

ZHI-DE DENG

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EDUCATION	Ph.D., Electrical Engineering , Columbia University	2013	
	Dissertation: <i>Electromagnetic Field Modeling of Transcranial Electric & Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive & Subconvulsive Applications</i>		
	M.Phil., Electrical Engineering , Columbia University	2011	
	Graduate concentration in Neuroscience		
	M.Eng., Electrical Engineering & Computer Science , MIT	2007	
Thesis: <i>Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms</i>			
	S.B., Electrical Science & Engineering , MIT	2007	
	S.B., Physics , MIT	2006	
Minor in Economics			
PROFESSIONAL & ACADEMIC APPOINTMENTS	Senior Associate Scientist* Staff Scientist , NIMH	2019–	
	Noninvasive Neuromodulation Unit Experimental Therapeutics & Pathophysiology Branch <i>Director</i> , Computational Neurostimulation Research Program		
	* Honoric title conferred in 2025, equivalent to the rank of Research Professor ☑		
	Adjunct Assistant Professor , Duke University School of Medicine	2016–2024	
Division of Behavioral Medicine & Neurosciences Department of Psychiatry & Behavioral Sciences <i>Network Faculty</i> , Duke Institute for Brain Sciences			
	Medical Instructor , Duke University School of Medicine	2014–2016	
Division of Brain Stimulation & Neurophysiology Department of Psychiatry & Behavioral Sciences <i>KL2 Scholar</i> , Duke Translational Medicine Institute			
POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS	Research Fellow , NIMH	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			
PREDOCTORAL RESEARCH ASSISTANTSHIPS & INTERNSHIPS	Visiting Graduate Research Assistant , Duke University	2010–2013	
	Division of Brain Stimulation & Neurophysiology		
	Graduate Research Assistant , Columbia University	2007–2010	
	Division of Brain Stimulation & Therapeutic Modulation <i>TL1 Scholar</i> , Irving Institute for Clinical and Translational Research		
	Research Assistant , Harvard–MIT Division of Health Sciences & Technology	2005–2007	
	Executive Intern , Weill Cornell Medicine Anesthesiology	Summer 2004	
	Internship Coordinator , Children’s Aid Society	Summer 2003	
	Newsroom Technology Intern , The New York Times Company	Summer 2002	

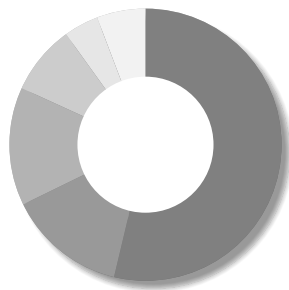
AWARDS & HONORS (SELECTED)	<p>Certificate for Top Cited Article 2025 <i>Bipolar Disorders</i>, International Society for Bipolar Disorders/Wiley</p> <p>Special Act Award 2025 For outstanding scholarship advancing precision neuromodulation, NIMH</p> <p>NIMH Director’s Award 2024 For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders</p> <p>Elected to Full Membership 2024 Sigma Xi, The Scientific Research Honor Society</p> <p>High Five Award 2024 For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit’s Board of Scientific Counselors review, NIMH</p> <p>Scholar, Advanced Research Institute in Geriatric Mental Health 2023–2024 Dartmouth College, supported by grant from NIH (R25MH068502)</p> <p>Elevated to Senior Membership 2023 Institute of Electrical and Electronics Engineers (IEEE)</p> <p>Elected to Associate Membership 2023 American College of Neuropsychopharmacology</p> <p>NIMH Director’s Award 2019 For scientific innovation at the interface of computation and psychiatry</p> <p>Richard J. Wyatt Memorial Fellowship Award for Translational Research 2018 NIMH Intramural Research Program</p> <p>New Investigator Award 2018 American Society of Clinical Psychopharmacology</p> <p>Early Career Investigator Travel Fellowship Award 2018 Society of Biological Psychiatry</p> <p>Research Colloquium for Junior Investigators 2018 American Psychiatric Association</p> <p>Alies Muskin Career Development Leadership Program 2018 Anxiety & Depression Association of America</p> <p>NARSAD Young Investigator Award 2017 Brain & Behavior Research Foundation</p> <p>Career Development Institute for Psychiatry 2017 NIMH/Stanford University/University of Pittsburgh</p> <p>New Investigator Award 2017 International Society for CNS Clinical Trials and Methodology</p> <p>Certificate for Highly Cited Research 2016 <i>Brain Stimulation</i>, Elsevier</p> <p>Young Investigator Memorial Travel Award 2015 American College of Neuropsychopharmacology</p> <p>Scholar, Summer Research Institute in Geriatric Mental Health 2015 Weill Cornell Medical College, supported by grant from NIH (R25MH019946)</p> <p>Chair’s Choice Travel Fellowship Award 2015 Society of Biological Psychiatry</p> <p>Innovative Research Poster Award 2014 National Network of Depression Centers</p>
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Best Abstract Award International Society for ECT and Neurostimulation	2010
Presidential Award for Outstanding Teaching, Finalist Columbia University	2010
CTSA T32 Certificate Award Columbia University Irving Institute for Clinical and Translational Research	2009
New York Times College Scholarship The New York Times Company Foundation	2002–2006

RESEARCH
FOCUS

- ♥ Neurostimulation: Technology development, computational modeling, stimulus parameter and dose optimization, translational and clinical applications
- ♥ Computational electromagnetics
- ♥ Electrophysiological and neuroimaging biomarker development
- ♥ Nonlinear dynamics of physiological systems

RESEARCH
OUTPUT
SUMMARY



- 65 Refereed journal articles
- 17 Refereed conference proceedings & technical letters
- 17 Refereed reviews, protocols, & consensus papers
- 10 Book chapters
- 5 Editorials, commentaries, & correspondences
- 4 Patents granted + 3 Patent applications pending
- + 174 Abstracts

REFEREED
JOURNAL
ARTICLES

* Denotes first, joint first, or senior author

A. V. Peterchev, **Z.-D. Deng**, C. Sikes-Keilp, E. C. Feuer, M. A. Rosa, and S. H. Lisanby, “Optimal frequency for seizure induction with electroconvulsive therapy and magnetic seizure therapy in nonhuman primates,” *Biological Psychiatry: Global Open Science*, online ahead of print, 100471, Feb. 2025.

DOI: 10.1016/j.bpsgos.2025.100471; PMID: PMC11722405; Data available

S. M. McClintock, **Z.-D. Deng**, M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Lubner, 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, pp. 175–185, Feb. 2025.

DOI: 10.1016/j.bpsc.2024.10.016; PMID: 39515580

Journal cover

Media coverage: *Brain & Behavior Research Foundation* | *UT Southwestern News Release*, Jan. 2025.

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*, vol. 18, no. 1, pp. 77–93, Jan./Feb. 2025.

DOI: 10.1016/j.brs.2024.12.1192; PMID: PMC11867869; Data available

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*, vol. 3, imag_a_00412, Jan. 2025.

DOI: 10.1162/imag_a_00412; Code available

- 🏆 First Place in Best Student Paper (awarded to N.I. Hasan), *International Applied Computational Electromagnetics Society Symposium*, 2024.
- 🏆 Third Place in Best Student Paper (awarded to N.I. Hasan), *Photonics and Electromagnetics Research Symposium*, 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, Sep. 2024.

DOI: 10.1093/cercor/bhae371; PMID: PMC11405677

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, Sep. 2024.

DOI: 10.1038/s41386-024-01871-w; PMID: PMC11319663

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, Aug. 2024.

DOI: 10.1097/YCT.0000000000001069; PMID: 39185880


- * 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.

DOI: 10.3389/fpsy.2024.1434434; PMID: PMC11345267

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.

DOI: 10.1088/1741-2552/ad692f; PMID: PMC11307324

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.

DOI: 10.1371/journal.pone.0302660; PMID: PMC11073721; Code available 

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.

DOI: 10.1017/S1092852923006387; PMID: PMC11524532

- * 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.


DOI: 10.1111/bdi.13370; PMID: PMC10839568

🏆 Top Cited Article, awarded by Wiley, 2025.

📰 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.

DOI: 10.3390/bioengineering11030258; PMID: PMC10968657

📖 Part of 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 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.

DOI: 10.1001/jamapsychiatry.2023.4599; PMID: PMC10701670

📖 Commentary: vol. 81, no. 7, pp. 736–737, Jul. 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. 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.

DOI: 10.1038/s41386-023-01780-4; PMID: PMC10876627

📄 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.

DOI: 10.1088/1361-6560/ad2638; PMID: PMC10902857; Data available 📄

📄 Part of 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. 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.

DOI: 10.1038/s41380-023-02318-2; PMID: PMC11116108; Code available 📄

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.

DOI: 10.1038/s41598-023-45602-5; PMID: PMC10618282; Code available 📄

- * **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,” *Biomedicines*, vol. 11, no. 8, 2320, Aug. 2023.

DOI: 10.3390/biomedicines11082320; PMID: PMC10452519

📄 Part of 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.

DOI: 10.1016/j.jad.2023.05.042; PMID: PMC10502963

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, Jul. 2023.

DOI: 10.1016/j.bpsgos.2022.04.001; PMID: PMC10382694

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, Jul. 2023.

DOI: 10.1016/j.bpsc.2023.03.001; PMID: PMC10329999

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.

DOI: 10.3389/fpsy.2023.1168672; PMID: PMC10232815

☐ Part of 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.

DOI: 10.1088/1741-2552/ac9a76; PMID: PMC10278869

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.

DOI: 10.1371/journal.pbio.3001999; PMID: PMC9983870

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.

DOI: 10.1038/s41398-023-02312-w; PMID: PMC9902462; Code available ☒

* 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.

DOI: 10.1088/1741-2552/aca0d; PMID: PMC10481791; Code available ☒

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.

DOI: 10.1186/s12916-022-02678-6; PMID: PMC9733153; Code available ☒

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.









DOI: 10.1016/j.neuroimage.2022.119705; PMID: PMC9854270





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.

DOI: 10.1038/s41597-022-01695-7; PMID: PMC9556519; Code available ☒ Data available ☒

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, Jun. 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.
DOI: 10.1088/1741-2552/ac697c; PMID: PMC10644970
- 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.
DOI: 10.1016/j.neuroimage.2021.118863; PMID: PMC8851689
 Part of 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.
DOI: 10.1038/s41380-021-01380-y; PMID: PMC9095458
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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.
DOI: 10.1038/s41386-021-01110-6; PMID: PMC8674270
- 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 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.
DOI: 10.1016/j.jagp.2021.04.006; PMID: PMC8595359
- 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. Vandembulcke, 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, Jul./Aug. 2021.
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- E.A. Fridgeirsson, **Z.-D. Deng**, D. Denys, J.A. van Waarde, and G.A. van Wingen, “Electric field strength induced by electroconvulsive therapy is associated with clinical outcome,” *NeuroImage: Clinical*, vol. 30, 102581, Feb. 2021.
DOI: 10.1016/j.nicl.2021.102581; PMID: PMC7895836

- 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.
DOI: 10.1007/s00406-020-01127-w; PMID: PMC8100980
Part of Collection: *Brain Stimulation in Psychiatry* 
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- ✍ J. Ferreira, L. Morales, R. Lemdiasov, H. Lu, **Z.-D. Deng**, and S. N. Makaroff, “TMS coil and TMS coil array designer with fast multipole method,” *Brain Stimulation*, vol. 16, no. 1, p. 136, 2023.
- A. Guillen, C. C. Abbott, **Z.-D. Deng**, D. Truong, and A. Datta, “Impact of modeled field of volume in ECT current flow simulations,” *Brain Stimulation*, vol. 16, no. 2, p. 10, 2023.
- * **Z.-D. Deng**, M. Hynd, Z. Rezaee, A. R. Brunoni, and S. H. Lisanby, “Sham response in transcranial magnetic stimulation depression trials is increasing over time,” *Neuropsychopharmacology*, vol. 47, supplement, p. 199, 2022.
- * H. Gura, E. Feuer, C. Abboud Chalhoub, S. Awasthi, M. Noh, B. Lubner, and S. H. Lisanby, and **Z.-D. Deng**, “Effect of intertrain interval on theta burst induced changes in motor cortical excitability,” Program No. 752.18. *Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience*, 2022.
- E. Jones, **Z.-D. Deng**, Z. Rezaee, F. Mukhtar, E. Feuer, P. Rohde, P. L. Robins, W. T. Regenold, and S. H. Lisanby, “Innovative electroconvulsive therapy: Individualized Low Amplitude Seizure Therapy,” *American Psychiatric Nurses Association Annual Conference*, 2022.

🏆 Poster Award (awarded to the Noninvasive Neuromodulation Unit), *NIMH 75th Anniversary Event*, 2023.

*🔗 P. L. Robins and **Z.-D. Deng**, “Comparison of coil localization approaches and induced electric fields in depressed adolescents receiving repetitive transcranial magnetic stimulation,” *NIMH IRP Fellows’ Scientific Training Day*, 2022.

*🔗 P. L. Robins, M. Dannhauer, L. M. Haugen, J. D. Port, P. E. Croarkin, and **Z.-D. Deng**, “Comparison of coil localization approaches and induced electric fields in depressed adolescents receiving repetitive transcranial magnetic stimulation,” *Brain & Human Body Modeling Conference*, 2022.

🏆 First Place in International Student Competition (awarded to P. L. Robins)

M. Argyelan, C. C. Abbott, **Z.-D. Deng**, B. Wade, GEMRIC Consortium, G. Petrides, and A. Malhotra, “Personalizing electroconvulsive therapy with electrical field modeling,” *Biological Psychiatry*, vol. 91, no. 9, p. S210, 2022.

*🔗 C. C. Abbott, S. M. McClintock, M. Argyelan, and **Z.-D. Deng**, “Individualizing electroconvulsive therapy (ECT) amplitude to improve clinical outcomes,” *Biological Psychiatry*, vol. 91, no. 9, pp. S54–S55, 2022.

*🔗 **Z.-D. Deng**, S. M. McClintock, M. Husain, and S. H. Lisanby, “Depressive symptom dimensions and response trajectories in electroconvulsive therapy and magnetic seizure therapy,” *Biological Psychiatry*, vol. 91, no. 9, p. S21, 2022.

E. C. Feuer, **Z.-D. Deng**, 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,” *International Society for ECT and Neurostimulation Annual Meeting*, 2022; also presented at *NIH Julius Axelrod Symposium*, 2022.

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, filed Jun. 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,” WO 2024/215761 A1, filed Apr. 10, 2024. ☑

C. C. Abbott, **Z.-D. Deng**, J. Upston, T. Jones, and A. Datta, “Systems and methods for electroconvulsive therapy,” WO 2024/148196 A1, Jul. 11, 2024. ☑

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, assigned to NEVA Electromagnetics, LLC. ☑

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 non-increasing parasympathetic modulation,” U.S. Patent 9,737,258, Aug. 22, 2017, assigned to MIT. ☑

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, filed Aug. 22, 2011. Not converted to non-provisional.

A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, “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. ☑

A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, “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. ☑

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 Award TP220072 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 electro-magnetic modeling.

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: Sheline, Narr, Espinoza, McClintock, Abbott

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

ECT amplitude titration for improved clinical outcomes in late-life depression

NIH/NIMH R61/R33 MH125126 2021.02–2026.01

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.

PENDING
RESEARCH
SUPPORT

Transdiagnostic trial to reduce default mode network connectivity in bipolar depression and major depressive disorder with accelerated iTBS

NIH 2025

Role: Intramural NIH collaborator; PI: Y. I. Sheline

Electromagnetic brain stimulation modeling at the synaptic level

NIH R21 2025.02

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

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

NIH UG3/UH3 2024.10

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

Development of high-density theta burst TMS technology and initial testing in humans

NIH UG3/UH3 2024.09

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</i>	
	NIH/NIMH UG3/UH3	2024.06
	Role: Intramural NIH collaborator; PI: C. C. Abbott	
COMPLETED RESEARCH SUPPORT	<i>Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders</i>	
	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.	
	<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 researcher. 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.	

- 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/NCCR 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 <i>Advancing neurostimulation treatment optimization and technology innovation</i>	2023
	Westmead Hospital, Sydney, Australia <i>Advances in neuromodulation: Electroconvulsive therapy</i>	2020
	Clinical TMS Society <i>Transcranial magnetic stimulation: Physics, devices, and modeling</i>	2018
	University of New Mexico, Department of Psychiatry & Behavioral Sciences <i>Toward individualized electroconvulsive therapy for treatment of depression</i>	2017
	Central Regional Hospital, Butner, NC <i>Individualized seizure therapy</i>	2015
	Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences <i>Toward next generation seizure therapy</i>	2015
	INVITED SEMINARS	NIMH Intramural Research Program Investigators' Seminar Series <i>Reading tells: Using facial expression analysis to track emotional states in depression</i>
IEEE Magnetics and EMBS Chapters		2025
Virginia Commonwealth University Mechanical & Nuclear Engineering Department Seminar <i>Recent advances in transcranial magnetic stimulation: Devices, modeling, and applications</i>		
University of Texas Southwestern, Department of Psychiatry <i>From models to medicine: Advancing precision neuromodulation through engineering</i>		2025
UCSF Department of Psychiatry & Behavioral Sciences <i>Engineering precision in neuromodulation: Computational models to clinical applications</i>		2025
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
National Center of Neuromodulation for Rehabilitation, MUSC <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
Brown University/Butler Hospital, Department of Psychiatry & Human Behavior <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		2020
Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar <i>Precision neurostimulation: History, physics, computational modeling, and engineering</i>		
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, & 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, & WEBINARS	Bergen Workshop of the Global ECT–MRI Collaboration <i>Computational approaches to ECT: How electric field modeling guides treatment</i>	Upcoming 2025
	International Society for ECT and Neurostimulation Webinar <i>Multichannel Individualized Stimulation Therapy (MIST): Engineering precision in ECT</i>	Upcoming 2025
	American Neuropsychiatric Association Annual Meeting <i>Advancing personalized seizure therapy: Magnetic seizure therapy and Multichannel Individualized Stimulation Therapy</i> Part of Program Committee Symposium: <i>Interventional neuropsychiatry: From mechanisms to clinical decision making</i>	2025
	International Brain Stimulation Conference <i>Multichannel Individualized Stimulation Therapy: A targeted approach to optimize ECT</i> Part of symposium: <i>ECT reimagined: Precision, prediction, and personalized care</i>	2025
	✂ Accepted for presentation, unable to attend due to government travel restrictions	
	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 <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 <i>TMS devices and modeling</i> Part of workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i>	2024
Brain and Human Body Modeling Conference <i>Effects of low intensity magnetic stimulation</i>	2023
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Modeling of TMS and ECT in the treatment of depression</i> Part of panel: <i>Computational analysis of non-invasive neuromodulation constructs: Brain & spine</i>	2023
ADAA Anxiety and Depression Conference <i>Modeling and dose optimization for TMS and ECT</i> Part of panel: <i>Parsing through syndromic heterogeneity in youths with mental illness to identify neurocircuit mechanisms and develop novel treatments</i>	2023
International Network of tES–fMRI Webinar Series <i>Electric field modeling and optimization approaches for individualized targeting</i>	2022
International Society for Magnetic Resonance in Medicine <i>Modeling of TMS</i>  Part of workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, & biomarker development</i>	2022
Bergen Workshop of the Global ECT–MRI Collaboration <i>ECT device development</i> 	2022
Brain and Human Body Modeling Conference <i>ECT, electric field, neuroplasticity, and clinical outcomes</i> Part of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>	2022
European Conference of Brain Stimulation in Psychiatry <i>Symptom dimensions and response trajectories in ECT and MST</i> Part of panel: <i>Beyond clinical syndromes: Understanding mechanisms of neuromodulation from a dimensional perspective</i>	2022
Society of Biological Psychiatry Annual Meeting <i>Depressive symptom dimensions in seizure therapy</i> Part of panel: <i>Dimensional approaches to device neuromodulation</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 <i>Introduction to computational psychiatry</i> Part of panel: <i>Recent work with contemporary computational methods and artificial intelligence to advance the practice of child and adolescent psychiatry</i>	2021
European College of Neuropsychopharmacology Congress <i>Precision neurostimulation: Electroconvulsive therapy</i> Part of panel: <i>Neurobiology of rapid mood changes</i>	2021
Society for Brain Mapping & Therapeutics Annual Congress <i>Advances in electroconvulsive therapy for treatment of depression</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 <i>Electric field modeling to inform ECT dosing and device development</i> Part of panel: <i>What can we learn from ECT: Insights from the GEMRIC consortium</i>	2020
University of Minnesota Non-Invasive Brain Stimulation Workshop <i>Use of individual electric field models in clinical research</i> 	2020

NYC Neuromodulation Online	2020
<i>Discussant, Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders</i>	
American Society of Clinical Psychopharmacology Annual Meeting	2020
<i>Advancing seizure therapy: Rational design for precision outcomes</i>	
Part of panel: <i>New developments in neurostimulation</i>	
☒ Accepted for presentation, conference was canceled due to COVID-19	
American College of Neuropsychopharmacology Annual Meeting	2019
<i>Rational design of precision seizure therapy</i>	
Part of panel: <i>Precision neurostimulation for treatment of psychiatric disorders</i>	
International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders, Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance	2019
<i>Rational design of precision seizure therapy</i>	
International College of Neuropsychopharmacology Meeting	2019
<i>Individualized seizure therapy: Reinventing ECT</i>	
Part of workshop: <i>Neurobiological and clinical characterization, and treatment development for treatment resistant depression</i>	
International Brain Stimulation Conference	2019
<i>Individualized electroconvulsive therapy for treatment of depression</i>	
Part of panel: <i>Individualized brain stimulation: Addressing heterogeneity across modalities</i>	
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
<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
<i>Electric field induced by TMS: Applications in depression and anxiety</i>	
Part of panel: <i>Computational human models for brain stimulation</i>	
American Psychiatric Association Annual Conference	2018
<i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	
Part of Presidential Symposium: <i>ECT in the era of new brain stimulation treatments</i>	
ADAA Anxiety and Depression Conference	2018
<i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	
Part of panel: <i>Personalized medicine for treatment resistant depressed patients: Novel strategies to optimize treatment with antidepressant medications, ketamine, and ECT</i>	
NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop	2017
<i>Use of individual electric field models in clinical research</i> ☒	
NYC Neuromodulation Conference	2017
<i>Low field magnetic stimulation</i>	
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>	
International Conference of the IEEE Engineering in Medicine and Biology Society	2010
<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>	

	Annual National Predoctoral Clinical Research Training Program Meeting	2009
	<i>Coil design for deep-brain transcranial magnetic stimulation</i>	
	TRANSFORM Research Day, Irving Institute for Clinical and Translational Research	2009
	<i>Electromagnetic field shaping and coil design for transcranial brain stimulation</i>	
	International Conference of the IEEE Engineering in Medicine and Biology Society	2008
	<i>Coil design considerations for deep brain transcranial magnetic stimulation</i>	
	Annual Meeting of the Society for Neuroscience	2006
	<i>Heart rate variability is more chaotic in REM than NREM sleep in children</i>	
	International Conference of the IEEE Engineering in Medicine and Biology Society	2006
	<i>Heart rate variability in pediatric obstructive sleep apnea</i>	
TEACHING & MENTORING APPOINTMENTS	Lecturer, 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
	Research Mentor, University of Maryland, College Park	2018–2019
	Fischell Department of Bioengineering	
	Capstone project: <i>Detection of brain-to-brain synchrony for improved psychotherapy</i>	
	Faculty, 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 (CME accredited)</i>	2015
	<i>Visiting Fellowship in Transcranial Magnetic Stimulation (CME accredited)</i>	2014–2016
	Teaching Assistant, Columbia University	
	Department of Electrical Engineering	
	<i>Analog Systems in VLSI (graduate level)</i>	Spring 2010
	<i>The Digital Information Age</i>	Fall 2009
	Recitation Instructor, Columbia University Mailman School of Public Health	
	Department of Biostatistics	
	<i>Biostatistics (graduate level)</i>	Fall 2009
	Teaching Assistant, 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	
	Career progression: Medical student, Stanford University School of Medicine	
THESIS EXAMINATION COMMITTEE MEMBERSHIP	S. J. Bolland, Biomedical Engineering, University of Western Australia	2025
	Ph.D. dissertation: “A comparative study of transcranial magnetic stimulation induced electrical field distributions in neural tissue: A translational pipeline for finite element method analysis using MRI modalities.” Sponsor: J. Rodger.	

	D. Tang, Electrical & Computer Engineering, Worcester Polytechnic Institute	2025
	M.S. thesis: “Computational and experimental approaches to brain stimulation: TMS simulation, coil measurement, and neural structure analysis.” Sponsor: S. N. Makaroff.	
	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: https://academicworks.cuny.edu/cc_etds_theses/774	
CAREER DEVELOPMENT AWARD ADVISORY	D. C. Farrar, M.D., Ph.D., University of New Mexico School of Medicine	2025 –
	Project: “CEASE-LD: Cortical Excitability, Adequacy of Seizures, and Efficacy in Late-life Depression with ECT”	
	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	2020 – 2025
	Project: “Personalized circuit-based neuromodulation targets for depression”	
	🏆 Klerman Prize for Exceptional Clinical Research, <i>Brain & Behavior Research Foundation</i> , 2022.	
	N. L. Balderston, Ph.D., University of Pennsylvania Perelman School of Medicine	
	NIH/NIMH K01 MH121777	2019 – 2023
	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 & Behavior Research Foundation</i> , 2021.	
RESEARCH FELLOWS & POSTDOCS	S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow	2024 –
	M. Dannhauer, Ph.D., NIMH Research Fellow	2022 – 2024
	Career progression: Assistant Professor, Computer Science, East Carolina University	
GRADUATE STUDENTS	E. Bharti, Ph.D. candidate, NIH–Cambridge Scholars Program	2024 –
	M. Kshirsagar, M.S., Biomedical Engineering, Duke University	2012
	Career progression: Consultant, Deloitte Consulting	
POSTBACS	P. L. Robins, B.A., NIMH Intramural Research Training Award (IRTA) Fellow	2021 – 2024
	🏆 Trainee Travel Award, NIMH Intramural Research Program, 2023.	
	🏆 First Place in Student Competition, <i>Brain & Human Body Modeling Conference</i> , 2022.	
	Career progression: TMS administrator, Columbia Associates	
	M. R. Hynd, B.S., NIMH IRTA Fellow	2020 – 2022
	Career progression: Ph.D. student, University of North Carolina at Chapel Hill	
	S. Awasthi, B.S., NIMH IRTA Fellow	2018 – 2020
	Career progression: Medical student, Stanford University School of Medicine	
	M. M. Noh, S.B., NIMH IRTA Fellow	2018 – 2019
	Career progression: Medical student, University of Cincinnati College of Medicine	
	J. Thomas, M.S., NIMH IRTA Fellow	2017 – 2019
	Career progression: Program officer, National Academies of Sciences, Engineering, & Medicine	

	M. Velez Afanador, B.S., NIMH IRTA Fellow 🏆 Outstanding Poster Award, <i>NIH Postbac Poster Day</i> , 2018. Career progression: Medical student, Howard University College of Medicine	2016 – 2019
UNDERGRADS	D. T. Weaver, Biology, Duke University Career progression: M.D./Ph.D. student, Case Western Reserve University	2016
	E. F. Salgado, Psychology & Neuroscience, Duke University 🏆 Graduated with Distinction Career progression: Ph.D. student, Indiana University–Purdue University Indianapolis	2016
	Z. Feng, Biomedical Engineering and Biology, Duke University Career progression: Medical student, University of Colorado School of Medicine	2015 – 2016
	M. L. Glidewell, Biomedical Engineering, Duke University Career progression: Senior strategy consultant, IBM	2015 – 2016
	W. Lim, Biomedical Engineering, Duke University Career progression: Medical student, Texas A&M College of Medicine	2015 – 2016
	F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University Career progression: Analyst, Morgan Stanley	2015 – 2016
	E. Shinder, Biology, Duke University 🏆 Graduated with Distinction Career progression: Medical student, Stony Brook School of Medicine	2015 – 2016
	E. P. Vienneau, Biomedical Engineering, Duke University 🏆 Howard G. Clark Award for Excellence in Research Career progression: Ph.D. student, Vanderbilt University	2015 – 2016
	S. H. Lee, Biomedical Engineering, Duke University Career progression: Manager, Strategy & Operations, Tempus Labs	2015
	R. Shah, Psychology & Neuroscience, Duke University Career progression: Medical student, Yale School of Medicine	2015
	J. R. Lilien, Electrical & Computer Engineering, Duke University 🏆 Walter J. Seeley Scholastic Award Career progression: Machine learning engineer, Amazon	2014 – 2016
INTERNS	W. H. Lohr, Ph.D. cand., Biomedical Engineering, Virginia Commonwealth University	2025
	M. Dib, Biomedical Engineering, University of Maryland, College Park Supervised as a summer intern at the NIH, provided ongoing mentorship during academic terms, including advising Capstone design project Career progression: Medical student, Weill Cornell Medicine	2018 – 2019
	E. Chung, Psychology, University of Maryland, College Park	2017
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University Career progression: Ph.D. student, Penn State University	Summer 2017
	C. M. Prevost, Biomedical Engineering, Clemson University Career progression: Medical student, University South Carolina School of Medicine Greenville	Summer 2015
	J. V. McCall, Biomedical Engineering, North Carolina State University Career progression: Ph.D. student, North Carolina State University	Summer 2013
PROFESSIONAL SOCIETIES MEMBERSHIP	IEEE , Engineering in Medicine and Biology Society Senior Member (2023 –), Member (2013 – 2023), Student Member (2004 – 2013)	2004 –
	American College of Neuropsychopharmacology , Associate Member	2023 –
	Biomedical Engineering Society , Member	2021 –

	American Society of Clinical Psychopharmacology, Member	2019 –
	<i>Past memberships:</i>	
	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
COMMITTEES, ADVISORY ROLES, & SPECIAL INTEREST GROUPS	Advisory Board, Center for Multiscale Bioelectromagnetic Studies of the Brain Department of Electrical & Computer Engineering, Worcester Polytechnic Institute	2025 –
	Contributor, Non-Invasive Brain Stimulation (NIBS)-BIDS extension proposal Collaborated on extending the Brain Imaging Data Structure (BIDS) specification to establish standardized data and metadata storage guidelines for the NIBS field 	2023 –
	Early Career Committee, American Society of Clinical Psychopharmacology	2023 – 2027
	Technology Committee, American Society of Clinical Psychopharmacology	2023 – 2025
	NIH Research Workforce Diversity and Equity Outreach Special Interest Group	2023 – 2025
	Technology Task Force, American Society of Clinical Psychopharmacology	2020 – 2023
	NIH Noninvasive Brain Stimulation Special Interest Group	2017 –
GRANT REVIEW	Reviewer, NIH BluePrint MedTech Program	2021 –
	Reviewer, NIH Center for Scientific Review Biophysics of Neural Systems Study Section	2021.10
	Reviewer, Duke Institute for Brain Sciences, Research Incubator Awards	2018, 2021
EDITORIAL ROLES	Editorial Board Member, <i>Brain Stimulation</i>	2025 –
	Deputy Editor, <i>Transcranial Magnetic Stimulation</i>	2024 –
	Associate Editor, <i>Frontiers in Psychiatry</i> Sections: Neurostimulation, Neuroimaging Co-Editor on Research Topic: <i>How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action</i> 	2022 – 2024
	Review Editor, <i>Frontiers in Psychology</i> Sections: Addictive Behaviors, Consciousness Research	2022 –
	Review Editor, <i>Frontiers in Psychiatry</i> Sections: Neurostimulation, Neuroimaging	2016 – 2022
	Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i> Co-Editor on Research Topic: <i>Neurobiology of Rapid Mood Changes</i> 	2020
	Guest Editor, <i>Physics in Medicine and Biology</i> Special Issue: <i>Electromagnetic Modeling for Brain Stimulation</i> 	2024
	<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>	

BMJ Mental Health
Brain Research Bulletin
Brain Sciences
Brain Stimulation
Cerebral Cortex
Chaos, Solitons & Fractals
Clinical EEG and Neuroscience
Clinical Neurophysiology
CNS Spectrums
Computational and Mathematical Methods in Medicine
Computer Methods and Programs in Biomedicine
Computer Methods in Biomechanics and Biomedical Engineering
Cortex
European Psychiatry
Frontiers in Cell and Developmental Biology
Frontiers in Medicine: Intensive Care Medicine and Anesthesiology
Frontiers in Neurology: Applied Neuroimaging
Frontiers in Neuroscience: Brain Imaging Methods
IEEE Antennas and Propagation Magazine
IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology
IEEE Transactions on Biomedical Engineering
IEEE Transactions on Neural Systems & Rehabilitation Engineering
IEEE Transactions on Magnetics
Imaging Neuroscience
Journal of ECT
Journal of Neural Engineering
Journal of Neuroscience Methods
Journal of Psychiatric Research
JoVE
Medical & Biological Engineering & Computing
Medical Hypotheses
Nature Mental Health
NeuroImage; NeuroImage Clinical
Neuromodulation: Technology at the Neural Interface
Neuroscience Letters
PLOS ONE
Scientific Reports
Translational Psychiatry

	Reviewer, conference proceedings and abstracts	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	
CONFERENCE & WORKSHOP ORGANIZATION	Brain and Human Body Modeling Conference	2023
	Organizing committee, and judge in student competition	
	Chair of panel: <i>New modeling methods: Spinal cord stimulation and novel stimulation</i>	
	Chair of panel: <i>Development and assessment of modeling methods</i>	
	American Society of Clinical Psychopharmacology Annual Meeting	2023
	Program review subcommittee	
	International Brain Stimulation Conference	2023
	Chair of symposium: <i>Insights and challenges in preclinical models of TMS: Multimodal investigations across animal species</i>	

	Chair of symposium: <i>Advanced computational modeling and optimization methods for non-invasive brain stimulation</i>	
	International Congress of Clinical Neurophysiology Chair of panel: <i>Towards optimized TMS targeting approaches</i>	2022
	Brain and Human Body Modeling Conference Organizing committee Chair of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>	2022
	American Society of Clinical Psychopharmacology Annual Meeting Chair of panel: <i>Treatment-resistant mood disorders across the lifespan: Novel therapeutics</i>	2019
	International Conference of the IEEE Engineering in Medicine and Biology Society Chair of panel: <i>Computational human models for brain stimulation</i>	2018
	NYC Neuromodulation Conference Director of preconference workshop: <i>Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers</i>	2018
COMMUNITY INVOLVEMENT, OUTREACH, & SCIENCE ADVOCACY	Producer, <i>Psychopharm Today</i> podcast  Hosted by the American Society of Clinical Psychopharmacology	2024–
	Educational Counselor, MIT	2022–2025
	Judge, NIMH Training Day Three-Minute Talks competition	2022
	Mental Health Association of Maryland Presentation: <i>Fundamentals of transcranial brain stimulation</i>	2020
	ASCP Early Career Workshop Presentation: <i>Engaging presentation strategies for any audience</i>	2021
	Jewish Social Service Agency Presentation: <i>Basics of brain stimulation devices: What are they and how do they work</i>	2020
	Exhibitor, USA Science & Engineering Festival  Event was canceled due to COVID-19	2020
	University of Pennsylvania, Wharton Undergraduate Health Care Club Presentation: <i>Research in mental health treatment</i>	2019
	Judge, MIT Hacking Medicine: DC Grand Hack	2019
	NIH High School Scientific Training and Enrichment Program Presentation: <i>Bioelectricity and brain stimulation</i>	2019
	NIH Take Your Child to Work Day Presentation: <i>How to fool your brain</i>	2019
	UCLA, CruX Neurotech Organization Presentation: <i>Neuromodulation in psychiatry</i>	2019
	University of Pennsylvania, Wharton Undergraduate Health Care Club Presentation: <i>Technology and the future of mental health treatment</i>	2018
	Judge/Lead Judge, NIH Postbac Poster Day	2017–2019
	Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Association	2016
	Duke Translational Medicine Institute, Undergraduate Research Society Presentation: <i>Engineering meets psychiatry</i>	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

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
	AFNI+SUMA Training Workshop, NIH	2018
	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
	LAST UPDATED	March 20, 2025