

**Brain Research through Advancing Innovative Neurotechnologies® (BRAIN)
Multi-Council Working Group (MCWG) Meeting**

Thursday, August 17, 2017

Meeting summary

On August 17, 2017, the Multi-Council Working Group (MCWG) of the NIH Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) Initiative held an in-person meeting, in Rockville, Maryland. The MCWG's role is to provide scientific wisdom and guidance related to funding strategies, initiative planning, and progress in achieving the goals laid out in the BRAIN 2025 vision. The day's primary activities were to hear Dr. Walter Koroshetz's overview of the state of BRAIN, and to discuss two concepts for potential funding opportunities.

Opening remarks

Dr. Walter Koroshetz, Director of the National Institute of Neurological Disorders and Stroke (NINDS), opened by thanking Dr. Mark Schnitzer for his completed service as a MCWG member, and welcoming new members, Drs. Carol Ann Mason and Elba E. Serrano. He explained that investigators continue to submit ambitious research grant proposals to BRAIN, with projects that are at the core of why BRAIN was launched. He also emphasized how important the MCWG is for providing feedback to BRAIN on various issues, and reiterated that the Initiative aims:

- To transform our understanding of how the brain works.
- To develop tools for understanding information processing in circuits of the brain.
- To help treat nervous system diseases, for which we currently lack reliable pathology due to limitations in our ability to modulate brain circuits.
- To follow the [BRAIN 2025 report](#) as a roadmap.

BRAIN is the most well-funded neuroscience project NIH has ever had. Since the last MCWG meeting, there have been hundreds of important BRAIN-funded research advances; Dr. Koroshetz described four:

- At the Salk Institute for Biological Studies, Dr. Joseph Ecker's team published in *Science* their breakthrough method of looking at DNA methylation patterns in nuclei, as a means of classifying brain cell types.
- At Harvard Medical School, Dr. Lawrence Wald's team published in the *International Journal on Magnetic Particle Imaging* their design for a magnetic particle imaging scanner, for dramatically more sensitive imaging of human brain activity.
- At the University of North Carolina, Chapel Hill, Dr. Dinggang Shen's team published in *Human Brain Mapping* their new technique for inexpensive and fast functional imaging analysis of the brain, which may enable early identification and interventions for Alzheimer's disease.
- At Purdue University, Dr. Meng Cui's team published in *Nature Methods* their brain imaging technique that greatly expands field-of-view and improves imaging of fast neural dynamics, for higher resolution and signal-to-noise ratio.

He added that BRAIN must focus on retaining well-trained, productive investigators despite the current academic environment's hyper-competitiveness. NIH is particularly concerned about early-stage investigators losing funding, and so is mandating that all the institutes fund early-stage investigators (i.e., within ten years of receiving their degree) up to the 25th percentile or a grant score of 35.

Dr. Koroshetz announced that NIH is broadening its requirements for reporting human studies research, with the aim of increasing reporting into ClinicalTrials.gov. The NIH Policy on Dissemination of NIH-

funded Clinical Trial Information establishes the expectation that all NIH-funded clinical trial results are submitted to ClinicalTrials.gov for public posting. The purpose of the policy is to promote broad, responsible dissemination of information. Dr. Koroshetz and the group discussed the importance of ensuring this policy change is operationalized smoothly, to avoid unreasonable impact upon studies.

There remains strong bipartisan support for the Initiative. Dr. Koroshetz encouraged the MCWG to help spread the message about the progress of the BRAIN Initiative at every opportunity, as we want to ensure the public and members of Congress stay informed:

- Dr. Koroshetz highlighted a financial landmark of \$260 million appropriated to BRAIN in fiscal year 2017 between the 21st Century Cures Innovation Fund and the 2017 omnibus spending bill. With this committed money, he said, BRAIN is set to make some great advances!
- He described plans to incorporate an ongoing project that NIH co-funds with the National Science Foundation (NSF) on collaborative research in computational neuroscience (CRCNS) with BRAIN.

Dr. Koroshetz noted that NIH plans to set up a committee to review *BRAIN 2025* and compare it to the progress of the Initiative. This newly-assembled group will evaluate the current scientific landscape, and may update the report to guide NIH from 2019 through 2025.

Lastly, he reiterated that NIH is seeking candidates for the position of Director of the BRAIN Initiative.

Remarks by Drs. Jim Olds and Jim Deshler from the National Science Foundation

NSF works closely with NIH to support scientific endeavors in the United States. NSF's annual budget is \$7 billion, with \$75 million allocated to BRAIN-related activities. NSF focuses on basic neuroscience research, stressing the importance of understanding the healthy brain. To understand mechanisms of disease, we need to understand what is happening *before* disease strikes. Areas of emphasis include:

- Supporting team neuroscience,
- Tools,
- Theory, and
- Building the neuroscience workforce of the future

NSF [recently announced new awards](#) through their NeuroNex Program (NSF's newest program):

- Half of NSF's \$75 million per year for BRAIN goes through core programs like engineering and computer science. The remainder goes through CRCNS, Integrative Strategies for Understanding Neural and Cognitive Systems (which builds small teams around hard problems), and NeuroNex.
- NeuroNex is funding \$2 million per year for up to five years on its first cohort of awards. They aim to form neurotechnology dissemination hubs to develop, refine, and widely disseminate (among scientists) the newest technologies. The first issued awards have two theory teams and nine hubs for neurotechnology. A third category (not a hub or a theory team), called innovation awards (\$400 thousand per year for two years), will hopefully be ready to disseminate in 2019.

Update from the Neuroethics Division of the MCWG

The Neuroethics Division explores ethical issues related to BRAIN. The Division helps provide guidance to ensure research is both performed ethically and is cognizant of what may be negative public reactions to some of the tools involved. Hank Greely, J.D. reported progress from three functions of the Division:

- Documents: They are drafting a *Principles for Neuroethics* (not rules or regulations, but issues for program officers, institutional review boards, researchers, and others to consider).

- Consults: At a meeting on the preceding day, Division members provided thoughts and guidance on BRAIN funding opportunity concepts, as well as on the research projects themselves, pertaining to potential ethics issues.
- Workshops: Members of the Division have hosted workshops and are planning more. Examples include a workshop recently held on ethical considerations surrounding *ex vivo* human brain tissue and organoids research, and a workshop in October on ethical issues involved in neuromodulation research (invasive and noninvasive).

Concept Clearances

Program staff presented two new funding opportunity concepts. The MCWG members ultimately voted to recommend whether these concepts should be turned into Requests for Applications (RFA) for BRAIN:

- The Neurobiology of Neurostimulation
 - Clinical research, and therapies, use various types of neurostimulation (electrical/magnetic). However, the cellular-level effect this has on neural tissue is unclear. Proposals to this funding opportunity would model (in rodents and non-human primates) the electric fields produced during neurostimulation, using various newly-developed stimulation and imaging tools. Funded projects would analyze the effects of a range of stimulation parameters, on neural cell morphology, metabolic processes, cell-cell interactions, and local circuit plasticity. With a better understanding of the tools currently used within BRAIN, researchers might develop better strategies of probing cell and circuit plasticity, which may in turn advance our understanding of neural circuitry.
 - The group voted yes to clear this funding opportunity concept, pending modifications. The group suggested that the ability to do research with humans be incorporated into the funding opportunity, and/or that the RFA encourage teams of human and basic researchers to work together on this problem.
- Faculty Recruitment Institutional Award to Build Strength in Quantitative Neuroscience
 - This concept addresses training recommendations in the BRAIN 2025 report: to bring more sophisticated quantitative approaches to a broader neuroscience spectrum, and to bridge neuroscience- and non-neuroscience departments (i.e., bring neuroscientists in contact with engineers, physicists, and mathematicians). Via this funding opportunity, institutions would facilitate hiring faculty who have quantitative neuroscience expertise (i.e., theoretical modeling, statistics, or novel data analysis) into neuroscience departments. Successful proposals to this RFA will develop intra-institution cross-disciplinary training and educational opportunities (i.e., research and courses).
 - The group voted yes to clear this funding opportunity concept.

The meeting proceeded with a closed session of the MCWG members and federal staff to discuss proposed funding plans for the remaining FY17 Requests for Applications.