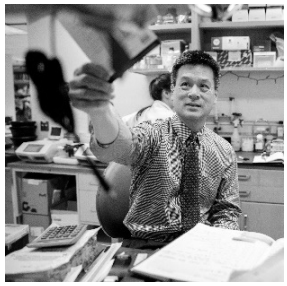


John Ngai, Ph.D.
Director NIH Brain Initiative

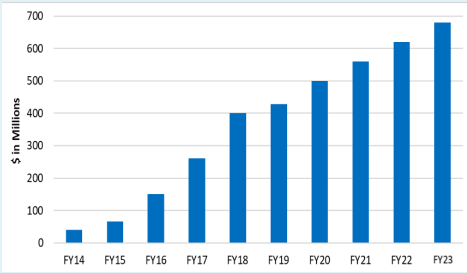
The BRAIN Initiative Mission

At the National Institutes of Health (NIH), the *Brain Research Through Advancing Innovative Neurotechnologies* ® (BRAIN) Initiative aims to revolutionizae our understanding of the human brain by accelerating the development and application of innovative technologies.

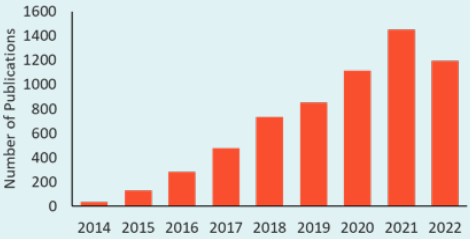
The BRAIN Initiative is uniquely situated for cross-cutting and accelerated discovery in neuroscience that goes beyond the capability of any single Institute or Center at the NIH by tapping into synergies across multiple fields to address the personal and societal challenges imposed by human brain disorders.

BRAIN by the Numbers

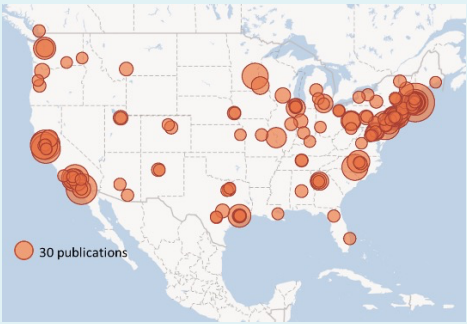
Budget: 2014 - 2023



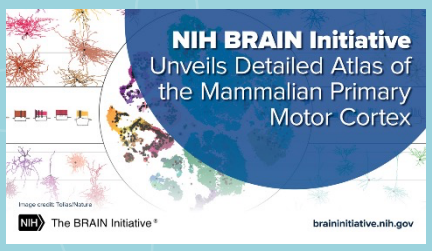
Publications: 2014 - 2022



1166 PIs across
234 Institutes
supported by
952 BRAIN Awards



Accelerating Interdisciplinary Neuroscience Discoveries Across Institutions



Integrating neuroscience across 10 participating NIH Institutes of Centers:

- NINDS
- NIDCD
- NIDA
- NIA
- NCCIH
- NIMH
- NICHD
- NIBIB
- NEI
- NIAAA

Scientific Vision: BRAIN Priority Areas

CELL TYPE
Discovering Diversity: Identify different brain cell types and determine their roles in health and disease.

CIRCUT DIAGRAM
Maps at multiple scales: Generate circut diagrams that vary in resolution from synapses to the whole brain.

MONITOR NEURAL ACTIVITY
The brain in action: Tool development to monitor large-scale neural activity to produce a dynamic picture of the brain.

INTERVENTIONAL TOOLS
Demonstrating causality: Interventional tools to establish causal links between patterns of brain activity and behavior.

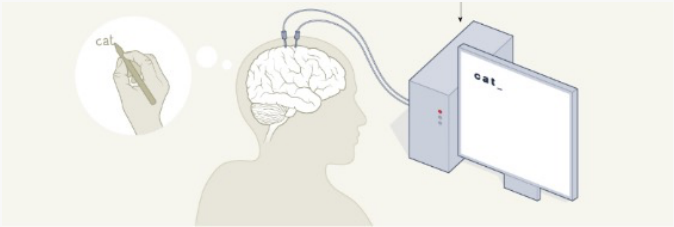
THEORY & DATA ANALYSIS TOOLS
Fundamental principles: Theoretical & analytical tools for conceptual understanding of neural processes.

HUMAN NEUROSCIENCE
Advancing human neuroscience through innovative technologies to understand the brain and treat its disorders.

INTEGRATED APPROACHES
Integrate technological/conceptual approaches to discover neural basis of cognition, emotion, perception, and action.

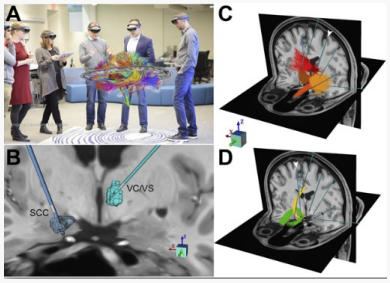
From tools to treatments: Leveraging best-in-class technology for novel applications to treat human brain disorders

Neural prosthetics. In conditions such as ALS, spinal cord injury, or stroke, brain-machine interfaces allow people who are paralyzed or "locked in" to communicate by converting their brain activity to speech and text. *(Willett et al, Nature, 2021)*



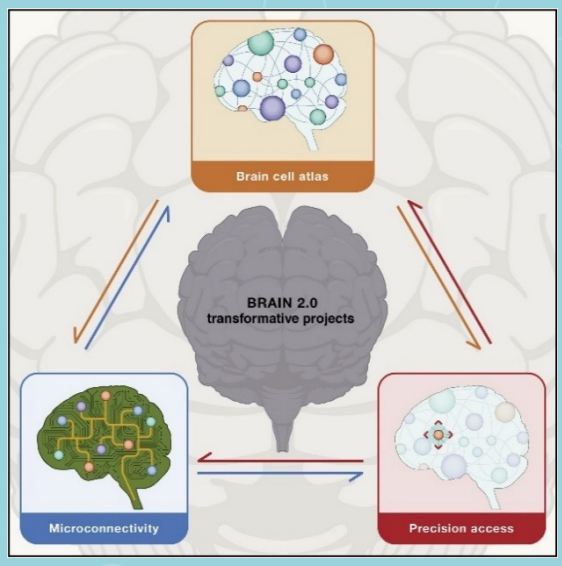
Personalized Deep Brain Stimulation for Major Depressive Disorder:

- Surgery planned with holographic augmented reality
- Stimulation tailored to the individual led to remission of symptons *(Sheth, Biol Psych, 2022)*



BRAIN 2.0: Looking to the Future

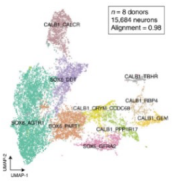
Transformative Projects that will change the future of neuroscience research and accelerating the search for cures *(Ngai, Cell, 2022)*



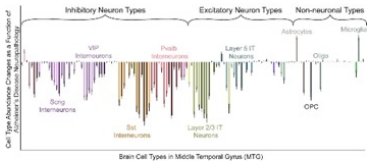
Brain cell atlas: A parts list of the human brain
Microconnectivity: Wiring diagrams of the brain at unprecendented scale
Precision cell access: An armamentarium of tools to access brain cell types with exquisite specificity

Basic Research: Laying the Foundations for Cures and Understanding What Makes Us Human

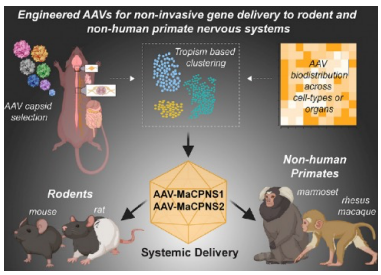
Parkinson's disease: BRAIN Cell Census tools reveal vulnerable brain cell types in humans *(Kamath et al, Nature Neuroscience, 2022)*



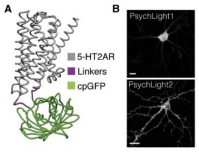
Alzheimer's disease: BRAIN-funded tools used in the SEA-AD cell atlas to identify brain cell types that change in people with Alzheimer's disease *(SEA-AD.org)*



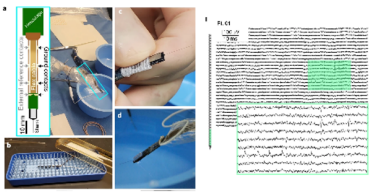
Precise gene delivery to brain cell types across species *(Chen et al, Neuron, 2022)*



PsychLight: Engineering new tools for drug discovery for **depression** *(Dong et al, Cell, 2021)*



New tools for large-scale recordings help listen to neural symphonies in the human brain using "Neuropixel" probes *(Caulk et al, Nature Neuroscience, 2022)*



Brain recordings reveal how humans store memories *(Zheng et al, Nature Neuroscience, 2022)*