Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN)
Multi-Council Working Group (MCWG) Meeting
May 8, 2025

On May 8, 2025, the National Institutes of Health (NIH) Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN) Initiative Multi-Council Working Group (MCWG) met virtually to discuss the current state of the BRAIN Initiative and learn about new and upcoming projects.

Susan Weiss, PhD, designated federal official of the MCWG, gave the welcome address. She provided an overview of the meeting, introduced new MCWG members—Edward Chang, MD, at large member; Liqun Luo, PhD, at large member; Roy Sillitoe, PhD, NINDS Representative; and Todd Constable, PhD, NIBIB Representative.

Next, John Ngai, PhD, Director of the NIH BRAIN Initiative and Chair of the MCWG, presented BRAIN Initiative updates and events. Dr. Ngai began his updates by providing an overview of BRAIN Initiative membership and highlighting recent awards and accomplishments of BRAIN Initiative contributors. Three BRAIN program staff were inducted into American Institute for Medical and Biological Engineering (AIMBE)'s College of Fellows: Grace M. Hwang, PhD; Chris Rozell, PhD; and Maryam Shanechi, PhD. Tatiana Pasternak, PhD, was awarded the Vision Sciences Society Lifetime Achievement Award, and Andrea Beckel-Mitchener, PhD, was named the Acting National Institute of Mental Health (NIMH) Director. Additionally, the National Academy of Sciences elected new members, including three BRAIN funded investigators: Paola Arlotta, PhD; Edward Chang, MD; and Adrienne Fairhall, PhD.

Then Dr. Ngai provided an update on the BRAIN Initiative's progress and budget. The BRAIN Initiative has supported 1,791 PIs at 266 institutions and has produced over 10,000 publications since 2014. The FY25 budget includes $230 million in base funding and an additional $91 million from the 21st Century Cures Act. Dr. Ngai then shared exciting recent neuroscience events supporting the BRAIN Initiative. In September 2024, Dr. Ngai published a commentary in *Neuron* summarizing the first decade of the BRAIN Initiative and highlighting opportunities for the future of neurotechnology. In October 2024, the BRAIN Initiative Alliance held the annual Toolmakers Satellite Event at the Society for Neuroscience Conference, highlighting the work of BRAIN-funded investigators, including 22 neuroscience tools and about 50 toolmakers. In November 2024, the BRAIN Initiative held a NeuroAI workshop which explored the convergence between neuroscience and AI and the role that large-scale BRAIN data can play in improving biomedical applications of AI. Dr. Ngai also highlighted a recently published funding opportunity, RFA-NS-25-016, which seeks to disseminate and integrate validated BRAIN Initiative tools to resource-limited institutions, and encouraged interested researchers to apply.

Lastly, Dr. Ngai highlighted new scientific findings and developments from the BRAIN Initiative. He described an ethics guide and checklist for highly portable MRIs, which increase access to imaging

in rural and other low-resource settings,[1] as well as the Brain Knowledge Platform data launch from the Brain Initiative Cell Atlas Network; He also shared significant BRAIN-funded discoveries. One of those discoveries provides new insights into the progression of Alzheimer's disease,[2] including an early "quiet" phase that occurs prior to the onset of symptoms; A set of nine joint publications in *Nature* described FlyWire's high resolution adult fly brain connectivity map ("connectome"), which is currently the largest and most complete connectome of an adult animal. And very recently, a set of ten joint publications in *Nature* and sister journals described the MICrONS consortium's connectome of a cubic millimeter of mouse visual cortex.

The MCWG meeting ended with a presentation from Mala Murthy, PhD, Professor of Neuroscience at Princeton University, co-leader of the FlyWire Consortium, and at large MCWG member. Dr. Murthy presented an overview of the relationship between brain wiring and behavior using the fruit fly (genus *Drosophila*) as a model organism. Dr. Murthy's lab mapped the fruit fly connectome in order to understand fruit fly social communication behavior, which is highly complex and multimodal. The project began by automating the reconstruction of a whole brain electron microscopy volume dataset[3] from Janelia Research Campus. The reconstructed dataset was shared with the neuroscience community on FlyWire's proofreading platform[4] and was collaboratively proofread over a span of three years, highlighting the importance of data sharing in this project. Dr. Murthy's team then automated the detection of synapses and neurotransmitters to complete the connectome. The full connectome is available on the Connectome Data Explorer (CoDEx) and does not require programming knowledge to navigate.

The fruit fly connectome has provided critical insights into the organization of the fruit fly brain. The FlyWire team has also used additional datasets to identify cell types within the connectome to better understand the functions of neural pathways and ultimately predict fruit fly behavior. Dr. Murthy is currently collaborating with Dr. Wei-Chung Allen Lee to proofread a female fruit fly brain and nerve cord connectome to better understand individual and species variability. Additionally, the BRAIN Initiative Connectivity Across Scales (BRAIN CONNECTS) program plans to generate whole brain connectomes for larger mammals like mice or primates. Dr. Murthy stressed that the work of the FlyWire team highlights the importance of data sharing, collaboration, and innovation in advancing breakthroughs in neuroscience research and lays the groundwork for deepening our

---

[1] Shen FX, Wolf SM, Lawrenz F, et al. Conducting Research with Highly Portable MRI in Community Settings: A Practical Guide to Navigating Ethical Issues and ELSI Checklist. *Journal of Law, Medicine & Ethics*. 2024;52(4):769-785. doi:10.1017/jme.2024.162

[2] Gabitto MI, Travaglini KJ, Rachleff VM, et al. Integrated multimodal cell atlas of Alzheimer's disease. *Nat Neurosci*. 2024 Dec;27(12):2366-2383. doi: 10.1038/s41593-024-01774-5. Epub 2024 Oct 14. PMID: 39402379; PMCID: PMC11614693.

[3] Zheng Z, Lauritzen JS, Perlman E et al. A Complete Electron Microscopy Volume of the Brain of Adult Drosophila melanogaster. *Cell*. 2018 Jul 26;174(3):730-743.e22. doi: 10.1016/j.cell.2018.06.019. Epub 2018 Jul 19. PMID: 30033368; PMCID: PMC6063995.

[4] Dorkenwald S, McKellar CE, Macrina T et al. FlyWire: online community for whole-brain connectomics. *Nat Methods*. 2022 Jan;19(1):119-128. doi: 10.1038/s41592-021-01330-0. Epub 2021 Dec 23. PMID: 34949809; PMCID: PMC8903166.

understanding of the relationship between brain cells, circuits, brain areas, and behavior and advancing the mission of the BRAIN Initiative.

For more on the open session of the MCWG meeting, view the video recording. The next MCWG meeting will be held on August 27, 2025.