

NIH Blueprint for Neuroscience Research

The NIH Office of the Director and these NIH Institutes and Centers participate in the NIH Blueprint for Neuroscience Research:

- NCATS
- NCCIH
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCR
- NIEHS
- NIMH
- NINDS
- NINR
- OBSSR



U.S. Department of Health
and Human Services
National Institutes of Health

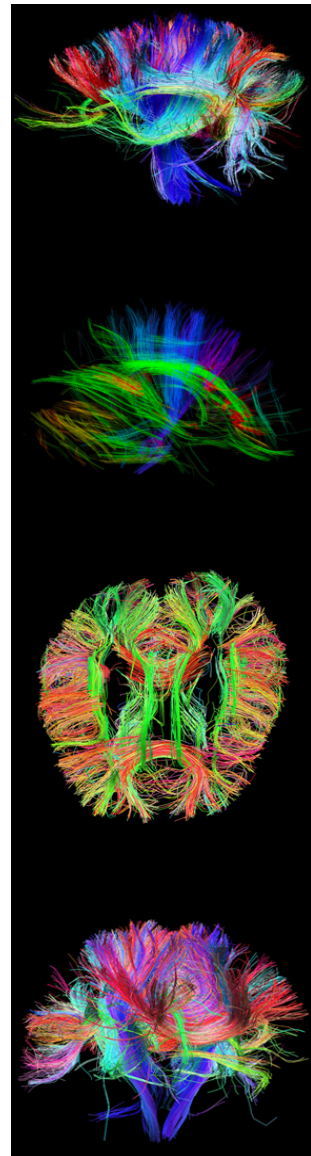
The Blueprint Mission

The NIH Blueprint for Neuroscience Research aims to accelerate transformative discoveries in brain function in health, aging and disease. Blueprint is a collaborative framework that includes the NIH Office of the Director together with NIH Institutes and Centers that support research on the nervous system. By pooling resources and expertise, Blueprint identifies cross-cutting areas of research and confronts challenges too large for any single Institute or Center. Since its inception in 2004, Blueprint has supported the development of new research tools, training opportunities and resources to assist neuroscientists.

Blueprint Grand Challenges

In 2009, the Blueprint Grand Challenges were launched to catalyze research with the potential to transform our basic understanding of the brain and our approaches to treating brain disorders.

- The **Human Connectome Project (HCP)** is an ambitious effort to map all the connections within the human brain. Beginning in 2010, Blueprint awarded \$40 million to two major research consortia which took complementary approaches to deciphering the brain's complex wiring diagram. In five years, this highly coordinated effort mapped the connections of 1,200 healthy adults paired with behavioral assessments and GWAS results, resulting in the publication of over 100 papers. The MRI scanner system developed by HCP scientists was 4-8 times more powerful than conventional systems, providing ten-fold faster imaging times and better spatial resolution than ever before. Building on the success of the Connectome Project, in 2014 Blueprint authorized funds to expand the age range of normal subjects to include both young people and older adults. The Connectome Coordination Facility, funded by Blueprint in 2015, maintains a central data repository for HCP data and offers advice to the research community regarding data collection strategies and harmonization.
- The **Grand Challenge on Chronic Neuropathic Pain** supported research to understand the changes in the nervous system that cause acute, temporary pain to become chronic. The initiative has supported multi-investigator projects partnering researchers in the pain field with researchers in the neuroplasticity field. Starting in 2010, Blueprint funded 10 R01 grants investigating various models, mechanisms, and plasticity in the transition to chronic pain, resulting in more than 80 publications related to pain and neural plasticity.
- The **Blueprint Neurotherapeutics Network (BPN)** helps small labs develop new drugs for nervous system disorders. BPN provides research funding, plus access to millions of dollars' worth of services and expertise to assist in every step of the drug development process, from laboratory studies to preparation for clinical trials. Since 2010, project teams across the U.S. have received funding to pursue drugs for conditions from vision loss to neurodegenerative disease to depression. A hallmark of the program is the research institution retains the intellectual property rights. Now in its eighth year, BPN has awarded 22 grants resulting in 1 Phase 1 clinical trial, 5 licensed programs, and several successful partnerships with industry.



The BRAIN InitiativeSM

April 2013 marked the beginning of the [Brain Research through Advancing Innovative NeurotechnologiesSM \(BRAIN\) Initiative](#), a coordinated effort among public and private institutions and agencies aimed at revolutionizing our understanding of the human brain. NIH has a large role in this effort, and Blueprint was one of the inaugural sponsors of the BRAIN Initiative by investing \$10 million in 2014 on initial high priority research areas. Blueprint invested an additional \$19 million in BRAIN Initiative research in 2015 and 2016.

NIH Blueprint for Neuroscience Research

The NIH Office of the Director and these NIH Institutes and Centers participate in the NIH Blueprint for Neuroscience Research:

- NCATS
- NCCIH
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCR
- NIEHS
- NIMH
- NINDS
- NINR
- OBSSR

Blueprint Research Initiatives

In addition to supporting cross-cutting neuroscience activities like research training, workforce diversity, informatics and therapeutic development, Blueprint also funds research initiatives. Recently, Blueprint developed three Funding Opportunity Announcements (FOA) that will support research in FY2018:

1. The Dynamic **Neuroimmune Interactions** in the Transition from Normal CNS Function to Disorders ([RFA-AA-18-07](#)) R01 seeks to transform our understanding of the dynamic changes among multiple neuroimmune components and how they contribute to the onset and progression of central nervous system (CNS) disorders. Research supported by this FOA is expected to address temporal changes in multiple neuroimmune components, such as neurons, microglia, and astrocytes. Proposals that blend diverse expertise with innovative approaches that address these questions at the molecular, cellular, and circuitry levels were highly encouraged.
2. The Innovative Approaches or Technologies to Investigate Regional, Structural and Functional Heterogeneity of CNS **Small Blood and Lymphatic Vessels** ([RFA-NS-18-003](#)) R01 solicited research focused on the development of new technology and tools or novel mechanistic studies (or a combination of both) to image, profile and map central nervous system small blood and lymphatic vessels in health and disease across the lifespan. Additional goals of this research are to elucidate mechanisms underlying CNS small blood and lymphatic vessels structure and functional heterogeneity, differential susceptibility to injury, role in disease and repair processes, and responses to therapies.
3. The Development and Validation of Technologies for Rapid Isolation and Characterization of **Extracellular Vesicles** (EVs) of Central Nervous System Origin ([RFA-MH-18-600](#)) R21/R33 is a phased innovation award focused on technology development for robust and reproducible CNS-EV isolation methods. The primary goal of this initiative is to advance the current technologies, develop novel techniques and approaches, and standardize protocols to reliably and specifically isolate EVs of CNS origin from human biofluids, identify the cell type from which they were derived, and characterize their composition.

Historic Blueprint Resources

Since 2004, Blueprint has supported the development of new resources, tools and opportunities for neuroscientists. From fiscal years 2007 to 2009, Blueprint focused on three major themes of neuroscience - neurodegeneration, neurodevelopment, and neuroplasticity. These efforts enabled unique funding opportunities and training programs, and helped establish new resources that continue to be available to researchers and the public. Some of these resources include:

- The **Gene Expression Nervous System Atlas (GENSAT)** and the **Cre Driver Network** are projects that have developed, characterized and continue to distribute transgenic mouse lines (GFP reporters and Cre drivers) to serve as tools for research on the central nervous system. Over 100 lines are available from the Cre driver network and over 1400 (GFP and Cre) lines are available from GENSAT.
- The **Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC)** triad of services include a resources registry, data commons, and cloud-based virtual machine with popular neuroimaging software pre-installed. These services help researchers save time, meet data sharing requirements, and leverage cloud-based computing on increasingly larger data sets.
- The **Neuroscience Information Framework (NIF)** is an online portal to neuroscience information that includes a customized search engine, a curated registry of resources and direct access to more than 100 databases.
- The **NIH Toolbox for Assessment of Neurological and Behavioral Function** is a set of integrated tools for measuring neurologic and behavioral function, and for generating data that can be used and compared across diverse clinical studies.
- The **NIH Blueprint Enhancing Neuroscience Diversity through Undergraduate Research Experiences (ENDURE)** supports undergraduates from underrepresented groups in a two-year neuroscience research program and encourages matriculation into PhD programs.

