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LAST UPDATED December 2, 2024

RESEARCH  Noninvasive brain stimulation: technology development, modeling, device safety, translational
SPECIALTIES and clinical applications

 Computational electromagnetics


 Electrophysiological and neuroimaging biomarker development

 Neural plasticity and translational neuromodeling

 Nonlinear dynamics of physiological systems

EDUCATION **Columbia University** New York, NY

Ph.D., Electrical Engineering 2013


 Dissertation: *Electromagnetic Field Modeling of Transcranial Electric and Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive and Subconvulsive Applications*

M.Phil., Electrical Engineering 2011

 Graduate concentration in Neuroscience

Massachusetts Institute of Technology Cambridge, MA

M.Eng., Electrical Engineering and Computer Science 2007

 Thesis: *Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms*

S.B., Electrical Science and Engineering 2007

S.B., Physics 2006

 Minor in Economics

PROFESSIONAL **National Institute of Mental Health** Bethesda, MD
& ACADEMIC

APPOINTMENTS *Staff Scientist* 2019–

Division of Intramural Research Programs, Experimental Therapeutics & Pathophysiology Branch, Noninvasive Neuromodulation Unit

 Director, Computational Neurostimulation Research Program





























Research Fellow 2016–2019



































Division of Intramural Research Programs, Experimental Therapeutics & Pathophysiology Branch, Noninvasive Neuromodulation Unit



































 Richard J. Wyatt Memorial Fellowship for Translational Research





















	Duke University School of Medicine	Durham, NC
	<i>Adjunct Assistant Professor</i>	2016–2024
	Department of Psychiatry & Behavioral Sciences, Division of Behavioral Medicine & Neurosciences	
	<i>Faculty Network Member</i>	2015–2024
	Duke Institute for Brain Sciences	
	<i>Medical Instructor</i>	2014–2016
	Department of Psychiatry & Behavioral Sciences, Division of Brain Stimulation & Neurophysiology	
	§ Duke Translational Medicine Institute KL2 Fellow	
	<i>Postdoctoral Associate</i>	2013–2014
	Department of Psychiatry & Behavioral Sciences, Division of Brain Stimulation & Neurophysiology, Neurocognitive Research Lab	
	<i>Visiting Graduate Research Assistant</i>	2010–2013
	Department of Psychiatry & Behavioral Sciences, Division of Brain Stimulation & Neurophysiology, Brain Stimulation Engineering Lab	
	Columbia University College of Physicians & Surgeons/New York State Psychiatric Institute	New York, NY
	<i>Graduate Research Assistant</i>	2007–2010
	Department of Psychiatry, Division of Brain Stimulation & Therapeutic Modulation, Technology Development Lab	
	§ Columbia Irving Institute for Clinical and Translational Research T32 Fellow	
	Harvard–MIT Division of Health Sciences and Technology	Cambridge, MA
	<i>Graduate Research Assistant</i>	2006–2007
	Neurophysiology & Neuroengineering Lab	
	<i>Undergraduate Research Assistant</i>	2005–2006
	Neurophysiology & Neuroengineering Lab	
NONPROFIT LEADERSHIP	Singula Institute	New York, NY
	<i>Co-founder, Scientific Advisor</i>	2017–
INTERNSHIPS	NewYork-Presbyterian/Weill Cornell Medical Center	New York, NY
	<i>Executive Intern</i>	2004
	Department of Anesthesiology	
	The New York Times Company, Inc.	New York, NY
	<i>Internship Coordinator</i>	2003
	The New York Times Company Foundation/The Children’s Aid Society	
	<i>Newsroom Technology Intern</i>	2002


* Denotes first, joint first, or senior author



- N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, "Real-time computation of brain E-field for enhanced transcranial magnetic stimulation neuronavigation and optimization," *Imaging Neuroscience*, in press.  
-  First Place in Student Paper Award (awarded to N.I. Hasan), *International Applied Computational Electromagnetics Society Symposium*, 2024.
-  Third Place in Best Student Paper (awarded to N.I. Hasan), *Photonics & Electromagnetics Research Symposium*, 2024.
- S. M. McClintock, **Z.-D. Deng**, M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Luber, and S. H. Lisanby, "Comparing the neurocognitive effects of right-unilateral ultra-brief pulse electroconvulsive therapy and magnetic seizure therapy for the treatment of major depressive episode," *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, online ahead of print, Feb. 2025.  
- N. Khadka, **Z.-D. Deng**, S. H. Lisanby, M. Bikson, and J. A. Camprodon, "Computational models of high-definition electroconvulsive therapy (ECT) for focal or multi-targeting," *The Journal of ECT*, online ahead of print, 2024.  
- B. Luber, L. Beynel, **Z.-D. Deng**, L. G. Appelbaum, T. Jones, A. Harrison, D. L. K. Murphy, E. Lo, R. A. McKinley, and S. H. Lisanby, "Site- and frequency-specific enhancement of visual search performance with online individual alpha frequency (IAF) repetitive transcranial magnetic stimulation (rTMS) to the inferior frontal junction," *Cerebral Cortex*, vol. 34, no. 9, bhae371, Sept. 2024.  
- M. Teferi, H. Gura, M. Patel, A. Casalvera, K. G. Lynch, W. Makhoul, **Z.-D. Deng**, D. J. Oathes, Y. I. Sheline, and N. L. Balderston, "Intermittent theta-burst stimulation to the right dorsolateral prefrontal cortex may increase potentiated startle in healthy individuals," *Neuropsychopharmacology*, vol. 49, no. 10, pp. 1619–1629, Sept. 2024.  
- * M. Dib, J. D. Lewine, C. C. Abbott, and **Z.-D. Deng**, "Electroconvulsive therapy modulates loudness dependence of auditory evoked potentials: A pilot MEG study," *Frontiers in Psychiatry*, vol. 15, 1434434, Aug. 2024.  
- H. Nguyen, C. Q. Li, S. Hoffman, **Z.-D. Deng**, Y. Yang, and H. Lu, "Ultra-high frequency repetitive TMS at subthreshold intensity induces suprathreshold motor response via temporal summation," *Journal of Neural Engineering*, vol. 21, no. 4, 046044, Aug. 2024.  
- L. Beynel, H. Gura, Z. Rezaee, E. C. Ekpo, **Z.-D. Deng**, J. O. Joseph, P. Taylor, B. Luber, and S. H. Lisanby, "Lessons learned from an fMRI-guided rTMS study on performance in a numerical Stroop task," *PLOS ONE*, vol. 19, no. 5, e0302660, May 2024.   
- S. K. Kar, A. Agrawal, A. Silva-dos-Santos, Y. Gupta, and **Z.-D. Deng**, "The efficacy of transcranial magnetic stimulation in the treatment of obsessive-compulsive disorder: An umbrella review of meta-analyses," *CNS Spectrums*, vol. 29, no. 2, pp. 109–118, Apr. 2024.  
- * B. Kadriu, **Z.-D. Deng**, C. Kraus, J. N. Johnston, A. Figtman, I. D. Henter, S. Kasper, and C. A. Zarate, Jr., "The impact of body mass index on clinical features of bipolar disorder: A STEP-BD study," *Bipolar Disorder*, vol. 26, no. 2, pp. 160–175, Mar. 2024.  
 Media coverage: *Psychiatric Times*, Feb. 2024. 
- * P. L. Robins, S. N. Makaroff, M. Dib, S. H. Lisanby, and **Z.-D. Deng**, "Electric field characteristics of transcranial rotating permanent magnetic stimulation," *Bioengineering*, vol. 11, no. 3, 258, Mar. 2024.  
-  NIMH Intramural Research Program Trainee Travel Award (awarded to P.L. Robins), *NIMH IRP Fellows' Scientific Training Day*, 2023.



- * **Z.-D. Deng**, B. Luber, S. M. McClintock, R. D. Weiner, M. M. Husain, and S. H. Lisanby, “Clinical outcomes of magnetic seizure therapy vs electroconvulsive therapy for major depressive episode: A randomized clinical trial,” *JAMA Psychiatry*, vol. 81, no. 3, pp. 240–249, Mar. 2024.  
 Commentary: vol. 81, no. 7, pp. 736–737. 
 Reply: vol. 81, no. 7, pp. 737–738, July 2024. 
 Media coverage: *Psychiatric News*, Feb. 2024.  · *MedPage Today*, Feb. 2024.  · *Brain & Behavior Research Foundation*, Jan. 2024.  · *NIMH Research Highlight*, Dec. 2023. 
- * C. C. Abbott, J. Miller, D. Farrar, M. Argyelan, M. Lloyd, T. Squillaci, B. Kimbrell, S. Ryman, T. R. Jones, J. Upston, D. K. Quinn, A. V. Peterchev, E. Erhardt, A. Datta, S. M. McClintock, and **Z.-D. Deng**, “Amplitude-determined seizure-threshold, electric field modeling, and electroconvulsive therapy antidepressant and cognitive outcomes,” *Neuropsychopharmacology*, vol. 49, no. 4, pp. 640–648, Mar. 2024.  
 Research highlight commentary: vol. 49, no. 4, pp. 635–636, Mar. 2024. 
- W. A. Wartman, K. Weise, M. Rachh, L. Morales, **Z.-D. Deng**, A. R. Nummenmaa, and S. N. Makaroff, “An adaptive h-refinement method for the boundary element fast multipole method for quasi-static electromagnetic modeling,” *Physics in Medicine and Biology*, vol. 69, no. 4, 055030, Feb. 2024.   
 Third Place in International Student Competition (awarded to W. A. Wartman), *Brain & Human Body Modeling Conference*, 2023.
- M. Argyelan, **Z.-D. Deng**, O. T. Ousdal, L. Olstedal, B. Angulo, M. Baradits, A. J. Spitzberg, U. Kessler, A. Sartorius, A. Dols, K. L. Narr, R. Espinoza, J. A. van Waarde, I. Tendolkar, P. van Eijndhoven, G. A. van Wingen, A. Takamiya, T. Kishimoto, M. B. Jørgensen, A. Jørgensen, O. B. Paulson, A. Yrondi, P. Péran, C. Soriano-Mas, N. Cardoner, M. Cano, L. van Diermen, D. Schrijvers, J.-B. Belge, L. Emsell, F. Bouckaert, M. Vandenbulcke, M. Kiebs, R. Hurlmann, P. C. R. Mulders, R. Redlich, U. Dannlowski, E. Kavakbasi, M. D. Kritzer, K. K. Ellard, J. A. Camprodon, G. Petrides, A. K. Malhotra, and C. C. Abbott, “Electroconvulsive therapy-induced volumetric brain changes converge on a common causal circuit in depression,” *Molecular Psychiatry*, vol. 29, no. 2, pp. 229–237, Feb. 2024.   
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- * **Z.-D. Deng**, P. L. Robins, M. Dannhauer, L. M. Haugen, J. D. Port, and P. E. Croarkin, “Optimizing TMS coil placement approaches for targeting the dorsolateral prefrontal cortex in depressed adolescents: An electric field modeling study,” *Biomedicine*, vol. 11, no. 8, 2320, Aug. 2023.  
 First Place in International Student Competition (awarded to P. L. Robins), *Brain & Human Body Modeling Conference*, 2022.
- C. Kraus, A. Kautzky, V. Watzal, A. Gramser, B. Kadriu, **Z.-D. Deng**, L. Bartova, C. A. Zarate, Jr., R. Lanzenberger, D. Souery, S. Montgomery, J. Mendlewicz, J. Zohar, G. Fanelli, A. Serretti, and S. Kasper, “Body mass index and clinical outcomes in individuals with major depressive disorder: Finding from the GSRD European Multicenter Database,” *Journal of Affective Disorder*, vol. 335, pp. 349–357, Aug. 2023.  
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- J. Miller, T. Jones, J. Upston, **Z.-D. Deng**, S. M. McClintock, S. Ryman, D. Quinn, and C. C. Abbott, “Ictal theta power as an electroconvulsive therapy safety biomarker: A pilot study,” *The Journal of ECT*, vol. 38, no. 2, pp. 88–94, June 2022.  
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- * **Z.-D. Deng**, M. Argyelan, J. Miller, D. Quinn, M. Lloyd, T. R. Jones, J. Upston, E. Erhardt, S. M. McClintock, and C. C. Abbott, “Electroconvulsive therapy, electric field, neuroplasticity, and clinical outcomes,” *Molecular Psychiatry*, vol. 27, no. 3, pp. 1676–1682, Mar. 2022.  
 Commentary: vol. 27, no. 9, pp. 3571–3572, Sept. 2022. 
 Reply: vol. 29, no. 10, pp. 3289–3290, Oct. 2024. 
- N. L. Balderston, J. C. Beer, D. Seok, W. Makhoul, **Z.-D. Deng**, T. Girelli, M. Teferi, N. Smyk, M. Jaskir, D. J. Oathes, R. T. Shinohara, and Y. I. Sheline, “Proof of concept study to develop a novel connectivity-based electric-field modelling approach for individualized



- targeting of transcranial magnetic stimulation treatment,” *Neuropsychopharmacology*, vol. 47, no. 2, pp. 588–598, Jan. 2022.  
- S. H. Lisanby, S. M. McClintock, W. V. McCall, R. G. Knapp, C. M. Cullum, M. Mueller, **Z.-D. Deng**, A. A. Teklehaimanot, M. V. Rudorfer, E. Bernhardt, G. Alexopoulos, S. H. Bailine, M. C. Briggs, E. T. Geduldig, R. M. Greenberg, M. M. Husain, S. Kaliora, V. Latoussakis, L. S. Liebman, G. Petrides, J. Prudic, P. B. Rosenquist, S. Sampson, K. G. Tobias, R. D. Weiner, R. C. Young, C. H. Kellner, Prolonging Remission in Depressed Elderly (PRIDE) Work Group, “Longitudinal neurocognitive effects of combined electroconvulsive therapy (ECT) and pharmacotherapy in geriatric major depressive disorder: Phase 2 of the PRIDE study,” *American Journal of Geriatric Psychiatry*, vol. 30, no. 1, pp. 15–28, Jan. 2022.  
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- M. L. Cox, **Z.-D. Deng**, H. Palmer, A. Watts, L. Beynel, J. R. Young, S. H. Lisanby, J. Migaly, and L. G. Appelbaum, “Utilizing transcranial direct current stimulation to enhance laparoscopic technical skills training: A randomized controlled trial,” *Brain Stimulation*, vol. 13, no. 3, pp. 863–872, May–June 2020.  
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N. L. Balderston, E. M. Beydler, C. Roberts, **Z.-D. Deng**, T. Radman, T. Lago, B. Lubner, S. H. Lisanby, M. Ernst, and C. Grillon, “Mechanistic link between right prefrontal cortical activity and anxious arousal revealed using transcranial magnetic stimulation in healthy subjects,” *Neuropsychopharmacology*, vol. 45, no. 4, pp. 694–702, Mar. 2020.  




L.-Z. Yang, W. Zhang, W. Wang, Z. Yang, H. Wang, **Z.-D. Deng**, C. Li, B. Qiu, D.-R. Zhang, R. Cohen Kadosh, H. Li, and X. Zhang, “Neural and psychological predictors of cognitive enhancement and impairment due to neurostimulation,” *Advanced Science*, vol. 7, no. 4, 1902863, Feb. 2020.  




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M. Argyelan, L. Olteidal, **Z.-D. Deng**, B. Wade, M. Bikson, A. Joanlanne, S. Sanghani, H. Bartsch, M. Cano, A. M. Dale, U. Dannlowski, A. Dols, V. Enneking, R. Espinoza, U. Kessler, K. L. Narr, K. J. Oedagaard, M. L. Oudega, R. Redlich, M. L. Stek, A. Takamiya, L. Emsell, F. Bouckaert, P. Sienaert, J. Pugol, I. Tendolkar, P. van Eijndhoven, G. Petrides, A. K. Malhotra, and C. Abbott, “Electric field causes volumetric changes in the human brain,” *eLife*, vol. 8, e49115, Oct. 2019.   



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- M. Velez Afanador, **Z.-D. Deng**, and S. H. Lisanby, “Resting-state EEG source analysis in depressed patients treated with electroconvulsive therapy and magnetic seizure therapy,” *Biological Psychiatry*, vol. 83, no. 9, p. S405, 2018.
 Outstanding Poster Award (awarded to M. Velez Afanador), *NIH Postbac Poster Day*, 2018.
- * **Z.-D. Deng**, S. M. McClintock, and S. H. Lisanby, “EEG-based graph theoretical measures as biomarkers of clinical outcome in electroconvulsive and magnetic seizure therapy,” *The National Network of Depression Centers Annual Conference*, 2014.
 Innovative Poster Award

INTELLECTUAL
PROPERTY

- Z.-D. Deng**, J. Kim, G. R. Dold, B. A. Pritchard, R. H. Schor, and S. H. Lisanby, “Systems and methods for adjustable current individualized stimulation therapy,” U.S. Provisional Patent application 63/656,515, June 5, 2024.
- Z.-D. Deng**, B. A. Pritchard, J. Kim, G. R. Dold, R. H. Schor, and S. H. Lisanby, “Systems and methods for multichannel individualized stimulation therapy,” PCT/US24/23876, Apr. 10, 2024; U.S. Provisional Patent application 63/495,244, Apr. 10, 2023.
- C. C. Abbott, **Z.-D. Deng**, J. Upston, T. Jones, and A. Datta, “Systems and methods for E-field informed electroconvulsive therapy,” PCT WO/2024/148196, July 11, 2024; U.S. Provisional Patent application 63/437,017, Jan. 4, 2023.
- C. C. Abbott, A. Datta, J. Upston, T. Jones, and **Z.-D. Deng**, “Systems and methods for amplitude-determined seizure titrations and electric field modeling in electroconvulsive therapy,” U.S. Provisional Patent application 63/516,371, July 28, 2023.
- S. N. Makarov, G. M. Noetscher, V. S. Makarov, and **Z.-D. Deng**, “Whole body non-contact electrical stimulation device with variable parameters,” U.S. Patent 10,551,449, Feb. 4, 2020.
- C.-S. Poon and **Z.-D. Deng**, “Systems and methods for detecting a physiological abnormality in a patient by using cardiac or other chaos in combination with a non-increasing parasympathetic modulation,” U.S. Patent 9,737,258, Aug. 22, 2017; PCT WO/2014/120353, July 8, 2014.

NIH
PROTOCOLS

- A. V. Peterchev and **Z.-D. Deng**, “Transcranial magnetic stimulation coil with electronically switchable active and sham modes,” U.S. Provisional Patent application 61/525,922, Aug. 22, 2011.
- A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, “Methods, apparatus, and systems for magnetic stimulation,” U.S. Patent 9,295,853 B2, Mar. 29, 2016; U.S. Patent 8,801,589, Aug. 12, 2014; PCT WO/2010/017249; U.S. Patent 2011/0184223 A1; U.S. Patent 2009/052768, Aug. 4, 2009.
- A feasibility study of Transcranial Electric Stimulation Therapy (TEST) for treatment resistant depression*
NIMH Protocol 21-M-0031 2021–
Role: Associate investigator; PI: S. H. Lisanby
- Role of GABAergic transmission in auditory processing in Autism Spectrum Disorder*
NIMH Protocol 20-M-0159 2020–
Role: Associate investigator; PI: S. H. Lisanby
- Safety and feasibility of individualized low amplitude seizure therapy*
NIMH Protocol 19-M-0073 2019–
Role: Associate investigator; PI: S. H. Lisanby
- Mechanism of action underlying ketamine’s antidepressant effects: An investigation of the AMPA throughput theory in patients with treatment-resistant major depression*
NIMH Protocol 19-M-0107 2019–
Role: Associate investigator; PI: C. A. Zarate, Jr.
- Concurrent fMRI-guided rTMS and cognitive therapy for the treatment of major depressive episodes*
NIMH Protocol 17-M-0147 2017–
Role: Associate investigator; PI: S. H. Lisanby
- Development of non-invasive brain stimulation techniques*
NIMH Protocol 18-M-0015 2017–
Role: Associate investigator; PI: S. H. Lisanby
- Development of functional and structural magnetic resonance imaging techniques for the study of mood and anxiety disorders*
NIMH Protocol 07-M-0021 2017–
Role: Associate investigator; PI: A. C. Nugent
- Identifying neurobiological mechanisms that underlie acute nicotine withdrawal and drive early relapse in smokers*
NIDA Protocol 12-DA-N474 2017–
Role: Associate investigator; PI: A. Janes
- Neuropharmacologic imaging and biomarker assessments of response to acute and repeated-dosed ketamine infusions in major depressive disorder*
NIMH Protocol 17-M-0060 2016–
Role: Associate investigator; PI: C. A. Zarate, Jr.
- Evaluation of patients with mood and anxiety disorders and healthy volunteers*
NIMH Protocol 01-M-0254 2016–
Role: Associate investigator; PI: C. A. Zarate, Jr.
- Modulation of the parieto-frontal communication*
NINDS Protocol 18-N-0054 2018–2019
Role: Associate investigator; PI: M. Hallett
- Effect of TMS to frontoparietal attention network on anxiety potentiated startle*
NIMH Protocol 17-M-0042 2017–2019
Role: Associate investigator; PI: C. Grillon

ONGOING
RESEARCH
SUPPORT

ADEPT: Adaptive trial for the treatment of depression associated with concussion using repetitive transcranial magnetic stimulation protocols

Congressionally Directed Medical Research Programs

2024–

Role: Intramural NIH collaborator; PI: D. L. Brody

This study aims to compare different types of TMS that may alleviate depressive symptoms in US military service members with a history of concussion.

Charge-based brain modeling engine with boundary element fast multipole method

NIH/NIMH R01 MH130490

2023.07–2028.05

Role: Intramural NIH collaborator; PI: S. N. Makaroff

This project seeks to create a new brain modeling engine that employs boundary element and fast multipole methods to achieve superior spatial resolution and accuracy in electromagnetic modeling, outperforming traditional approaches based on the finite element method.

Novel electric-field modeling approach to quantify changes in resting state functional connectivity following theta burst stimulation

NIH/NIMH U01 MH130447

2022.09–2027.06

Role: Intramural NIH collaborator; PI: N. L. Balderston

This study aims to develop a model using whole-brain estimates of the TMS-induced electric field to predict changes in resting state functional connectivity following neuro-modulatory TMS, and validate this model in a large cohort of healthy volunteers receiving multiple doses of either intermittent or continuous theta burst stimulation.

Development of a novel, scalable, neurobiologically-guided transcranial magnetic stimulation protocol for the treatment of cannabis use disorder

Centre for Addiction and Mental Health, Toronto, ON, Canada

2023.02–

Role: Consultant; PI: V. M. Tang

This proof-of-concept clinical trial will evaluate the feasibility and tolerability of a 4-week course of rTMS to the prefrontal cortex and insula as a treatment for cannabis use disorder.

Deciphering mechanisms of ECT outcomes and adverse effects (DECODE)

NIH/NIMH R01 MH128686/MH128690/MH128691/MH128692

2022.08–2027.05

Role: Intramural NIH collaborator; mPIs: Y. I. Sheline, K. L. Narr, R. Espinoza, S. M. McClintock, C. C. Abbott

This multi-site prospective study aims to study the mechanism of ECT-induced antidepressant benefits and cognitive adverse effects to determine optimal ECT dose.

Electroconvulsive therapy amplitude titration for improved clinical outcomes in late-life depression

NIH/NIMH R61/R33 MH125126

2021.02–2023.01

Role: Intramural NIH collaborator; PI: C. C. Abbott

This study uses titrated amplitude ECT, individualized based on seizure threshold, to improve clinical response while minimizing cognitive impairment in geriatric depression.

Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders

NIH/NIMH R61/R33 MH120188

2020.05–2023.04

Role: Intramural NIH collaborator; mPIs: A. N. Voineskos, D. M. Blumberger

This study uses advanced brain imaging, and compare different brain stimulation techniques, to determine whether targeting the dorsomedial prefrontal cortex can engage social cognitive brain circuitry in people with schizophrenia spectrum disorders.

PENDING
RESEARCH
SUPPORT

Improving ECT clinical outcomes through seizure- and model-guided stimulation parameters

NIH UH3/UG3

2024.10

Role: mPI; collaborating PIs: C. C. Abbott, A. Datta

Development of high-density theta burst transcranial magnetic stimulation (TMS) technology and initial testing in humans

NIH UH3/UG3

2024.09

COMPLETED RESEARCH SUPPORT	Role: Intramural NIH collaborator; PI: H. Lu	
	<i>Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks</i>	
	NIH/NIMH R01	2024.10
	Role: Intramural NIH collaborator; PI: Y. Fan	
	<i>Targeting the causal depression network with electroconvulsive therapy</i>	
	NIH/NIMH R33/R61	2024.02
	Role: Intramural NIH collaborator; PI: M. Argyelan	
	<i>Development of a next generation ECT system: PRecision Optimally Targeted ECT (PRO-TECT)</i>	
	NIH/NIMH UG3/UH3	2024.06
	Role: Intramural NIH collaborator; PI: C. C. Abbott	
	<i>ECT pulse amplitude and medial temporal lobe engagement</i>	
	NIH/NINDS U01 MH111826	2016.09–2020.07
	Role: Co-I; PI: C. C. Abbott	
	This study explores the impact of targeted hippocampal engagement with varying levels of electroconvulsive therapy current amplitude in elderly patients with clinical, neuropsychological and neuroimaging assessments.	
	<i>Individualized low amplitude seizure therapy (iLAST)</i>	
	Brain & Behavior Research Foundation Young Investigator Award 26161	2018.06–2020.06
	Role: PI	
	This study aims to develop a novel form of seizure therapy for depression that avoids the neurocognitive side effects of electroconvulsive therapy by using computational modeling to direct multi-electrode configurations that provide targeted and individualized dosing.	
	<i>Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)</i>	
	NIMH 271201200006I-3-27100003-1	2016.06–2017.12
	Role: Data analyst; PI: A. D. Krystal	
	The goal of this project is to establish the kappa opiate receptor occupancy and mu opiate receptor effects after two weeks of daily dosing with the investigational agent LY2456302, which has been demonstrated to be a selective kappa opiate receptor antagonist.	
	<i>Transcranial direct current stimulation as a treatment for acute fear</i>	
	NIH/NIMH R21 MH106772	2015.04–2017.01
	Role: Co-I; PI: A. D. Krystal	
	This study investigates the utility of transcranial direct current stimulation to engage a target neural circuit, which could serve as the basis for developing better therapies for those suffering from acute fear related difficulties.	
	<i>Individualized optimally-targeted seizure therapy</i>	
	NIH/NCATS KL2 TR001115	2014.07–2016.06
	Role: PI; Training Grant PI: R. M. Califf	
	This award from the Duke Translational Medicine Institute prepares the fellow for a successful career as a multidisciplinary independent investigator in the field of brain stimulation. The goal of the project is to develop a novel individualized neurotargeted seizure therapy.	
	<i>Safety and feasibility of low amplitude electroconvulsive therapy</i>	
	Duke University School of Medicine, Pilot fund	2015.03–2016.06
	Role: PI	
	This study evaluates whether neurocognitive side effects of electroconvulsive therapy can be improved by reducing the current pulse amplitude.	
	<i>Prolonging Remission In Depressed Elderly (PRIDE)</i>	
	NIH/NIMH U01 MH084241	2009.04–2016.03

- Role: Data analyst; PI: S. H. Lisanby
 This study evaluates the efficacy and neurocognitive effects of combined electroconvulsive and pharmacotherapy in prolonging remission in elderly patients with major depression.
- Low field magnetic stimulation coil design*
 Tal Medical 2015.04–2016.06
 Role: Co-I; PI: A. V. Peterchev
 This project develops a novel coil system for low field magnetic stimulation.
- Concurrent cognitive behavioral therapy and transcranial magnetic stimulation in obsessive-compulsive disorder*
 American Psychiatric Association Research Scholarship 2015.11–2016.06
 Role: Acting PI; Grantee: Y. Hu
 The purpose of this pilot study is to evaluate the feasibility of repetitive transcranial magnetic stimulation of the supplementary motor area concurrently with elements of exposure and response prevention in patients with obsessive-compulsive disorder.
- Evoked potentials as markers of ketamine-induced cortical plasticity in patients with major depressive disorder*
 Janssen Research & Development, LLC 2014.01–2015.12
 Role: Co-I; PI: A. D. Krystal
 This open-label trial evaluates the utility of somatosensory, motor, and transcranial magnetic stimulation-based evoked potentials as markers of cortical plasticity in response to a single intravenous infusion of ketamine in patients with depression.
- Magnetic seizure therapy for the treatment of depression*
 Stanley Medical Research Institute 2005.07–2011.07
 Role: Postdoctoral fellow; PI: S. H. Lisanby
 This two-center, randomized, double-blind controlled trial compares the antidepressant efficacy and side effects of magnetic seizure therapy and electroconvulsive therapy.
- Translational research evaluating neurocognitive memory processes*
 NIH/NIMH K23 MH087739 2010.07–2015.01
 Role: Postdoctoral fellow; PI: S. M. McClintock
 This study informs the cognitive component processes underlying memory impairment after electroconvulsive therapy.
- Rational dosing for electric and magnetic seizure therapy*
 NIH/NIMH R01 MH091083 2010.07–2015.12
 Role: Graduate research assistant, contributed to grant writing; PI: S. H. Lisanby
 This study lays a foundation for optimizing stimulus parameters of electric and magnetic seizure therapy through computational modeling and preclinical studies of seizure induction.
- Field shaping and coil design for transcranial magnetic stimulation*
 NIH/NCRR TL1 RR024158 2010.09–2011.06
 Role: PI; Training Grant PI: H. N. Ginsberg
 This award from the Columbia University Irving Institute for Clinical and Translational Research supports clinical research training for predoctoral students in the basic sciences. The goal of the project is to develop novel coil design for deep transcranial magnetic stimulation.
- Development of a novel TMS device with controllable pulse shape*
 NIH/NIBIB R21 EB006855 2007.08–2009.07
 Role: Graduate research assistant; PI: A. V. Peterchev
 This project develops an efficient transcranial magnetic stimulation device that produces nearly rectangular pulses with adjustable amplitude, width, and directionality.
- Nonlinear analysis of heart rate variability*
 NIH/NHLBI R01 HL079503 2005.11–2009.06

Role: Graduate research assistant; PI: C.-S. Poon

This project develops advanced nonlinear estimation and adaptive control algorithms for the modeling and analysis of the cardiovascular system.


SCHOLARSHIPS, FELLOWSHIPS, & HONORS	NIMH Director's Award	2024
	For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders, NIMH Intramural Research Program	
	High Five Award	2024
	For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit's Board of Scientific Counselors review, NIMH Intramural Research Program	
	Scholar, Advanced Research Institute in Geriatric Mental Health,	2023–2024
	Dartmouth College, supported by grant from NIH (R25MH068502)	
	NIMH Director's Award	2019
	For scientific innovation at the interface of computation and psychiatry, NIMH Intramural Research Program	
	Richard J. Wyatt Memorial Fellowship Award for Translational Research	2018
	NIMH Intramural Research Program	
	New Investigator Award	2018
	American Society of Clinical Psychopharmacology	
	Early Career Investigator Travel Fellowship Award	2018
	Society of Biological Psychiatry	
	Research Colloquium for Junior Investigators	2018
	American Psychiatric Association	
	Alies Muskin Career Development Leadership Program	2018
	Anxiety & Depression Association of America	
	NARSAD Young Investigator Award	2017
	Brain & Behavior Research Foundation	
	Career Development Institute for Psychiatry	2017
	Stanford University	
	New Investigator Award	2017
	International Society for CNS Clinical Trials and Methodology	
	Certificate for Highly Cited Research	2016
	<i>Brain Stimulation</i> , Elsevier	
	Young Investigator Memorial Travel Award	2015
	American College of Neuropsychopharmacology	
	Scholar, Summer Research Institute in Geriatric Mental Health	2015
	Weill Cornell Medical College, supported by grant from NIH (R25MH019946)	
	Chair's Choice Award	2014
	Society of Biological Psychiatry	
	Innovative Poster Award	2014
	National Network of Depression Centers	
	Best Abstract Award	2010
	International Society for ECT and Neurostimulation	
	Presidential Teaching Award Finalist	2010
	Columbia University	

	Student Paper Competition Finalist	2006
	IEEE Engineering in Medicine and Biology Society	
	New York Times College Scholarship	2002
	The New York Times Company Foundation	
GRAND ROUNDS	Advanced Research Institute Grand Rounds in Mental Health and Aging Research	2023
	<i>Advancing neurostimulation treatment optimization and technology innovation</i>	
	Westmead Hospital, Sydney, Australia	2020
	<i>Advances in neuromodulation: Electroconvulsive therapy</i>	
	Clinical TMS Society	2018
	<i>Transcranial magnetic stimulation: Physics, devices, and modeling</i>	
	University of New Mexico, Department of Psychiatry & Behavioral Sciences	2017
	<i>Toward individualized electroconvulsive therapy for treatment of depression</i>	
	Central Regional Hospital, Butner, NC	2015
	<i>Individualized seizure therapy</i>	
	Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences	2015
	<i>Toward next generation seizure therapy</i>	
INVITED SEMINARS	NIMH Intramural Research Program Investigators' Seminar Series Meeting	Upcoming 2025
	<i>Reading faces: Application of facial expression analysis for tracking emotional states in depression</i>	
	UCSF Department of Psychiatry & Behavioral Sciences	Upcoming 2025
	<i>Engineering precision in neuromodulation: Computational models and clinical applications</i>	
	University of Pittsburgh, Geriatric Psychiatry Neuroimaging Laboratory	2024
	<i>The full spectrum: Electromagnetic brain stimulation from minimal to maximal intensity</i>	
	University of Texas Southwestern, Center for Depression Research and Clinical Care	2023
	<i>Advancements in computational neurostimulation for depression treatment optimization and technology development</i>	
	University of Pittsburgh, Department of Psychiatry	2023
	<i>Computational neurostimulation: Approach to treatment optimization and technology development</i>	
	Medical University of South Carolina, National Center of Neuromodulation for Rehabilitation	
	<i>Model-driven design for brain stimulation therapies</i> 	2022
	NIMH Intramural Research Program Investigators' Seminar Series	2022
	<i>Seizure therapies: The next generation</i>	
	Butler Hospital, Brown University	2021
	<i>Computational model driven design for brain stimulation</i>	
	University of Pennsylvania, Center for Neuromodulation in Depression and Stress	2021
	<i>Electromagnetic brain stimulation from low to high intensity</i>	
	VA Boston Healthcare System, Boston University School of Medicine, Harvard Medical School	
	Neuropsychiatry Translational Research Fellowship Seminar	2020
	<i>Precision neurostimulation: History, physics, computational modeling, and engineering</i>	
	Medical University of Vienna, Neuroimaging Lab	2020
	<i>Precision seizure therapy</i>	
	Mount Sinai Icahn School of Medicine, Depression and Anxiety Center	2019
	<i>Rational design of individualized noninvasive brain stimulation</i>	

	NIMH Intramural Research Program Investigators' Seminar Series <i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	2018
	UCLA Brain Mapping Center <i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	2018
	UCLA Semel Institute for Neuroscience and Human Behavior, Neuromodulation Division <i>Modeling and design for magnetic stimulation</i>	2018
	USC Mark and Mary Stevens Neuroimaging and Informatics Institute <i>Computational neurostimulation</i>	2018
	NIDA, Neuroimaging Research Branch <i>Advances in transcranial magnetic stimulation technology</i>	2016
	Mayo Clinic College of Medicine, Department of Molecular Pharmacology, Neurobiology of Alcoholism and Drug Addiction Lab <i>Transcranial magnetic stimulation technology development</i>	2016
	Mayo Clinic College of Medicine, Department of Neurologic Surgery, Neural Engineering Lab <i>Optimizing transcranial magnetic stimulation</i>	2016
	NIMH, Experimental Therapeutics & Pathophysiology Branch <i>Engineering better electromagnetic brain stimulation therapies</i>	2016
	Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences Chair's round: <i>Fundamentals of transcranial electric and magnetic stimulation dosing</i>	2015
	Weill Cornell Medical College, Department of Biomedical Engineering <i>Transcranial magnetic stimulation: Pulse source, coil design, & concurrent neuroimaging</i>	2015
	Duke University, Department of Biomedical Engineering <i>Modeling and coil design considerations for transcranial magnetic stimulation</i>	2014
CONFERENCE TALKS, WORKSHOPS, & PANELS	International Society for ECT and Neurostimulation Annual Meeting <i>Multichannel Individualized Stimulation Therapy</i>	Upcoming 2025
	American Neuropsychiatric Association Annual Meeting Panel: <i>Interventional neuropsychiatry: From mechanisms to clinical decision-making</i>	Upcoming 2025
	International Brain Stimulation Conference On-demand symposium: <i>ECT reimaged: Precision, prediction, and personalized care</i>	Upcoming 2025
	IEEE Brain Discovery & Neurotechnology Workshop, University of Illinois Chicago <i>A model-driven approach to personalized neuromodulation treatment</i>	2024
	International Symposium on Novel Neuromodulation Techniques for Neurocognitive Disorders <i>Model-driven brain stimulation treatments</i>	2024
	NIMH Workshop on The Placebo Effect: Key Questions for Translational Research <i>Challenges and strategies in implementing effective sham stimulation for noninvasive brain stimulation trials</i> 	2024
	International Society for Magnetic Resonance in Medicine Annual Meeting Workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i> Contributed talk: <i>TMS devices and modeling</i>	2024
	Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging, Massachusetts General Hospital Chair: <i>New modeling methods and targets: Spinal cord stimulation and novel stimulation</i> Chair: <i>Development and assessment of modeling methods</i> Contributed talk: <i>Effects of low intensity magnetic stimulation</i> Judge: Student competition	2023
	International Conference of the IEEE Engineering in Medicine and Biology Society	2023

Panel: <i>Computational analysis of non-invasive neuromodulation: Brain and spine</i> Contributed talk: <i>Modeling of TMS and ECT in the treatment of depression</i>	
ADAA Anxiety and Depression Conference Panel: <i>Parsing through syndromic heterogeneity in youths with mental illness to identify neurocircuit mechanisms and develop novel treatments</i> Contributed talk: <i>Modeling and dose optimization for TMS and ECT</i>	2023
International Brain Stimulation Conference Symposium chair: <i>Insights and challenges in preclinical models of TMS: Multimodal investigations across animal species</i> Fast-track oral symposium chair: <i>Advanced computational modeling and optimization methods for noninvasive brain stimulation</i>	2023
International Network of tES-fMRI (INTF) Webinar Series <i>Electric field modeling and optimization approaches for individualized targeting</i>	2022
International Society for Magnetic Resonance in Medicine Workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, and bio-marker development</i> Contributed talk: <i>Modeling of TMS</i> 	2022
Bergen Workshop of the Global ECT-MRI Collaboration <i>ECT device development</i> 	2022
International Congress of Clinical Neurophysiology Chair: <i>Towards optimized TMS targeting approaches</i>	2022
Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging, Massachusetts General Hospital Chair: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i> Contributed talk: <i>ECT, electric field, neuroplasticity, and clinical outcomes</i>	2022
European Conference of Brain Stimulation in Psychiatry Panel: <i>Beyond clinical syndromes: Understanding mechanisms of neuromodulation from a dimensional perspective</i> Contributed talk: <i>Symptom dimensions and response trajectories in ECT and MST</i>	2022
Society of Biological Psychiatry Annual Meeting Panel: <i>Dimensional approaches to device neuromodulation</i> Contributed talk: <i>Depressive symptom dimensions in seizure therapy</i>	2022
Global ECT-MRI Collaboration Young Researchers Collective <i>ECT, electric field, neuroplasticity, and clinical outcomes</i>	2022
American Academy of Child and Adolescent Psychiatry Annual Meeting Panel: <i>Recent work with contemporary computational methods and artificial intelligence to advance the practice of child and adolescent psychiatry</i> Contributed talk: <i>Introduction to computational psychiatry</i>	2021
European College of Neuropsychopharmacology Congress Panel: <i>Neurobiology of rapid mood changes</i> Contributed talk: <i>Precision neurostimulation: Electroconvulsive therapy</i>	2021
Society for Brain Mapping & Therapeutics Annual Congress <i>Advances in electroconvulsive therapy for treatment of depression</i>	2021
American Society of Clinical Psychopharmacology Annual Meeting Early Career Workshop: <i>How to give a virtual talk</i>	2021
International College of Neuropsychopharmacology Virtual World Congress <i>Next generation seizure therapy and neuromodulation</i>	2021
European Conference of Brain Stimulation in Psychiatry	2020

Panel: <i>What can we learn from ECT: Insights from the GEMRIC consortium</i>	
Contributed talk: <i>Electric field modeling to inform ECT dosing and device development</i>	
University of Minnesota Non-Invasive Brain Stimulation Workshop	2020
Use of individual electric field models in clinical research 	
American Society of Clinical Psychopharmacology Annual Meeting	2020
Panel: <i>New developments in neurostimulation</i> #coronacancelled	
NYC Neuromodulation Online	2020
Discussant: <i>Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders</i>	
American College of Neuropsychopharmacology	2019
Panel: <i>Precision neurostimulation for treatment of psychiatric disorders</i>	
Contributed talk: <i>Rational design of precision seizure therapy</i>	
International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders, Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance	
<i>Rational design of precision seizure therapy</i>	2019
International College of Neuropsychopharmacology Meeting	2019
Workshop: <i>Neurobiological and clinical characterization, and treatment development for treatment resistant depression</i>	
Contributed talk: <i>Individualized seizure therapy: Reinventing ECT</i>	
American Society of Clinical Psychopharmacology Annual Meeting	2019
Co-chair: <i>Treatment-resistant mood disorders across the lifespan: Novel therapeutics</i>	
International Brain Stimulation Conference	2019
Panel: <i>Individualized brain stimulation: Addressing heterogeneity across modalities</i>	
Contributed talk: <i>Individualized electroconvulsive therapy for treatment of depression</i>	
2 nd Bergen Workshop of the Global ECT–MRI Collaboration	2018
<i>Electric field modeling for electroconvulsive therapy</i>	
Joint NYC Neuromodulation Conference & NANS Summer Series	2018
Preconference workshop director: <i>Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers</i>	
Contributed talk: <i>Optimizing high-density stimulation arrays for brain targeting</i>	
Neuropsychiatric Drug Development Summit	2018
<i>Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders</i>	
International Conference of the IEEE Engineering in Medicine and Biology Society	2018
Chair: <i>Computational human models for brain stimulation</i>	
Contributed talk: <i>Electric field induced by TMS: Applications in depression and anxiety</i>	
APA Annual Conference Presidential Symposium	2018
Presidential symposium: <i>ECT in the era of new brain stimulation treatments</i>	
Contributed talk: <i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	
ADAA Anxiety and Depression Conference	2018
Panel: <i>Personalized medicine for treatment resistant depressed patients: Novel strategies to optimize treatment with antidepressant medications, ketamine, and ECT</i>	
Contributed talk: <i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	
NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop	2017
Use of individual electric field models in clinical research 	
NYC Neuromodulation Conference	2017
<i>Low field magnetic stimulation</i>	

TEACHING & MENTORING APPOINTMENTS	NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications	2016
	<i>Effect of anatomical variability on electric field characteristics of tES</i>	
	International Society for ECT and Neurostimulation Annual Meeting	2015
	Workshop: <i>Spatial targeting with transcranial magnetic stimulation</i>	
	National Institutes of Health	Bethesda, MD
	<i>Lecturer</i> , NINDS	
	Clinical Neuroscience Program Lecture Series	2017, 2019
	<i>Lecturer</i> , NIMH	
	NIH Basic Training Course on Transcranial Magnetic Stimulation 	2020
	fMRI Course	2017
	University of Maryland, College Park	College Park, MD
	<i>Research Mentor</i> , Fischell Department of Bioengineering	2018–2019
	Capstone project: <i>Detection of brain-to-brain synchrony for improved psychotherapy</i>	
	Duke University	Durham, NC
	<i>Instructor</i> , Department of Psychology & Neuroscience	
	Research Independent Study	2016
	<i>Faculty</i> , Department of Psychiatry & Behavioral Sciences	
	Visiting Fellowship in Transcranial Magnetic Stimulation & Electroconvulsive Therapy Fellowship (Continuing Medical Education accredited)	2014–2016
	<i>Research Mentor</i> , Matching Undergraduates to Science and Engineering Research Program	2015–2016
	<i>Faculty</i> , Biosciences Collaborative for Research Engagement	2015–2016
	Columbia University	New York, NY
	<i>Teaching Assistant</i> , Department of Electrical Engineering	
	Analog Systems in VLSI (graduate level)	Spring 2010
	The Digital Information Age	Fall 2009
	<i>Recitation Instructor</i> , Department of Biostatistics, Mailman School of Public Health	
	Biostatistics (graduate level)	Fall 2009
	Massachusetts Institute of Technology	Cambridge, MA
	<i>Educational Counselor</i>	2022–
	<i>Teaching Assistant</i> , Department of Mathematics	
	Multivariable Calculus	Fall 2003–2006
	Differential Equations	Spring 2004–2007
	<i>Grader</i> , Department of Electrical Engineering & Computer Science	
	Signals and Systems	Fall 2004

SUPERVISED THESES	G. Asturias, “Effect of repetitive transcranial magnetic stimulation on the structural and functional connectome in patients with major depressive disorder,” Undergraduate Honors Thesis, Duke University, Department of Psychology and Neuroscience, Durham, NC, 2017. Available: DukeSpace. 
THESIS EXAMINATION COMMITTEES	W. A. Wartman, “BEM-FMM with adaptive mesh refinement for brain modeling,” Ph.D. dissertation, Worcester Polytechnic Institute, Department of Electrical and Computer Engineering, Worcester, MA, 2024. Sponsor: S. N. Makaroff. D. Q. Troung, “Translational modeling of non-invasive electrical stimulation,” Ph.D. dissertation, City College of the City University of New York, Department of Biomedical Engineering, New York, NY, 2019. Sponsor: M. Bikson. Available: CUNY Academic Works. 
CAREER DEVELOPMENT AWARD ADVISORY	S. M. Hare, Ph.D., University of Maryland, Baltimore NIH/NIMH K01 MH133116 2024–2029 <i>Cognitive and neural correlates of TMS motor intracortical inhibition in schizophrenia</i> S. H. Siddiqi, M.D., Brigham & Women’s Hospital NIH/NIMH K23 MH121657 2020–2025 <i>Personalized circuit-based neuromodulation targets for depression</i> N. L. Balderston, Ph.D., NIH/University of Pennsylvania NIH/NIMH K01 MH121777 2019–2023 <i>Examining the mechanisms of anxiety regulation using a novel, sham-controlled, fMRI-guided rTMS protocol and a translational laboratory model of anxiety</i>
RESEARCH FELLOWS & POSTDOCS	S. Dey, Ph.D., NIH 2024– M. Dannhauer, Ph.D., NIH 2022–2024 Post-training position: Assistant Professor, Department of Computer Science, East Carolina University
GRADUATE STUDENTS	E. Bharti, Ph.D. candidate, University of Cambridge (NIH–OxCam Program) 2024– M. Kshirsagar, M.S., Biomedical Engineering, Duke University 2012 Post-training position: Consultant, Deloitte Consulting
NIH POSTBAC TRAINEES	P. L. Robins, B.A., Physics, Lawrence University 2021–2024  NIMH Intramural Research Program Trainee Travel Award 2023  First Place in Student Competition, <i>Brain & Human Body Modeling Conference</i> 2022 Post-training position: TMS technician, Columbia Associates S. M. Awasthi, B.S., Biomedical Engineering, Johns Hopkins University 2018–2020 Post-training position: Medical student, Stanford University School of Medicine M. Noh, S.B., Bioengineering, MIT 2018–2019 Post-training position: Medical student, University of Cincinnati College of Medicine J. Thomas, M.S., Physiology and Biophysics, Georgetown University 2017–2019 Post-training position: Program Officer, National Academies of Sciences, Engineering, and Medicine M. Velez Afanador, B.S., Microbiology, University of Puerto Rico 2016–2019  Outstanding Poster Award, <i>NIH Postbac Poster Day</i> 2018 Post-training position: Medical student, Howard University College of Medicine
UNDERGRAD STUDENTS	G. Asturias, Psychology & Neuroscience, Duke University 2015–2017  Graduated with Distinction Z. Feng, Biomedical Engineering and Biology, Duke University 2015–2016 M. Glidewell, Biomedical Engineering, Duke University 2015–2016

	S. Lee, Biomedical Engineering, Duke University	2015–2016
	W. Lim, Biomedical Engineering, Duke University	2015–2016
	F. M. Mercer, Women’s Studies, Duke University	2015–2016
	E. Salgado, Psychology & Neuroscience, Duke University 🏆 Graduated with Distinction	2015–2016
	R. Shah, Psychology & Neuroscience, Duke University	2015–2016
	E. Shinder, Biology, Duke University 🏆 Graduated with Distinction	2015–2016
	E. P. Vienneau, Biomedical Engineering, Duke University 🏆 Howard G. Clark Award for Excellence in Research	2015–2016
	D. T. Weaver, Biology, Duke University	2015–2016
	J. R. Lilien, Electrical & Computer Engineering, Duke University 🏆 Walter J. Seeley Scholastic Award	2014–2016
INTERNS	M. Dib, Biomedical Engineering, University of Maryland, College Park	2018
	E. Chung, Psychology, University of Maryland, College Park	2017
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University	2017
	G. Asturias, Psychology & Neuroscience, Duke University	2016
	C. M. Prevost, Biomedical Engineering, Clemson University	2015
	J. V. McCall, Biomedical Engineering, North Carolina State University	2013
PROFESSIONAL & SCHOLASTIC SOCIETIES MEMBERSHIP	IEEE , Engineering in Medicine and Biology Society Senior Member Member Student Member	2023– 2013–2023 2004–2013
	American Society of Clinical Psychopharmacology Member Early Career Committee Technology Committee Program Review Sub-Committee Technology Task Force	2019– 2023–2027 2023–2025 2023 2020–2023
	Biomedical Engineering Society Member	2021–
	American College of Neuropsychopharmacology Associate Member	2023–
	Sigma Xi, The Scientific Research Honor Society Full Member	2024–
	Anxiety and Depression Association of America Member	2017–2018
	International Society for CNS Clinical Trials and Methodology Member	2017–2019
	Organization for Human Brain Mapping Member	2014–2019
	Society for Industrial and Applied Mathematics Student Member	2008–2012

	Society for Neuroscience	
	Student Member	2005–2012
	American Physical Society	
	Student Member	2004–2009
EDITORIAL ROLES	Deputy Editor, <i>Transcranial Magnetic Stimulation</i>	2024–
	Associate Editor, <i>Frontiers in Psychiatry: Neurostimulation</i>	2022–
	Associate Editor, <i>Frontiers in Psychiatry: Neuroimaging</i>	2022–
	Co-Editor on Research Topic: How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action 	2024
	Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i>	
	Co-Editor on Research Topic: Neurobiology of Rapid Mood Changes 	2020
	Review Editor, <i>Frontiers in Psychology: Addictive Behaviors</i>	2022–
	Review Editor, <i>Frontiers in Psychology: Consciousness Research</i>	2022–
	Guest Editor, <i>Physics in Medicine and Biology</i>	
	Special Issue: Electromagnetic Modeling for Brain Stimulation 	2024
	<i>Ad hoc</i> journal reviewer	2010–
	<i>AIP Advances</i>	
	<i>American Journal of Psychiatry</i>	
	<i>Asian Journal of Psychiatry</i>	
	emphAustralasian Physical and Engineering Sciences in Medicine	
	<i>Biological Psychiatry</i>	
	<i>BioMedical Engineering OnLine</i>	
	<i>Brain Sciences</i>	
	<i>Brain Stimulation</i>	
	<i>Cerebral Cortex</i>	
	<i>Clinical EEG and Neuroscience</i>	
	<i>Clinical Neurophysiology</i>	
	<i>CNS Spectrums</i>	
	<i>Computational and Mathematical Methods in Medicine</i>	
	<i>Computer Methods and Programs in Biomedicine</i>	
	<i>Cortex</i>	
	<i>European Psychiatry</i>	
	<i>Frontiers in Cell and Developmental Biology</i>	
	<i>Frontiers in Medicine: Intensive Care Medicine and Anesthesiology</i>	
	<i>Frontiers in Neurology: Applied Neuroimaging</i>	
	<i>Frontiers in Neuroscience: Brain Imaging Methods</i>	
	<i>IEEE Transactions on Biomedical Engineering</i>	
	<i>IEEE Transactions on Neural Systems & Rehabilitation Engineering</i>	
	<i>IEEE Transactions on Magnetics</i>	
	<i>Imaging Neuroscience</i>	
	<i>Journal of ECT</i>	
	<i>Journal of Neural Engineering</i>	
	<i>Journal of Neuroscience Methods</i>	
	<i>JoVE</i>	
	<i>Medical & Biological Engineering & Computing</i>	
	<i>Medical Hypotheses</i>	
	<i>Nature Mental Health</i>	
	<i>NeuroImage; NeuroImage Clinical</i>	
	<i>Neuromodulation: Technology at the Neural Interface</i>	
	<i>Neuroscience Letters</i>	
	<i>PLOS ONE</i>	

Scientific Reports
Translational Psychiatry

	Reviewer, Conference Proceedings & Abstract	2008–
	International Conference of the IEEE Engineering in Medicine and Biology Society	
	IEEE/EMBS International Conference on Neural Engineering	
	IEEE/EMBS International Conference on Biomedical and Health Informatics	
	Biomedical Engineering Society Annual Meeting	
	American Society of Clinical Psychopharmacology Annual Meeting	
GRANT	Reviewer, NIH BluePrint MedTech Program	2022–2024
REVIEW	<i>Ad hoc</i> reviewer, NIH Early Career Reviewer Program	2021
PANELS	Biophysics of Neural Systems Study Section	
	Reviewer, Duke Institute for Brain Sciences, Research Incubator Awards	2018, 2021
CONFERENCE	Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging,	
ORGANIZING	Massachusetts General Hospital	2022–2023
COMMITTEE		
COMMUNITY	NIH Research Workforce Diversity and Equity Outreach Special Interest Group	2023–
INVOLVEMENT,	Judge, NIMH Training Day Three-Minute Talks competition	2022
OUTREACH, &	Mental Health Association of Maryland	2020
SPECIAL	Presentation: <i>Fundamentals of transcranial brain stimulation</i>	
INTEREST	Jewish Social Service Agency	2020
GROUPS	Presentation: <i>Basics of brain stimulation devices: What are they and how do they work</i>	
	Exhibitor, USA Science & Engineering Festival #coronacancelled	2020
	University of Pennsylvania, Wharton Undergraduate Health Care Club	2019
	Presentation: <i>Research in mental health treatment</i>	
	Judge, MIT Hacking Medicine: DC Grand Hack	2019
	NIH High School Scientific Training and Enrichment Program	2019
	Presentation: <i>Bioelectricity and brain stimulation</i>	
	NIH Take Your Child to Work Day	2019
	Presentation: <i>How to fool your brain</i>	
	UCLA, CruX Neurotech Organization	2019
	Presentation: <i>Neuromodulation in psychiatry</i>	
	University of Pennsylvania, Wharton Undergraduate Health Care Club	2018
	Presentation: <i>Technology and the future of mental health treatment</i>	
	NIH Noninvasive Brain Stimulation Special Interest Group	2017–
	Judge/Lead Judge, NIH Postbac Poster Day	2017–2019
	Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Association	2016
	Duke Psychiatry, Mood Disorders Support and Education Group	
	Presentation: <i>Brain stimulation treatments for severe mood disorders</i>	2016
	Presentation: <i>New frontiers in treatments for mood disorders</i>	2015
	Duke Translational Medicine Institute, Undergraduate Research Society	2016
	Presentation: <i>Engineering meets psychiatry</i>	

PROFESSIONAL DEVELOPMENT & CONTINUING EDUCATION	Mid-Level Leadership Program, NIH	2023
	Diversity and Inclusion Certificate Program, NIH	2021–2022
	Non-invasive Transcranial Brain Stimulation Course, Danish Research Centre for Magnetic Resonance, Copenhagen University Hospital Hvidovre	2019
	Health Disparities Research Curriculum, Duke Translational Medicine Institute	2015–2016
	Tackling the Challenges of Big Data, MIT Professional Education Program	2015
	Clinical Research Training Program, Duke University	2014–2015
	Transcranial magnetic stimulation administration certified, Columbia University Irving Medical Center/New York State Psychiatric Institute	2009
	Basic Life Support, American Heart Association	renewed 2023