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Abstract. This opinion piece discusses potential funding opportunities by the NIH BRAIN initiative to support the development of deep imaging technologies. © The Authors. Published by SPIE under a Creative Commons Attribution 3.0 Unported License. Distribution or reproduction of this work in whole or in part requires full attribution of the original publication, including its DOI. [DOI: [10.1117/1.JBO.19.3.030601](https://doi.org/10.1117/1.JBO.19.3.030601)]

The ability to noninvasively map, monitor, and manipulate the activity of millions of neurons at single cell and millisecond resolution is hindered by the turbid and light scattering nature of living nervous tissue. Two-photon microscopy permits visualization of single neurons only at a depth of 1 mm, and functional magnetic resonance imaging provides only an indirect means to measure the gross activity of ensembles of neurons. In the awake behaving animal invasive fiber optic probes are required to visualize and manipulate circuits at the single cell level at depths greater than 1 mm. These probes have a limited depth of field and width of view. New technologies are needed to overcome these obstacles to advance brain research and develop new methods for diagnosing and treating brain diseases such as Alzheimer's disease, schizophrenia, depression, and substance abuse.

To address issues like these, President Obama in his 2013 State of the Union Address launched the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative. \$100 million has been allocated to National Institutes of Health (NIH), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF) in the President's Fiscal Year 2014 budget for the BRAIN initiative. NIH has issued six funding opportunity announcements (FOAs) totaling \$40 million (<http://www.nih.gov/science/brain/funding.htm>). These are:

- Transformative Approaches for Cell-Type Classification in the Brain (U01) (RFA-MH-14-215). Application Receipt: March 13, 2014.
- Development and Validation of Novel Tools to Analyze Cell-Specific and Circuit-Specific Processes in the

Brain (U01) (RFA-MH-14-216). Application Receipt: March 13, 2014.

- New Technologies and Novel Approaches for Large-Scale Recording and Modulation in the Nervous System (U01) (RFA-NS-14-007). Application Receipt: March 24, 2014.
- Optimization of Transformative Technologies for Large Scale Recording and Modulation in the Nervous System (U01) (RFA-NS-14-008). Application Receipt: March 24, 2014.
- Integrated Approaches to Understanding Circuit Function in the Nervous System (U01) (RFA-NS-14-009). Application Receipt: March 24, 2014.
- Planning for Next Generation Human Brain Imaging (R24) (RFA-MH-14-217). Application Receipt: March 13, 2014.

The FOAs RFA-NS-14-007, RFA-NS-14-008, and RFA-MH-14-217 are likely to be of greatest interest to the imaging and biophotonics community. Investigators with interests in developing high resolution deep imaging techniques may also consider submitting applications in response to NIDA Cutting Edge for Basic Research Award (CEBRA PAR-12-086), the NIH Pioneer Award Program (DP1 RFA-RM-006), The NIH Director's New Innovator Award Program (DP2 RFA-RM-13-007), or an investigator initiated R01 application.

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