NIH 启动 2014 财年 BRAIN 计划首轮资助（附项目清单）

2014 年 9 月 30 日，NIH 宣布通过 BRAIN 计划开启 2014 财年首轮资助，共计 4600 万美元将用于支持美国 15 个州及其它 3 个国家超过 100 位科研人员用于绘制人类大脑动态图，研发辅助理解神经环路功能以及大脑动力学的新工具和新技术。该计划作为一项为期 12 年的科学规划的一部分旨在通过工具和技术的发展在大脑研究方面实现又一个飞跃。这些新工具的面世最终将催生解救脑疾病患者的新型治疗手段。

当日宣布了 58 个受资助项目，隶属于 6 个门类，其中大部分是关于发展可加速推动基础神经科学研究的转化型技术，如制造一个可穿戴扫描仪以实现大脑动态成像，利用激光追踪神经细胞放电，记录整个神经系统动态变化，利用无线电波刺激特定神经环路，结合 DNA 条形码（DNA barcodes）确认复杂环路。

以下为六大门类：

- 对大脑大数量级细胞类型进行分类——Census of Cell Types (RFA MH-14-215)；
- 分析大脑细胞和环路的工具和技术——Tools for Cells and Circuits (RFA MH-14-216)；
- 创制新一代人脑成像技术——Next Generation Human Imaging (RFA MH-14-217)；
- 脑活动的大尺度记录方法（新技术）——Large-Scale Recording-Modulation - New Technologies (RFA NS-14-007)
- 脑活动的大尺度记录方法（最优）——Large-Scale Recording-Modulation - Optimization (RFA NS-14-008)
- 理解神经环路——Understanding Neural Circuits (RFA NS-14-009)

以下为受资助项目简介（只列出项目名称与单位，PI 与项目简介请见链接）：

- **Census of Cell Types (RFA MH-14-215)**

Num.	Title - Project	Institution
1	Establishing a Comprehensive and Standardized Cell Type Characterization Platform	Allen Institute for Brain Science
2	Combining genetics, genomics, and anatomy to classify cell types across mammals	Brandeis University
3	Towards quantitative cell type-based mapping of the whole mouse brain	Cold Spring Harbor Laboratory

4	Comprehensive Classification Of Neuronal Subtypes By Single Cell Transcriptomics	Havard University
5	Epigenomic mapping approaches for cell-type classification in the brain	Salk Institute for Biological Studies
6	Classification of Cortical Neurons by Single Cell Transcriptomics	University of California Berkeley
7	Defining cell types, lineage, and connectivity in developing human fetal cortex	University of California Los Angeles
8	Classifying Cortical Neurons by Correlating Transcriptome with Function	University of California San Diego
9	Mapping the Developing Human Neocortex by Massively Parallel Single Cell Analysis	University of California, San Francisco
10	A Novel Approach for Cell-Type Classification and Connectivity in the Human Brain	Yale University

- **Tools for Cells and Circuits (RFA MH-14-216)**

Num.	Title - Project	Institution
1	An optogenetic toolkit for the interrogation and control of single cells.	Cold Spring Harbor Laboratory
2	Developing drivers for neuron type-specific gene expression	Columbia University
3	In-vivo circuit activity measurement at single cell, sub-threshold resolution	Georgia Institute of Technology
4	Mapping neuronal chloride microdomains	Massachusetts General Hospital
5	Ultra-Multiplexed Nanoscale In Situ Proteomics for Understanding Synapse Types	Massachusetts Institute of Technology
6	Novel technologies for nontoxic transsynaptic tracing	Massachusetts Institute of Technology
7	Remote regulation of neural activity	Rockefeller University

8	Novel Genetic Strategy for Sparse Labeling and Manipulation of Mammalian Neurons	University of California Los Angeles
9	Identification of enhancers whose activity defines cortical interneuron types	University of California, San Francisco
10	Dreadd2.0: An Enhanced Chemogenetic Toolkit	University of North Carolina Chapel Hill

- **Next Generation Human Imaging (RFA MH-14-217)**

Num.	Title - Project	Institution
1	Dissecting human brain circuits in vivo using ultrasonic neuromodulation	California Institute of Technology
2	Path Toward MRI with Direct Sensitivity to Neuro-Electro-Magnetic Oscillations	Duke University
3	Imaging in vivo neurotransmitter modulation of brain network activity in realtime	Johns Hopkins University
4	Magnetic Particle Imaging (MPI) for Functional Brain Imaging in Humans	Massachusetts General Hospital
5	Vascular Interfaces for Brain Imaging and Stimulation	Massachusetts Institute of Technology
6	MRI Corticography (MRCoG): Micro-scale Human Cortical Imaging	University of California Berkley
7	Advancing MRI & MRS Technologies for Studying Human Brain Function and Energetics	University of Minnesota
8	Imaging Brain Function in Real World Environments & Populations with Portable MRI	University of Minnesota
9	Imaging the Brain in Motion: The Ambulatory Micro-Dose, Wearable PET Brain Imager	West Virginia University

- **Large-Scale Recording-Modulation - New Technologies (RFA NS-14-007)**

Num.	Title - Project	Institution
1	High-Density Recording and Stimulating Microelectrodes	Boston University (Charles

		River Campus)
2	Modular nanophotonic probes for dense neural recording at single-cell resolution	California Institute of Technology
3	Time-Reversal Optical Focusing for Noninvasive Optogenetics	California Institute of Technology
4	Calcium sensors for molecular fMRI	Massachusetts Institute of Technology
5	Neurotransmitter Absolute Concentration Determination with Diamond Electrode	Mayo Clinic Rochester
6	Genetically encoded reporters of integrated neural activity for functional mapping of neural circuitry	University of California at Davis
7	Genetically encoded sensors for the biogenic amines: watching neuromodulation in action	University of California at Davis
8	Optogenetic mapping of synaptic activity and control of intracellular signaling	University of California San Diego
9	Modular systems for measuring and manipulating brain activity	University of California, San Francisco
10	Modular High-Density Optoelectrodes for Local Circuit Analysis	University Of Michigan
11	Fast High-Resolution Deep Photoacoustic Tomography of Action Potentials in Brains	Washington University

- **Large-Scale Recording-Modulation Optimization (RFA NS-14-008)**

Num.	Title - Project	Institution
1	Optimization of 3-photon microscopy for Large Scale Recording in Mouse Brain	Cornell University
2	Large-Scale Electrophysiological Recording and Optogenetic Control System	Graymatter Research
3	Development of Protein-based Voltage Probes	John B. Pierce Laboratory, Inc.

4	Next generation high-throughput random access imaging, in vivo	Massachusetts Institute of Technology
5	Three Dimensional Holography for Parallel Multi-target Optogenetic Circuit Manipulation	Pierre and Marie Curie University
6	Protein voltage sensors: kilohertz imaging of neural dynamics in behaving animals	Stanford University
7	Optical control of synaptic transmission for in vivo analysis of brain circuits and behavior	University of California Berkeley
8	Multi-area two-photon microscopy for revealing long-distance communication between multiple local brain circuits	University of Zurich

- **Understanding Neural Circuits (RFA NS-14-009)**

Num.	Title - Project	Institution
1	Integrative Functional Mapping of Sensory-Motor Pathways	California Institute of Technology
2	Neural circuits in zebrafish: form, function and plasticity	Harvard University
3	Cortical circuits and information flow during memory-guided perceptual decisions	Massachusetts Institute of Technology
4	Behavioral readout of spatiotemporal codes dissected by holographic optogenetics	New York University School of Medicine
5	Mechanisms of neural circuit dynamics in working memory	Princeton University
6	Vertically integrated approach to visual neuroscience: microcircuits to behavior	Princeton University
7	Towards a Complete Description of the Circuitry Underlying Memory replay.	University of California-Irvine
8	Revealing the connectivity and functionality of brain stem circuits	University of California San Diego
9	The role of patterned activity in neuronal codes for	University of Chicago

	behavior	
10	Crowd coding in the brain:3D imaging and control of collective neuronal dynamics	University of Maryland College PK Campus

原文标题：NIH awards initial $46 million for BRAIN Initiative research

原文链接：http://www.nih.gov/news/health/sep2014/od-30.htm

原文标题：Initial wave of NIH grants and private investments announced for brain initiative

原文链接：http://brainfeedback.nih.gov/initial-wave-of-nih-grants-and-private-investments-announced-for-brain-initiative/

原文标题：NIH BRAIN Awards

原文链接：http://www.braininitiative.nih.gov/nih-brain-awards.htm

Salk 生物研究所获资 300 万美元

2014 年 9 月 30 日，NIH 通过 BRAIN 计划向 Salk 生物研究所的 Margarita Behrens 和 Joseph Ecker 授予 300 万美元资助，为期 3 年。

此次旨在资助二位所在的实验室构建出可以识别出每一种大脑细胞类型的脑图集以及确认彼此间的联接方式。重点是，Behrens 和 Ecker 计划研究表观遗传学如何影响脑细胞构建，如 DNA 上的一组分子或化学标识如何调节基因活动。

Ecker 表示，利用他们的新方法—脑细胞类型在表观遗传方面的差异，可以完成脑图谱构建，最终获得对神经元“身份”和功能差异的深层次理解，同时为脑发育与疾病提供一个可能的窗口。

原文标题：Salk scientists receive $3 million for BRAIN Initiative grant

原文链接：http://www.salk.edu/news/pressrelease_details.php?press_id=2054

加州大学伯克利分校获资 720 万美元

9 月 30 日，NIH 宣布向加州大学伯克利分校（University of California, Berkeley）的 3 个项目提供为期 3 年共计 720 万美元的资助。

- 为脑细胞画像（Profiling brain cells）：由 NIMH 资助，为大脑神经元类型编制完整目录集。
- 人脑表面成像（Surface imaging of the brain）：由 NIMH 资助，改进成像工具以看到大脑中更多细节。
- 光控开关（Photoswitches）：由 NINDS 资助，创制一个光控开关的神经元信号探测仪

原文标题：NIH awards UC Berkeley $7.2 million to advance brain initiative

原文链接：http://newscenter.berkeley.edu/2014/09/30/nih-awards-uc-berkeley-7-2-million-to-advance-brain-initiative/