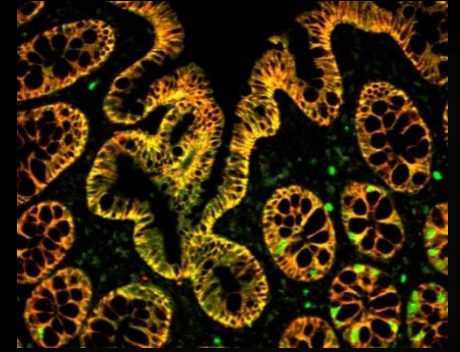
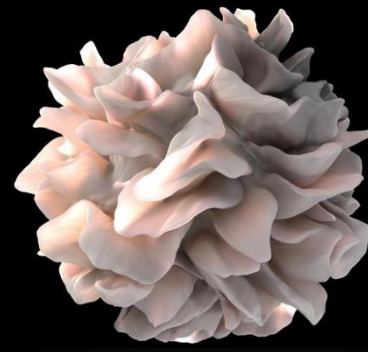
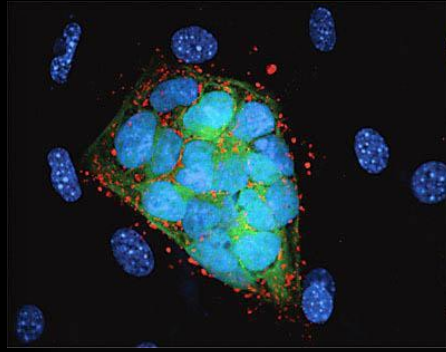


B.R.A.I.N.

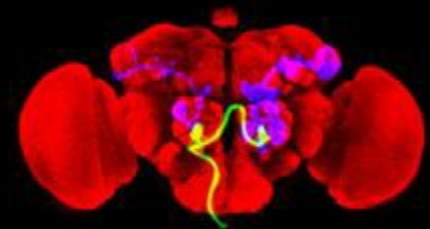
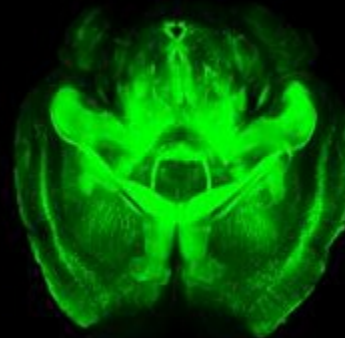
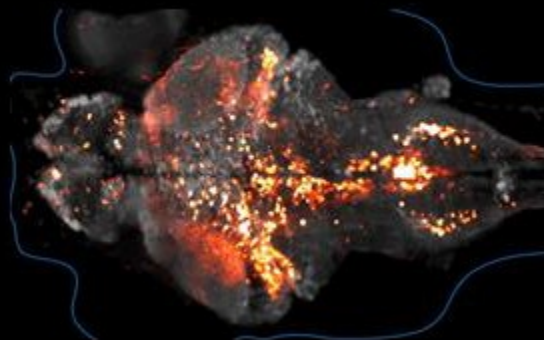
Brain
Research Through
Advancing
Innovative
Neurotechnologies

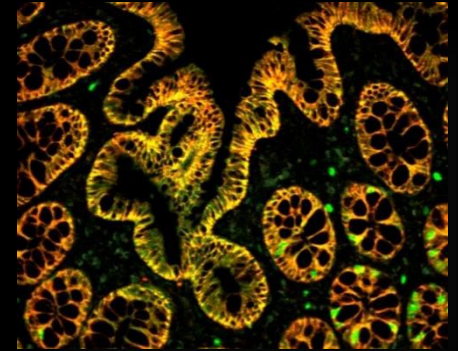
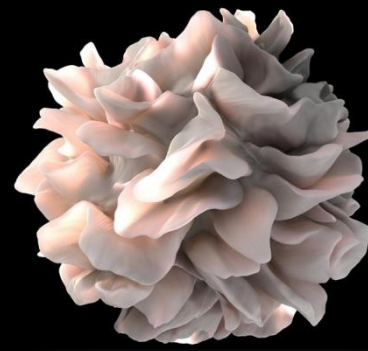
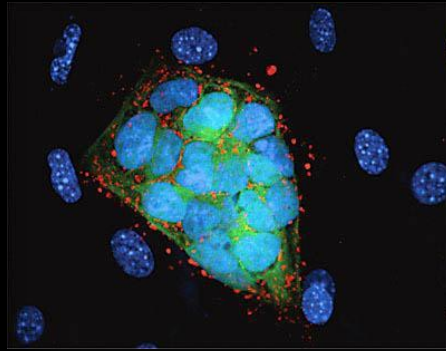
Изучение мозга
путём развития
инновационных
нейротехнологий



BRAIN...

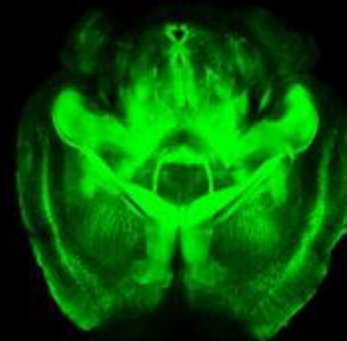
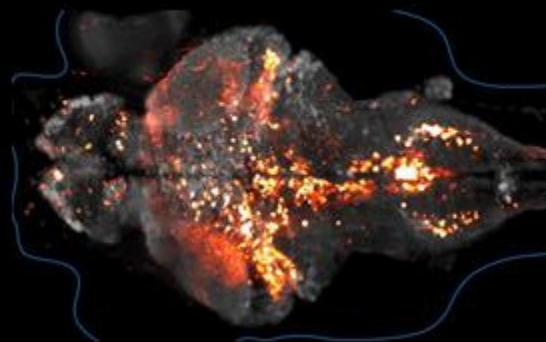
mapping brain activity at the
speed of thought





МОЗГ...

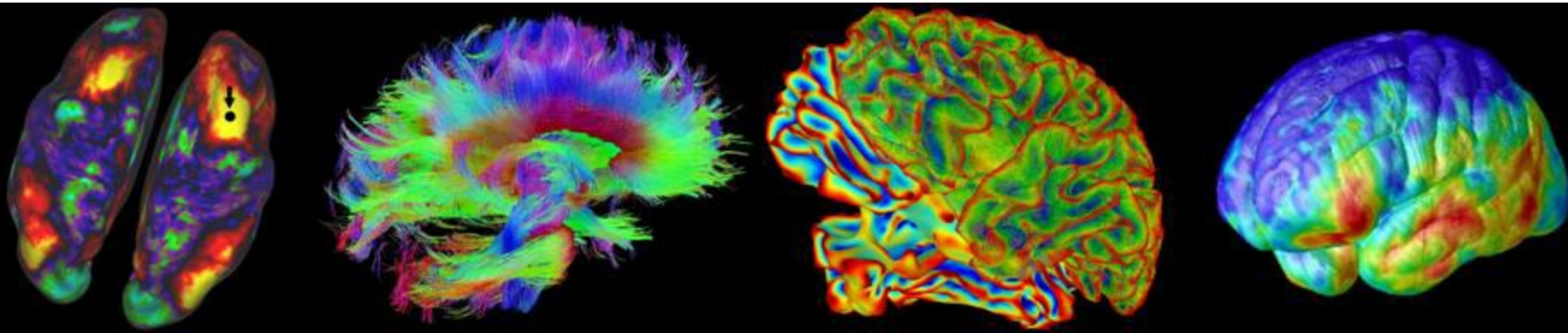
КАРТИРОВАНИЕ АКТИВНОСТИ
МОЗГА СО СКОРОСТЬЮ МЫСЛИ



THE BRAIN INITIATIVE®

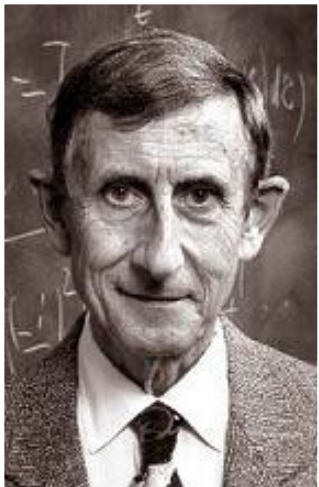
Brain disorders -- a leading source of disease burden and cost in the world. Recent breakthroughs are transforming how we study brain structure and function. **The BRAIN Initiative builds on this recent progress to create tools that will accelerate discovery and build the foundation we need to reduce the burden of brain disorders.**

Заболевания головного мозга – это серьезное бремя для общества и огромные финансовые затраты. Недавние революционные открытия изменили наши подходы к изучению структуры и функций мозга. **Инициатива BRAIN, основанная на новейших открытиях и достижениях, представляет собой инструмент, который поможет быстрее достигнуть прогресса и заложить основы для уменьшения бремени патологий мозга.**



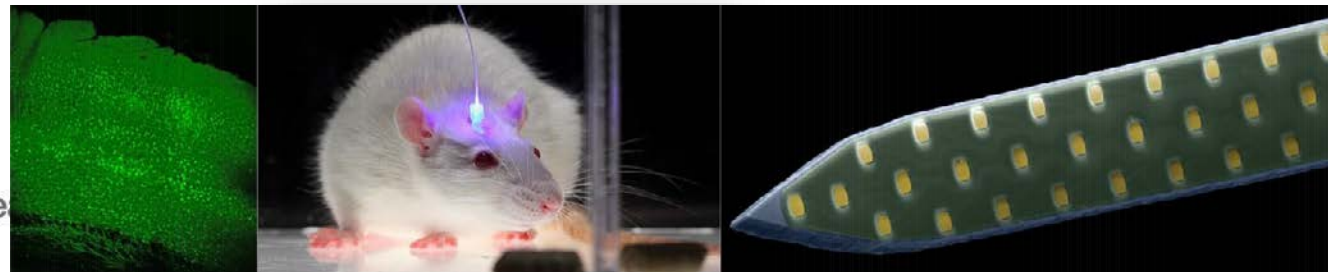
“**New directions in science are launched by new tools much more often than by new concepts.** The effect of a concept-driven revolution is to explain old things in new ways. The effect of a tool-driven revolution is to discover new things that have to be explained.”

«**Новые направления в науке гораздо чаще возникают как результат появления новых инструментов, чем вследствие новых концепций.** Но если новые концепции объясняют старые вещи по-новому, то новые инструменты открывают новые вещи, которые потребуют объяснения».



Freeman Dyson (1997) *Imagined Worlds*
(Книга «Воображаемые миры»)

Harvard University Press, Cambridge, MA



BRAIN 2025

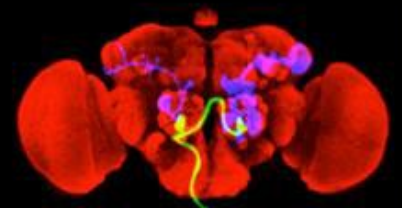
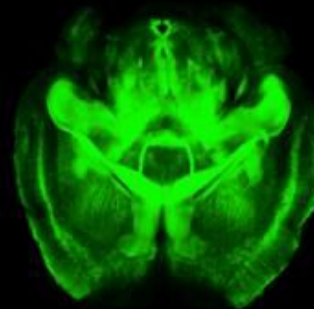
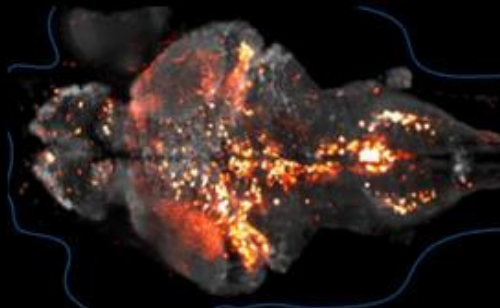
A SCIENTIFIC VISION

Brain Research through Advancing Innovative
Neurotechnologies (BRAIN) Working Group
Report to the Advisory Committee to the
Director, NIH

June 5, 2014



- Focus on Circuit Structure and Function
- Seven Priority Goals
- 74 Short-term Goals
- Focus is on assessment of where we are now, iteratively mapping the course to reach our goals.



О запуске инициативы B.R.A.I.N. стало известно в 2013 г. Сроком начала ее реализации был объявлен сентябрь 2014 г. (с этого месяца начинается финансирование большинства проектов). Программа рассчитана на 12 лет – до 2025 года.

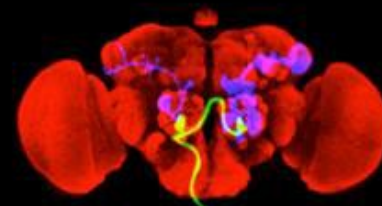
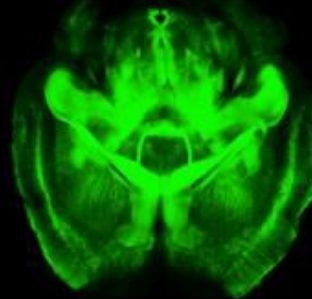
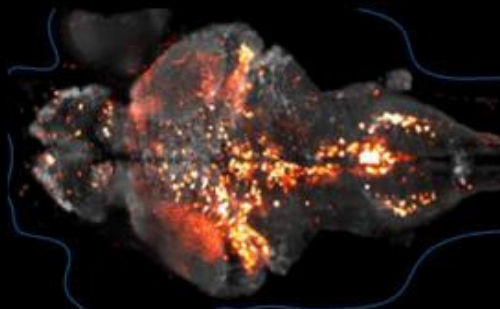
Главный координатор Инициативы — Национальные институты здоровья, NIH. Первые два года (финансовые 2014 и 2015) - подготовительные, основной фокус первой «пятилетки» (финансовые 2016–2020 гг.) направлен на разработку новых технологий исследований мозга, а в течение следующей «пятилетки» (2021–2025 гг.) с использованием разработанных технологий будут, как надеются ученые, сделаны фундаментальные открытия.

BRAIN 2025

A SCIENTIFIC VISION

Brain Research through Advancing Innovative
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- 1. Discovering Diversity:** Identify/provide experimental access to the different brain cell types to determine roles in health/disease.
- 2. Maps at multiple scales:** Generate circuit diagrams that vary in resolution from synapses to the whole brain.
- 3. The brain in action:** Produce a dynamic picture of the functioning brain with new methods for large-scale monitoring of neural activity.
- 4. Demonstrating causality:** Link brain activity to behavior with precise interventional tools that change neural circuit dynamics.
- 5. Identifying fundamental principles:** Understand the biological basis of mental processes with new theoretical/data analysis tools.
- 6. Advancing human neuroscience:** Develop innovative technologies to understand the human brain and treat its disorders; create human brain research networks.
- 7. From BRAIN Initiative to brain:** Integrate new technological and conceptual approaches produced in goals #1-6 to discover how dynamic patterns of neural activity are transformed into cognition, emotion, perception, and action in health and disease.

- 1. ИССЛЕДОВАНИЕ РАЗНООБРАЗИЯ:** экспериментальное описание всех типов клеток головного мозга, их роли в здоровом и больном мозге.
- 2. КАРТИРОВАНИЕ В КРУПНЫХ МАСШТАБАХ:** создание диаграмм нейронных связей в разрешении от отдельных синапсов до мозга в целом.
- 3. МОЗГ В ДЕЙСТВИИ:** получение динамических картин функционирования мозга с использованием новых методов мониторинга нейронной активности.
- 4. ДЕМОНСТРАЦИЯ ПРИЧИННО-СЛЕДСТВЕННЫХ СВЯЗЕЙ:** соотнесение активности мозга с поведенческими рефлексам с использованием инструментов, изменяющих динамику нейронных сетей.
- 5. ИДЕНТИФИКАЦИЯ ФУНДАМЕНТАЛЬНЫХ ПРИНЦИПОВ:** разработка моделей биологических основ психологических процессов с использованием новых теоретических инструментов.
- 6. ИССЛЕДОВАНИЯ ЧЕЛОВЕКА:** разработка инновационных технологий исследования мозга человека и лечения его патологий, создание и поддержка интегрированных исследовательских консорциумов.
- 7. ОТ ИНИЦИАТИВЫ BRAIN К МОЗГУ:** новые технологии и подходы, описанные выше, продемонстрируют, как динамические массивы нейронной активности трансформируются в такие действия человеческого мозга, как познание, эмоции, восприятие и действие.

We need to be able to see the circuits in action to:

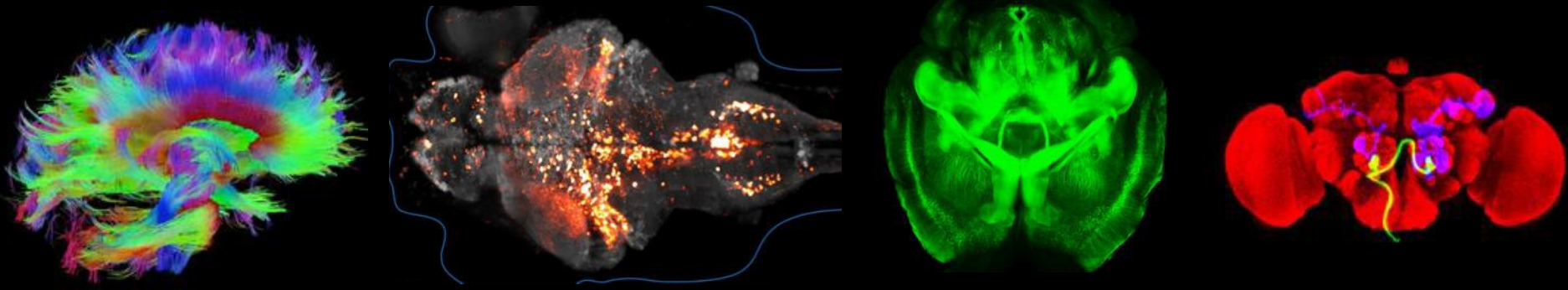
- Understand how the brain forms memories, plans, executes
- Understand how to diagnose, monitor and treat brain disorders.
- The disability that patients with neuro/mental/substance abuse disorders suffer is a direct result of disordered brain circuits.

Molecular/Structural
Pathology

Circuit
Dysfunction

Neuro/Mental
Functional Disability

- Goal: Make circuit normalization/compensation the target of intervention: Pharmacologic/Cell/Device. Neuromodulation.



BRAIN Initiative
Announced
April 2013

1st meeting of
the BRAIN
MCWG
August 2014

1st BRAIN PI
meeting
*November
2014*

Neuroethics
Workgroup
Established
August 2015

2nd BRAIN PI
meeting
December 2015

3rd BRAIN PI
meeting
December 2016



BRAIN
2025
Report
released

June 2014



1st NIH BRAIN
awards
*September
2014*

1st BRAIN
Initiative Alliance
discussion
July 2015



2nd NIH BRAIN
awards
*September
2015*

New awards
announced
October 2016



2014

- 58 грантов, 46 млн долларов

2015

- 67 грантов, 38 млн долларов
- Более 130 исследователей в 8 странах (кроме США)

2016

- Более 100 грантов, свыше 150 млн долларов
- 170 исследователей в США и других 8 странах
- С 2013 года в исследования по программе BRAIN вовлечены ученые из 13 стран



233 BRAIN Projects are currently funded:

New awards by year: 58 in FY 2014, 67 in FY 2015, 108 in FY 2016

At present, NIH-supported BRAIN research is being conducted by over 400 investigators spread across >140 performance sites in 13 countries. Each Funding opportunity addresses one or more of the 7 priority areas identified in the *BRAIN 2025* report.



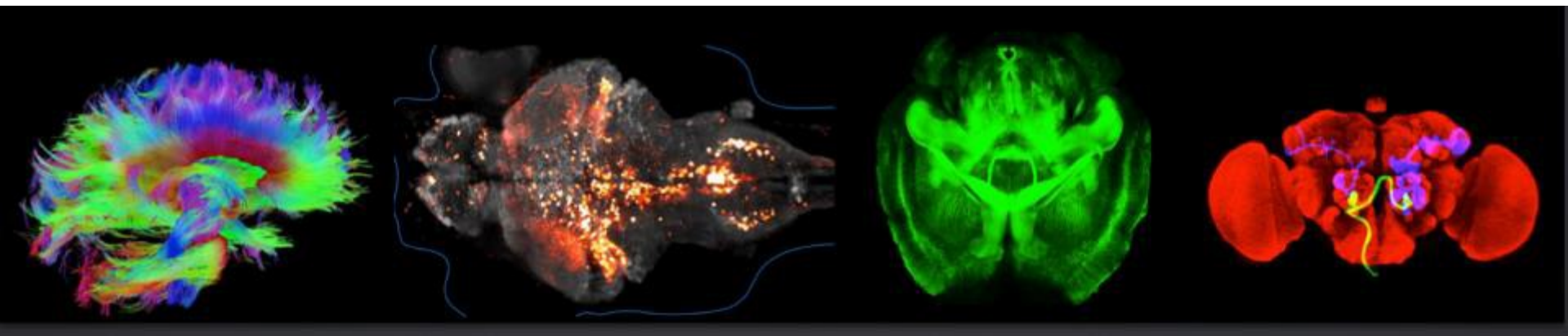
Projects By Topic

- Large Scale Recording and Modulation (83)
 - New Technologies/Optimization
 - New Concepts & Early Stage Research
- Non-Invasive Neuromodulation (16)
- Foundations/Next-Gen Human Imaging (26)
- Next-Gen Human Invasive Devices (11)
- Tools for Cells and Circuits (34)
- Census of Cell Types (10)
- Integrated Approaches (17)
- Research Opportunities (7)
- Short Courses (3)
- Tech Sharing/Propagation (6)
- Theories, Models, Methods (20)

Fiscal Year	Actual Budget	# New BRAIN Awards	21 st Century Cures	ACD WG Recommendation
FY14	\$46.1M	58		
FY15	\$85M	67		\$100M
FY16	\$150M	108		\$190M
FY17	\$250M		\$10M	\$300M
FY18			\$86M	\$400M
FY19			\$115M	\$500M

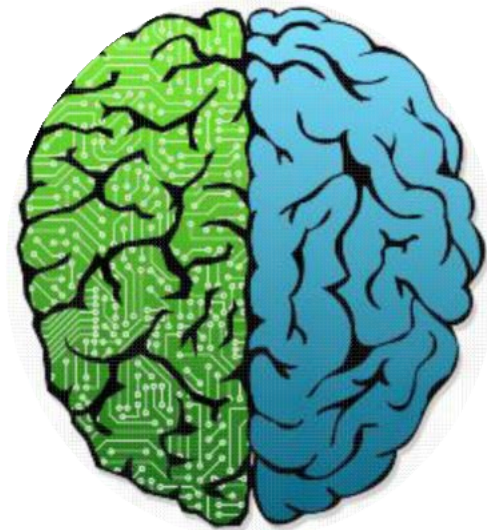
\$140 M appropriated for BRAIN
 \$10 M from NIH Blueprint
 \$4 M additional contributions from ORWH and OBSSR

- Blueprint
- NCCIH
- NEI
- NIA
- NIAAA
- NIBIB
- NICHD
- NIDA
- NIDCD
- NIMH
- NINDS
- OBSSR
- OD
- ORWH



BRAIN Neuroethics Working Group

- A consultative ethics group to work with BRAIN leadership and BRAIN investigators
 - Co-chaired by Dr. Christine Grady and Hank Greely
- Recent/upcoming activities:
 - Duke planning a workshop April 18
 - Yuste and Goering (2016) On the necessity of ethical guidelines for novel neurotechnologies. *Cell* 167:882-885
- **Request for Information (RFI): Guidance for Opportunities in Neuroethics closed July 29**
- **New Funding Opportunity, informed by RFI: BRAIN Initiative: Research on the Ethical Implications of Advancements in Neurotechnology and Brain Science (R01)**



LUNDBECK FOUNDATION



Goals:

- Develop a coordinated program to foster collaborative research in areas of mutual interest within the BRAIN Initiative
- Jointly support research projects involving Foreign and U.S. scientists; exchange of scientific information
 - Funding for projects in Denmark provided by Lundbeck Foundation
 - Funding for projects in Canada provided by Brain Canada
 - Funding for projects in Australia provided by the Australian National Health and Medical Research Council

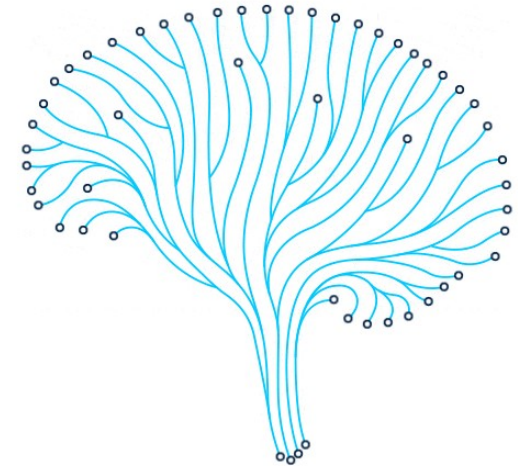


Coordinating Global Brain Projects

September 19, 2016 | Rockefeller University

Meeting Focus: *Promote collaboration and cooperation between large-scale international brain projects. Speakers included both scientists and administrators representing private and public projects*

Ideas Proposed: *Create universal brain-mapping tools, create an International Brain Observatory with tools and resources scientists from around the world could access, and increase virtual, cloud-based data sharing resources*



Meeting offers opportunity for BRAIN investigators to interact across project areas and funding agencies

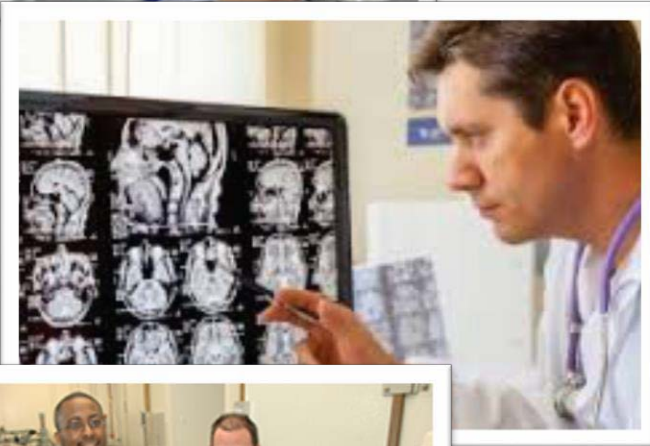
3rd Annual Meeting: December 12-14, 2016

- Over 750 people attended in-person; over 900 registered
- Live video-cast archived on NIH site
- 3 Scientific Keynotes; over 300 scientific posters
- Open to public with press (*Washington Post*, *Science*, *Nature*...)
- and advocacy groups (Dana Foundation, Michael J. Fox Foundation...)



NEEDS IDENTIFIED:

- Develop positive incentives for data sharing and dissemination of new neurotechnologies
- Encourage scientists and engineers across many diverse disciplines and sectors to work together in new combinations and teams
- Develop ways to encourage parallel experimentation and exchange of ideas between the animal and human groups, and among clinical, translational, and basic investigators
- Develop public-private partnerships and involve industry earlier in the technology development process

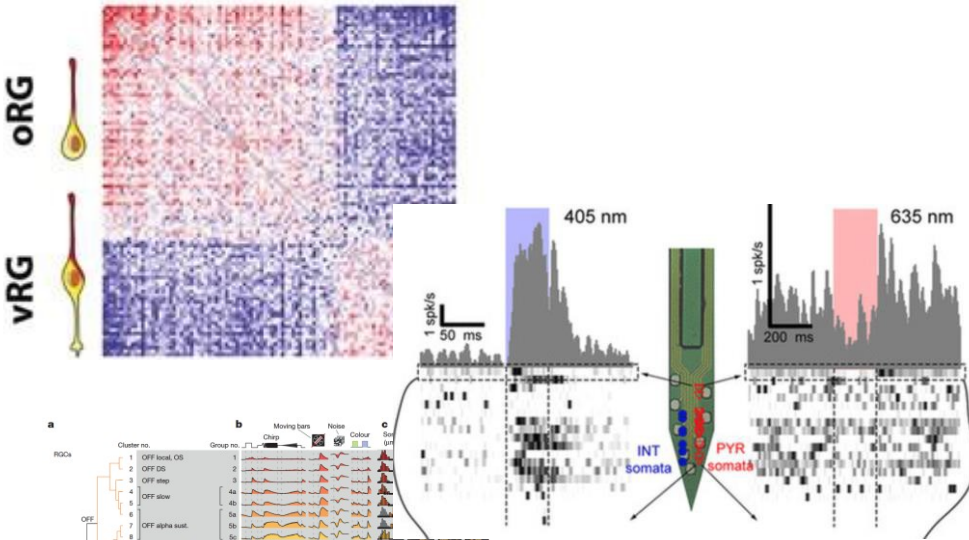


- The BRAIN Initiative is reaching investigators who have not submitted to NIH previously, and their applications are doing spectacularly well.
- К участию в Инициативе BRAIN привлекаются ученые, которые раньше не подавали заявки на гранты NIH, и их заявки находятся в приоритете.
- The number of BRAIN Initiative applications from women and underrepresented minorities is a little lower than might be expected.
- Количество заявок на гранты от женщин и мало представленных групп несколько меньше, чем можно было бы ожидать.
- Limited participation so far by the intramural program.
- Ограниченное участие в очной программе.
- Overall, there is **not** strong evidence in support of the idea that we have saturated the technology development applicant pool.
- **Нет** убедительных данных в пользу того, что лимит на подачу заявок на гранты для развития технологии исчерпан.

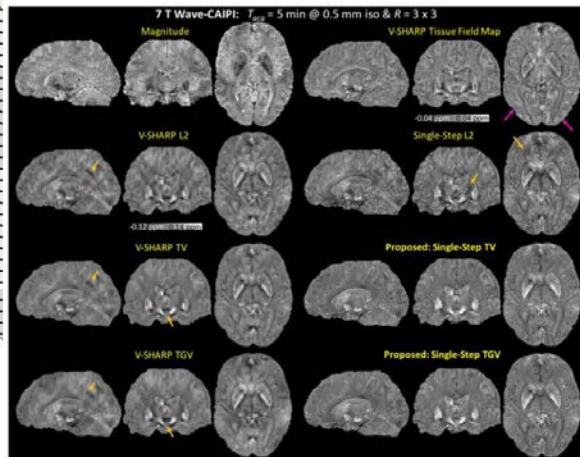
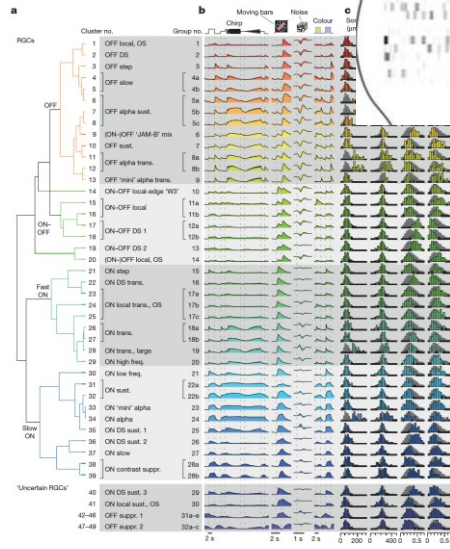
Three Different Flavors of BRAIN Data

THE BRAIN INITIATIVE®

oRG-Specific Genes



- Инициатива BRAIN поддерживает создание больших массивов данных по:
 - Имиджингу
 - Регистрации
 - Сиквенсам



Потребуется различные решения и платформы для облегчения обмена данными и сотрудничества в рамках Инициативы BRAIN.

Категория	2015	2016
Биохимия	11	12
Биология/Клеточная биология /Микробиология/Патология/Иммунология	43	36
Химия	17	11
Генетика	4	3
Биоинформатика	12	33
Физика	16	14
Инженерия (все категории)	119	141
Нейронауки/ Неврология	146	141
Нейрохирургия	14	47
Психиатрия/Психология	17	69
Radiology/ Radiation-Diagnostic	31	61
Биоимиджинг/ Имиджинг	15	8



I A R P A

Mission Statement: *The aim of the BRAIN Initiative Alliance is to coordinate and facilitate communications from its members related to the BRAIN Initiative.*

Short Term Focus: Website that serves as a single point of communication for all BRAIN Initiative-related announcements of funding opportunities and accomplishments

HHMI
HOWARD HUGHES MEDICAL INSTITUTE

SIMONS FOUNDATION

THE  KAVLI FOUNDATION

 ALLEN INSTITUTE
for BRAIN SCIENCE
Fueling Discovery

THE BRAIN INITIATIVE®

BRAIN Initiative Alliance



I A R P A

**МИССИЯ: Цель созданного в рамках
Инициативы BRAIN альянса –
координировать и облегчить коммуникацию
всех участников.**

Краткосрочная задача:

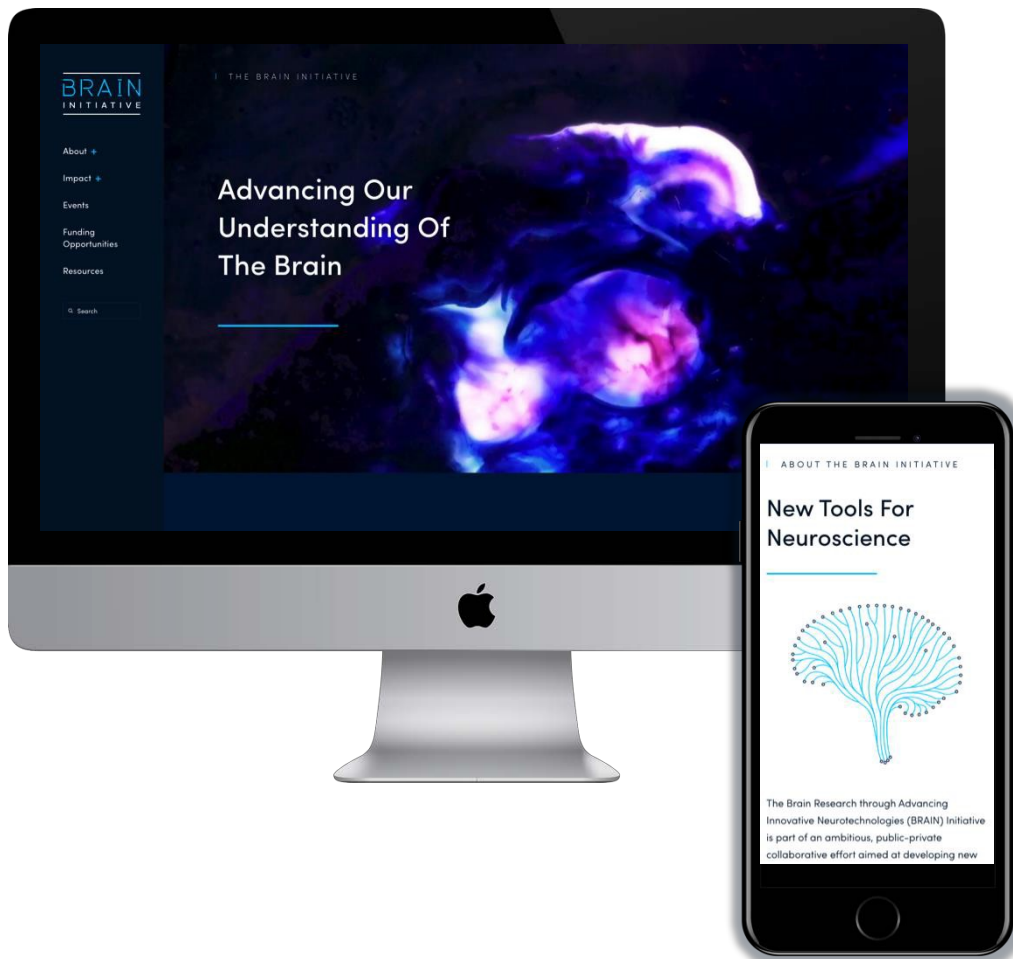
Вебсайт как единый информационный центр, аккумулирующий сведения по грантам в рамках Инициативы BRAIN.

HHMI
HOWARD HUGHES MEDICAL INSTITUTE

SIMONS FOUNDATION

THE  KAVLI FOUNDATION

 ALLEN INSTITUTE
for BRAIN SCIENCE
Fueling Discovery



Новый вебсайт Инициативы BRAIN!

Информационная
платформа по
ВОЗМОЖНОСТЯМ
финансирования,
новостям, достижениям,
ресурсам и пр.,
относящемуся к
Инициативе BRAIN.

LETTER



Bidirectional electromagnetic control of the hypothalamus regulates feeding and metabolism

Sarah A. Stanley¹, Leah Kelly³, Kaamashri N. Latcha¹, Sarah F. Schmidt¹, Xiaofei Yu¹, Alexander R. Nectow¹, Jeremy Sauer², Jonathan P. Dyke³, Jonathan S. Dordick² & Jeffrey M. Friedman^{1,4}

A Toolkit for Orthogonal and *in vivo* Optical Manipulation of Ionotropic Glutamate Receptors

Joshua Levitz, Andrei T. Popescu, [...], and Ehud Y. Isacoff

LETTERS



Cre-dependent selection yields AAV variants for widespread gene transfer to the adult brain

Benjamin E Deverman¹, Piers L Pravdo¹, Bryan P Simpson¹, Sripriya Ravindra Kumar¹, Ken Y Chan¹, Abhik Banerjee¹, Wei-Li Wu¹, Bin Yang¹, Nina Huber², Sergiu P Pasca² & Viviana Gradinaru¹

Neuron

Volume 88, Issue 6, 16 December 2015, Pages 1121–1135

NeuroResource

Mapping Sub-Second Structure in Mouse Behavior

Alexander B. Wiltschko^{1,2}, Matthew J. Johnson^{1,2}, Giuliano Iurilli¹, Ralph E. Peterson¹, Jesse M. Katon¹, Stan L. Pashkovski¹, Victoria E. Abraira¹, Ryan P. Adams², Sandeep Robert Datta¹  



Cell Stem Cell

Available online 30 March 2016
In Press, Corrected Proof — Note to users

Brief Report Expression Analysis Highlights AXL Entry Receptor in Neural Stem Cell

Tomasz J. Nowakowski^{1,2,3}, Alex A. Pollen^{1,2,3}, Elizabeth Di Lullo^{1,2}, Carmen Sandoval-Espinosa^{1,2}, Marina Bershteyn^{1,2}, Arnold R. Kriegstein^{1,2}  

Neuron

Inhibition, Not Excitation, Drives Rhythmic Whisking

Authors
... Deschênes, Jun Takatoh, ...
... Kurnikova, ..., ...
... Hiro Furuta, Fan Wang, ...
... Kleinfeld

Over 190 publications have emerged from NIH BRAIN to date

Международный семинар 10-16 декабря 2016

Состав делегации РФФИ: А.Г. Габибов, С.М. Деев, А.В. Латанов, А.В. Семьянов и М.К. Бактышева.

Участники от США:

- Francis S. Collins, директор NIH
- сотрудники различных институтов NIH
- представители IARPA (Агентство передовых исследований в сфере)
- представители DARPA (Управление перспективных исследовательских проектов Министерства обороны США)
- представители DOE (Департамент энергетики)
- Walter J. Koroshetz, директор NINDS (Национальный институт неврологических заболеваний и инсульта)

Обсуждались перспективы организации сотрудничества РФФИ с NIH в области нейронаук. Представители РФФИ выразили заинтересованность в объявлении совместного конкурса трехлетних исследовательских проектов по заранее согласованным тематикам с паритетным финансированием.

4-5 мая 2017

NINDS (Национальный институт неврологических заболеваний и инсульта)

Walter Koroshetz, Director

Alan Koretsky, Scientific Director

Avindra (Avi) Nath, Clinical Director

Robert Finkelstein, Director, Division of Extramural Research

David Owens, Acting Deputy Director, Division of Extramural Research

Meghan Mott, Chief of Staff

Claudia Moy, Program Director, Division of Clinical Research

Edmund Talley, Program Director, Channels, Synapses & Circuits

Rita Devine, Assistant Director for Science Administration

NIA (Национальный институт старения)

Richard Hodes, Director

Marie Bernard, Deputy Director

Eliezer Masliah, Director, Division of Neuroscience

NIDA (Национальный институт по вопросам злоупотребления наркотиками)

Rita Valentino, Director, Division of Neuroscience & Behavior

NEI (Национальный институт глаза)

Michael Steinmetz, Director, Division of Extramural Science Programs

Draft Logistical Plan for U.S.-RFBR Collaboration on BRAIN

NIH will do:

1. Publish a notice in the NIH guide stating that:
 - a. RFBR and NIH have signed an LOI to collaborate on BRAIN projects in which part of the work will be performed in Russia and that part would be funded by RFBR.
 - b. NIH grantees for BRAIN projects with collaborators in Russia should encourage their Russian colleagues to submit a letter of intent to RFBR.
 - c. In NIH grants for BRAIN projects with Russian collaborators, U.S. grantees should describe work to be done in Russia but not include those costs in the NIH grant budget.
2. At the time NIH issues notices of grant award (NGA) to U.S. investigators for BRAIN projects, NIH will discuss with RFBR any Russian components in these grants and their budgets.

Draft Logistical Plan for U.S.-RFBR Collaboration on BRAIN (*continued*)

RFBR will do:

1. Announce to their scientists RFBR's intent to fund portion of work performed in Russia as part of an NIH-funded BRAIN project.
2. Accept letters of intent from Russian scientists to submit to NIH BRAIN RFAs along with the budget for work to be done in Russia.
 - a. RFBR may also choose to ask Russian scientists to send their grant and reviewer comment material associated with NIH grant applications to RFBR.
3. Notify NIH of RFBR's intent to fund or not fund, the amounts requested by Russian investigators in their letters of intent.
4. Fund the Russian component of NIH-funded BRAIN projects directly to the Russian scientists.

Questions to address:

- Ask Russian investigators to submit grant progress reports to RFBR?
- What is the timeframe of RFBR's own solicitations and awards/review process?
 - How will it adjust to NIH BRAIN grants (given that these are typically 3 year awards)?