

# ZHI-DE DENG

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LAST UPDATED January 1, 2025

RESEARCH FOCUS Noninvasive brain stimulation: Device development, modeling, stimulus parameter and dose optimization, translational and clinical applications

Computational electromagnetics

Electrophysiological and neuroimaging biomarker development

Neural plasticity and translational neuromodeling

Nonlinear dynamics of physiological systems

EDUCATION **Ph.D., Electrical Engineering**, Columbia University 2013

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

**M.Phil., Electrical Engineering**, Columbia University 2011

Graduate concentration in Neuroscience

**M.Eng., Electrical Engineering & Computer Science**, MIT 2007

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

**S.B., Electrical Science & Engineering**, MIT 2007

**S.B., Physics**, MIT 2006

Minor in Economics

POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS **Research Fellow**, National Institute of Mental Health 2016–2019

Noninvasive Neuromodulation Unit

Experimental Therapeutics & Pathophysiology Branch

 Richard J. Wyatt Memorial Fellowship for Translational Research

**Postdoctoral Associate**, Duke University School of Medicine 2013–2014

Division of Brain Stimulation & Neurophysiology

Department of Psychiatry & Behavioral Sciences

PROFESSIONAL & ACADEMIC APPOINTMENTS **Staff Scientist**, NIMH 2019–

Noninvasive Neuromodulation Unit

Experimental Therapeutics & Pathophysiology Branch

 *Director*, Computational Neurostimulation Research Program

**Adjunct Assistant Professor**, Duke University School of Medicine 2016–2024

Division of Behavioral Medicine & Neurosciences

Department of Psychiatry & Behavioral Sciences

*Network Faculty*, Duke Institute for Brain Sciences

**Medical Instructor**, Duke University School of Medicine 2014–2016

Division of Brain Stimulation & Neurophysiology

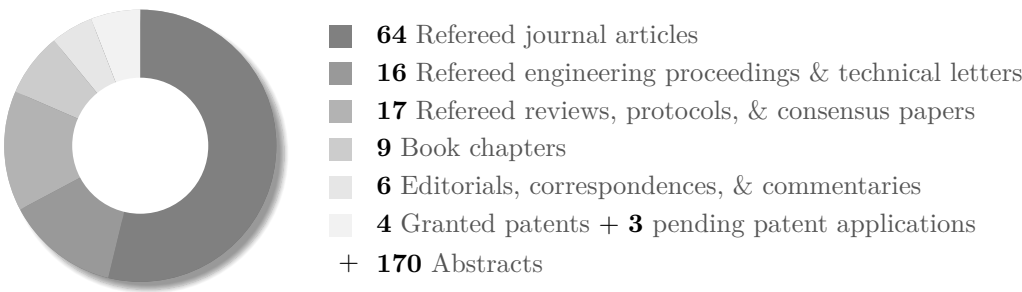
Department of Psychiatry & Behavioral Sciences

 Duke Translational Medicine Institute KL2 Fellow

NONPROFIT LEADERSHIP	<b>Co-founder &amp; Scientific Advisor</b> Singula Institute	2017 –
RESEARCH ASSISTANTSHIPS & INTERNSHIPS	<b>Visiting Graduate Research Assistant</b> , Duke Psychiatry Division of Brain Stimulation & Neurophysiology	2010 – 2013
	<b>Graduate Research Assistant</b> , Columbia Psychiatry Division of Brain Stimulation & Therapeutic Modulation Irving Institute for Clinical and Translational Research T32 Fellow	2007 – 2010
	<b>Research Assistant</b> , MIT Harvard–MIT Division of Health Sciences & Technology	2005 – 2007
	<b>Executive Intern</b> , NewYork-Presbyterian/Weill Cornell Medical Center Department of Anesthesiology	2004
	<b>Internship Coordinator</b> , The New York Times Company Foundation	2003
	<b>Newsroom Technology Intern</b> , The New York Times Company	2002
AWARDS & HONORS	<b>NIMH Director’s Award</b> For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders, NIMH	2024
	<b>Elected to Full Membership</b> Sigma Xi, The Scientific Research Honor Society	2024
	<b>High Five Award</b> For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit’s Board of Scientific Counselors review, NIMH	2024
	<b>Scholar, Advanced Research Institute in Geriatric Mental Health</b> Dartmouth College, supported by grant from NIH (R25MH068502)	2023 – 2024
	<b>Elevated to Senior Membership</b> Institute of Electrical and Electronics Engineers (IEEE)	2023
	<b>Elected to Associate Membership</b> American College of Neuropsychopharmacology	2023
	<b>NIMH Director’s Award</b> For scientific innovation at the interface of computation and psychiatry, NIMH	2019
	<b>Richard J. Wyatt Memorial Fellowship Award for Translational Research</b> NIMH Intramural Research Program	2018
	<b>New Investigator Award</b> American Society of Clinical Psychopharmacology	2018
	<b>Early Career Investigator Travel Fellowship Award</b> Society of Biological Psychiatry	2018
	<b>Research Colloquium for Junior Investigators</b> American Psychiatric Association	2018
	<b>Alies Muskin Career Development Leadership Program</b> Anxiety & Depression Association of America	2018
	<b>NARSAD Young Investigator Award</b> Brain & Behavior Research Foundation	2017
	<b>Career Development Institute for Psychiatry</b> NIMH/Stanford University/University of Pittsburgh	2017


<b>New Investigator Award</b> International Society for CNS Clinical Trials and Methodology	2017
<b>Certificate for Highly Cited Research</b> <i>Brain Stimulation</i> , Elsevier	2016
<b>Young Investigator Memorial Travel Award</b> American College of Neuropsychopharmacology	2015
<b>Scholar, Summer Research Institute in Geriatric Mental Health</b> Weill Cornell Medical College, supported by grant from NIH (R25MH019946)	2015
<b>Chair's Choice Travel Fellowship Award</b> Society of Biological Psychiatry	2015
<b>Innovative Research Poster Award</b> National Network of Depression Centers	2014
<b>Best Abstract Award</b> International Society for ECT and Neurostimulation	2010
<b>Presidential Teaching Award Finalist</b> Columbia University	2010
<b>CTSA T32 Certificate Award</b> Columbia University Irving Institute for Clinical and Translational Research	2009
<b>Student Paper Competition Finalist</b> IEEE Engineering in Medicine and Biology Society	2006
<b>New York Times College Scholarship</b> The New York Times Company Foundation	2002


RESEARCH  
OUTPUT  
SUMMARY











REFEREED  
JOURNAL  
ARTICLES






\* Denotes first, joint first, or senior author




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*, vol. 10, no. 2, Feb. 2025.  
 PMID: 39515580; DOI: 10.1016/j.bpsc.2024.10.016  
 Journal cover

Z. Qi, G. M. Noetscher, A. Miles, K. Weise, T. R. Knösche, C. R. Cadman, A. R. Potashinsky, K. Liu, W. A. Wartman, G. Nunez Ponasso, M. Bikson, H. Lu, **Z.-D. Deng**, A. R. Nummenmaa, and S. N. Makaroff, “Enabling electric field model of microscopically realistic brain,” *Brain Stimulation*, online ahead of print, 2024.   
 PMID: 39710004; DOI: 10.1016/j.brs.2024.12.1192





- 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*, online ahead of print, 2024.   
PMCID: PMC10635016; DOI: 10.1162/imag\_a\_00412  
 Third Place in Best Student Paper (awarded to N. I. Hasan), *Photonics and Electromagnetics Research Symposium*, 2024.
- 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 multitargeting treatment,” *The Journal of ECT*, online ahead of print, 2024.  
PMID: 39185880; DOI: 10.1097/YCT.0000000000001069
- 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.  
PMCID: PMC11405677; DOI: 10.1093/cercor/bhae371
- 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.  
PMCID: PMC11319663; DOI: 10.1038/s41386-024-01871-w
- \* 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.  
PMCID: PMC11345267; DOI: 10.3389/fpsyt.2024.1434434
- 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.  
PMCID: PMC11307324; DOI: 10.1088/1741-2552/ad692f
- 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.   
PMCID: PMC11073721; DOI: 10.1371/journal.pone.0302660
- 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.  
PMCID: PMC11524532; DOI: 10.1017/S1092852923006387
- \* 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.  
PMCID: PMC10839568; DOI: 10.1111/bdi.13370  
 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 rotating permanent magnet stimulation,” *Bioengineering*, vol. 11, no. 3, 258, Mar. 2024.  
PMCID: PMC10968657; DOI: 10.3390/bioengineering11030258  
 Part of the Special Issue: *Electric, Magnetic, and Electromagnetic Fields in Biology and Medicine: From Mechanisms to Biomedical Applications*   
 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.  
PMCID: PMC10701670; DOI: 10.1001/jamapsychiatry.2023.4599  
⇒ Commentary: vol. 81, no. 7, pp. 736–737, July 2024. ⇨ Reply: pp. 737–738. ⇨  
📰 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. Rymann, 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.  
PMCID: PMC10876627; DOI: 10.1038/s41386-023-01780-4  
📖 Research highlight commentary: pp. 635–636. ⇨
- W. A. Wartman, K. Weise, M. Rachh, L. Morales, **Z.-D. Deng**, A. 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. 5, 055030, Feb. 2024. 📦  
PMCID: PMC10902857; DOI: 10.1088/1361-6560/ad2638  
⇒ Part of the Special Issue: *Electromagnetic Modeling for Brain Stimulation* ⇨  
🏆 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. Oltedal, 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. Jorgensen, A. Jorgensen, O. B. Paulson, A. Yroni, 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. Hurlemann, 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. 📦  
PMCID: PMC11116108; DOI: 10.1038/s41380-023-02318-2
- S. N. Makaroff, Z. Qi, M. Rachh, W. A. Wartman, K. Weise, G. M. Noetscher, M. Daneshzand, **Z.-D. Deng**, L. Greengard, and A. R. Nummenmaa, “A fast direct solver for surface-based whole-head modeling of transcranial magnetic stimulation,” *Scientific Reports*, vol. 13, no. 1, 18657, Oct. 2023. 📦  
PMCID: PMC10618282; DOI: 10.1038/s41598-023-45602-5
- \* **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.  
PMCID: PMC10452519; DOI: 10.3390/biomedicine11082320  
⇒ Part of the Special Issue: *Emerging Trends in Brain Stimulation* ⇨  
🏆 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.  
PMCID: PMC10502963; DOI: 10.1016/j.jad.2023.05.042

- M. Teferi, W. Makhoul, **Z.-D. Deng**, D. J. Oathes, Y. Sheline, and N. L. Balderston, “Continuous theta-burst stimulation to the right dorsolateral prefrontal cortex may increase potentiated startle in healthy individuals,” *Biological Psychiatry: Global Open Science*, vol. 3, no. 3, pp. 470–479, July 2023.  
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- J. Miller, T. Jones, J. Upston, **Z.-D. Deng**, S. M. McClintock, E. Erhardt, D. Farrar, and C. C. Abbott, “Electric field, ictal theta power, and clinical outcomes in electroconvulsive therapy,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 8, no. 7, pp. 760–767, July 2023.  
PMCID: PMC10329999; DOI: 10.1016/j.bpsc.2023.03.001
- A. Guillen, C. C. Abbott, **Z.-D. Deng**, Y. Huang, P. Pascoal-Faria, D. Q. Truong, and A. Datta, “Impact of modeled field of view in electroconvulsive therapy current flow simulations,” *Frontiers in Psychiatry*, vol. 14, 1168672, May 2023.  
PMCID: PMC10232815; DOI: 10.3389/fpsyt.2023.1168672  
✂ Part of the Research Topic: *Translational Approaches in Neurostimulation Research: Challenges and Opportunities for Neuropsychiatry* 
- M. Alawi, P. F. Lee, **Z.-D. Deng**, Y. K. Goh, and P. E. Croarkin, “Modelling the differential effects of age on transcranial magnetic stimulation induced electric fields,” *Journal of Neural Engineering*, vol. 20, no. 2, 026016, Mar. 2023.  
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- X. Chen, R. Ma, W. Zhang, G. Q. Zeng, Q. Wu, A. Yimiti, X. Xia, J. Cui, Q. Liu, X. Meng, J. Bu, Q. Chen, Y. Pan, N. X. Yu, S. Wang, **Z.-D. Deng**, A. T. Sack, M. McLaughlin, and X. Zhang, “Alpha oscillatory activity is causally linked to working memory retention,” *PLOS Biology*, vol. 21, no. 2, e3001999, Feb. 2023.  
PMCID: PMC9983870; DOI: 10.1371/journal.pbio.3001999
- Z. Fu, C. C. Abbott, J. Miller, **Z.-D. Deng**, S. M. McClintock, M. S. E. Sendi, J. Sui, and V. D. Calhoun, “Cerebro-cerebellar functional neuroplasticity mediates the effect of electric field on electroconvulsive therapy outcomes,” *Translational Psychiatry*, vol. 13, no. 1, 43, Feb. 2023.  
PMCID: PMC9902462; DOI: 10.1038/s41398-023-02312-w
- \* S. N. Makaroff, H. Nguyen, Q. Meng, H. Lu, A. R. Nummenmaa, and **Z.-D. Deng**, “Modeling transcranial magnetic stimulation coils with magnetic cores,” *Journal of Neural Engineering*, vol. 20, no. 1, 016028, Jan. 2023.   
PMCID: PMC10481791; DOI: 10.1088/1741-2552/acae0d
- S. Qi, V. D. Calhoun, D. Zhang, J. Miller, **Z.-D. Deng**, K. L. Narr, Y. Sheline, S. M. McClintock, R. Jiang, X. Yang, J. Upston, T. Jones, J. Sui, and C. C. Abbott, “Links between electroconvulsive therapy responsive and cognitive impairment multimodal brain networks in late-life major depressive disorder,” *BMC Medicine*, vol. 20, no. 1, 477, Dec. 2022.   
PMCID: PMC9733153; DOI: 10.1186/s12916-022-02678-6  
✂ Correction: vol. 21, no. 1, 113, Mar. 2023. 
- H. Li, **Z.-D. Deng**, D. Oathes, and Y. Fan, “Computation of transcranial magnetic stimulation electric fields using self-supervised deep learning,” *NeuroImage*, vol. 264, 119705, Dec. 2022.  
PMCID: PMC9854270; DOI: 10.1016/j.neuroimage.2022.119705
- A. Richie-Halford, M. Cieslak, L. Ai, S. Caffarra, S. Covitz, A. R. Franco, I. I. Karipidis, J. Kruper, M. Milham, B. Avelar-Pereira, E. Roy, V. J. Sydnor, J. D. Yeatman, The Fibr Community Science Consortium [including **Z.-D. Deng**], T. D. Satterthwaite, and A. Rokem, “An analysis-ready and quality controlled resource for pediatric brain white-matter research,” *Scientific Data*, vol. 9, no. 1, 616, Oct. 2022.   
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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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- H. Bagherzadeh, Q. Meng, **Z.-D. Deng**, H. Lu, E. Hong, Y. Yang, and F.-S. Choa, "Angle-tuned coils: Attractive building blocks for TMS with improved depth–spread performance," *Journal of Neural Engineering*, vol. 19, no. 2, 026059, May 2022.  
PMCID: PMC10644970; DOI: 10.1088/1741-2552/ac697c
- B. Luber, S.W. Davis, **Z.-D. Deng**, D. Murphy, A. Martella, A.V. Peterchev, and S.H. Lisanby, "Using diffusion tensor imaging to effectively target TMS to deep brain structures," *NeuroImage*, vol. 249, 118863, Apr. 2022.  
PMCID: PMC8851689; DOI: 10.1016/j.neuroimage.2021.118863  
✉ Part of the Special Issue: *Neuromodulation and Neuroimaging for Targeted Brain Networks Interrogation*   
📰 Media coverage: *NIMH Research Highlight*, Mar. 2022. 
- \* **Z.-D. Deng**, M. Argyelan, J. Miller, D.K. 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.  
PMCID: PMC9095458; DOI: 10.1038/s41380-021-01380-y  
✉ Commentary: vol. 27, no. 9, pp. 3571–3572, Sept. 2022.   
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- N.L. Balderston, J.C. Beer, D. Seok, W. Makhoul, **Z.-D. Deng**, T. Girelli, M. Teferi, N. Smyk, M. Jaskir, D.J. Oathes, 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.  
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- 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. Latousakis, 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 major depressive disorder in older adults: Phase 2 of the PRIDE study," *American Journal of Geriatric Psychiatry*, vol. 30, no. 1, pp. 15–28, Jan. 2022.  
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- B. Kadriu, C.A. Farmer, P. Yuan, L.T. Park, **Z.-D. Deng**, R. Moaddel, I.D. Henter, B. Shovestul, E.D. Ballard, C. Kraus, P.W. Gold, R. Machado-Vieira, and C.A. Zarate, Jr., "The kynurenine pathway and bipolar disorder: Intersection of the monoaminergic and glutamatergic systems and immune response," *Molecular Psychiatry*, vol. 26, no. 8, pp. 4085–4095, Aug. 2021.  
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- A. Takamiya, F. Bouckaert, M. Laroy, J. Blommaert, A. Radwan, A. Khatoun, **Z.-D. Deng**, M. McLaughlin, W. Van Paesschen, F.-L. De Winter, J. Van den Stock, S. Sunaert, P. Sienaert, M. Vandenbulcke, and L. Emsell, "Biophysical mechanisms of electroconvulsive therapy-induced volume expansion in the medial temporal lobe: A longitudinal *in vivo* human imaging study," *Brain Stimulation*, vol. 14, no. 4, pp. 1038–1047, July–Aug. 2021.  
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- P. J. C. Suen, S. Doll, M. C. Batistuzzo, G. Busatto, L. B. Razza, F. Padberg, E. Mezger, L. Bulubas, D. Keeser, **Z.-D. Deng**, and A. R. Brunoni, “Association between tDCS computational modeling and clinical outcomes in depression: Data from the ELECT-TDCS trial,” *European Archives of Psychiatry and Clinical Neuroscience*, vol. 271, no. 1, pp. 101–110, Feb. 2021.  
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✉ Part of the Collection: *Brain Stimulation in Psychiatry* 
- C. C. Abbott, D. Quinn, J. Miller, E. Ye, S. Iqbal, M. Lloyd, T. R. Jones, J. Upston, **Z.-D. Deng**, E. Erhardt, and S. M. McClintock, “Electroconvulsive therapy pulse amplitude and clinical outcomes,” *American Journal of Geriatric Psychiatry*, vol. 29, no. 2, pp. 166–178, Jan. 2021.  
PMCID: PMC7744398; DOI: 10.1016/j.jagp.2020.06.008
- 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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
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	<p>* <b>Z.-D. Deng</b>, S. M. McClintock, M. Husain, and S. H. Lisanby, “Depressive symptom dimensions and response trajectories in electroconvulsive therapy and magnetic seizure therapy,” <i>Biological Psychiatry</i>, vol. 91, no. 9, p. S21, 2022.</p> <p>E. C. Feuer, <b>Z.-D. Deng</b>, A. V. Peterchev, C. Sikes-Keilp, M. A. Rosa, and S. H. Lisanby, “Effects of stimulus frequency and individualized current amplitude on EEG and EMG characteristics in electroconvulsive therapy and magnetic seizure therapy,” <i>International Society for ECT and Neurostimulation Annual Meeting</i>; also presented at <i>NIH Julius Axelrod Symposium</i>, 2022.</p>
INTELLECTUAL PROPERTY	<p><b>Z.-D. Deng</b>, 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, filed June 5, 2024, assigned to the National Institutes of Health.</p> <p><b>Z.-D. Deng</b>, 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, filed Apr. 10, 2024, assigned to the National Institutes of Health.</p> <p>C. C. Abbott, <b>Z.-D. Deng</b>, J. Upston, T. Jones, and A. Datta, “Systems and methods for E-field informed electroconvulsive therapy,” PCT WO 2024/148196, July 11, 2024, assigned to the University of New Mexico.</p> <p>C. C. Abbott, A. Datta, J. Upston, T. Jones, and <b>Z.-D. Deng</b>, “Systems and methods for amplitude-determined seizure titrations and electric field modeling in electroconvulsive therapy,” U.S. Provisional Patent Application 63/516,371, filed July 28, 2023 (not converted to non-provisional).</p> <p>S. N. Makarov, G. M. Noetscher, V. S. Makarov, and <b>Z.-D. Deng</b>, “Whole body non-contact electrical stimulation device with variable parameters,” U.S. Patent 10,551,449, Feb. 4, 2020, assigned to NEVA Electromagnetics, LLC.</p> <p>C.-S. Poon and <b>Z.-D. Deng</b>, “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, assigned to the Massachusetts Institute of Technology.</p> <p>A. V. Peterchev and <b>Z.-D. Deng</b>, “Transcranial magnetic stimulation coil with electronically switchable active and sham modes,” U.S. Provisional Patent Application 61/525,922, filed Aug. 22, 2011 (not converted to non-provisional).</p> <p>A. V. Peterchev, S. H. Lisanby, and <b>Z.-D. Deng</b>, “Methods, apparatus, and systems for magnetic stimulation,” U.S. Patent 9,295,853, Mar. 29, 2016, assigned to The Trustees of Columbia University in the City of New York.</p> <p>A. V. Peterchev, S. H. Lisanby, and <b>Z.-D. Deng</b>, “Methods, apparatus, and systems for magnetic stimulation,” U.S. Patent 8,801,589, Aug. 12, 2014, assigned to The Trustees of Columbia University in the City of New York.</p>
NIH PROTOCOLS	<p><i>A feasibility study of Transcranial Electric Stimulation Therapy (TEST) for treatment resistant depression</i> NIMH Protocol 21-M-0031 2021 – Role: Associate investigator; PI: S. H. Lisanby</p> <p><i>Role of GABAergic transmission in auditory processing in Autism Spectrum Disorder</i> NIMH Protocol 20-M-0159 2020 – Role: Associate investigator; PI: S. H. Lisanby</p> <p><i>Safety and feasibility of individualized low amplitude seizure therapy</i> NIMH Protocol 19-M-0073 2019 –</p>

	<p>Role: Associate investigator; PI: S. H. Lisanby</p> <p><i>Mechanism of action underlying ketamine's antidepressant effects: An investigation of the AMPA throughput theory in patients with treatment-resistant major depression</i></p> <p>NIMH Protocol 19-M-0107 2019–</p> <p>Role: Associate investigator; PI: C. A. Zarate, Jr.</p> <p><i>Concurrent fMRI-guided rTMS and cognitive therapy for the treatment of major depressive episodes</i></p> <p>NIMH Protocol 17-M-0147 2017–</p> <p>Role: Associate investigator; PI: S. H. Lisanby</p> <p><i>Development of non-invasive brain stimulation techniques</i></p> <p>NIMH Protocol 18-M-0015 2017–</p> <p>Role: Associate investigator; PI: S. H. Lisanby</p> <p><i>Development of functional and structural magnetic resonance imaging techniques for the study of mood and anxiety disorders</i></p> <p>NIMH Protocol 07-M-0021 2017–</p> <p>Role: Associate investigator; PI: A. C. Nugent</p> <p><i>Identifying neurobiological mechanisms that underlie acute nicotine withdrawal and drive early relapse in smokers</i></p> <p>NIDA Protocol 12-DA-N474 2017–</p> <p>Role: Associate investigator; PI: A. Janes</p> <p><i>Neuropharmacologic imaging and biomarker assessments of response to acute and repeated-dosed ketamine infusions in major depressive disorder</i></p> <p>NIMH Protocol 17-M-0060 2016–</p> <p>Role: Associate investigator; PI: C. A. Zarate, Jr.</p> <p><i>Evaluation of patients with mood and anxiety disorders and healthy volunteers</i></p> <p>NIMH Protocol 01-M-0254 2016–</p> <p>Role: Associate investigator; PI: C. A. Zarate, Jr.</p> <p><i>Modulation of the parieto-frontal communication</i></p> <p>NINDS Protocol 18-N-0054 2018–2019</p> <p>Role: Associate investigator; PI: M. Hallett</p> <p><i>Effect of TMS to frontoparietal attention network on anxiety potentiated startle</i></p> <p>NIMH Protocol 17-M-0042 2017–2019</p> <p>Role: Associate investigator; PI: C. Grillon</p>
ONGOING RESEARCH SUPPORT	<p><i>ADEPT: Adaptive trial for the treatment of depression associated with concussion using repetitive transcranial magnetic stimulation protocols</i></p> <p>Congressionally Directed Medical Research Programs Award TP220072 2024–</p> <p>Role: Intramural NIH collaborator; PI: D. L. Brody</p> <p>This study aims to compare different types of TMS that may alleviate depressive symptoms in US military service members with a history of concussion.</p> <p><i>Charge-based brain modeling engine with boundary element fast multipole method</i></p> <p>NIH/NIMH R01 MH130490 2023.07–2028.05</p> <p>Role: Intramural NIH collaborator; PI: S. N. Makaroff</p> <p>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 electro-magnetic modeling.</p> <p><i>Novel electric-field modeling approach to quantify changes in resting state functional connectivity following theta burst stimulation</i></p> <p>NIH/NIMH U01 MH130447 2022.09–2027.06</p>



	<p>Role: Intramural NIH collaborator; PI: N. L. Balderston</p> <p>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.</p>
	<p><i>Development of a novel, scalable, neurobiologically-guided transcranial magnetic stimulation protocol for the treatment of cannabis use disorder</i></p> <p>Centre for Addiction and Mental Health, Toronto, ON, Canada 2023.02 –</p> <p>Role: Consultant; PI: V. M. Tang</p> <p>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.</p>
	<p><i>Deciphering mechanisms of ECT outcomes and adverse effects (DECODE)</i></p> <p>NIH/NIMH R01 MH128686/MH128690/MH128691/MH128692 2022.08 – 2027.05</p> <p>Role: Intramural NIH collaborator; mPIs: Y. I. Sheline, K. L. Narr, R. Espinoza, S. M. McClintock, C. C. Abbott</p> <p>This multi-site prospective study aims to study the mechanism of ECT-induced antidepressant benefits and cognitive adverse effects to determine optimal ECT dose.</p>
	<p><i>ECT amplitude titration for improved clinical outcomes in late-life depression</i></p> <p>NIH/NIMH R61/R33 MH125126 2021.02 – 2026.01</p> <p>Role: Intramural NIH collaborator; PI: C. C. Abbott</p> <p>This study uses titrated amplitude ECT, individualized based on seizure threshold, to improve clinical response while minimizing cognitive impairment in geriatric depression.</p>
PENDING RESEARCH SUPPORT	<p><i>Improving ECT clinical outcomes through seizure- and model-guided stimulation parameters</i></p> <p>NIH UG3/UH3 2024.10</p> <p>Role: mPI; collaborating PIs: C. C. Abbott, A. Datta</p>
	<p><i>Development of high-density theta burst TMS technology and initial testing in humans</i></p> <p>NIH UG3/UH3 2024.09</p> <p>Role: Intramural NIH collaborator; PI: H. Lu</p>
	<p><i>Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks</i></p> <p>NIH/NIMH R01 2024.10</p> <p>Role: Intramural NIH collaborator; PI: Y. Fan</p>
	<p><i>Targeting the causal depression network with electroconvulsive therapy</i></p> <p>NIH/NIMH R33/R61 2024.02</p> <p>Role: Intramural NIH collaborator; PI: M. Argyelan</p>
	<p><i>Development of a next generation ECT system: PRrecision Optimally Targeted ECT</i></p> <p>NIH/NIMH UG3/UH3 2024.06</p> <p>Role: Intramural NIH collaborator; PI: C. C. Abbott</p>
COMPLETED RESEARCH SUPPORT	<p><i>Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders</i></p> <p>NIH/NIMH R61/R33 MH120188 2020.05 – 2023.04</p> <p>Role: Intramural NIH collaborator; mPIs: A. N. Voineskos, D. M. Blumberger</p> <p>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.</p>
	<p><i>ECT pulse amplitude and medial temporal lobe engagement</i></p> <p>NIH/NINDS U01 MH111826 2016.09 – 2020.07</p> <p>Role: Co-I; PI: C. C. Abbott</p> <p>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.</p>

*Individualized low amplitude seizure therapy (iLAST)*

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.

*Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)*

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.

*Transcranial direct current stimulation as a treatment for acute fear*

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.

*Individualized optimally-targeted seizure therapy*

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 researcher. The goal of the project is to develop a novel individualized neurotargeted seizure therapy.

*Safety and feasibility of low amplitude electroconvulsive therapy*

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.

*Prolonging Remission In Depressed Elderly (PRIDE)*

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.

*Translational research evaluating neurocognitive memory processes*  
NIH/NIMH K23 MH087739 2013.07 – 2014.06  
Role: Postdoctoral fellow; PI: S. M. McClintock  
This study informs the cognitive component processes underlying memory impairment after electroconvulsive therapy.

*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.

*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 aims to optimize 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 2008.07 – 2009.06  
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 transcranial magnetic stimulation.

*Development of a novel TMS device with controllable pulse shape*  
NIH/NIBIB R21 EB006855 2007.08 – 2008.06  
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 – 2007.05  
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.

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
INVITED SEMINARS	<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>	
	NIMH Intramural Research Program Investigators' Seminar Series	Upcoming 2025
	<i>Reading faces: Using facial expression analysis to track 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 <i>The full spectrum: Electromagnetic brain stimulation from minimal to maximal intensity</i>	2024
University of Texas Southwestern, Center for Depression Research and Clinical Care <i>Advancements in computational neurostimulation for depression treatment optimization and technology development</i>	2023
University of Pittsburgh, Department of Psychiatry <i>Computational neurostimulation: Treatment optimization and technology development</i>	2023
MUSC National Center of Neuromodulation for Rehabilitation <i>Model-driven design for brain stimulation therapies</i> 	2022
NIMH Intramural Research Program Investigators' Seminar Series <i>Seizure therapies: The next generation</i>	2022
Butler Hospital, Brown University <i>Computational model driven design for brain stimulation</i>	2021
University of Pennsylvania, Center for Neuromodulation in Depression and Stress <i>Electromagnetic brain stimulation from low to high intensity</i>	2021
VA Boston Healthcare System, Boston University School of Medicine Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar <i>Precision neurostimulation: History, physics, computational modeling, and engineering</i>	2020
Medical University of Vienna, Neuroimaging Lab <i>Precision seizure therapy</i>	2020
Mount Sinai Icahn School of Medicine, Depression and Anxiety Center <i>Rational design of individualized noninvasive brain stimulation</i>	2019
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, &amp; concurrent neuroimaging</i>	2015

	Duke University, Department of Biomedical Engineering	2014
	<i>Modeling and coil design considerations for transcranial magnetic stimulation</i>	
CONFERENCE TALKS, WORKSHOPS, & PANELS	International Society for ECT and Neurostimulation Annual Meeting	Upcoming 2025
	<i>Multichannel Individualized Stimulation Therapy</i>	
	American Neuropsychiatric Association Annual Meeting	Upcoming 2025
	Panel: <i>Interventional neuropsychiatry: From mechanisms to clinical decision-making</i>	
	Contributed talk: <i>Advancing personalized seizure therapy: Magnetic seizure therapy and Multichannel Individualized Stimulation Therapy</i>	
	International Brain Stimulation Conference	Upcoming 2025
	Symposium: <i>ECT reimaged: Precision, prediction, and personalized care</i>	
	Contributed talk: <i>Multichannel Individualized Stimulation Therapy (MIST): A targeted approach to optimize electroconvulsive therapy</i>	
	IEEE Brain Discovery & Neurotechnology Workshop, University of Illinois Chicago	2024
	<i>A model-driven approach to personalized neuromodulation treatment</i>	
	International Symposium on Novel Neuromodulation Techniques	2024
	<i>Model-driven brain stimulation treatments</i>	
	NIMH Workshop on The Placebo Effect: Key Questions for Translational Research	2024
	<i>Challenges and strategies in implementing effective sham stimulation for noninvasive brain stimulation trials</i> 	
	International Society for Magnetic Resonance in Medicine Annual Meeting	2024
	Workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i>	
	Contributed talk: <i>TMS devices and modeling</i>	
	Brain and Human Body Modeling Conference	2023
	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>	
	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	2023
	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>	
	International Brain Stimulation Conference	2023
	Symposium chair: <i>Insights and challenges in preclinical models of TMS: Multimodal investigations across animal species</i>	
	Symposium chair: <i>Advanced computational modeling and optimization methods for noninvasive brain stimulation</i>	
	International Network of tES-fMRI (INTF) Webinar Series	2022
	<i>Electric field modeling and optimization approaches for individualized targeting</i>	
	International Society for Magnetic Resonance in Medicine	2022
	Workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, and bio-marker development</i>	
	Contributed talk: <i>Modeling of TMS</i> 	
	Bergen Workshop of the Global ECT-MRI Collaboration	2022
	<i>ECT device development</i> 	

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 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>	2020
University of Minnesota Non-Invasive Brain Stimulation Workshop <i>Use of individual electric field models in clinical research</i> 	2020
American Society of Clinical Psychopharmacology Annual Meeting Panel: <i>New developments in neurostimulation</i> <del>#coronacancelled</del>	2020
NYC Neuromodulation Online Discussant: <i>Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders</i>	2020
American College of Neuropsychopharmacology Annual Meeting Panel: <i>Precision neurostimulation for treatment of psychiatric disorders</i> Contributed talk: <i>Rational design of precision seizure therapy</i>	2019
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 Workshop: <i>Neurobiological and clinical characterization, and treatment development for treatment resistant depression</i> Contributed talk: <i>Individualized seizure therapy: Reinventing ECT</i>	2019

American Society of Clinical Psychopharmacology Annual Meeting Co-chair: <i>Treatment-resistant mood disorders across the lifespan: Novel therapeutics</i>	2019
International Brain Stimulation Conference Panel: <i>Individualized brain stimulation: Addressing heterogeneity across modalities</i> Contributed talk: <i>Individualized electroconvulsive therapy for treatment of depression</i>	2019
Bergen Workshop of the Global ECT–MRI Collaboration <i>Electric field modeling for electroconvulsive therapy</i>	2018
Joint NYC Neuromodulation Conference & NANS Summer Series <i>Optimizing high-density stimulation arrays for brain targeting</i>	2018
Neuropsychiatric Drug Development Summit <i>Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders</i>	2018
International Conference of the IEEE Engineering in Medicine and Biology Society Chair: <i>Computational human models for brain stimulation</i> Contributed talk: <i>Electric field induced by TMS: Applications in depression and anxiety</i>	2018
American Psychiatric Association Annual Conference Presidential symposium: <i>ECT in the era of new brain stimulation treatments</i> Contributed talk: <i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	2018
ADAA Anxiety and Depression Conference 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>	2018
NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop <i>Use of individual electric field models in clinical research</i> 	2017
NYC Neuromodulation Conference <i>Low field magnetic stimulation</i>	2017
NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications <i>Effect of anatomical variability on electric field characteristics of tES</i>	2016
International Society for ECT and Neurostimulation Annual Meeting Workshop: <i>Spatial targeting with transcranial magnetic stimulation</i>	2015
International Conference of the IEEE Engineering in Medicine and Biology Society <i>TMS in the presence of deep brain stimulation implants: Induced electrode currents</i> <i>ECT in the presence of deep brain stimulation implants: Electric field effects</i>	2010
Annual National Predoctoral Clinical Research Training Program Meeting <i>Coil design for deep-brain transcranial magnetic stimulation</i>	2009
TRANSFORM Research Day, Irving Institute for Clinical and Translational Research <i>Electromagnetic field shaping and coil design for transcranial brain stimulation</i>	2009
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Coil design considerations for deep brain transcranial magnetic stimulation</i>	2008
Annual Meeting of the Society for Neuroscience <i>Heart rate variability is more chaotic in REM than NREM sleep in children</i>	2006
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Heart rate variability in pediatric obstructive sleep apnea</i>	2006



TEACHING & MENTORING APPOINTMENTS	<b>Educational Counselor</b> , MIT	2022 –
	<b>Research Mentor</b> , University of Maryland, College Park	2018 – 2019
	Fischell Department of Bioengineering	
	Capstone project: <i>Detection of brain-to-brain synchrony for improved psychotherapy</i>	
	<b>Lecturer</b> , NIH	
	National Institute of Mental Health	
	<i>Basic Training Course on Transcranial Magnetic Stimulation</i> 	2020
	<i>fMRI Course</i>	Summer 2017
	National Institute of Neurological Disorders and Stroke	
	<i>Clinical Neuroscience Program Lecture Series</i>	2017, 2019
	<b>Faculty</b> , Duke University	
	Department of Psychology & Neuroscience	
	<i>Research Independent Study</i>	2016
	Matching Undergraduates to Science and Engineering Research Program	2015 – 2016
	Biosciences Collaborative for Research Engagement	2015 – 2016
	Department Psychiatry & Behavioral Sciences	
	<i>Visiting Fellowship in Electroconvulsive Therapy</i> (CME accredited)	2015
	<i>Visiting Fellowship in Transcranial Magnetic Stimulation</i> (CME accredited)	2014 – 2016
	<b>Teaching Assistant</b> , Columbia University	
	Department of Electrical Engineering	
	<i>Analog Systems in VLSI</i> (graduate level)	Spring 2010
	<i>The Digital Information Age</i>	Fall 2009
	<b>Recitation Instructor</b> , Columbia University Mailman School of Public Health	
	Department of Biostatistics	
	<i>Biostatistics</i> (graduate level)	Fall 2009
	<b>Teaching Assistant</b> , MIT	
	Concourse Program	
	<i>Multivariable Calculus</i>	Fall 2003 – 2006
	<i>Differential Equations</i>	Spring 2004 – 2007
SPONSORED THESES	G. Asturias, Psychology & Neuroscience, Duke University	2015 – 2017
	Undergraduate honors thesis: “Effect of repetitive transcranial magnetic stimulation on the structural and functional connectome in patients with major depressive disorder.”	
	Available: <i>DukeSpace</i> . HDL: 10161/14299	
	 Graduated with Distinction	
	Post-training position: Medical student, Stanford University School of Medicine	
THESIS EXAMINATION COMMITTEE MEMBERSHIP	W. A. Wartman, Electrical & Computer Engineering, Worcester Polytechnic Institute	2024
	Ph.D. dissertation: “Adaptive mesh refinement for quasistatic electromagnetic modeling of brain stimulation and recording methods.” Sponsor: S. N. Makaroff.	
	D. Q. Troung, Biomedical Engineering, CUNY City College	2019
	Ph.D. dissertation: “Translational modeling of non-invasive electrical stimulation.” Sponsor: M. Bikson. Available: <i>CUNY Academic Works</i> . URL: <a href="https://academicworks.cuny.edu/cc_etds_theses/774">https://academicworks.cuny.edu/cc_etds_theses/774</a>	
CAREER DEVELOPMENT AWARD ADVISORY	S. K. Conroy, M.D., Ph.D., Indiana University School of Medicine	2024 –
	Project: “Targeting the medial prefrontal cortex with theta burst stimulation to reduce negative self-referential processing in major depression”	
	S. M. Hare, Ph.D., University of Maryland School of Medicine	
	NIH/NIMH K01 MH133116	2024 – 2029
	Project: “Cognitive and neural correlates of TMS motor intracortical inhibition in schizophrenia”	

	S. H. Siddiqi, M.D., Brigham & Women's Hospital NIH/NIMH K23 MH121657 Project: "Personalized circuit-based neuromodulation targets for depression" 🏆 Klerman Prize for Exceptional Clinical Research, <i>Brain &amp; Behavior Research Foundation</i>	2020 – 2025
	N. L. Balderston, Ph.D., University of Pennsylvania Perelman School of Medicine NIH/NIMH K01 MH121777 Project: "Examining the mechanisms of anxiety regulation using a novel, sham-controlled, fMRI-guided rTMS protocol and a translational laboratory model of anxiety" 🏆 Klerman Prize for Exceptional Clinical Research, <i>Brain &amp; Behavior Research Foundation</i>	2019 – 2023
RESEARCH FELLOWS & POSTDOCS	S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow M. Dannhauer, Ph.D., NIMH Research Fellow Post-training position: Assistant Professor, Department of Computer Science, East Carolina University	2024 – 2022 – 2024
GRADUATE STUDENTS	E. Bharti, Ph.D. candidate, NIH–Cambridge Scholars Program M. Kshirsagar, M.S., Biomedical Engineering, Duke University Post-training position: Consultant, Deloitte Consulting	2024 – 2012
POSTBACS	P. L. Robins, B.A., NIMH Intramural Research Training Award (IRTA) Fellow 🏆 NIMH Intramural Research Program Trainee Travel Award 🏆 First Place in Student Competition, <i>Brain &amp; Human Body Modeling Conference</i> Post-training position: TMS technician, Columbia Associates M. R. Hynd, B.S., NIMH IRTA Fellow Post-training position: Ph.D. student, University of North Carolina at Chapel Hill S. Awasthi, B.S., NIMH IRTA Fellow Post-training position: Medical student, Stanford University School of Medicine M. M. Noh, S.B., NIMH IRTA Fellow Post-training position: Medical student, University of Cincinnati College of Medicine J. Thomas, M.S., NIMH IRTA Fellow Post-training position: Program officer, National Academies of Sciences, Engineering, and Medicine M. Velez Afanador, B.S., NIMH IRTA Fellow 🏆 Outstanding Poster Award, <i>NIH Postbac Poster Day</i> Post-training position: Medical student, Howard University College of Medicine	2021 – 2024 2023 2022 2020 – 2022 2018 – 2020 2018 – 2019 2017 – 2019 2016 – 2019 2018
UNDERGRADS	D. T. Weaver, Biology, Duke University Post-training position: M.D./Ph.D. student, Case Western Reserve University E. F. Salgado, Psychology & Neuroscience, Duke University 🏆 Graduated with Distinction Post-training position: Ph.D. student, Indiana University–Purdue University Indianapolis Z. Feng, Biomedical Engineering and Biology, Duke University Post-training position: Medical student, University of Colorado School of Medicine M. L. Glidewell, Biomedical Engineering, Duke University Post-training position: Senior strategy consultant, IBM W. Lim, Biomedical Engineering, Duke University Post-training position: Medical student, Texas A&M College of Medicine F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University Post-training position: Analyst, Morgan Stanley	2016 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016

	E. Shinder, Biology, Duke University	2015 – 2016
	🏆 Graduated with Distinction	
	Post-training position: Medical student, Stony Brook School of Medicine	
	E. P. Vienneau, Biomedical Engineering, Duke University	2015 – 2016
	🏆 Howard G. Clark Award for Excellence in Research	
	Post-training position: Ph.D. student, Vanderbilt University	
	S. H. Lee, Biomedical Engineering, Duke University	2015
	Post-training position: Manager, Strategy & Operations, Tempus Labs	
	R. Shah, Psychology & Neuroscience, Duke University	2015
	Post-training position: Medical student, Yale School of Medicine	
	J. R. Lilien, Electrical & Computer Engineering, Duke University	2014 – 2016
	🏆 Walter J. Seeley Scholastic Award	
	Post-training position: Machine learning engineer, Amazon	
INTERNS	M. Dib, Biomedical Engineering, University of Maryland, College Park	2018 – 2019
	Supervised as a summer intern at the NIH, provided ongoing mentorship during academic terms, including advising Capstone design project	
	Post-training position: Medical student, Weill Cornell Medicine	
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University	Summer 2017
	Post-training position: Ph.D. student, Penn State University	
	C. M. Prevost, Biomedical Engineering, Clemson University	Summer 2015
	Post-training position: Medical student, University of South Carolina School of Medicine	
	J. V. McCall, Biomedical Engineering, North Carolina State University	Summer 2013
	Post-training position: Ph.D. student, North Carolina State University	
PROFESSIONAL SOCIETIES MEMBERSHIP & SERVICE	<b>IEEE</b> , Engineering in Medicine and Biology Society	
	Senior Member	2023 –
	Member	2013 – 2023
	Student Member	2004 – 2013
	<b>American Society of Clinical Psychopharmacology</b>	
	Member	2019 –
	Early Career Committee	2023 – 2027
	Technology Committee	2023 – 2025
	Technology Task Force	2020 – 2023
	<b>Biomedical Engineering Society</b>	
	Member	2021 –
	<b>American College of Neuropsychopharmacology</b>	
	Associate Member	2023 –
	<b>Anxiety and Depression Association of America</b>	
	Member	2017 – 2018
	<b>International Society for CNS Clinical Trials and Methodology</b>	
	Member	2017 – 2019
	<b>Organization for Human Brain Mapping</b>	
	Member	2014 – 2019
	<b>Society for Industrial and Applied Mathematics</b>	
	Student Member	2008 – 2012
	<b>Society for Neuroscience</b>	
	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</i>	2022 –
Sections: Neurostimulation, Neuroimaging	
Co-Editor on Research Topic: <i>How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action</i> 	2024
Review Editor, <i>Frontiers in Psychology</i>	2022 –
Sections: Addictive Behaviors, Consciousness Research	
Review Editor, <i>Frontiers in Psychiatry</i>	2016 – 2022
Sections: Neurostimulation, Neuroimaging	
Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i>	2020
Co-Editor on Research Topic: <i>Neurobiology of Rapid Mood Changes</i> 	
Guest Editor, <i>Physics in Medicine and Biology</i>	2024
Special Issue: <i>Electromagnetic Modeling for Brain Stimulation</i> 	
<i>Ad hoc</i> journal reviewer	2010 –
<i>AIP Advances</i>	
<i>American Journal of Psychiatry</i>	
<i>Asian Journal of Psychiatry</i>	
<i>Australasian Physical and Engineering Sciences in Medicine</i>	
<i>Biological Psychiatry</i>	
<i>BioMedical Engineering OnLine</i>	
<i>Brain Sciences</i>	
<i>Brain Stimulation</i>	
<i>Cerebral Cortex</i>	
<i>Chaos, Solitons &amp; Fractals</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 Antennas and Propagation Magazine</i>	
<i>IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology</i>	
<i>IEEE Transactions on Biomedical Engineering</i>	
<i>IEEE Transactions on Neural Systems &amp; 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>Journal of Psychiatric Research</i>	
<i>JoVE</i>	
<i>Medical &amp; Biological Engineering &amp; 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> <i>Scientific Reports</i> <i>Translational Psychiatry</i>	
	Reviewer, Conference Proceedings and 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	
GRANT	Reviewer, NIH BluePrint MedTech Program	2022 –
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	Organizing committee, and judge in student competition	2022 – 2023
ORGANIZING	Brain and Human Body Modeling Conference	
COMMITTEE	Program review subcommittee	2023
	American Society of Clinical Psychopharmacology Annual Meeting	
	Preconference workshop director, NYC Neuromodulation Conference	2018
	Workshop: <i>Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers</i>	
COMMUNITY	Producer, <i>Psychopharm Today</i> podcast 	2024 –
INVOLVEMENT,	Hosted by the American Society of Clinical Psychopharmacology	
OUTREACH, &	NIH Research Workforce Diversity and Equity Outreach Special Interest Group	2023 –
SCIENCE	Judge, NIMH Training Day Three-Minute Talks competition	2022
ADVOCACY	Mental Health Association of Maryland	2020
	Presentation: <i>Fundamentals of transcranial brain stimulation</i>	
	Jewish Social Service Agency	2020
	Presentation: <i>Basics of brain stimulation devices: What are they and how do they work</i>	
	Exhibitor, USA Science & Engineering Festival <i>#coronacancelled</i>	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	Recertified 2023.07