Stanford



Patrick Lee Purdon

Professor of Anesthesiology, Perioperative and Pain Medicine (Department Research) and, by courtesy, of Bioengineering

CONTACT INFORMATION

- **Alternate Contact**

  Susan Saba - Clinical Research Lab Manager

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  Tel (215) 272-8414

Bio

BIO

My research integrates neuroimaging, biomedical signal processing, and the systems neuroscience of general anesthesia and sedation.

We are a neuroengineering lab focused on brain dynamics, brain health, and the neural mechanisms of anesthesia. Our research aims to understand the brain dynamics of aging, Alzheimer's disease, child development, sleep, anesthesia, and consciousness. We use this knowledge to develop novel technologies for brain monitoring and physiological control. We also teach anesthesiologists how to use EEG to provide personalized anesthesia care.

ACADEMIC APPOINTMENTS

- Professor, Anesthesiology, Perioperative and Pain Medicine
- Professor (By courtesy), Bioengineering
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Faculty Fellow, Stanford Biodesign (2023-2024)
- Invited Author and Participant, Ernst Strungmann Forum, Manifestations and Mechanisms of Dynamic Brain Coordination over Development (2017)
- Nathanial M. Sims Endowed Chair in Anesthesia Innovation and Bioengineering, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital (2017)
- Winner, Art of Talking Science competition, Massachusetts General Hospital Research Institute (2016)
- Nathanial M. Sims Endowed Scholar in Anesthesia Innovation and Bioengineering, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital (2016)
- Election to Association of University Anesthesiologists, Association of University Anesthesiologists (AUA) (2015)
- Best of Meeting Award Nominee, International Anesthesia Research Society (2015)
- Best in Neuroscience Award, Society for Neuroscience in Anesthesiology and Critical Care (2015)
- Election to College of Fellows, American Institute for Medical and Biological Engineering (AIMBE) (2015)
- Innovation Development Grant Award, Partners Innovation, Partners Healthcare (2014)

- Best Abstract, Clinical Sciences, Annual Meeting of the American Society of Anesthesiologists (2013)
- Honorable Mention, MGH Martin Prize, Massachusetts General Hospital (2013)
- DACCPM Clinical Research Day Award, Staff Category, Department of Anesthesia and Critical Care, Massachusetts General Hospital (2011)
- Citizenship Award, Department of Anesthesia and Critical Care, Department of Anesthesia and Critical Care, Massachusetts General Hospital (2009)
- National Institutes of Health Director's New Innovator Award, National Institutes of Health (2009)
- Individual Award, Massachusetts General Hospital Clinical Research Day, Massachusetts General Hospital (2008)
- Best in Section poster prize (among Neuroanesthesia posters), Annual Meeting of the International Anesthesia Research Society (2008)
- Best Young Investigator, 7th International Symposium for Memory and Awareness in Anesthesia (2008)
- NIH/NIBIB Neuroimaging Training Program Fellowship, Harvard-MIT Division of Health Sciences and Technology (2005)
- Allan and Luanne Reed Scholarship, Harvard-MIT Division of Health Sciences and Technology (2000 - 2005)
- Whittaker Foundation Predoctoral Fellowship in Biomedical Engineering, Whitaker Foundation (1996 - 2001)
- Phi Beta Kappa Honor Society, Harvard College (1995)
- John Harvard Honorary Scholarship, Harvard College (1993 - 1995)
- Detur Prize Book, Harvard College (1993)
- Harvard National Scholar, Harvard College (1992 - 1996)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Grant Reviewer - NPAS Study Section, Temporary Member (Neural Basis of Psychopathology, Addictions and Sleep Disorders Study Section), NIH/CSR (2022 - 2022)
- Ad hoc Reviewer, PLoS Computational Biology (2021 - present)
- Ad hoc Reviewer, New England Journal of Medicine (2019 - present)
- Research Council, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2-year term, elected by peers) (2019 - 2020)
- Ad hoc Reviewer, Nature Communications (2018 - present)
- Co-Founder, Director, PASCALL Systems, Inc. (2018 - present)
- Grant Reviewer - ZRG1 SBIB-Z (02) M, BTSS and SAT member conflict review panel, NIH/CSR (2018 - 2018)
- Thesis Committee, M.D. Honors Thesis Committee for Katie Hartnack, Antioch University New England, Keene, NH (2018 - 2018)
- Honors Thesis Committee, M.D. Honors Thesis Committee for Alexis Roy, Harvard Medical School (2017 - 2017)
- Ad hoc Reviewer, Proceedings of the National Academy of Sciences (2016 - present)
- Ad hoc Reviewer, Frontiers in Neural Circuits (2016 - present)
- Thesis Committee, Ph.D. Thesis Committee for Britni Crocker, Medical Engineering and Medical Physics Program, Harvard-MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology (2016 - 2018)
- Ad hoc Reviewer, British Journal of Anesthesia (2015 - present)
- Ad hoc Reviewer, Journal of Neural Engineering (2015 - present)
- Ad hoc Reviewer, Physiological Measurement (2015 - present)
- College of Fellows, American Institute for Medical and Biological Engineering (2015 - present)
- Member, Association of University Anesthesiologists (2015 - present)
- Member, Society for Neuroscience in Anesthesiology and Critical Care (2015 - present)
- Associate Editor, IEEE Neural Engineering Conference (2015 - 2015)
- Grant Reviewer - NIH Director's Early Independence Award Review Panel, NIH/CSR (2015 - 2015)
- Ad hoc Reviewer, Anesthesiology (2014 - present)

- Ad hoc Reviewer, Cerebral Cortex (2014 - present)
- Thesis Committee, Ph.D. Thesis Committee for Koeun Lim, Speech and Hearing Bioscience and Technology Program, Harvard-MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology (2014 - 2017)
- Research Council, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2-year term, elected by peers) (2014 - 2016)
- Ad hoc Reviewer, Anesthesia and Analgesia (2013 - present)
- Member, International Anesthesia Research Society (2013 - present)
- Member, American Society of Anesthesiologists (2013 - present)
- Thesis Committee, Ph.D. Thesis Committee for Mohammad Ghassemi, M.S., Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA (2013 - 2014)
- Associate Editor, IEEE Neural Engineering Conference (2013 - 2013)
- Grant Reviewer - Collaborative Research in Computational Neuroscience Study Section, NSF/NIH (2013 - 2013)
- Grant Reviewer - NIH Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Working Group Advisory Committee to the Director, NIH (2013 - 2013)
- Grant Reviewer - NINDS Board of Scientific Counselors Ad Hoc Member, NIH/NINDS (2013 - 2013)
- Grant Reviewer - Special Emphasis Review Panel ZGM1 PPBC-Y, NIH/NIGMS (2013 - 2013)
- Ad hoc Reviewer, Journal of Computational Neuroscience (2012 - present)
- Ad hoc Reviewer, IEEE Trans. Neural Sys. & Rehab. Engineering (2012 - present)
- Guest Editor, PLoS Computational Biology (2012 - 2012)
- Research Council, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2-year term, elected by peers) (2010 - 2012)
- Research Task Force, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2010 - 2010)
- Ad hoc Reviewer, Biological Cybernetics (2009 - present)
- Member, Organization for Human Brain Mapping (2009 - 2010)
- Member, Institute of Electrical and Electronics Engineers (IEEE) (2008 - present)
- Member, International Anesthesia Research Society (2007 - 2008)
- Ad hoc Reviewer, Statistics in Medicine (2006 - present)
- Member, Society for Neuroscience (2005 - present)
- Admissions Committee, Harvard-MIT Division of Health Sciences and Technology (2002 - 2003)
- Ad hoc Reviewer, Neuroimage (2001 - present)

PROFESSIONAL EDUCATION

- Ph.D., Harvard-MIT Division of Health Sciences and Technology Massachusetts Institute of Technology, Cambridge, MA , Biomedical Engineering (2005)
- S.M., Massachusetts Institute of Technology, Cambridge, MA , Electrical Engineering and Computer Science (1998)
- A.B., Harvard College, Cambridge, MA. , Engineering Sciences, summa cum laude (1996)

PATENTS

- Patrick Purdon. "United States Apparatuses and Methods For Electrophysiological Signal Delivery and Recording During MRI"
- Purdon PL, Soulat H, Beck AM, Stephen EP. "United States System and method for monitoring neural signals", Jul 16, 2019
- Brown EN, Van Dort CJ, Akeju O, Purdon PL. "United States Patent MGH 22571.02 Systems and Methods for Administering, Monitoring and Controlling Biomimetic Sleep", Aug 24, 2015
- Purdon PL, Akeju O, Brown EN. "United States Patent MGH 23036 A System and Method for Predicting Arousal to Consciousness During General Anesthesia and Sedation", Aug 24, 2015

- Purdon PL, Brown EN. "United States Patent MGH 23707.02 A System and Method for Discovery and Characterization of Neuroactive Drugs", Aug 24, 2015
- Purdon PL, Mukamel EA, Brown EN. "United States Patent MGH 22628.01 System and Method for Characterizing Brain States During General Anesthesia and Sedation Using Phase-Amplitude Modulation", Jan 14, 2015
- Purdon PL, Brown EN, Akeju O. "United States Patent MGH 22205.10 Systems and Methods for Improved Brain Monitoring During General Anesthesia and Sedation", Sep 13, 2014
- Purdon PL, Brown EN, Lewis LD, Westover MB. "United States Patent MGH 22295 System and Method to Infer Brain State During Burst Suppression", Jun 28, 2014
- Prerau MJ, Purdon PL. "United States Patent MGH 22302.03 A Method for Tracking Non-Stationary Spectral Peak Structure in EEG Data", Jun 25, 2014
- Prerau MJ, Purdon PL. "United States Patent MGH 22687 A Method for Quantifying the Sleep Onset Process using Combined Behavioral and Physiological Measures", Jun 25, 2014
- Purdon PL, Brown EN, Akeju O, Prerau MJ. "United States Patent MGH 22205.04 System and Method for Monitoring Level of Dexmedetomidine-Induced Sedation", Apr 24, 2014
- Brown EN, Ba D, Babadi B, Purdon PL. "United States Patent MGH 22205.13 System and Method for Estimating High Time-Frequency Resolution EEG Spectrograms to Monitor Patient State", Apr 24, 2014
- Purdon PL, Brown EN, Akeju O, Lewis LD. "United States Patent MGH 22205.01 System and Method for Monitoring Anesthesia and Sedation Using Measures of Brain Coherence and Synchrony", Apr 23, 2014
- Patrick L. Purdon, Emery N. Brown, ShiNung Ching, David A. Boas, Maria Angela Franceschini, Jason Sutin. "United States Patent MGH 22205.02 Monitoring Brain Metabolism and Activity Using Elecetroencephalogram and Optical Imaging", Apr 23, 2014
- Krishnaswamy P, Bonmassar G, Purdon PL, Brown EN. "United States Patent MGH 22191 A System and Method for Removing Artifacts from Electrophysiologic Information Acquired in the Magnetic Resonance Imaging Scanner", Apr 10, 2014
- Brown EN, Purdon PL, Ching S, Chemali J. "United States Patent MGH 21412 System and Method for Monitoring and Controlling a State of a Patient During and After Administration of Anesthetic Compound", Oct 14, 2013
- Brown EN, Purdon PL, Prerau MJ, Mukamel EA, Cimenser A. "United States Patent MGH 21181 System and Method for Tracking Brain States During Administration of Anesthesia", May 7, 2012

Research & Scholarship

CLINICAL TRIALS

- Assessment of Drug Liking In Peri-procedural Clinical Settings, Recruiting
- Characterizing Drug Liking During Drug Administration in Peri-procedural Clinical Settings, Not Specified

PROJECTS

- Developing novel technologies to monitor nociception and opioid administration during surgery and general anesthesia in order to minimize post-operative opioid requirements - PASCALL Systems, Inc (9/2020 - 6/2025)
- Characterizing brain dynamic biomarkers of fentanyl using intracranial and high-density electroencephalogram in humans (8/2022 - 5/2027)
- Characterizing sleep brain dynamics associated with Alzheimer’s disease pathology and progression in humans using EEG source localization and PET (12/2022 - 11/2027)
- Developing active stimulation and monitoring technologies to optimize pain and nociception management during regional anesthesia, general anesthesia, and post-operative care (10/2023 - 9/2026)
- Advanced signal processing methods for neural data analysis to support development of brain dynamic biomarkers for research and clinical applications in patients with Alzheimer's and related dementias (7/2023 - 6/2028)
- Developing a novel system combining cognitive assessment with PASCALL FDA-cleared intraoperative anesthesia EEG brain monitor to prevent postoperative neurocognitive disorders in aging patients (10/2023 - 8/2026)

Teaching

COURSES

2023-24

- Time Series Analysis for Neuroscience Data Using State Space Models: BIOS 404 (Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Joanna Sands

Postdoctoral Faculty Sponsor

Hanan Baker, Steven Brandt, Mingjian He, Scott Oshiro

Doctoral Dissertation Advisor (AC)

Katherine Liu

Publications

PUBLICATIONS

- **ICA-S3M: switching state-space model guided automatic EEG artifact removal from independent components.** *Frontiers in neuroscience*
  Tou, S. L., He, M., Oshiro, S. Y., Das, P., Purdon, P. L.
  2026; 20: 1865301

- **Rethinking the Integration of Artificial Intelligence Into Surgery: Centralized Risk Assessment for System-Level Impact.** *Annals of surgery open : perspectives of surgical history, education, and clinical approaches*
  Mather, R. V., Kunitake, H., Purdon, P. L.
  2026; 7 (2): e661

- **A Prospective Study Characterizing Cognitive Function in Patients with Inflammatory Bowel Disease.** *Clinical and translational gastroenterology*
  Raje, P., Stone, T. A., Alkourabi, J., Mather, R. V., Liu, R., Higuchi, M., Nipp, R. D., Purdon, P. L., Kochar, B., Kunitake, H.
  2026

- **Intraoperative Electroencephalogram Alpha Power Associated with Mortality: Reply.** *Anesthesiology*
  Mather, R. V., Nipp, R. D., Balanza, G., Stone, T. A., Gutierrez, R., Raje, P., Higuchi, M., Liu, R., Mercado, L. A., Bittner, E. A., Kunitake, H., Purdon, P. L.
  2025; 143 (5): 1425-1427

- **Association of peripheral nerve blocks with increased postoperative pain and opioid use in orthopaedic surgery: a single-centre retrospective cohort study.** *British journal of anaesthesia*
  Chung, A. R., Mather, R. V., Gutierrez, R., Liu, R., Leung, C. F., Zhang, M., Santa Cruz Mercado, L. A., Houle, T. T., Bittner, E. A., Purdon, P. L.
  2025

- **Retrospective Study on Perioperative Opioid Administration and Maximum Perioperative Pain by Median Income of Patient Zip Code**
  Sydloski, J., Mather, R., Johnson, J., Gutierrez, R., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 725-727

- **State-Space Oscillator Modeling to Identify a Personalized Intraoperatiye EEG Marker for Opioid Effects**
  Bharadwar, K., Mather, R., He, M., Das, P., Villegas, G., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 584-589

- **EEG Patterns Correlated with Biomarkers of Alzheimer's Disease and Neurodegeneration after Cardiac Surgery**
  Mather, R., Feinstein, I., Gutierrez, R., Young, C., McAllister, T., Mendiola, J., Gao, X., Porras, G., Kitsis, A., Hansine, A., Delaney, G., Wilson, E., Angst, et al
  LIPPINCOTT WILLIAMS & WILKINS.2025: 485

- **Phase-Amplitude Modulation Between Delta and Alpha Oscillations in the Electroencephalogram (EEG) During Pediatric Anesthesia**
  Chao, J., Gutierrez, R., Chao, C., Zhang, L., Yozawitz, E., Legatt, A., Jackson, W., Nafiu, B., Kudchadkart, S., Li, G., Eikermann, M., Lo, Y., Shinnar, et al
  LIPPINCOTT WILLIAMS & WILKINS.2025: 901-902

- **Biomarkers of Alzheimer's Disease and Neurodegeneration After Cardiac Surgery: First Insights from the Ongoing CARDIAC-PND Study**

Feinstein, I., Young, C., McAllister, T., Mendiola, J., Gao, X., Porras, G., Kitsis, A., Huhn, A., Delaney, G., Mather, R., Gutierrez, R., Purdon, P., Wilson, et al
LIPPINCOTT WILLIAMS & WILKINS.2025: 530-533

- **Association of Single-Shot Peripheral Nerve Block With Postoperative Pain and Opioid Use in Orthopedic Surgery**
  Chung, A., Mather, R., Gutierrez, R., Liu, R., Leung, A., Zhang, M., Mercado, L., Houle, T., Bittner, E., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 1100-1105
- **Comparison of Pain Assessments and Max Pain Scores by Language Group in Women Receiving Neuraxial Analgesia for Vaginal Delivery**
  Pandit, A., Gutierrez, R., Leung, A., Mather, R., Johnson, J., Chung, A., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 607-609
- **The Effects of Timing of Intraoperative Opioid Administration on Postoperative Pain and Opioid Use Outcomes**
  Liu, R., Gutierrez, R., Mather, R., Stone, T., Bittner, E., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 734-738
- **Intraoperative Frontal EEG Alpha Power is Associated with Postoperative Mortality and Other Adverse Outcomes**
  Mather, R., Villegas, G., Stone, T., Gutierrez, R., Raje, P., Higuchi, M., Liu, R., Mercado, L., Bittner, E., Nipp, R., Kunitake, H., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2025: 554-558
- **A ketogenic diet decreases sevoflurane-induced burst suppression in rats.** *Brain research bulletin*
  Siegmann, M. J., Parry, S., Lark, A. R., Mir, F. A., Choi, J., Carpenter, A. H., Crowley, E. A., White, C. G., Kang, J., Purdon, P. L., Nehs, C. J.
  2025: 111274
- **Electroencephalogram-Guided General Anesthesia in a Pediatric Patient With Alexander's Disease: A Case Report.** *A&A practice*
  Zhang, M., Mather, R. V., Chung, A. R., Leung, C. F., Ramamurthi, R. J., Purdon, P. L.
  2025; 19 (1): e01910
- **EEG Artifact Removal Using Switching State Space Models 2025** *2025 59th Asilomar Conference on Signals, Systems, and Computers*
  Stone, T. A., Tou, S., He, M., Beck, A., Purdon, P. L.
  2025: 6
- **Intraoperative Frontal EEG Alpha Power is Associated with Post-Operative Mortality and Other Adverse Outcomes.** *Anesthesiology*
  Mather, R. V., Nipp, R. D., Balanza, G., Stone, T. A., Gutierrez, R., Raje, P., Higuchi, M., Liu, R., Santa Cruz Mercado, L. A., Bittner, E. A., Kunitake, H., Purdon, P. L.
  2024
- **Intraoperative EEG Alpha Power Predicts Postoperative Mortality and Adverse Postoperative Outcomes**
  Mather, R., Villegas, G., Stone, T., Gutierrez, R., Raje, P., Higuchi, M., Liu, R., Mercado, L., Bittner, E., Kunitake, H., Nipp, R., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2024: 449-453
- **Electroencephalographic (EEG) Characteristics in Children Undergoing Sevoflurane Anesthesia: Comparing EEG-Guided Anesthesia vs Standard Care**
  Bong, C., Villegas, G., Stone, T., Gutierrez, R., Liang, S., Allen, J., Purdon, P.
  LIPPINCOTT WILLIAMS & WILKINS.2024: 677
- **Depth of anesthesia monitoring: an argument for its use for patient safety.** *Current opinion in anaesthesiology*
  Brook, K., Agarwala, A. V., Li, F., Purdon, P. L.
  2024
- **A dynamic generative model can extract interpretable oscillatory components from multichannel neurophysiological recordings.** *eLife*
  Das, P., He, M., Purdon, P. L.
  2024; 13
- **For EEG-Guided Anesthesia, We Have to Go Beyond the Index.** *Anesthesia and analgesia*
  Kreuzer, M., García, P. S., Gutierrez, R., Purdon, P. L.
  2024
- **A dynamic generative model can extract interpretable oscillatory components from multichannel neurophysiological recordings.** *bioRxiv : the preprint server for biology*
  Das, P., He, M., Purdon, P. L.

2024

- **Development and multicentre validation of the FLEX score: personalised preoperative surgical risk prediction using attention-based ICD-10 and Current Procedural Terminology set embeddings.** *British journal of anaesthesia*
  Liu, R., Stone, T. A., Raje, P., Mather, R. V., Santa Cruz Mercado, L. A., Bharadwaj, K., Johnson, J., Higuchi, M., Nipp, R. D., Kunitake, H., Purdon, P. L.
  2024
- **Simultaneous localization of multiple oscillations using dynamic solutions to the inverse problem in E/MEG source analysis**
  He, M., Das, P., Beck, A., Hotan, G., Purdon, P. L.
  edited by Matthews, M. B.
  IEEE.2024: 228-233
- **Development and prospective validation of postoperative pain prediction from preoperative EHR data using attention-based set embeddings.** *NPJ digital medicine*
  Liu, R., Gutiérrez, R., Mather, R. V., Stone, T. A., Santa Cruz Mercado, L. A., Bharadwaj, K., Johnson, J., Das, P., Balanza, G., Uwanaka, E., Sydloski, J., Chen, A., Hagood, et al
  2023; 6 (1): 209
- **Anesthesia-induced Brain Oscillations and Vulnerability to Postoperative Neurocognitive Disorders.** *Anesthesiology*
  Gutierrez, R., Purdon, P. L.
  2023; 139 (5): 557-559
- **Multilevel State-Space Models Enable High Precision Event Related Potential Analysis.** *Conference record. Asilomar Conference on Signals, Systems & Computers*
  Das, P., He, M., Purdon, P. L.
  2023; 2023: 1496-1499
- **Switching state-space modeling of neural signal dynamics.** *PLoS computational biology*
  He, M., Das, P., Hotan, G., Purdon, P. L.
  2023; 19 (8): e1011395
- **Multilevel State-Space Models Enable High Precision Event Related Potential Analysis**
  Das, P., He, M., Purdon, P. L.
  edited by Matthews, M. B.
  IEEE.2023: 1496-1499

PRESENTATIONS

- Model Comparison Methods for fMRI Data Analysis - Optical Imaging Laboratory (David Boas), Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Charlestown, MA (2005 - 2005)
- Dynamic Solutions to the MEG Source Localization Problem - Computational Neuroscience Workgroup, Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Charlestown, MA (2006 - 2006)
- Multimodal Functional Imaging of Central Auditory Function During General Anesthesia - Eaton-Peabody Laboratory, Massachusetts Eye and Ear Infirmary, Boston, MA (2007 - 2007)
- Studying the Neural Mechanisms of General Anesthesia in Humans with Functional Imaging, EEG Source Localization, and Intracranial Electrophysiology - Research Seminar, Department of Anesthesia and Critical Care, Massachusetts General Hospital, Boston, MA (2009 - 2009)
- The Neural Mechanisms of General Anesthesia - BrainMap Research Seminar, Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Charlestown, MA (2009 - 2009)
- Recording and Analysis of Human Intracranial Neural Activity During General Anesthesia - Laboratory of Sydney Cash Department of Neurology, Massachusetts General Hospital, Boston, MA
- Human Intracranial Neurophysiology during Induction of General Anesthesia - Laboratory of Emad Eskandar Department of Neurosurgery, Massachusetts General Hospital, Boston, MA (2009 - 2009)
- Neural dynamics during general anesthesia - Laboratory of Emad Eskandar Department of Neurosurgery, Massachusetts General Hospital, Boston, MA (2011 - 2011)
- Phase-Amplitude Modulation During General Anesthesia - the Laboratory of Sydney Cash, Department of Neurology, Massachusetts General Hospital, Boston, MA (2012 - 2012)
- EEG Monitoring During General Anesthesia and Sedation - Pediatric Anesthesia Team Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, MA (2013 - 2013)

- Anesthesia-Induced Unconsciousness: Neurons, Oscillations, and Clinical Monitoring - Summer Student Seminar, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2013 - 2013)
- Neurophysiology of Propofol-induced Sedation and Unconsciousness - Critical Care Grand Rounds, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2013 - 2013)
- The Neurophysiology of General Anesthesia and Sedation: From Neurons and Oscillations to Clinical Monitoring - Center for Brain Mind Medicine, Brigham and Women's Hospital (2013 - 2013)
- Potential Awareness Case - Mortality and Morbidity Rounds, Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA (2014 - 2014)
- Back to the Future: How A New Approach to EEG Monitoring Could Transform Anesthesia and Critical Care - Executive Committee on Research, Massachusetts General Hospital, Boston, MA (2014 - 2014)
- Pediatric Anesthetic Monitoring Sensors - Internal Advisory Board Meeting, Partners Innovation, Partners Healthcare, Boston, MA (2014 - 2014)
- A protocol to study changes in propofol-induced EEG oscillations in pediatric patients during repeated daily anesthesia - Pediatric Anesthesia Staff Meeting, Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, MA (2015 - 2015)
- A protocol to study changes in propofol-induced EEG oscillations in pediatric patients during repeated daily anesthesia - Pediatric Brain Tumor Research Meeting, Pediatric Hematology-Oncology Unit, Massachusetts General Hospital, Boston, MA (2015 - 2015)
- Developing preoperative assessments of brain function to improve anesthetic care in elderly patients - Staff Meeting, Post-Anesthesia Care Unit Nursing Staff, Massachusetts General Hospital, Boston, MA (2015 - 2015)
- Clinical Encephalography for the Anesthesiologist - 2015 – 2016 Core Lecture Series Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, MA
- State Space Models for Phase-Amplitude Modulation Analysis - Lab meeting for Nancy Kopell, Uri Eden, and Mark Kramer, Boston University, Boston, MA (2018 - 2018)
- Basic Steps for Setting Up and Using the EEG to Monitor The Level of Consciousness During Anesthesia - Staff Meeting, Nursing Staff, Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, MA (2020 - 2020)
- Dynamic Disruption: A Mechanism of Anesthesia and A Window into Brain Resilience - R&D Monthly Research Seminar, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine, Palo Alto, CA (2023 - 2023)
- Dynamic Disruption: A Mechanism of Anesthesia and A Window into Brain Resilience - Knight Initiative for Brain Resilience Seminar Series, Wu Tsai Neurosciences Institute, Stanford University School of Medicine, Palo Alto, CA
- Regularization and Model Comparison for fMRI - Workshop on Analysis of Neural Data, Marine Biology Laboratory, Woods Hole, MA (1999 - 1999)
- Functional Imaging of Loss of Consciousness Under General Anesthesia - Center for Biodynamics, Boston University, Boston, MA (2002 - 2002)
- Functional Imaging of Loss of Consciousness Under General Anesthesia - Laboratory of Christopher Moore, Brain and Cognitive Sciences Department, Massachusetts Institute of Technology, Cambridge, MA (2004 - 2004)
- Applications of Spectral Analysis in Anesthesia Research - CMBA0264-01 Statistics with Applications, Tufts University Medical School (2008 - 2008)
- Applications of Spectral Analysis in Anesthesia Research - CMBA0264-01 Statistics with Applications, Tufts University Medical School (2009 - 2009)
- The Neural Mechanisms of General Anesthesia - Laboratory of Lisa Barrett, Department of Psychology, Boston College, Chestnut Hill, MA (2009 - 2009)
- Neural dynamics during general anesthesia - Laboratory of Lisa Barrett, Department of Psychology, Northeastern University, Boston, MA (2011 - 2011)
- Neural Mechanisms of General Anesthesia - MIT Medical Electronic Device Realization Center Workshop, Massachusetts Institute of Technology (2012 - 2012)
- Multimodal Imaging - MIT 9.272/HST.576, "Topics in Neural Signal Processing," Massachusetts Institute of Technology (2013 - 2013)
- Clinical Electroencephalography for the Anesthesiologist: Basic Science and Practical Tools for the Operating Room - Grand Rounds, Department of Anesthesiology, Tufts Medical Center, Boston, MA (2014 - 2014)
- MEG and EEG Inverse Solutions - MIT 9.272/HST.576, "Topics in Neural Signal Processing," Massachusetts Institute of Technology (2014 - 2014)
- Systems-Level Mechanisms of General Anesthesia - Neuroscience Seminar, Neuroscience Program, Wellesley College, Wellesley, MA (2015 - 2015)
- Electroencephalography for Anesthesiologists - Grand Rounds, Department of Anesthesiology, Eastern Maine Medical Center, Bangor, Maine (2016 - 2016)
- Aging and Development Through The Lens of Anesthesia-induced Brain Oscillations - Aging Brain Seminar, Picower Institute, Massachusetts Institute of Technology, Cambridge, MA (2017 - 2017)
- The Aging Brain Under Anesthesia - Grand Rounds, Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital (2021 - 2021)

- Signal Processing Methods for Multimodal Functional Imaging - 3rd Workshop on the Statistical Analysis of Neural Data (SAND3), Carnegie-Mellon University, Pittsburgh, PA (2006 - 2006)
- Multimodal Functional Imaging of Loss of Consciousness Under Propofol Anesthesia Using Simultaneous EEG/fMRI: fMRI Correlates of the 40-Hz ASSR and Loss of Cortical-fugal Inhibition - Society for Neuroscience, San Diego, CA (2007 - 2007)
- Ballistocardiogram-free EEG during fMRI using a distributed high impedance ink-based EEG cap with 100-micron electrodes - Society for Neuroscience, Washington, DC (2008 - 2008)
- Evidence for Loss of Auditory Corticofugal Feedback during Propofol Anesthesia: An EEG/fMRI Study - American Society of Anesthesiologists Annual Meeting, Orlando, FL (2008 - 2008)
- Resting State Functional Connectivity, EEG, and General Anesthesia - Panel Discussion " From Memory to Molecules to Memory," American Society of Anesthesiologists Annual Meeting, San Diego, CA (2010 - 2010)
- Quantitative EEG Monitoring of General Anesthesia and Sedation - Panel Discussion, American Clinical Neurophysiology Society, Miami, FL (2013 - 2013)
- Anesthesia-Induced Unconsciousness: Making Sense of Big Dynamic Data - Plenary Session, "Theory, computation and big data for the BRAIN Initiative," Workshop for the NIH BRAIN Initiative, Boston, MA (2013 - 2013)
- Localizing EEG oscillatory dynamics of unconsciousness and return of consciousness - American Society of Anesthesiologists Annual Meeting, San Francisco, CA (2013 - 2013)
- Clinical Electroencephalography for Anesthesiologists - Department of Anesthesiology, University of Vermont Medical School, Burlington, VT (2014 - 2014)
- A New Paradigm for EEG Monitoring During General Anesthesia and Sedation: From Neurophysiology to Clinical Practice - Grand Rounds, Department of Anesthesiology, University of Vermont Medical School, Burlington, VT (2014 - 2014)
- Clinical Electroencephalography for the Anesthesiologist - Society of Milwaukee Anesthesiologists, Milwaukee, WI (2014 - 2014)
- A neural systems approach to monitoring brain states during general anesthesia and sedation - NIH Common Fund High-Risk, High-Reward Research Symposium, National Institutes of Health, Bethesda, MD (2014 - 2014)
- The Elderly Brain Under Anesthesia: An Age-Dependent Analysis of Propofol- and Sevoflurane-Induced Electroencephalogram Dynamics - Association of University Anesthesiologists 62nd Annual Meeting, Nashville, TN (2015 - 2015)
- Combining State-Space Modeling, Neuroanatomy, and Compressive Sensing to Solve The EEG/MEG Inverse Problem - Panel Discussion, Joint Statistical Meetings, Seattle, WA (2015 - 2015)
- Closed-Loop Control of Refractory Status Epilepticus - Panel Discussion on PCLC of Anesthesia and Fluid Resuscitation, Public Workshop on Physiological Closed-Loop Controlled Devices, Food and Drug Administration, Silver Springs, MD (2015 - 2015)
- Contrasting Neural Mechanisms of Sleep and Anesthesia - Society of Anesthesia and Sleep Medicine 5th Annual Meeting, San Diego, CA (2015 - 2015)
- EEG and Unconsciousness - Mini-Symposium, "The Unresponsive Patient," Society for Neuroscience in Anesthesiology and Critical Care 43rd Annual Meeting, San Diego, CA (2015 - 2015)
- The aging brain: An age-dependent analysis of the electroencephalogram dynamics during propofol and sevoflurane general anesthesia - Business Lunch and Award Presentation Session, Society for Neuroscience in Anesthesiology and Critical Care 43rd Annual Meeting, San Diego, CA (2015 - 2015)
- The Elderly Brain and the Pediatric Brain during General Anesthesia: From Neurobiology to Electroencephalography - Masimo Symposium, Annual Meeting of the American Society of Anesthesiologists, San Diego, CA (2015 - 2015)
- Clinical Electroencephalography for Anesthesiologists: A Window Into the Unconscious Brain During Aging and Development - Grand Rounds, University of Tennessee Graduate School of Medicine, Knoxville, Tennessee, (2016 - 2016)
- Theory of Spectrograms - American Clinical Neurophysiology Society, 2016 Fall Courses, Nashville, TN (2016 - 2016)
- EEG in General Anesthesia - American Clinical Neurophysiology Society, 2016 Fall Courses, Nashville, TN (2016 - 2016)
- The Neuroscience and Clinical Implications of the Emergence from General Anesthesia - Moderator, Panel Discussion, Society for Neuroscience in Anesthesiology and Critical Care, Boston, MA (2017 - 2017)
- The neurophysiology of general anesthetic drugs in the elderly: A window into the dynamics of the aging brain - Organizer and Invited Speaker, Panel Discussion, "The Aging Brain Under Anesthesia: From Basic Neuroscience to Clinical Practice," American Society of Anesthesiologists, Boston, MA (10/20/2017 - 10/24/2017)
- The neurophysiology of general anesthetic drugs in children: A window into the dynamics of the developing brain - Organizer and Invited Speaker, Panel Discussion, "The Neuroscience of Brain Development: Opportunities and Alternative Perspectives for Pediatric Anesthesia Research," American Society of Anesthesiologists, Boston, MA (10/20/2017 - 10/24/2017)
- Cortical and thalamocortical dynamics during induction and emergence from anesthesia-induced unconsciousness - Organizer and Invited Speaker, Panel Discussion, "The Neuroscience of Altered States of Consciousness: Insights from Anesthesia, Sleep, and Coma," American Society of Anesthesiologists, Boston, MA (10/20/2017 - 10/24/2017)

- New Developments in the Neuroscience of General Anesthesia - Panelist, Plenary session, “Principles of Pediatric Anesthesia and Critical Care,” Boston, MA (2018 - 2018)
- Brain Dynamic Biomarkers of Aging and Anesthesia - Invited Speaker, Plenary Session, AARP/ASA Perioperative Brain Health Initiative Summit, Washington, DC (2018 - 2018)
- The Developing Brain, Viewed Through the Lens of Anesthesia-Induced Brain Dynamics - Child Neurodevelopment Workshop on Neuroimaging, Bill and Melinda Gates Foundation, Seattle, WA (2018 - 2018)
- The BIS Anesthesia Monitor - Child Neurodevelopment Workshop on Neuroimaging, Bill and Melinda Gates Foundation, Seattle, WA (2018 - 2018)
- The Aging Brain Under General Anesthesia, Viewed Through the Lens of the EEG - Grand Rounds, Visiting Professorship, Department of Anesthesia and Perioperative Care, University of California at San Francisco, San Francisco, CA (2018 - 2018)
- Brain Dynamics in Children Receiving General Anesthesia: A Natural Experiment in Human Neural Circuit Development - Department of Anesthesia and Perioperative Care, University of California at San Francisco, San Francisco, CA (2018 - 2018)
- The EEG as a Biomarker of Perioperative Brain Vulnerability - Perioperative Cognition and Delirium Workshop, American Delirium Society Meeting, Indianapolis, IN, (2022 - 2022)
- An EEG Signature for Opioids - National Institutes of Health (NIH)/National Institute on Drug Abuse (NIDA) and Food and Drug Administration (FDA)/ Center for Devices and Radiological Health (CDRH) Public Workshop: Diagnostic and Monitoring Medical Devices for Opioid Use, Bethesda, MD (2022 - 2022)
- The EEG as a Biomarker of Perioperative Brain Vulnerability - Rutgers- New Jersey Medical School, Department of Anesthesia, Newark, NJ (2022 - 2022)
- Unlocking The Secrets of the Developing Brain: Anesthesia’s Hidden Power - Grand Rounds, Children’s Hospital of Pennsylvania, Department of Anesthesiology and Critical Care Medicine, Philadelphia, PA (2023 - 2023)
- An EEG Biomarker for Opioids: Insights From the Operating Room to aid in the Opioid Crisis - Panelist, Minisyposium, Monitoring and Diagnostic Devices for Substance Use Disorders: Challenges and Opportunities, The College on Problems of Drug Dependence (CPDD) 85th Annual Scientific Meeting, Denver, CO (2023 - 2023)
- The Influence of Intraoperative Opioid Administration on Postoperative Pain and Opioid Requirements - The College on Problems of Drug Dependence (CPDD) 85th Annual Scientific Meeting, Denver, CO (2023 - 2023)
- Un-true false-positive rates due to temporal autocorrelation in fMRI statistical analysis - International Society for Magnetic Resonance in Medicine 6th Scientific Meeting and Exhibition, Sydney, Australia (1998 - 1998)
- Signal processing in fMRI: a new hemodynamic response model and estimation method - International Society for Magnetic Resonance in Medicine 6th Scientific Meeting and Exhibition, Sydney, Australia (1998 - 1998)
- Ballistocardiogram Removal and Motion Correction for EEG in the Magnet - International Society for Magnetic Resonance in Medicine 9th Scientific Meeting and Exhibition, Glasgow, Scotland (2001 - 2001)
- A Dynamic Solution to the Ill-Conditioned MEG Source Localization Problem - IEEE International Symposium on Biomedical Imaging, Alexandria, VA (2006 - 2006)
- Dynamic Solutions to the MEG Source Localization Problem - Recent Advances in Biomagnetic Signal Processing and Source Localization, Satellite Program, World Conference on Biomagnetism, Vancouver, Canada (2006 - 2006)
- Consciousness and Anaesthesia - Second World Congress of Total Intravenous Anaesthesia – TCI, Berlin, Germany (2009 - 2009)
- A State Space Approach to Multimodal Integration of Simultaneously Recorded EEG and fMRI - IEEE International Conference on Acoustics, Speech, and Signal Processing, Dallas, TX (2010 - 2010)
- Robust Time-Varying Multivariate Coherence Estimation: Application to Electroencephalogram Recordings During General Anesthesia - 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Boston, MA (2011 - 2011)
- Bayesian Analysis of Trinomial Data in Behavioral Experiments and Its Application to Human Studies of General Anesthesia - 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Boston, MA (2011 - 2011)
- Neurophysiological Correlates of Unconsciousness Under General Anesthesia - International Science Symposium, International Anesthesia Research Society, Boston, MA (2012 - 2012)
- Electroencephalogram Signatures of Loss and Recovery of Consciousness During Propofol-Induced General Anesthesia - Anesthesiology and Sleep Disorders Workshop, Fields Institute, Toronto, Ontario, Canada (2012 - 2012)
- The Neural Dynamics of Loss and Recovery of Consciousness Under General Anesthesia - Association for the Scientific Study of Consciousness, Brighton, England (2012 - 2012)
- Monitoring Brain States During General Anesthesia and Sedation - Distinguished Lecture Series, Institute for Biomaterials and Biomedical Engineering, University of Toronto, Toronto, Ontario, Canada (2013 - 2013)
- Clinical Electroencephalography for the Anesthesiologist - International Anesthesia Research Society, San Diego, CA (2013 - 2013)
- Electroencephalogram dynamics during general anesthesia - European Society of Anesthesia, Barcelona, Spain (2013 - 2013)

- Anesthesia-Induced Unconsciousness: Neurons, Oscillations, and Clinical Monitoring - Modeling Neural Activity: Statistics, Dynamical Systems, and Networks, Lihue, Hawaii (2013 - 2013)
- Slow-wave Oscillations in Sleep and Anesthesia: Similarities and Differences - Anesthesiologists Concerned with Cognition, Emergence, Sleep, and Sedation (ACCESS) Workshop, Oxford, England (2013 - 2013)
- Monitoring Anesthesia-Induced States of Unconsciousness using EEG - Third Annual Bertarelli Symposium, “Neuroengineering: Molecules, Minds, and Machines” (2014 - 2014)
- Electroencephalogram Monitoring of General Anesthesia and Sedation: From Neurophysiology to Clinical Practice - International Anesthesia Research Society, Montreal, Quebec, Canada (2014 - 2014)
- Anesthesia-Induced Unconsciousness: From Neurons and Oscillations to Clinical Monitoring - European Society of Anesthesia, Stockholm, Sweden (2014 - 2014)
- Neurons, Networks, and Clinical Neurophysiology during Anesthesia-Induced Unconsciousness - 9th International Symposium on Memory and Awareness in Anesthesia (MAA9), Tokyo, Japan (2014 - 2014)
- The Aging Brain During General Anesthesia - Masimo Symposium International Anesthesia Research Society, Honolulu, Hawaii, USA (2015 - 2015)
- Clinical Electroencephalography for Anesthesiologists - Panel Discussion “Neurophysiology Over Numerology: New Approaches to EEG Monitoring During Anesthesia (2015 - 2015)
- Sleep and Consciousness: Clinical Need Versus Safety - , Panel Discussion World Medical Innovation Forum, Boston, MA (2015 - 2015)
- Electroencephalogram monitoring of brain states in the intensive care unit - Panel Discussion, European Society of Anesthesia, Berlin, Germany (2015 - 2015)
- The Clinical Neurophysiology of Anesthesia: Insights on the Pediatric and the Elderly Brain - “Modulation of cortical network dynamics by anesthetics: from synaptic transmission to global network dynamics” 9th International Conference on Mechanisms of Anaesthesia (MAC 2015), Bonn, Germany (2015 - 2015)
- Computational models for anesthesia-induced EEG rhythms - Plenary Session “Neural Circuit Mechanisms of General Anesthesia” 9th International Conference on Mechanisms of Anaesthesia (MAC 2015), Bonn, Germany (2015 - 2015)
- Clinical EEG for Anesthesiologists: An Introduction to Spectrograms and Drug Signatures” - Mini Conference, 62nd Brazilian Congress of Anesthesiology, Florianopolis, Brazil (2015 - 2015)
- The Aging Brain Under Anesthesia: Basic Neuroscience and Clinical Neurophysiology - XV Brazilian Symposium of Depth of Anesthesia Monitoring, 62nd Brazilian Congress of Anesthesiology, Florianopolis, Brazil (2015 - 2015)
- The Pediatric Brain Under Anesthesia: Basic Neuroscience and Clinical Neurophysiology - XV Brazilian Symposium of Depth of Anesthesia Monitoring, 62nd Brazilian Congress of Anesthesiology, Florianopolis, Brazil (2015 - 2015)
- EEG States During Anesthesia and ICU Admission - International Symposium on Neuromonitoring in Neuroanesthesia and Neurocritical Care, Cleveland Clinic Abu Dhabi, Abu Dhabi (2016 - 2016)
- The Elderly Brain During General Anesthesia and Emergence: From Neurobiology to Electroencephalography - Masimo Symposium, EuroNeuro 2016, Barcelona, Spain (2016 - 2016)
- Consciousness and Memory - 9th International Update on Neuro-Anesthesia & Neuro-Intensive Care, Barcelona, Spain (2016 - 2016)
- The Elderly Brain and The Developing Brain During General Anesthesia: From Neurobiology to Electroencephalography - Grand Rounds, Hospital Universitario La Paz, Madrid, Spain (2016 - 2016)
- The Elderly Brain and The Developing Brain During General Anesthesia: From Neurobiology to Electroencephalography - Grand Rounds, Hospital Clinic Universitari de Barcelona, Barcelona, Spain (2016 - 2016)
- The Elderly Brain and The Developing Brain During General Anesthesia: From Neurobiology to Electroencephalography - Grand Rounds, Hospital Universitario Virgen del Rocío, Seville, Spain (2016 - 2016)
- Clinical Electroencephalography for Anesthesiologists: A Window Into the Unconscious Brain and Personalized Anesthesia - Grand Rounds, University Hospital Ramón y Cajal, Madrid, Spain (2016 - 2016)
- The neurophysiology of general anesthetic drugs in the elderly: A window into the dynamics of the aging brain - “Anesthesia, Intensive Care, and the Aging Brain,” International Anesthesia Research Society, San Francisco, California, USA (5/21/2016 - 5/24/2016)
- EEG monitoring of brain states during anesthetic management - Neuromonitoring Symposium, Japanese Society of Anesthesiologists, Fukuoka, Japan (2016 - 2016)
- The Aging Brain Under General Anesthesia - Masimo Symposium, Japanese Society of Anesthesiologists, Fukuoka, Japan (2016 - 2016)
- Using the EEG to Monitor General Anesthesia and Sedation - Grand Rounds, Tokyo Medical University Hospital, Tokyo, Japan (2016 - 2016)
- Clinical Electroencephalography for Anesthesiologists: A Window Into the Unconscious Brain During Aging and Development - Grand Rounds, St. Luke’s International Hospital, Tokyo, Japan (2016 - 2016)
- Anesthesia-Related EEG Signatures and Brain Circuits - Encephalography and Anesthesia Workshop, Charité - Universitätsmedizin, Berlin, Germany (2016 - 2016)

- Interpreting EEG During Anesthesia - 16th World Congress of Anaesthesiologists, Hong Kong, China (2016 - 2016)
- Measuring Hypnosis - 16th World Congress of Anaesthesiologists, Hong Kong, China (2016 - 2016)
- The Neurophysiology of the Aging Brain Under General Anesthesia - Masimo Symposium, 16th World Congress of Anaesthesiologists, Hong Kong, China (2016 - 2016)
- A Window into Brain Function During Aging and Development - Tiantan International Neurosurgical & Anesthesia Symposium, Beijing, China (2016 - 2016)
- The Aging Brain Under General Anesthesia - Xijing Hospital, Xi'an, China (2016 - 2016)
- The Aging Brain Under General Anesthesia - Zhongshan University 2nd Affiliated Hospital, Guangzhou, China (2016 - 2016)
- A Window into Brain Function During Aging and Development - Zhongshan 1st Affiliated Hospital, Guangzhou, China (2016 - 2016)
- Clinical Electroencephalography for Anesthesiologists: A Window into Brain Function During Aging and Development - First Affiliate Hospital of Zhejiang University, Hangzhou, China (2017 - 2017)
- Clinical Electroencephalography for Anesthesiologists: Using the EEG to Provide Personalized Anesthesia Care - Third Xiangya Hospital, Changsha, China (2017 - 2017)
- Clinical Electroencephalography for Anesthesiologists: Using the EEG to Provide Personalized Anesthesia Care - Sichuan Provincial People's Hospital, Chengdu, China (2017 - 2017)
- Clinical Electroencephalography for Anesthesiologists: A Window into Brain Function During Aging and Development - First Affiliate Hospital of Peking University, Beijing, China (2017 - 2017)
- Closed-Loop Control of Medical Coma - 37th International Symposium on Intensive Care and Emergency Medicine, Brussels, Belgium (3/21/2017 - 3/24/2017)
- Basic Principles for EEG Monitoring of Anesthetic Brain States - "EEG Monitoring for Anesthetic Management: A Practical Case Study Approach to Personalized Anesthesia Care," International Anesthesia Research Society, Washington, DC (5/6/2017 - 5/7/2017)
- The Neurophysiology of General Anesthetic Drugs in Children: A Window into the Dynamics of the Developing Brain - Panel Discussion, "The Neuroscience of Brain Development: Opportunities and Alternative Perspectives for Pediatric Anesthesia Research," International Anesthesia Research Society, Washington, DC (2017 - 2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Plenary Session, Neurosur 2017: The Neurobiology of Consciousness, University of Chile, Santiago, Chile (5/8/2017 - 5/12/2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Chilean Society of Anesthesiologists, Santiago, Chile (2017 - 2017)
- Brain dynamics during anesthesia-induced unconsciousness and sleep - Plenary Session, Neurosur 2017: The Neurobiology of Consciousness, University of Chile, Santiago, Chile (5/8/2017 - 5/12/2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Grand Rounds, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina (2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Hospital Italiano de Buenos Aires, Fundacion de Cuidados Criticos, Buenos Aires (2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Evening Lecture, Sociedad Colombiana de Anestesia y Reanimación, Bogota, Colombia (2017)
- Clinical electroencephalography for anesthesiologists: Neuroscience principles and case studies - Grand Rounds, Fundacion Santa Fe de Bogota, Bogota, Colombia (2017)
- The Aging Brain Under General Anesthesia - Chinese Association of Anesthesiologists, Kunming, China (2018)
- The Developing Brain Under Anesthesia: Oscillations, Neural Circuits, and Critical Period Plasticity - Panel Discussion "SmartTots: Neurotoxicity in Children Exposed to Anesthesia: Where is the Money," International Anesthesia Research Society, Chicago, Illinois, USA (2018)
- The Aging and Developing Brain Under General Anesthesia, Viewed Through the Lens of the EEG - XLIV Annual Meeting of the Mexican College of Anesthesiologists, Mexico City, Mexico (2018)
- EEG Monitoring for Anesthetic Management: Theory and Practice for Personalized Anesthesia Care - XLIV Annual Meeting of the Mexican College of Anesthesiologists, Mexico City, Mexico (2018)
- The Aging Brain Under General Anesthesia: Neuroscience Principles and EEG Case Studies - Grand Rounds, Department of Anaesthesia, National University of Singapore, Singapore (2019)
- The Developing Brain Under General Anesthesia: Neuroscience Principles and EEG Case Studies - Grand Rounds, Department of Paediatric Anaesthesia, KK Women's and Children's Hospital, Singapore (2019)
- Anesthesiology: A case study of innovation at the intersection of neuroscience, engineering, and clinical practice - Research Seminar, Nanyang Technical University, School of Computer Science and Engineering, Singapore (2019)

- Anesthesiology: A case study of innovation at the intersection of neuroscience, engineering, and clinical practice - Research Seminar, Agency for Science and Technology Research (A*STAR), Singapore (2019)
- Anesthesia: A Natural Experiment in Human Neural Circuit Development - Research Symposium, International Research Center for Neurointelligence, University of Tokyo (2019)
- EEG for Anaesthetists - Singapore General Hospital, Singapore (2/7/2020 - 2/8/2020)
- Advancements and Updates in Perioperative Neuromonitoring - Central Commissioned Training Programme (week-long course), Hospital Authority of Hong Kong (2/10/2020 - 2/14/2020)
- Anesthesia: A Dynamic Disruption of Consciousness - Research Symposium, Korean Society for Brain and Neural Sciences, Virtual
- Can EEG patterns, at baseline or in response to anesthetic drugs, predict perioperative neurocognitive disorders (PND)? - Euroanaesthesia 2020 (2020)
- The Aging Brain Under General Anesthesia: Neuroscience Principles and EEG Case Studies - Research Symposium, Evidence-Based Perioperative Medicine - Asia and Annual Scientific Meeting in Anaesthesiology (11/14/2020 - 11/15/2020)
- Anesthesia-Induced Brain Oscillations: A Natural Experiment in Human Neurodevelopment - Research Seminar, The 80th Fujihara Seminar, Japan (2021)
- Unlocking the Secrets of the Developing Brain - Asian Society of Paediatric Anaesthesiologists Conference (2021)
- EEG Workshop - Asian Society of Paediatric Anaesthesiologists Conference (2021)
- The Aging Brain Under Anesthesia: Brain Health and the EEG - Research Symposium, The Society of Anaesthetists of Hong Kong (2021)
- Dynamic Disruption: A Fundamental Mechanism of Anaesthesia - Research Symposium, The Society of Anaesthetists of Hong Kong (2021)
- EEG for Anaesthesiologists - Anaesthesiology Classroom Lecture, Department of Anaesthesiology & Intensive Care, Sarawak General Hospital, Kuala Lumpur, Malaysia (2022)
- Dynamic Disruption: A Fundamental Mechanism of Anaesthesia - Annual Congress, Korean Society for Anesthetic Pharmacology (2022)
- EEG for Anesthesiologists: Basic Principles and Clinical Case Studies - Acerca del 2do Curso sobre Neurociencias, Monitoreo y Perfusiones – Anestesia Mérida 2023 (2023)
- Dynamic Disruption: A Mechanism of Anesthesia - Acerca del 2do Curso sobre Neurociencias, Monitoreo y Perfusiones – Anestesia Mérida 2023 (2023)