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:

- NCCAM
- NCRR
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCD
- NIDCR
- NIEHS
- NIGMS
- NIMH
- NINDS
- NINR
- OBSSR

What is the NIH Blueprint for Neuroscience Research?

The Blueprint is a framework to enhance cooperative activities among the NIH Office of the Director and the NIH Institutes and Centers that support research on the nervous system. By pooling resources and expertise, the Blueprint takes advantage of economies of scale, confronts challenges too large for any single Institute or Center, and develops research tools and infrastructure that serve the entire neuroscience community. Best practices developed at a single Institute or Center are implemented more widely, planning is coordinated at the early concept stage, resources established by one Institute or Center are opened to neuroscientists supported by others, and new working groups can focus on broad disease mechanisms and cross-cutting scientific issues.

How does the Blueprint affect the way the NIH does business?

Each Institute and Center continues to carry out the basic, disease-specific, and life course-specific research unique to its mission. Just as the NIH Roadmap for Medical Research addresses roadblocks that hamper progress across all of medical science, the Blueprint selectively takes on challenges in neuroscience that are best met collectively.

How will the Blueprint affect people's health?

Nervous system disorders take many forms: mental disorders, such as schizophrenia, depression, and obsessive compulsive disorder; neurological disorders, such as stroke, traumatic brain injury, epilepsy, Parkinson's disease, and multiple sclerosis; degenerative dementias of aging, such as Alzheimer's disease and vascular dementia; developmental disorders, such as autism, mental retardation, and attention deficit disorder; inherited and acquired sensory disorders, including visual and hearing loss; chronic pain conditions; alcohol dependence; and drug addiction. Many of these diseases share mechanisms. While the Blueprint does not target individual disorders, the tools, resources, and infrastructure created through the Blueprint have the potential to accelerate research for all of them, which in turn will lead to advances in prevention and treatment.

What are examples of recent Blueprint activities?

NIH Neuroscience Microarray Consortium, a group of four state-of-the-art facilities that allows grantees from all Blueprint Institutes or Centers access to microarray platforms, training, data analysis, and data sharing via an online database.

GENSAT (**G**ene **E**xpression **N**ervous **S**ystem **AT**las), a large-scale project to map the expression of thousands of genes in the mouse central nervous system.

NIH Toolbox for Assessment of Neurological and Behavioral Function, a project to develop a set of integrated assessment tools for measuring cognitive, emotional, motor, and sensory health that will be appropriate for diverse populations, settings, and study types.

Recombinase-Expressing Mouse Lines, several grants to develop mouse lines for the study of gene function in distinct cell types or to plot the temporal/spatial patterns of gene expression.

Mouse Archiving and Central Distribution, an initiative that supports the unrestricted distribution of genetic mouse models and makes them available to the neuroscience community for further research, development, and application via the Mutant Mouse Regional Resource Centers (MMRRC).

How will the Blueprint develop in the future?

The Blueprint welcomes suggestions from the scientific, clinical, and patient communities for initiatives that will advance the progress of neuroscience research and benefit the neuroscience community.

Current initiatives are focused on neurodevelopment (FY2008) and neuroplasticity (FY2009). Contact us by e-mail at blueprint@mail.nih.gov. Workshop summaries, requests for information, new developments, and specific initiatives are posted at www.neuroscienceblueprint.nih.gov.

NIH Blueprint activities are funded by the National Institutes of Health (NIH) and the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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NIH Blueprint for Neuroscience Research

Blueprint-Funded Resources

Assay Development for High-Throughput Screening (HTS)
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scheidelerm@ninds.nih.gov
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BRAINdev (Blueprint Resource Antibody Initiative for Neurodevelopment)
Contacts: Robert Riddle, Ph.D.
Program Director, Neurogenetics Cluster
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riddler@ninds.nih.gov
(301) 496-5745

Randall R. Stewart, Ph.D.
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Centers for Evaluation of Neurodevelopmental Antibodies
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Courses in the Neurobiology of Disease
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Director, Office of Research Training and Career Development
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***Cre*-Drivers for the Mouse Nervous System**
Contact: Andrea C. Beckel-Mitchener, Ph.D.
Chief, Functional Neurogenomics Program
National Institute of Mental Health (NIMH)
amitchen@mail.nih.gov
(301) 443-5288

Data Ontologies for Biomedical Research
Contact: Greg Farber, Ph.D.
Senior Health Scientist Administrator
National Center for Research Resources (NCRR)
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(301) 435-0778

GENSAT (Gene Expression Nervous System ATlas)
Contact: Laura Mamounas, Ph.D.
Program Director and GENSAT Project Officer
National Institute of Neurological Disorders and Stroke (NINDS)
mamounal@ninds.nih.gov
(301) 496-5745
www.gensat.org

High-Throughput Collection of Gene Expression Data in Developing Rhesus Macaque Brain
Contacts: Michelle Freund, Ph.D.
Chief, Molecular Biotechnology Program
Office of Cross-Cutting Science and Scientific Technology
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Kathleen C. Anderson, Ph.D.
Deputy Director
Division of Developmental Translational Research
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Interdisciplinary Center Core Grants
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Blueprint-Funded Resources *(continued)*

Lab to Marketplace: Tools for Brain and Behavioral Research
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Mouse Archiving and Central Distribution
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(301) 443-5288
www.mmrrc.org

Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC) and Supplementary Initiatives
Contact: Yantian Zhang, Ph.D.
Program Director, Division of Applied Science and Technology
National Institute of Biomedical Imaging and Bioengineering (NIBIB)
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Neuroscience Information Framework
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Deputy Director for Science and Technology Development
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David Shurtleff, Ph.D.
Director, Division of Basic Neuroscience and Behavioral Research
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(301) 443-1887
www.neurogateway.org

Neuroscience Microarray Consortium
Contact: Elizabeth R. Salomon
NIH Neuroscience Microarray Consortium Coordinator
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http://arrayconsortium.tgen.org

NIH Toolbox for Assessment of Neurological and Behavioral Function
Contact: Molly V. Wagster, Ph.D.
Chief, Behavioral and Systems Neuroscience Branch
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National Institute on Aging (NIA)
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(301) 496-9350

Pediatric MRI Study of Normal Brain Development
Contact: Lisa Freund, Ph.D.
Chief, Developmental Cognitive Psychology, Behavioral Neuroscience, and Psychobiology Branch
Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)
freundl@mail.nih.gov
(301) 435-6879
www.brain-child.org

Sharing Data and Tools: A Federation Using the BIRN and caBIG Infrastructures
Contact: Greg Farber, Ph.D.
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Training in Computational Neuroscience
Training in Neuroimaging
Training in Translational Research in Neurobiology of Disease
Contacts: Susan Weiss, Ph.D.
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Larry Stanford, Ph.D.
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GENSAT

GENSAT (**G**ene **E**xpression **N**ervous **S**ystem **AT**las) involves the large-scale creation of transgenic mouse lines expressing green fluorescent protein (GFP) reporters or DNA recombinases in specific neural and glial cell populations. In each mouse line, expression of the reporter or recombinase is controlled by promoter elements derived from a bacterial artificial chromosome (BAC) containing a specific gene of interest, in order to mimic expression patterns of that gene. To date, over 800 transgenic BAC-GFP reporter mouse lines have been generated. Many of these lines have proven to be extremely valuable in experiments requiring identification of specific cell populations and details of cellular morphology. Furthermore, each of these lines is a unique reagent that provides important data regarding the potential utility of its specific BAC targeting vector. In collaboration with the NIMH Intramural Program, GENSAT is also generating BAC-*Cre* recombinase driver lines to serve as tools for cell-specific genetic manipulations in the CNS. Twenty fully-characterized BAC-*Cre* recombinase lines have been created so far, targeting selected neuronal or glial populations in the brain and spinal cord.

The BAC-GFP expression data and mouse brain images are available to the public in online, searchable databases (see weblinks below). Since the transgenic BAC mouse lines are powerful tools for neuroscience research, GENSAT distributes the mouse strains generated for the project via the Mutant Mouse Regional Resource Center (MMRRC) http://www.mmrrc.org/catalog/StrainCatalogSearchForm.jsp. Nearly 600 BAC mouse lines have been placed in the MMRRC repositories since the beginning of the project and are available for a small processing fee; to date, more than 130 of these lines have been ordered, many of them by multiple investigators. Researchers can nominate genes for the GENSAT project by completing an online gene nomination form at http://www.gensat.org/GeneNominationForm.jsp. In addition, researchers can register interest for specific BAC-*Cre* recombinase driver lines currently in development at http://www.gensat.org/CrePipeline.jsp.

Resources:

BAC Transgenic Mouse GENSAT Database www.gensat.org/index.html
Mutant Mouse Regional Resource Centers www.mmrrc.org (select major collection 'GENSAT' and mutation type 'Transgenic(cre)' or 'Transgenic(BAC)')
In Situ Hybridization GENSAT Database www.stjudebgem.org/web/mainPage/mainPage.php
Submission of gene nominations for the generation of BAC-EGFP reporter and BAC-*Cre* recombinase mouse lines http://www.gensat.org/GeneNominationForm.jsp
NCBI GENSAT Database www.ncbi.nlm.nih.gov/projects/gensat

Contacts:

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GENSAT is a contract funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

The Mutant Mouse Regional Resource Centers contract is supported by the National Center for Research Resources at www.ncrr.nih.gov, with additional funding from the other Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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NIH Neuroscience Microarray Consortium

The NIH Neuroscience Microarray Consortium is a group of four facilities chosen for their outstanding resources and their diverse range of microarray platforms. The Consortium gives NIH-funded neuroscience researchers cost-effective access to state-of-the-art microarray technology for gene expression profiling and SNP genotyping in diverse model organisms. The goal of the initiative is to promote basic and translational research by producing and sharing high-quality genomic data.

The National Institute of Neurological Disorders and Stroke (NINDS) and the National Institute of Mental Health (NIMH) originally established the Consortium, and the Blueprint initiative began contributing funds in FY2005. This gives grantees from all Blueprint Institutes and Centers access to the Consortium resources on a fee-for-service basis.

Resources:

Consortium Centers (http://arrayconsortium.tgen.org/)

- Duke University, Durham, NC
- Translational Genomics Research Institute (TGen), Phoenix, AZ
- University of California, Los Angeles, CA
- Yale University, New Haven, CT

Microarray Platforms

- Affymetrix
- Illumina — Illumina Genome Analyzer (sequencing)
- Agilent — Spotted Arrays (cDNA, oligonucleotide, miRNA)

Other Services

- Laser Capture Microdissection
- Experimental design assistance prior to project submission
- Data analysis support via statistical software packages and online and on-site training
- Data sharing via the Consortium online databases
- Education and training that emphasize experimental design, technical procedures, and data analysis techniques specific to neuroscience research
- Manuscript assistance and consultation

Contact:

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The NIH Neuroscience Microarray Consortium (http://arrayconsortium.tgen.org) is funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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Experimental Mouse Lines

Development of Recombinase-Expressing ("Driver") Mouse Lines for Studying the Nervous System

The use of experimental mice is widely recognized as a critical component of biomedical research, including studies of the development and function of the nervous system. The grants in this program support the design, creation, and characterization of *Cre* recombinase-expressing ("driver") C57B1/6 mouse lines, which can be used to study gene functions in distinct cell types and temporal or spatial patterns in the nervous system.

Through cooperative agreements with multiple investigators, 100 or more novel *Cre*-expressing mice will become available in the next several years along with characterization data detailing the recombinase expression profile for each mouse line.

Details on the specific lines generated through this effort, anticipated availability dates, and distribution information will be posted on the NIH Blueprint for Neuroscience Research website (www.neuroscienceblueprint.nih.gov/neuroscience_resources/animal_models.htm#rodents) as they become available.

Mouse Archiving and Central Distribution

Supplemental funds have been provided to two mouse repositories supported by the National Center for Research Resources (NCRR) to archive existing mouse lines of interest to the neuroscience community and to provide central distribution services and quality control. Approximately 220 mouse lines will be deposited in the Mutant Mouse Regional Resource Centers (MMRRCs) at the University of California at Davis and the University of Missouri/Harlan.

This Blueprint funding ensures that experimental mice developed with NIH support will be made readily available in a timely fashion to the research community for further research, development, and application. This furthers the research enterprise, increases knowledge, and accelerates the development of products to benefit the public.

Resources:

Mutant Mouse Regional Resource Centers http://www.mmrrc.org/

NIH Policy on Sharing of Model Organisms for Biomedical Research
http://grants.nih.gov/grants/policy/model_organism/index.htm

Contact:

Andrea C. Beckel-Mitchener, Ph.D.
Chief, Functional Neurogenomics Program
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The grants supporting the Development of Recombinase-Expressing ("Driver") Mouse Lines for Studying the Nervous System are funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

The Mutant Mouse Regional Resource Centers is a contract supported by the NCRR (www.ncrr.nih.gov), with additional funding from the other Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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Neuroimaging

New Ways to Image Neural Activity

Neuroimaging technologies, such as EEG, MEG, and fMRI, allow us to observe brain functions. To date, however, the imaging techniques that are most commonly used to study neural activation during particular behaviors have been invasive (via the insertion of electrodes or the injection of radioactive tracers), constraining (such as the MRI chamber), or limited in their spatial and temporal resolution (for example, an EEG report is specific about time, but vague about location).

Six grants have been awarded to support the development of new ways to image the brain that are non-invasive, non-constraining, and can capture the rapid neural activation reflected in electrophysiological signals such as action potentials or local field potentials. These new imaging techniques will allow us to view neural activity simultaneously in space and time with high accuracy, making them valuable for measuring the neural underpinnings of behavior.

Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC)

NITRC is an Internet-based clearinghouse that helps researchers find and compare neuroimaging resources for fMRI and related structural analyses. NITRC collects and points to standardized information about tools, making the task of finding and comparing them easier than before. Information is gathered and evaluated with respect to usage, interoperability, features, quality of documentation and support, and user satisfaction. Interaction between the user and the associated technology developers is encouraged via user forums. The site also encourages public comment to guide the development of tools and resources and to enhance their use by the neuroimaging research community. Supplemental grants are awarded to researchers for improving the interoperability and dissemination of informatics tools that are candidates for inclusion in the Clearinghouse.

Resources:

NITRC www.nitrc.org

Contact:

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New Ways to Image Neural Activity and the NITRC are funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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NIH Toolbox for Assessment of Neurological and Behavioral Function

Many studies collect data on aspects of neural function, such as cognition, sensation, movement, or emotion, but there is little uniformity among the measures used to capture these constructs. The use of non-standardized assessment tools makes it problematic to compile and compare data across multiple studies. There is a need for concise assessment tools that can be used across diverse study designs and populations.

The goal of the NIH Toolbox project is to develop a set of neurological and behavioral measures that use state-of-the-art psychometric research and novel testing methods, which will be useful to researchers in a variety of settings. The end result of the project will be a set of integrated assessment tools for measuring cognitive, emotional, motor, and sensory health with enough flexibility to be appropriate for diverse populations (ages 3-85 years), settings, and study types, such as:

- large longitudinal and epidemiologic studies; and
- prevention or intervention trials.

By using the tools in the NIH Toolbox to measure neurological and behavioral function, investigators will ensure the maximum use of data from large, expensive, long-term studies. The availability of consistent, uniform data will increase the yield from these types of studies by allowing a greater number of research questions relating to neurological and behavioral health to be asked and answered. By creating assessment tools that can be modified or improved in the future, the architects of the Toolbox will ensure that this project is a valuable resource for NIH and the entire neuroscience community.

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The NIH Toolbox for Assessment of Neurological and Behavioral Function is a contract funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research. For more information about the Toolbox, which is operated by the Evanston Northwestern Healthcare Research Institute (Richard Gershon, Ph.D., Principal Investigator), please visit http://www.nihtoolbox.org.

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Course Development in the Neurobiology of Disease — Resources

This initiative supported the creation or the significant expansion of courses for neuroscience graduate students. "Neurobiology of disease" refers to basic genetic, molecular, and cellular mechanisms that underlie a wide range of neurological and neuropsychiatric diseases and disorders. The courses are designed to foster an understanding of the links between basic science, disease-oriented research, and translational research. The courses offer a foundation of knowledge in critical areas of basic and clinical neuroscience.

Contact:

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Twelve institutions received grants to develop courses. Below is a list of the 12 grantees with contact information and links to websites (if available) that offer access to the developed curriculum. These sites offer PowerPoint presentations, videos of patient interviews, links to journal articles, links to disorder related resources such as support organizations and voluntary groups, webcasts of lecture presentations, syllabi, and additional course materials.

Contacts:

Baylor College of Medicine
Contacts: Jeffrey Noebels, M.D., Ph.D.
Director, Developmental Neurogenetics Laboratory
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Michael Friedlander, Ph.D.
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(log on: nod; password: nodnod223)

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(781) 736-3181
www.bio.brandeis.edu/nbio146/index.html

University of California, San Diego
Contact: Neal R. Swerdlow, M.D., Ph.D.
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http://meded.ucsd.edu/neu232/

Georgetown University
Contact: Karen N. Gale, Ph.D.
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Course Development in the Neurobiology of Disease — Resources

(continued)

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Meharry Medical College
Contact: Lee E. Limbird, Ph.D.
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Oregon Health and Science University
Contact: Gary L. Westbrook, M.D.
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University of Pennsylvania
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www.med.upenn.edu/neurobiologyofdisease/

Medical University of South Carolina
Contact: Jacqueline F. McGinty, Ph.D.
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(843) 792-9036
http://etl2.library.musc.edu/bnnd/

University of Washington
Contact: Marc D. Binder, Ph.D.
Professor, Physiology and Biophysics
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(206) 543-2509

Yale University
Contact: George R. Heninger, M.D.
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Senior Research Scientist
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The grants supporting Course Development in the Neurobiology of Disease are funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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Interdisciplinary Training

Advances in the treatment of neurological disorders will require researchers who can venture outside their disciplines to master new tools and techniques that will help them better understand how diseases begin and progress. The Blueprint Interdisciplinary Training grants have been awarded to institutions across the country to develop programs that encourage this kind of exploration by young neuroscientists and also attract other students who are currently training in the physical and quantitative sciences. These programs were created and implemented to enrich the knowledge base of neuroscience research.

Computational Neuroscience

This initiative establishes new research education and research training programs in computational neuroscience for undergraduate and predoctoral level students. Programs supported by these grants provide teaching and training in both experimental neuroscience and in the theories and principles of the physical, computer, mathematical, or engineering sciences. Students learn how to develop models of normal or disordered neural systems or processes, test them experimentally, and then use experimental data to refine them. Programs are designed to stimulate interactions among training faculty from multiple disciplines and departments and to foster development of an integrated curriculum in computational neuroscience at the home institution. Four programs have been funded through this initiative.

Carnegie Mellon University
Contact: Robert E. Kass, Ph.D.
kass@stat.cmu.edu

The University of Chicago
Contact: Philip Ulinski, Ph.D.
pulinski@uchicago.edu

Princeton University
Contact: David W. Tank, Ph.D.
dwtank@princeton.edu

University of Pennsylvania
Contact: Leif Finkel, M.D., Ph.D.
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Neuroimaging

This training initiative was designed to foster the development of novel interdisciplinary training programs that integrate comprehensive training in basic neuroscience, the physical and biological bases of neuroimaging, the technologies of *in vivo* neuroimaging, and the application of these technologies to understanding questions in neuroscience across the life span. The goal of these programs is to train the next generation of neuroimaging researchers so that they have a solid understanding of the underlying principles and the technologies of neuroimaging, as well as their application to experimental questions in neuroscience. Three programs have been funded through this initiative.

Massachusetts General Hospital/Harvard/MIT
Contact: Bruce R. Rosen, M.D., Ph.D.
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University of California, Los Angeles
Contact: Mark S. Cohen, Ph.D.
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The University of Pittsburgh
Contact: Seong-Gi Kim, Ph.D.
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Interdisciplinary Training *(continued)*

Translational Research in Neurobiology of Disease

This initiative supports programs that cross-train students in both basic and clinical neuroscience and focus not on specific diseases, but on the biological mechanisms that are shared across diseases. Participants are trained to identify and conduct research on clinically relevant neurobiological questions and are taught how to move the knowledge gained from basic research into clinical and disease-oriented research. Conversely, students learn how findings in clinical research can serve to inform and refine basic research. The program is designed to support trainees at multiple stages in their careers, including doctoral and M.D./Ph.D. students, postdoctoral fellows, and short-term health professional research trainees. Three programs have been funded through this initiative.

University of Kentucky
Contact: Edward D. Hall, Ph.D.
edhall@uky.edu

University of Minnesota
Contact: Walter C. Low, Ph.D.
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University of Pennsylvania
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The grants supporting these programs are funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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Blueprint Thematic Initiatives

The NIH Neuroscience Blueprint initiatives are based upon fundamental themes in neuroscience research that cross Institute and Center boundaries. Blueprint grants are awarded each year to encourage exploration and gain new knowledge in the areas of neurodegeneration during disease and aging (FY2007), neurodevelopment throughout the life span (FY2008), and neuroplasticity from the molecular to the behavioral levels (FY2009).

Neurodegeneration

Programs funded by grants in this group promote the development of research tools, resources, and training activities to accelerate progress in neurodegeneration research. Neurodegeneration occurs in disorders such as Alzheimer's and Parkinson's disease, in macular degeneration and other disorders of sight and hearing, in drug and alcohol abuse, and in mental disorders and chronic pain. In at least some of these conditions, nerve cells die as a result of common insults, which could include free radical damage, excitotoxicity, aggregation of abnormal proteins in cells, and programmed cell death. Therapeutic strategies that target these common mechanisms have the potential to act as the basis for treatments for a variety of neurological diseases and injuries. As the population ages, the impact upon society of diseases associated with neurodegeneration will become even larger without better prevention and treatment. Developing strategies to prevent degeneration of neurons and to promote a healthy nervous system is a smart and strategic way to approach the treatment of these disorders.

Funded Programs:

Biomarkers for Neurodegeneration
Contact: Lorenzo Refolo, Ph.D.
Program Director
National Institute of Neurological Disorders and Stroke (NINDS)
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(301) 496-5680

Individual Postdoctoral Fellowships in Neurodegeneration Research
Contact: Andrew A. Monjan, Ph.D., M.P.H.
Chief, Neurobiology of Aging Branch
Neuroscience and Neuropsychology of Aging Program
National Institute on Aging (NIA)
monjana@mail.nih.gov
(301) 496-9350

Short-Term Interdisciplinary Career Enhancement Awards for Neurodegeneration Research
Contact: Dan Sklare, Ph.D.
Research Training Officer
Division of Scientific Programs
National Institute on Deafness and Other Communication Disorders (NIDCD)
sklared@nidcd.nih.gov
(301) 496-1804

Therapeutics Delivery for Neurodegenerative Diseases
Contact: Mike Oberdorfer, Ph.D.
Director, Strabismus Amblyopia and Visual Neuroscience Programs
Director, Low Vision and Blindness Rehabilitation Program
National Eye Institute (NEI)
oberdorfer@nei.nih.gov
(301) 451-2020

Neurodevelopment

Understanding how the nervous system develops provides insight into inherited disorders of the nervous system and developmental disorders such as cerebral palsy and autism, and also sheds light on the vulnerability of the developing brain to many types of insults. In addition to developmental disorders that become apparent during early postnatal life and childhood (e.g., mental retardation, autism, learning disorders), it is becoming increasingly clear that neurological and behavioral disorders that begin later in life, such as Parkinson's disease or schizophrenia, also have developmental antecedents. The study of neural development encompasses many levels of analysis, from

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Blueprint Thematic Initiatives *(continued)*

molecular to behavioral research, and ranges from animal models to human studies. An improved understanding of neurodevelopment–and a perspective that views aging and disease within that context–will have profound implications for the treatment of brain disorders. Programs in this group are focused on areas of neurodevelopment that will benefit from accelerated strategic investments, especially in the creation, expansion, and distribution of tools and resources, and in the implementation of guidelines for advancing model systems of neurodevelopment.

Funded Programs:

BRAINdev and Centers for Evaluation of Neurodevelopmental Antibodies
Contacts: Robert Riddle, Ph.D.
Program Director, Neurogenetics Cluster
National Institute of Neurological Disorders and Stroke (NINDS)
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(301) 496-5745

Randall R. Stewart, Ph.D.
Program Director, Channels, Synapses and Circuits, and SBIR/STTR Program Coordinator
National Institute of Neurological Disorders and Stroke (NINDS)
stewartr@ninds.nih.gov
(301) 496-1917

High-Throughput Collection of Gene Expression Data in Developing Rhesus Macaque Brain
Contact: Michelle Freund, Ph.D.
Chief, Molecular Biotechnology Program
Office of Cross-Cutting Science and Scientific Technology
National Institute of Mental Health (NIMH)
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(301) 443-1815

Tools and Techniques for Elucidating and Manipulating Neural Circuit Development
Contact: Michelle Freund, Ph.D.
Chief, Molecular Biotechnology Program
Office of Cross-Cutting Science and Scientific Technology
National Institute of Mental Health (NIMH)
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(301) 443-1815

Neuroplasticity

In the last two decades, mounting evidence has indicated that the adult nervous system has remarkable plasticity; in other words, the capacity to adapt to experience. It is capable of forming new connections in response to injury and it also stores stem cells that can differentiate into almost every cell of the nervous system. Discovering how to harness this plasticity holds the promise of novel therapeutic approaches for disorders as diverse as stroke, addiction, and post-traumatic stress disorder. Equally important evidence suggests that another aspect of brain plasticity may contribute to conditions such as dystonia, epilepsy, chronic pain states, drug and alcohol dependence, and depression. Understanding neural plasticity at all levels–from molecules and cells to physiology and behavior–has broad implications for treating neurological disease. Programs funded in this group are meant to accelerate research in this area by developing new tools to monitor and manipulate nervous system plasticity.

Funded Program:

Probes and Instrumentation for Monitoring and Manipulating Nervous System Plasticity
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Office of Cross-Cutting Science and Scientific Technology
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The grants supporting these programs are funded by the Institutes and Centers that comprise the NIH Blueprint for Neuroscience Research.

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Blueprint and Blueprint-Affiliated Informatics Activities

Blueprint Informatics

Blueprint Informatics Team (BIT)

The BIT has three overall objectives: 1) to accelerate the use of computational approaches in the neurosciences by advancing informatics research, 2) to increase the value of informatics research by encouraging communication, collaboration, and coordination among the Blueprint Institutes and Centers, and 3) to provide a collective neuroscience voice and unified leadership for informatics activities across the National Institutes of Health (NIH) and within the wider neuroscience research community. The BIT functions as a common platform for hosting discussions about the overarching area of informatics and serves as an integrating force across all informatics initiatives, whether they are Blueprint, Blueprint-affiliated, or otherwise.

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Associate Director
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(301) 443-1815

Neuroscience Information Framework (NIF)

The Blueprint launched the NIF in 2005 to develop a network infrastructure for neuroscientists to search for research resources at multiple levels of integration, including research materials, web pages, software tools, data sets, literature, and other information. In January 2008, a beta version of the framework became publicly available via the Internet at http://nif.nih.gov. A unique feature of the NIF is that users are able to issue direct queries against multiple databases simultaneously, retrieving content that is largely hidden from traditional search engines. Another feature unique to the NIF is an extensive vocabulary that covers major neuroscience domains for describing and searching the resources. The NIF takes advantage of advances in knowledge engineering to broaden and refine searches based on related concepts. Members of the research community are invited to test the beta version, identify resources to be included in the NIF registry, nominate vocabulary terms, and suggest improvements and enhancements for upcoming new releases of the system, now in the planning stages. In September, 2008, a contract was awarded to the University of California, San Diego, for the operation, maintenance, and enhancement of the NIF.

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David Shurtleff, Ph.D.
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Blueprint and Blueprint-Affiliated Informatics Activities *(continued)*

Blueprint-Affiliated Informatics

Biomedical Informatics Research Network (BIRN)

The goal of the BIRN is to develop an infrastructure that allows researchers to share data, both for limited collaborations inside a defined research group and also among the research community at large. Most of the basic BIRN infrastructure has been developed at the University of California, San Diego under a Coordinating Center award. Three large projects, all of which involve neuroinformatics research, have been funded to ensure that the data-sharing infrastructure is responsive to the needs of biomedical investigators. These projects are focused on structural MRI imaging, functional MRI imaging, and new techniques for merging and blending imaging technologies and image resolutions. The tools developed with support from this project are freely available to the biomedical community via the BIRN website at www.nbirn.net.

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(301) 435-0778

Blueprint Informatics Funding Opportunity Announcements (FOAs)

Developed under the BIT to take advantage of the BIRN infrastructure already in place are two active, Blueprint-affiliated FOAs:

Sharing Data and Tools (PAR-07-426 http://grants.nih.gov/grants/guide/pa-files/PAR-07-426.html) asks researchers to apply for funds to bring either their data analysis tools or their data into the BIRN infrastructure for use by the research community. The BIRN infrastructure is unique in that it allows multiple data analysis tools to be compared against each other in a common environment using real data. The infrastructure also provides a convenient way for researchers to store and share their data.

Data Ontologies for Biomedical Research (PAR-07-425 http://grants.nih.gov/grants/guide/pa-files/PAR-07-425.html) tackles a deeper problem of research data sharing – how to match the meanings of words when their usage varies among data sets. This grant will support research to create an ontology using controlled vocabularies for two datasets in a specific research area. Once the ontology is created, it will be shared within the field.

Contacts from individual Institutes and Centers are listed in each FOA.

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