

ISMIRM Workshop on MRI of Neuromodulation: Target Engagement, Neural Mechanism & Biomarker Development



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www.ismrm.org/workshops/2022/Neuromodulation

OVERVIEW

During recent years, neuromodulation techniques such as transcranial direct current stimulation (tDCS), transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS), as well as alternative methods using optical and ultrasonic modulations, have become an important means to study how complex neural circuits interact in the brain, to manipulate human cognition, and to treat brain disorders. Magnetic resonance imaging (MRI) can now be performed either concurrently with or pre- and post-these neuromodulation techniques to visualize their effects on the human brain, to understand the neurophysiological mechanism, and to improve their efficacy. The proposed workshop will bring together a diverse group of scientists and clinicians as well as industry partners who are interested in developing and applying advanced MRI techniques to visualize, understand, and quantify neuromodulation effects on the human brain. This workshop will be the first of its kind on the topic of MRI in neuromodulation in ISMIRM history and will integrate presentations with ample discussion periods covering advances in various MRI techniques for neuromodulation (electromagnetic field mapping, functional connectivity, arterial spin labeled perfusion and permeability, temperature and acoustic radiation force imaging, etc.), preclinical animal models and cellular-level mechanisms of neuromodulation, and safety issues related to MRI with neuromodulation devices. Existing and emerging clinical applications for MRI in neuromodulation and biomarker development will be discussed between academic and industry partners.

EDUCATIONAL OBJECTIVES

Upon completion of this activity, participants should be able to:

- Explain the state-of-the-art and latest developments of concurrent MRI and neuromodulation techniques including tDCS, TMS, DBS, and emerging optical and ultrasonic modulations;
- Define the biophysical and neurophysiological parameters that can be measured by MRI of neuromodulation;
- Recognize the potentials and challenges of in-vivo MRI mapping of neuromodulation; and
- Identify the suitable clinical applications and associated barriers need to be overcome for the translation of MRI in neuromodulation.

TARGET AUDIENCE

MRI scientists interested in developing novel methods for in-vivo imaging of neuromodulation effects on human brain using MRI; neuroscientists, neurologists, psychiatrists, and neurosurgeons interested in the application of in-vivo imaging of neuromodulation effects on human brain using MRI; and manufacturers of MRI and/or neuromodulation devices interested in latest advances of MRI in neuromodulation.

ORGANIZING COMMITTEE

Committee Chairs: Danny JJ Wang, Ph.D. & Yihong Yang, Ph.D.

Committee: Dogu Baran Aydogan, Ph.D. • Asta K. Håberg, M.D., Ph.D. • Luis Hernandez-Garcia, Ph.D. • Yu (Andy) Huang, Ph.D. • Lucia Navarro de Lara, Ph.D. • Rosalind J. Sadleir, Ph.D. • A. Duke Shereen, Ph.D. • Ti-Fei Yuan, Ph.D.