **Gu BM**, Kang DH, Kwon JS (2010). Functional imaging of obsessive-compulsive disorder. In Shenton, M.E. & Turetsky, B.I. (Eds.), Understanding neuropsychiatric disorders. pp. 247-259. Cambridge: UK, Cambridge University Press.

5. Computational modeling of cortico-basal ganglia circuits: To bring a deeper understanding of basal ganglia circuits, I employed computational models of cortico-basal ganglia circuits. Specifically, I introduced a neural oscillatory model designed to explain the shared and distinctive neural mechanisms underlying timing and working memory processes.
    a. **Gu BM**, van Rijn H, Meck WH (2015). Oscillatory multiplexing of neural population codes for interval timing and working memory. *Neuroscience & Biobehavioral Reviews*, 48, 160-185. PMID: 25454354
    b. van Rijn H, **Gu BM**, Meck WH (2014) Dedicated clock/timing-circuit theories of time perception and timed performance. *Advances in Experimental Medicine and Biology*. 829:75-99. PMID: 25358706
    c. Teki S, **Gu BM**, Meck WH (2017). The Persistence of Memory: How the Brain Encodes Time in Memory. *Current Opinion in Behavioral Sciences*, 17, 178-185. PMID: 29915793
    d. Sachdeva PS, Livezey JA, Dougherty ME, **Gu BM**, Berke JD, Bouchard KE (2021) Improved inference in coupling, encoding, and decoding models and its consequence for neuroscientific interpretation. *Journal of Neuroscience Methods*. 358:109195. PMID: 33905791

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