

Sean C. Mackey, M.D., Ph.D.

Chief, Division of Pain Medicine
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CURRENT APPOINTMENTS

04/2022 – present	Vice Chair for Clinical Science	Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine
11/2012 – present	Redlich Professor	Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Division of Pain Medicine, Neurosciences and (by courtesy) Neurology
09/2007 – present	Chief	Stanford University School of Medicine, Division of Pain Medicine
01/2002 – present	Director & Founder	Stanford University School of Medicine, Systems Neuroscience and Pain Laboratory

PREVIOUS APPOINTMENTS

09/2007 – 09/2019	Fellowship Program Director	Stanford University School of Medicine, Division of Pain Medicine
10/2015 – 12/2017	Clinic Chief (Interim)	Stanford Pain Management Center
11/2007 – 11/2012	Associate Professor	Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Division of Pain Medicine, Neurosciences and (by courtesy) Neurology
03/2004 – 08/2007	Associate Director	Stanford University School of Medicine, Division of Pain Medicine
02/2000 – 07/2006	Director & Co-Founder	Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Regional Anesthesia Services

07/1999 – 11/2007	Assistant Professor	Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Division of Pain Medicine
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EDUCATION AND TRAINING

07/1998 - 07/1999	Fellowship	Stanford University Medical Center, Division of Pain Medicine
07/1997 – 07/1998	Chief Resident	Stanford University Medical Center, Department of Anesthesiology, Perioperative and Pain Medicine
07/1996 - 07/1998	Residency	Stanford University Medical Center, Department of Anesthesiology, Perioperative and Pain Medicine
07/1995 – 07/1996	Internship	Tucson Hospitals Medical Education Program
12/1994	Ph.D.	University of Arizona (Electrical and Computer Engineering)
		<u>PhD Dissertation:</u> Mackey, Sean. A Thermodynamic Model of Radiofrequency Catheter Ablation for the Treatment of Cardiac Arrhythmias. N.p.: Pacing and Clinical Electrophysiology, 1996. Print.
05/1994	M.D.	University of Arizona
12/1986	M.S.E.	University of Pennsylvania (Bioengineering)
05/1986	B.S.E.	University of Pennsylvania (Bioengineering)

RESEARCH SUPPORT

07/2018 – 06/2029	T32 DA035165 PD: Sean Mackey	Interdisciplinary Research Training in Pain and Substance Use Disorders
08/2023 – 07/2028	NIH NINDS R01HL166253 PI: Pervez Sultan CO-Investigator	Development and validation of a PROMIS-based measure to assess postpartum sleep
09/2023 – 07/2028	NIH NINDS R01NS129852 PI: Zachary Smith CO-Investigator: Sean Mackey	Structural and functional imaging markers in Degenerative Cervical Myelopathy

09/2023 – 05/2028	NIH NINDS R01NS133305 PI: Kenneth Weber CO-Investigator: Sean Mackey	Dermatomal Mapping with Spinal Cord Functional Magnetic Resonance Imaging
05/2023 – 01/2028	NIH NINDS R01NS128478 PI: Kenneth Weber CO-Investigator: Sean Mackey	MRI-Derived Neuromuscular Signatures to Predict Surgical Response in Degenerative Cervical Myelopathy
04/2022 – 03/2027	PCORI # PCS-2021C1-22347 PI: Beth Darnall CO-Investigator: Sean Mackey	Comparative Effectiveness of Online Cognitive Behavioral Therapy vs. an Online Single-Session Pain Relief Skills Class for Chronic Pain
09/2021 – 08/2025	2U01FD005978-06 UCSF Stanford CERSI PI: Sean Mackey	Grant Award #63 Development, Implementation, and Evaluation of an Open Source Software Program to Support Patient-based Estimation of Clinically Meaningful Levels and Change Scores for Patient Reported Outcome Measures.
09/2019 – 08/2025 (NCE)	2U01FD005978-06 UCSF Stanford CERSI PI: Sean Mackey	Grant Award #40 Characterizing Risk-Benefit Tradeoff in Opioid-based Chronic Pain Treatment
02/2018 – 06/2025	PCORI OPD-1610-37007 PI: Beth Darnall CO-Investigator: Sean Mackey	Comparative Effectiveness of Pain Cognitive Behavioral Therapy and Chronic Pain Self-Management within the Context of Opioid Reduction
09/2020 – 02/2025	NIH NINDS R61 NS118651 PI: Sean Mackey	Prognostic biomarkers for high-impact chronic pain: Development and Validation
09/2021 – 08/2024	NIH NINDS K24NS126781 PI: Sean Mackey	Mentoring in Discovery and Validation of Clinical Chronic Pain Biomarkers
10/2021 – 05/2024	1U24AR076730-01 PI: Sean Mackey	Back Pain Consortium (BACPAC) Research Program Data Integration, Algorithm Development and Operations Management Center (Operational)
09/2018 – 08/2024 (NCE)	NIH NINDS R01 NS109450 PI: Sean Mackey	Characterization of central pain mechanisms using simultaneous

		spinal cord-brain functional imaging
08/2018 – 07/2023	NIH NIDA R01 DA045027 PI: Jennifer Hah CO-Investigator: Sean Mackey	Psychological Risk Factors for Persistent Opioid Use and Prevention of Chronic Opioid Use and Misuse After Surgery: Postoperative Motivational Interviewing and Guided Opioid Weaning
02/2020 – 06/2021 (NCE)	180206 Wu Tsai Neurosciences Institute	CPStim: Optimized Non-Invasive Brain Stimulation Treatment for Chronic Pain
08/2015 – 03/2022	NIH R01 HD082200 The Oregon Health Sciences University PI: Beth Darnall CO-Investigator: Sean Mackey	Maternal Chronic Pain: Risk for Pain and Poor Outcomes in Children
09/2015 – 05/2023 (NCE)	NIH R01 AT008561 Co-PI: Sean Mackey Co-PI: Beth Darnall	Single Session Pain Catastrophizing Treatment: Comparative Efficacy & Mechanisms
05/2010 – 03/2021	NIH K24 DA029262 PI: Sean Mackey	Neuroimaging and Mentoring in Translational Pain Research
02/2019 – 01/2021	NIH R03 HD094577 Regis University PI: Alex Smith CO-Investigator: Sean Mackey	MRI and machine learning to improve early prognosis and clinical management after spinal cord injury
09/2015 – 08/2020	K23 AT008477 PI: Jiang-Ti Kong Mentor: Mackey	Predicting Analgesic Response to Acupuncture - A Practical Approach
07/2015 – 06/2020	K99/R00 DA040154 PI: Katie Martucci Mentor: Mackey	The Impact of Opioids on Chronic Pain: Clinical Research and Career Training in Spinal Cord fMRI and Brain Reward Systems
09/2013 - 09/2018	K23 DA035302 PI: Jennifer Hah Mentor: Mackey	Psychological Factors Contributing to Persistent Opioid Use After Surgery
09/2013-10/2016	P01 AT006651S1 PI: Sean Mackey	Sex/Gender-Specific Brain Risks for Prescription Opioids in Chronic Low Back Pain

09/2013-08/2014	NIH: 562197 PI: Sean Mackey	Limited Competition of MAPP DCC
08/2013-03/2018	R01 DA035484 PI: Tor Wager Co-Investigator: Sean Mackey	fMRI-Based Biomarkers for Multiple Components of Pain
03/2013-02/2016	P01 AT006651S2 PI: Sean Mackey	The Psychobiological and Neural Mechanisms of Pain Catastrophizing
09/2012-09/2015	HHSN 2712011200728P PI: Sean Mackey	Development of an Open-Source National Pain Registry
09/2012-08/2013	Stanford CME Grant PI: Sean Mackey	Safe Opioid Prescribing and Risk Evaluation and Mitigation Strategies (REMS)
2012 - 2014	Stanford BioX NeuroVentures Co-PI: Sean Mackey	Understanding and Preventing Neuropathic Pain
09/2011-05/2016	P01 At006651S1 PI: Sean Mackey	Stanford CAM Center for Chronic Back Pain Supplement
09/2011-02/2018	P01 AT006651 PI: Sean Mackey	Stanford CAM Center for Chronic Back Pain
07/2011-05/2016	K23 DA031808 PI: Kevin Johnson Mentor: Sean Mackey	Research Training Using TMS to Study Pain Processing in Long- Term Opioid Use
07/2011-06/2013	T32 Stanford Department of Anesthesia PI: Jiang-Ti Kong Mentor: Sean Mackey	Anesthesia Training Program in Biomedical Research
07/2011-06/2013	T32 Stanford Department of Anesthesia PI: Jennifer Hah Mentor: Sean Mackey	Anesthesia Training Program in Biomedical Research
2011	Pfizer Visiting Pain Professorship PI: Sean Mackey	Grant to support a Visiting Professorship for Dr. Michael Cousins
2010-2015	K24 DA029262 PI: Sean Mackey	Neuroimaging and Mentoring in Translational Pain Research
2010-2013	Stanford Institute for Neuro- Innovation and Translational Neurosciences Pilot Grant PI: Ian Carroll Co-Investigator: Sean Mackey	Determinants of Time to Pain Resolution Following Surgery: Complimentary Clinical & Preclinical Models

2010-2013	Stanford Institute for Neuro-Innovation and Translational Neurosciences Pilot Grant PI: Jarred Younger Co-Investigator: Sean Mackey	The Role of Pro-inflammatory Factors in Mediating the Negative Consequences of Chronic Opioid Use
09/2009-Forever	Chris Redlich Endowed Professorship PI: Sean Mackey	Endowed Funds for use by Division of Pain for research, teaching, related expenses
2009-2011	Rocky Mountain CRPS Foundation PI: Sean Mackey	Funds to support research related to Complex Regional Pain Syndrome
05/2009-04/2012	R21 DA026092 PI: Sean Mackey	Learned Control of Frontal and Limbic Systems via Real-Time fMRI
2008-2014	K23 DA25152 PI: Ian Carroll Mentor and Co-Investigator: Sean Mackey	Prescription Opioid Use, Misuse, and Pain in Post-Surgical Patients
2008-2014	U01 DK082316 Consortium PI: Sean Mackey	Central Mechanisms of Urological Pelvic Pain: Functional and Structural Analysis by MRI
2008-2011	Stanford BioX Grant PI: Sean Mackey	Development and Applications of Real-Time fMRI Technology
2008-2011	American Academy of Neurology Research Training Fellowship PI: Meredith Barad Mentor: Sean Mackey	Learned Control of Brain Activity in Chronic Pain Patients Using Real-Time fMRI
2008-2009	American Fibromyalgia Syndrome Association PI: Sean Mackey	Low-Dose Naltrexone in the Treatment of Fibromyalgia
2007-2009	K99/R00 DA023609 PI: Jarred Younger Mentor and Co-Investigator: Sean Mackey	Mechanisms of Opioid-Induced Hyperalgesia in Pain Patients: Examination via fMRI
2007-2008	Foundation for Anesthesia Education and Research-Mentored Research Training Grant PI: Ian Carroll Mentor: Sean Mackey	Mechanisms of Analgesic Response During IV Lidocaine Infusion in Neuropathic Pain Patients

01/2006-12/2012	R01 NS 053961 NIH NINDS PI: Sean Mackey	fMRI of Pain in the Human Spinal Cord
2006-2008	Eli Lilly Investigator Initiated Grant PI: Sean Mackey	Duloxetine: Functional MRI Neural Correlates of Efficacy in Patients with Chronic Low Back Pain
2006-2007	Arthritis Foundation-Fellowship Grant PI: Younger Mentor: Sean Mackey	Scientific Projects to achieve faster cure for types of arthritis
2005-2007	SBIR Phase II Fast Track Contract: Virtual Reality and Real Time fMRI PI: Christopher deCharms Consortium PI: Sean Mackey	Major goal of project to use combination of virtual reality and real time fMRI to significantly enhance patient's ability to control activation in brain areas related to pain regulation
2004-2007	5 R44 NS050642-04 NIH NINDS PI: Christopher deCharms Consortium PI: Sean Mackey	Applications of Real Time fMRI-Phase II
2004-2006	Foundation for Anesthesia Education and Research-Research Starter Grant PI: Sean Mackey	Imaging Neural Systems in Complex Regional Pain Syndrome
2002-2004	5 R43 MH067290 NIMH PI: Christopher deCharms Co-Investigator: Sean Mackey	Applications of Real Time fMRI
2001-Forever	Dodie and John Rosekrans Pain Research Endowment Fund Director: Sean Mackey	This endowment used to support projects related to pain research
2001-2004	Oxnard Foundation Grant PI: Sean Mackey	Use of NMDA-Antagonists and Opiates in the Treatment of Fibromyalgia Using Validated Outcome Measurements and Functional Magnetic Resonance Imaging
2001-2004	Stanford Office of Technology Licensing Grant PI: Sean Mackey	Processing of Pain in the Human Central Nervous System: Analysis through Functional Magnetic Resonance Imaging
2000-2002	Cognitive Neurosciences Grant-Clark Center for	Advanced Imaging Techniques Applied to Pain Research-

	Bioengineering PI: Sean Mackey	Functional Magnetic Imaging Of Human Spinal Cord and Brain
1999-2007	Department of Anesthesiology Research Grant PI: Sean Mackey	Development of a Human Neuropathic Pain Model and Determination of Effects of Intravenous Lidocaine on the Sensory and Affective Components of Pain
1999-2003	Department of Anesthesiology Research Grant PI: Sean Mackey	Interventional Magnetic Resonance Imaging Applied to Regional Anesthesia and Pain Medicine
1994	American College of Cardiology Research Grant PI: Sean Mackey	Electrical and Thermal Characterization of Radiofrequency Catheter Ablation
1991-1992	Alpha Omega Alpha Honor Society Research Fellowship PI: Sean Mackey	Transvenous Catheter Delivery of Electrical Energy to Ablate Arrhythmogenic Tissue in Patients with Arrhythmias
1990-1991	American Heart Association Fellowship PI: Sean Mackey	Characterization and Optimization of Radiofrequency Catheter Ablation for the Treatment of Cardiac Arrhythmias
1989-1994	NIH Short-Term Research Fellowship PI: Sean Mackey	Optimal Control of Transvenous Catheter Ablation in the Treatment of Tachyarrhythmias
	NIH Loan Repayment Program PI: Jarred Younger Mentor: Sean Mackey	

ADDITIONAL FUNDING

2010	Bill Cohen Gift	Gift to Support Research into Fibromyalgia Treatment
2008	Allergen Gift	Gift to Support Research in Botulinum Toxin for Chronic Pain

2006	Stanford Med Scholars Grant	Grant to Support Stanford Medical Student: Andrea Crowell, to Perform Research at SNAPL
2005	American Heart Association Medical Student Fellowship	AHA Grant to Foster Research for David Ludlow in the area of: The Effects of Botulinum Toxin in Lumbar Sympathetic Blocks for the Treatment of Peripheral Arterial Disease
2005	Allergen Educational Grant	Major Goal to Develop Web Based Pain Management Educational Materials for Community Physicians
2002-2003, 2006	VPUE Stanford Faculty Grants for Undergraduate Research	Major Goal to Provide funding support for Stanford University Undergraduate Students to work in SNAPL Investigating Pain Processing Using Functional MRI Techniques
1999	Glaxo Welcome Educational Grant	Major Goal to Develop Internet/Intranet Based Sources to Aid Medical Students, Residents, Faculty and Staff in Stanford University Department of Anesthesia
	RSDSA Foundation	
	Rainin Foundation	

STUDY SECTION REVIEWER

2008-2012, 2016	National Institute on Drug Abuse, Career Award Scientific Review Committee
	Canada Institutes of Health Research, Medical Research Council

SCHOLARSHIPS/AWARDS

2025	Inaugural Inductee as USASP Fellow
2024	IPPS James E. Carter Memorial Award
2024	FAER-Helrich Lecture Award

2022	American Academy of Pain Medicine, Founders Award
2020	American Academy of Pain Medicine, Robert G. Addison, MD Award
2019	American Academy of Pain Medicine, Presidential Commendation, in Recognition & Appreciation of Support for AAPM Mission, Advocacy for Patients, Role in National Pain Strategy & Advisory Role in NIH
2017	American Academy of Pain Medicine, Distinguished Service Award, in Recognition of Commitment and Outstanding Contributions to AAPM
2016	Wilbert E. Fordyce Clinical Investigator Award for Excellence in Clinical Pain Scholarship, American Pain Society
2015	National Institute of Health, Director's Award for Leadership Role on National Pain Strategy
2008, 2012	American Pain Society, Clinical Center of Excellence Award
2002, 2004, 2006-2018	Top Doctors in America published in "Guide to Top Doctors"
2011-2012	Institute of Medicine Committee on Advancing Pain Research, Care, and Education
2012	American Academy of Pain Medicine Presidential Commendation, Recognizing Role in Institute of Medicine Committee on Relieving Pain in America
2012	Top 1% Pain Medicine Physicians in America, US News & World Report Guide to Top Doctors
2010	Ellis Cohen Achievement Award, Stanford Department of Anesthesia
2003	Stanford Department of Anesthesia, Teacher of the Month
1994	Yuma Friends of Arizona Health Sciences Center Young Investigator Award

1994	American Federation for Clinical Research Medical Student Award
1994	University of Arizona MD/PhD Academic Scholarship
1994	Van Winkle Award for Excellence in Surgical Research
1994	Upjohn Medical Student Research Superstar Award
1994	1 st Place Medical Student Research Competition, AHSC
1994	Honors and Awards Committee Research Award, AHSC
1992	Yuma Friends of Arizona Health Sciences Center Young Investigator Award
1987	GTE Electrical Engineering Scholarship
1981-1983	Mildred P. Coitner Academic Scholarship

PATENTS

01/26/2004	US2005072433	Toxin Induced Sympathectomy: Mackey, S., Carroll, I., Clark, D.
11/17/1998	US05837001	Radio Frequency Energy Delivery System for Multipolar Electrode Catheters: Mackey, S.

PEER REVIEWED PUBLICATIONS

1. Prodoehl J, Cowley A, Durham J, Lodes M, Rindal B, Mackey S. Bridging the medical-dental divide: a public health imperative for temporomandibular disorders. *BMC global and public health*. 2025; 3 (1): 97. DOI 10.1186/s44263-025-00217-y. PMID: 41189035
2. Mackey S, Darnall B, Kao MC. Digital twin learning health systems and multimodal biomarkers transform pain care. *Pain*. Nov 2025; 166 (11S): S106-S110 DOI 10.1097/j.pain.0000000000003779. PMID: 41086340
3. Oliva V, Bédard S, Kaptan M, Pfyffer D, Chy B, Aufrichtig S, Berhe N, Chaudhari AS, Tharin S, Hu SS, Ratliff J, Smith ZA, Smith AC, Glover GH, Mackey S, Law CSW, Weber Ii KA. Mapping hand function with simultaneous brain-spinal cord functional MRI. *Imaging Neurosci (Camb)*. Oct 3 2025; DOI: 10.1162/IMAG.a.159. PMID: 41064375
4. Banerjee R, Kaptan M, Tinnermann A, Khatibi A, Dabbagh A, Büchel C, Kündig CW, Law CSW, Pfyffer D, Lythgoe DJ, Tsivaka D, Van De Ville D, Eippert F, Muhammad F, Glover GH, David G, Haynes G, Haaker J, Brooks JCW, Finsterbusch J, Martucci KT, Hemmerling KJ, Mobarak-Abadi M, Hoggarth MA, Howard MA, Bright MG, Kinany N, Kowalczyk OS, Freund P, Barry RL, Mackey S, Vahdat S, Schading S, McMahon SB, Parish T, Marchand-Pauvert V, Chen Y, Smith ZA, Weber Ii KA, De Leener B, Cohen-Adad J. EPISeg: Automated segmentation of the spinal cord on echo

- planar images using open-access multi-center data. *Imaging Neurosci (Camb)*. Sep 9 2025; DOI: 10.1162/IMAG.a.98. PMID: 40937159
5. Vollert J, Spivack J, Adamson B, Baron R, Farrar JT, Gilron I, Hohenschurz-Schmidt D, Kerns RD, Mackey S, Markman JD, McDermott MP, Parides M, Rice ASC, Turk DC, Wasan AD, Dworkin RH, Langford DJ; Real-world data and evidence in pain research: an IMMPACT comprehensive review and best practice recommendations. ACTION'S Consortium on Pain Efficacy, Effectiveness, and Safety Studies (COPESS). *Pain*. 2025 Sep 3. doi: 10.1097/j.pain.0000000000003798. PMID: 40893022
 6. Cook KF, You DS, Korff MV, Mackey SC. Defining chronic pain impact levels: a patient-clinician approach using PROMIS® pain interference scores. *J Patient Rep Outcomes*. 2025 Aug 18;9(1):103. doi: 10.1186/s41687-025-00908-y. PMID: 40824460
 7. Rowland, B., Barth, K. S., Bell, K. M., Brooks, A. K., Chadwick, A. L., Cleven, A., Hurley, R. W., Mackey, S., Patel, K. V., Piva, S. R., Schneider, M. J., Al-Kadhi, F., Asante-Nketiah, B., Bagaason, S., Batorsky, A., Borckardt, J. J., Bowden, A. E., Carey, T. S., Castellanos, J., Chen, L., Chidgey, B., Dalton, D., Dufour, J. S., Eberting, J. L., Eller, S. M., Fields, A. J., Fritz, J. M., Fu, A., Ghulamhussain, I., Goolsby, R. W., Greco, C. M., Grim, S., Gunn, C. A., Hanes, L., Harris, R. E., Harte, S. E., Hassett, A. L., Helton, K., Hoffmeyer, A., Ivanova, A., Jones Berkeley, S., Kaplan, C., Kidwell, K. M., Knapik, G. G., Kosorok, M. R., Kurillo, G., Li, D., Lobo, R., Long, J., Lotz, J. C., Mageswaran, P., Majumdar, S., Mao, J., Marras, W. S., McCracken, L. M., McCumber, M., McLean, S. A., McMillan, M., Mehling, W., Mendoza, R., Mitchell, U. H., Napadow, V., O'Neill, C., Pearson, S., Peltier, S., Rundell, S. D., Ryser, S., Schrepf, A., Schulze, E., Sperger, J., Vo, N., Wallace, M. S., Wampler, A. M., Wasan, A. D., Weaver, T. E., Weber, K. A., Wilcox, L., Williams, D. A., Wilson, L., Woo, J. E., Zeidan, F., Zhao, B., Zhou, B., Anstrom, K. J., Clauw, D. J., Sowa, G. A., Mauck, M. C. Baseline characteristics of participants in the Biomarkers for Evaluating Spine Treatments clinical trial: a sequential multiple assignment randomized trial for chronic low back pain. *Pain Med*. 05 Aug 2025; DOI 10.1093/pm/pnaf073. PMID: 40794568
 8. Swarm RA, Youngwerth JM, Agne JL, Anitescu M, Are M, Buga S, Butler T, Chwistek M, Cleary J, Copenhaver D, Coyne C, Craig D, Finnes H, Greenlee H, Gupta M, Hansen E, Javed S, Kandil E, Mackey S, McDonald A, McGrath K, Moryl N, Nesbit S, Noonan M, Norris J, Paice JA, Prsic E, Rabow MW, Rickerson E, Sindt J, Smith M, Vorenkamp K, Bruce JY, Yoo S, Cunningham R, Gurski LA, Jones F. Adult Cancer Pain, Version 2.2025, NCCN Clinical Practice Guidelines In Oncology. *J Natl Compr Canc Netw*. 2025 Jul;23(7):e250032. PMID: 40639401
 9. Dixit AA, Lagisettey PA, Odden MC, Bicket MC, Humphreys KR, Mackey SC, Sun EC. Association Between Opioid Use Disorder and Healthcare Spending and Utilization in Emergency Surgical Patients: A Retrospective Analysis Using Commercial Claims. *Ann Surg Open*. 2025 Jun;6(2):e568. PMID: 40557352
 10. Kim S, Zeitzer JM, Mackey S, Darnall BD. Revealing sleep and pain reciprocity with wearables and machine learning. *Commun Med (Lond)*. 2025 May 7;5(1):160. doi: 10.1038/s43856-025-00886-8. PMID: 40335627
 11. You DS, Lannon E, Kim S, Dildine TC, Weber KA 2nd, Raney E, Mackey SC. Impact of Pain Self-Efficacy on Health Outcomes in High-Impact Chronic Pain: A Longitudinal Study. *Clin J Pain*. 2025 May 6; doi: 10.1097/AJP.0000000000001295. PMID: 40325564
 12. Mauck MC, Barth KS, Bell KM, Brooks AK, Chadwick AL, Gunn CA, Hurley RW, Ivanova A, Piva SR, Schneider MJ, Bailey JF, Bagaason S, Batorsky A, Borckardt JJ, Bowden AE, Carey TS, Castellanos J, Chen L, Chidgey B, Dalton D, Dufour JS, Fields AJ, Fritz JM, Goolsby RW, Greco CM, Harris RE, Harte S, Hassett AL, Hoffmeyer A, Jones Berkeley S, Kaplan C, Kidwell KM, Knapik GG, Kosorok MR, Kurillo G, Lobo R, Lotz JC, Mackey S, Mageswaran P, Majumdar S, Mao J, Marras WS, McCumber M, McLean SA, Mehling W, Mitchell UH, Napadow VJ, O'Neill C, Patel

- KV, Peltier S, Psioda M, Rowland B, Rundell SD, Schrepf A, Sperger J, Vo N, Wallace MS, Wasan AD, Weaver TE, Weber KA 2nd, Williams DA, Wilson L, Zeidan F, Zhao B, Anstrom KJ, Clauw DJ, Sowa GA. The Design and Rationale of the Biomarkers for Evaluating Spine Treatments (BEST) Trial: A Sequential Multiple Assignment Randomized Trial. *Pain Med.* 2025 Apr 9; doi.org/10.1093/pm/pnaf032. PMID: 40205455
13. Edwards KA, You DS, Lannon EW, Dildine TC, Darnall BD, Mackey SC. Beyond pain intensity: Validating single-item pain bothersomeness measures. *J Pain.* 2025 Apr 12; DOI: 10.1016/j.jpain.2025.105395. PMID: 40228688
 14. Edwards KA, Dildine TC, You DS, Herrick AM, Darnall BD, Mackey SC, Ziadni MS. Zoom-Delivered Empowered Relief for Chronic Pain: Observational Longitudinal Pilot Study Exploring Feasibility and Pain-Related Outcomes in Patients on Long-Term Opioids. *JMIR Form Res.* 2025 March;9:e68292. doi: 10.2196/68292. PMID: 40068160
 15. Oliva V, Bédard S, Kaptan M, Pfyffer D, Chy B, Aufrichtig S, Berhe N, Chaudhari AS, Tharin S, Hu SS, Ratliff J, Smith ZA, Smith AC, Glover GH, Mackey S, Law CSW, Weber KA. Mapping Hand Function with Simultaneous Brain-Spinal Cord Functional MRI. *bioRxiv.* 2025 Feb 27;2025.02.27.640504. PMID: 40060434
 16. Boyd H, You DS, Nguyen A, Conroy L, Ahuja D, Chambers C, Cowan P, Cox R, Crombez G, Feinstein AB, Fuqua A, Gilam G, Mackey SC, McCracken LM, Martire LM, Sluka K, O'Sullivan P, Turner JA, Veasley C, Ziadni MS, Ashton-James CE, Webster F, Darnall BD. Clinician and researcher responses to the term pain catastrophizing and whether new terminology is needed: Content analysis of international, cross-sectional, qualitative survey data. *The journal of pain.* Feb 2025; 29: 105330. Doi: 10.1016/j.jpain.2025.105330. PMID: 39921100
 17. Mackey S, Aghaeepour N, Gaudilliere B, Kao MC, Kaptan M, Lannon E, Pfyffer D, Weber K. Innovations in acute and chronic pain biomarkers: enhancing diagnosis and personalized therapy. *Regional anesthesia and pain medicine.* Feb 2025; 50 (2): 110-120. DOI: 10.1136/rapm-2024-106030. PMID: 39909549
 18. Smith AC, Laguna JM, Wesselink EO, Scott ZE, Jenkins H, Thornton WA, Wasielewski M, Connor J, Delp S, Chaudhari AS, Parrish TB, Mackey S, Elliott JM, Weber KA 2nd. Leg Muscle Volume, Intramuscular Fat and Force Generation: Insights From a Computer-Vision Model and Fat-Water MRI. *J Cachexia Sarcopenia Muscle.* 2025 Feb;16(1):e13735. doi: 10.1002/jcsm.13735. PMID: 39972963
 19. Junghaenel DU, Fillingim RB, Pratscher SD, Goldstein S, Mackey S, Stone AA. Development and preliminary testing of a comprehensive Ecological Momentary Assessment of people with chronic pain. *The journal of pain.* Feb 2025: 105328. DOI: 10.1016/j.jpain.2025.105328. PMID: 39900321
 20. Weber KA 2nd, Wesselink EO, Gutierrez J, Law CSW, Mackey S, Ratliff J, Hu S, Chaudhari AS, Pool-Goudzwaard A, Coppieters MW, Elliott JM, Hancock M, De Leener B. Three-dimensional spatial distribution of lumbar paraspinal intramuscular fat revealed by spatial parametric mapping. *Eur Spine J.* 2025 Jan;34(1):27-35. PMID: 39556147
 21. Banerjee R, Kaptan M, Tinnermann A, Khatibi A, Dabbagh A, Kündig CW, Law CS, Pfyffer D, Lythgoe DJ, Tsivaka, D., Ville, D. V., Eippert, F., Muhammad, F., Glover, G. H., David, G., Haynes, G., Haaker, J., Brooks, J. C., Finsterbusch, J., Martucci, K. T., Hemmerling, K. J., Mobarak-Abadi, M., Hoggarth, M. A., Howard, M. A., Bright, M. G., Kinany, N., Kowalczyk, O. S., Freund, P., Barry, R. L., Mackey, S., Vahdat, S., Schading, S., McMahon, S. B., Parish, T., Marchand-Pauvert, V., Chen, Y., Smith, Z. A., Weber, K. A., Leener, B. D., Cohen-Adad, J. EPISeg: Automated segmentation of the spinal cord on echo planar images using open-access multi-center data. *bioRxiv : the preprint server for biology.* Jan 2025. DOI: 10.1101/2025.01.07.631402. PMID: 39829895
 22. Begum T, Veeranki B, Chike OJ, Tamang S, Simard JF, Chen J, Chaichian Y, Mackey S, Darnall BD, Falasinnu T. Refining Chronic Pain Phenotypes: A Comparative Analysis of Sociodemographic and

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86. McCue R, Lawrence J, Sohlberg E, Knutson B, Mackey S. *Differential Effects of Reward Stimuli on Pain Evaluation in Fibromyalgia Patients and Healthy Controls*. International Association for the Study of Pain 13th World Congress on Pain, Montreal, August 29-September 2, 2010.
87. Brown J, Chatterjee N, Mackey S. *Human Brain Activity Identifies the Presence or Absence of Pain*. International Association for the Study of Pain 13th World Congress on Pain, Montreal, August 29-September 2, 2010.

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89. Brown J, Chatterjee N, Mackey S. *Thalamo-cortical connectivity distinguishes painful from non-painful stimulation in humans*. Society for Neuroscience Annual Meeting, San Diego, November 13-17, 2010.
90. Brown J, Ung H, Mackey S. *A Heat-Capsaicin Model of Pain: Anticipation Significantly Alters the Perception of Pain Reduction*. American Pain Society (APS) 28th Annual Meeting, San Diego, May 6-9, 2009.
91. McCue R, Lawrence J, Knutson B, Mackey S. *Cumulative Effects of Reward and Loss on Pain*. American Pain Society (APS) 28th Annual Meeting, San Diego, May 6-9, 2009.
92. Tieu M, McCue R, Gandhi V, Mackey S. *Increasing Working Memory Load Attenuates Pain in Healthy Volunteers but not in Chronic Low Back Pain Patients*. American Pain Society (APS) 28th Annual Meeting, San Diego, May 6-9, 2009.
93. Younger J, Aron A, Parke S, Gandhi V, Mackey S. *The Analgesic Effects of Romantic Love: A Neuroimaging Study*. American Pain Society (APS) 28th Annual Meeting, San Diego, May 6-9, 2009.
94. Younger J, Mackey S. *Low-dose Naltrexone Reduces the Primary Symptoms of Fibromyalgia*. American Pain Society (APS) 28th Annual Meeting, San Diego, May 6-9, 2009.
95. Chatterjee N, Crowell A, Maeda U, Moulton R, Mackey S. *Chronic Low Back Pain is Associated with Increased Amygdala and PAG Grey Matter*. Organization for Human Brain Mapping (OHBM) 15th Annual Meeting, San Francisco, June 17-23, 2009.
96. Chatterjee N, Mackey S, Peterson W, Moulton R, Tieu M, Carroll I. *Mechanisms of Analgesic Response during IV lidocaine Infusions in Neuropathic Pain Patients*. Organization for Human Brain Mapping (OHBM) 15th Annual Meeting, San Francisco, June 17-23, 2009.
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98. Barad M, Ueno T, Hoeft F, Moulton R, Younger J, Glover G, Mackey S. *Voxel based morphometry analysis of patients with chronic neuropathic pain*. American Pain Society (APS) 27th Annual Meeting, Tampa, May 7-11, 2008.
99. Carroll I, Wang J, Wang C, Mackey S. *Psychological impairment influences pain duration following surgical injury*. American Pain Society (APS) 27th Annual Meeting, Tampa, May 7-11, 2008.
100. Wang C, Pollard J, Yang G, Humphreys K, Trafton J, Cannon W, Dirbas F, Donnington J, Goodman S, Whyte R, Gillespie M, Wang J, Barelka P, Mackey S, Carroll I. *Risk Factors for Delayed Opioid Cessation Following Surgery*. American Pain Society (APS) 27th Annual Meeting, Tampa, May 7-11, 2008.
101. Maeda U, Carroll I, Mackey A, Younger J, Mackey S. *Pain Quality Predicts Response to Sodium Channel Blockade with Lidocaine*. American Pain Society (APS) 27th Annual Meeting, Tampa, May 7-11, 2008.
102. Younger J, Parke S, Barelka P, Carroll I, Chu L, Prasad R, Gaeta R, Mackey S. *Decrease of Cold Pain Tolerance Following Opioid Detoxification*. American Pain Society (APS) 27th Annual Meeting, Tampa, May 7-11, 2008.
103. Brown J, Kornelsen J, Watcha D, Glover G, Mackey S. *Processing of motor, tonic pain and phasic pain signals in the human spinal cord*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.

104. Prasad R, Younger J, Barelka P, Carroll I, Chu L, Gaeta R, Mackey S, Kaplan K. *Opioid Induced Hyperalgesia: Paradoxical Findings in a Chronic Pain*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.
105. Carroll I, McCue R, Clark D, Mackey S. *Lumbar Sympathetic Block with Botulinum Toxin type A for Complex Regional Pain Syndrome*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.
106. Mackey S, Barad M, Ueno T, Greicius M. *Spontaneous Chronic Neuropathic Pain Remodels the Salience Network*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.
107. Barad M, Ueno T, Hoeft F, Moulton R, Younger J, Glover G, Mackey S. *Voxel Based Morphometry analysis of patients with chronic neuropathic pain*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.
108. Younger J, Aron A, Parke S, Mackey S. *Passionate Love Attenuates Acute Pain Via Involvement of Dopaminergic Reward System Pathways*. International Association for the Study of Pain (IASP) 12th World Congress on Pain, Glasgow, August 16-22, 2008.
109. Mackey S, *Modulation of brain networks via real-time fMRI feedback training*, April 2007, Association of University Anesthesiologists Meeting.
110. Watcha D, Brown J, Kornelsen J, Darnauer J, Sarin R, Glover G, Mackey S, *Processing of motor, tonic pain, and phasic pain signals in the human spinal cord*, May 2007, American Pain Society Meeting.
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115. Lawrence J, Lucca A, Younger J, Ueno T, Lutomski K, MacLeod S, Hoeft F, Glover G, Gaeta R, deCharms C, Mackey S. *Effective connectivity changes associated with learned control over neural activity: A Granger Causality study*. Organization for Human Brain Mapping (OHBM) 13th Annual meeting, Chicago, June 10-14, 2007, 179W-AM.
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117. Mackey S, Lucca A, Soneji D, Kaplan K, Glover G, *fMRI Evidence of Noxious Thermal Stimuli Encoding in the Human Spinal Cord*, May 2006, American Pain Society Meeting
118. Ueno T, Barad M, Kaplan K, Lucca A, Hoeft F, Soneji D, Muramoto D, Averill C, Mackey S, *Posterior Cingulate Cortex Volume Reduction and Correlation with Fear of Pain in Complex Regional Pain Syndrome (CRPS)*, June 2006, Organization for Human Brain Mapping.
119. Mackey S, Ludlow D, Soneji D, Lucca A, Ueno T, Glover G, *fMRI of the Human Spinal Cord: Encoding of Noxious Thermal Stimuli*, October 2006, Society for Neuroscience.

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123. Lobato R, Mackey S, Cluster Analysis of SF-36 Scores in Patients Presenting for Initial Evaluation American Pain Society Meeting, March 2005
124. Maeda F, Lutomski K, MacLeod S, Soneji D, Mackey S, Gabrieli J, Glover G, Pauly J, deCharms C, *Control Over Brain Activation and Pain in Chronic Pain Patients Achieved Through Repetitive Real Time fMRI (rtfMRI) Training*, June 2005, Human Brain Mapping Meeting
125. Ueno T, Soneji D, Ludlow D, Kaplan K, Glover G, Mackey SC, *Reorganization of the Somatosensory Cortex in Complex Regional Pain Syndrome*, August 2005, International Association for the Study of Pain Meeting
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130. Mackey S, Maeda F, Soneji D, Ludlow D, Gabrieli J, deCharms C, Real-time fMRI Directed Modulation of Pain Perception and Brain Activation in Chronic Pain Patients, May 2004, American Pain Society Meeting
131. Ludlow D, Ochsner K, Knierim K, Hanelin J, Ramachandran T, Glover G, Mackey S, Neural Correlates of Individual Differences in Pain-Related Fear and Anxiety, May 2004, American Pain Society Meeting
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136. Drover DR, Mackey S, Schmidt H, Loetsch J. *Morphine and its Metabolites After Routine Post-operative PCA Use*, October, 2002 American Society of Anesthesiologists Meeting
137. Sze DY, Mackey SC, *Nerve Blocks Using Magnetic Resonance Imaging Guidance*. J VascInterventRadiol 12(1 part 2):S13 2001

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- 139.Mackey, S., Sze, D., Gaeta, R., *Magnetic Resonance Therapy Guided Regional Blockade for Pain Management*Anesthesiology September 1999
- 140.Mackey, S., Brodsky, J.B., *Choosing a DLT: Is There a Racial Difference in Airway Size?*, Western Anesthesia Residents Conference, March, 1997
- 141.Tataru C, Mackey S, Zupfer G, Angst M, Dyck B, Brock-Utne JG. Rapid Add Site: *A New Double Lumen Extension Set Reduces Pain Caused By Propofol*. AnesthAnalg 84:S275, 1997.
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- 154.Mackey, S., Lampe, L., Marcus, F.I. *Radiofrequency Power Losses During Catheter Ablation of Cardiac Arrhythmias*, Clinical Research, February, 1994
- 155.Mackey, S., Thornton, L., He, D., Marcus, F.I. *Frequency Dependent Impedance Measurements: An Indicator of Catheter Contact*, Circulation 88 No. 4:400, 1993.

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GRAND ROUNDS, INVITED/VISITING LECTURES

2025

1. American Academy of Pain Medicine (AAPM) 2025 Annual Meeting, Invited Speaker, Lecture: From Data to Decisions: The Role of Learning Healthcare Systems in Advancing Pain Care and Research, Austin, TX, April 2025
2. NIH, National Academies, Exploring the Treatment and Management of Chronic Pain and Implications for Disability Determinations: A Workshop, Planning Committee & Invited Speaker. Washington, DC April 2025
3. University of Toronto, 46th Annual Shields Research Day, Invited Keynote Speaker, Lecture: Decoding Pain: Mechanisms, Biomarkers, and Clinical Empowerment, Toronto, Ontario, Canada, April 2025
4. Canadian Pain Society (CPS), Annual Scientific Meeting, Invited Speaker, Lecture: Cracking the Code of Pain: How Science is Transforming Treatment and Empowering Patients, Toronto, Ontario, Canada, May 2025
5. American Society of Anesthesiologists (ASA), Invited Speaker, Lecture: An Update of Pain Medicine Research in the Last Five Years That Might Influence Our Practice, San Antonio, TX, October 2025

2024

1. American Academy of Pain Medicine (AAPM) 2024 40th Annual Meeting, Invited Speaker, Lecture: Neuroimaging of Pain, Scottsdale, AZ, March 2024
2. University of Arizona (UACOM), Medical Scientist Training Program (MSTP) Colloquium, Invited Speaker, Lecture: A conversation with Dr. Mackey, Tucson, AZ, March 2024
3. 2nd Annual NIH Positively Uniting Researchers of Pain to Opine, Synthesize, & Engage (PURPOSE) Meeting for Pain Research, Invited Speaker, Lecture: Working with Orphan Data: Needs, Do's & Don'ts, Oxon Hill, MD, May 2024
4. University of Texas, MD Anderson Cancer Center Translational Pain Conference, Invited Speaker, Lecture: Decoding Pain: Mechanisms, Biomarkers, and Clinical Empowerment, Houston, TX, May 2024
5. International Association for the Study of Pain (IASP), Invited Speaker, Amsterdam, Netherlands, August 2024
6. 6th World Congress International Pelvic Pain Society (IPPS), Invited Keynote Speaker, Lecture: James E. Carter Memorial Award Lecture, "Decoding Pain: Mechanisms, Biomarkers, and Clinical Empowerment" Cartagena, Columbia, October 2024
7. American Society of Anesthesiologists (ASA) Annual Meeting, Invited Speaker, Lectures: FAER Helrich Lecture: From Pain's Enigma to Clinical Transformation: Unraveling Mechanisms, Forging Biomarkers, and Empowering Clinicians and Patients; FAER Panel: The Future of Pain Relief — Lessons From Pain Mechanisms and Predictive Models to Scaling Evidence-based Interventions; Neuropathophysiology of

Fibromyalgia, Nociceptive Pain, and Central Sensitivity Syndromes: Implications for Anesthetic Management, Philadelphia, PA, October 2024

8. Pain Societies of the Carolinas Annual Meeting (PSC), Invited Speaker for James Crews Memorial Lecture, Charleston, SC, December 2024

2023

1. North American Neuromodulation Society (NANS) 26th Annual Meeting, Invited Speaker, Neuroimaging Biomarkers of Chronic Pain: Advancing Personalized Pain Medicine, Las Vegas, NV, January 2023
2. American Academy of Pain Medicine (AAPM) 2023 39th Annual Meeting, Invited Speaker, Keynote Lecture: Answering the National Pain Strategy's Call to Action: Transforming Pain Care with Learning Health Systems and Digital Innovations, Fort Lauderdale, FL, March 2023
3. Dalhousie University, Pain Research Day, Invited Speaker, Keynote Lecture, Learning Health Systems for Optimized Care and Real-World Research Discovery and Innovation, Halifax, Nova Scotia, Canada, April 2023
4. New York State Pain Society Annual Meeting & Scientific Sessions, Invited Speaker, Advancing Precision Pain Care and Real-World Research through Learning Health Systems, Virtual, April 2023
5. NIH - Positively Uniting Researchers of Pain to Opine, Synthesize, & Engage (PURPOSE) Meeting, Invited Speaker, Gaylord National Harbor, MD, May 2023
6. BH Robbins Scholars Visiting Professor at Vanderbilt, Invited Grand Rounds Speaker, Brain Based Biomarkers to Enhance Discovery, Innovation, and Precision Pain Care; Seminar: Transforming Pain Care with Learning Health Systems and Digital Innovations, Nashville, TN, May 2023
7. American Society of Anesthesiologists (ASA) Annual Meeting, Invited Speaker: Pain outcomes: lack of uniformity and need for objective assessment! | Choice of pain outcome metrics available; The Strain in Pain Lies Mainly in the Brain: Lessons Learned from the Neuroimaging of Pain, San Francisco, CA, October 2023
8. 12th World Congress of World Institute of Pain (WIP), Invited Speaker: Real-world observational outcomes sourced from consortia: a substitute for RCTs, often unavailable for interventional procedures?; Pain imaging; Digital platform for acute and chronic pain, and running pragmatic trials for invasive interventions; Collection of "Real-World" Data as a Substitute for RCTs in Interventional Pain Practice: Acceptance of "real-world" evidence by the scientific, regulatory and insurance communities, Antalya, Turkey, October 2023
9. Huberman Lab Podcast, Invited Speaker, Malibu, CA, December 2023

2022

1. Memorial Sloan Kettering Cancer Center Health Outcomes Research Group Seminar Series, Invited Speaker, Learning Health Systems for Optimized Care and Real-World Innovative Research, (virtual) February 2022
2. American Academy of Pain Medicine (AAPM) 2022 Annual Meeting, Invited Speaker, Behavioral Mechanisms in Pain and Analgesia; Digital Precision Pain Care: Assessment, Treatment, and Monitoring; Latest in Chronic Overlapping Pain Conditions, Scottsdale, AZ, March 2022
3. Duke-Margolis Center for Health Policy and the U.S. Food and Drug Administration public workshop: Identifying Key Competencies for Opioid Prescriber Education, Invited Speaker, Opening Remarks and Panel Discussion for Future Directions and Next Steps for Shaping Prescriber Education Efforts, (virtual) April 2022

4. Cleveland Clinic | Case Western Reserve University, Invited Keynote Speaker, MSK Pain: What does a successful comprehensive pain center look like; Future research trends in pain, (virtual) April 2022
5. International Neuromodulation Society's (INS) 15th World Congress, Invited Speaker, Neuroimaging Based Pain Biomarkers; Panel Discussion: Symposium on Conflict of Interest, Barcelona, Spain, May 2022
6. North American Pain School (NAPS), Invited Faculty and Speaker, Can Real World Data Replace Randomized Controlled Trials? Montebello, Quebec, Canada, June 2022
7. 1st World Patients Conference, Invited Speaker, Session: Digital Health; Transforming Health Care: A digital health platform providing accessible, equitable and evidence-based treatment worldwide, Rome, Italy, October 2022
8. Swiss Pain Congress, Invited Speaker, Session: Psychological Aspects of Pain: Advanced neuroimaging in chronic pain, Montreux, Switzerland, December 2022

2021

1. American Academy of Pain Medicine (AAPM) 2021 Annual Meeting, Invited Speaker, Temporomandibular Disorders: Priorities for Research and Care – A Report from the National Academy of Medicine, (virtual), April 2021
2. Canadian Pain Society 2021 Annual Scientific Meeting (CPS), Invited Speaker, Learning Health Systems for Optimized Care and Real-World Innovative Research, (virtual), April 2021
3. International Association for the Study of Pain (IASP), Invited Speaker, Topical Workshop, National Pain Strategies: Working Strategically and Collaboratively to Solve the Global Problem of Pain, (virtual), June 2021
4. Summer Institute on Medical Ignorance (SIMI), Invited Speaker, “Adventures in Curiosity and Care”, (virtual), July 2021
5. **Veterans In Pain–Pain management, Opioid safety, Suicide prevention Team (VIP-POST)**, Invited Speaker, Keynote Address: “What Really Matters in the Treatment of Chronic Pain and Personalizing Pain Medicine”, (virtual), September 2021
6. International Collaboration on Repair Discoveries (ICORD) Symposium, Invited Speaker, “Learning Health Systems for Optimized Care and Real-World Innovative Research”, (virtual), September 2021
7. American Society of Regional Anesthesia and Pain Medicine (ASRA) Persistent Perioperative Pain Symposium, Invited Speaker, “Development, Validation and Clinical Utility of Acute to Chronic Pain Biomarkers”, (virtual), September 2021
8. American Society of Regional Anesthesia and Pain Medicine (ASRA) 20th Annual Pain Medicine Meeting, Invited Speaker, Ask the Experts Interactive Session - Pain Biomarkers and Functional Imaging: "Advances and Future Prospects of Neuroimaging for Pain"; Plenary Session - Disruptive, Constructive or Destructive Innovations: “Is Learning worth the Effort? Embedding Knowledge in Patient Care”, San Francisco, CA, November 2021

2020

1. Washington University, Invited Speaker, Grand Rounds, Learning Health Systems for Optimized Care and Real-World Research Discovery and Innovation, St. Louis, MO, January 2020
2. American Academy of Pain Medicine (AAPM) 2020 36th Annual Meeting, Invited Speaker, Award Winner, Career Paths for the Clinician Scientist, The Advances and Utility of Neuroimaging for Pain, Latest Advances in CHOIR, Results, and Practice Lessons Learned for Session: Moving from Patient-

Reported Outcomes to Medical Informatics Approaches to Help Your Practice, National Harbor, Maryland, March 2020

3. Kauai Pain Conference 2020, Invited Speaker, What Really Matters in the Treatment of Chronic Pain, and Personalizing Pain Medicine, Spoke Virtually (Lihue, HI), March 2020
4. 15th Annual NIH Pain Consortium Symposium, Virtual, Invited Keynote Speaker, Technology Integration to Enhance Discovery, Innovation, and Precision Pain Care, June 2020
5. Walter Reed National Military Medical Center, Web Based Distinguished Professor Lecture Series, Invited Speaker, Neuroimaging Based Biomarkers of Pain, August 2020
6. NIH – HEAL Workshop, Virtual, Developing Meaningful Endpoints for Pain Clinical Trials. Invited Speaker/Panelist, October 2020
7. American Society of Regional Anesthesia and Pain Medicine (ASRA) 19th Annual Meeting, Invited Speaker, The Neurobiology of Pain: Breaking Down the Pain Pathway and Brain based biomarkers to enhance discovery, innovation, and precision pain care, (virtual), November 2020

2019

1. 2019 North American Neuromodulation Society (NANS) 22nd Annual Meeting, Invited Speaker and Moderator, Cognitive and Affective Components of Pain: Implications for Neuromodulation, Las Vegas, NV, January 2019
2. American Academy of Pain Medicine (AAPM) 2019 35th Annual Meeting, Invited Speaker, Advances In Medical Informatics and Cutting Edge Data Analysis of Registry Data, Denver, CO, March 2019
3. Weill Cornell Medical College, Visiting Professor and Grand Rounds Speaker, Learning Health Systems for Optimized Care and Real-World Research Discovery and Innovation, New York, NY, March 2019
4. New York University School of Medicine, Visiting Professor and Grand Rounds Speaker, Learning Health Systems for Optimized Care and Real-World Research Discovery and Innovation, New York, NY, March 2019
5. George Washington Institute for Neuroscience Symposium, Invited Keynote Speaker, Brain Based Biomarkers of Pain: Scientific, Clinical and Ethical Implications, Washington, DC, April 2019
6. IARS 2019 Annual Meeting, Invited Speaker, Scholars Session: Establishing Independence, Building an Academic Career through Innovations in Research and Education, Review Course Lecture: Pain Outcomes, Patient Registries and Learning Health Systems: Delivery of Best Pain Care at Lower Cost, Montreal, Canada, May 2019
7. University of Washington, Visiting Professor, Academic Evening Judge and Grand Rounds Speaker, Learning Health Systems for Optimized Care and Real-World Research Discovery, Seattle, WA, June 2019
8. Food and Drug Administration (FDA), Invited Speaker, 2019 Science Forum, Precision Medicine, Big Data, Pain Opioid Use, Learning Healthcare Systems and Big Data: Advancing the Goal of Precision Pain Medicine, Silver Spring, MD, September 2019

2018

1. Kauai Pain Conference, Invited Speaker, The Physician's Role in the Opioid Crisis, The Future of Pain Care at a National Level, Lihue, HI, February 2018
2. American Academy of Pain Medicine (AAPM) 2018 34th Annual Meeting, Invited Speaker, Abnormalities of the Dynamic Pain Connectome in Chronic Pain: can Neuroimaging Be Used to Predict Pain and

Treatment Outcomes?, Getting Your Research Funded, The Latest CHOIR Enhancements Make it Even Easier to Get It Up and Running, Perspectives from NAM/NASEM: The National Pain Strategy and US Task Force on Pain and Opioids: Shared solutions for our pain and opioid crises, Vancouver, BC, Canada, April 2018

3. WIP 2018 9th World Congress of the World Institute of Pain, Invited Speaker, Opioids in chronic non-cancer pain, Learning Health Systems: Using Patient-Reported Outcomes for Research and Patient Care, Dublin, Ireland, May 2018
4. University of Utah, Visiting Professor and Grand Rounds Speaker, Learning Health Systems: A New Dawn in Personalized Pain and Perioperative Care, and Real-World Discovery Research, Brain Based Biomarkers for Pain: Objective Measures of Pain or a Journey Down the Rabbit Hole?, Salt Lake City, UT, May 2018
5. Duke University School of Medicine, Visiting Professor and Grand Rounds Speaker, Learning Health Systems: A New Dawn in Personalized Pain and Perioperative Care and Real-World Discovery Research, Durham, NC May 2018
6. 2018 Marfan Conference, Invited Speaker, Pain and Medications, Santa Clara, CA, July 2018
7. PainWeek 2018, Invited Speaker, Brain Based Biomarkers for Pain: Objective Measures of Pain or a Journey Down the Rabbit Hole? Workshop: Patient Centered Opioid Reduction, Las Vegas, CA September 2018
8. IASP World Congress on Pain, Invited Speaker, ELIP SIG: Pain Scans and Prescribing: The State v. People in Pain - Brain Based Biomarkers of Pain: Objective Measures of Pain or a Journey Down the Rabbit Hole, Lecture: Pain Analytics: The Experience of Pain: Extracting Insights from Learning Healthcare Systems on Real-World Patients, Boston, MA, September 2018
9. 12th Annual Pain & Migraine Summit, Invited Speaker, Learning healthcare systems to enable real world research discovery, clinical innovation and optimal patient care, Burlingame, CA, October 2018
10. Anesthesiology 2018, Annual Meeting, Invited Speaker, Objective Biomarkers of Pain or a Journey Down the Rabbit Hole? San Francisco, CA, October 2018
11. For Grace's Change Agent Pain Summit, Invited Keynote Speaker and Panelist, National Pain Strategy, Los Angeles, CA, October 2018
12. American Society of Regional Anesthesia and Pain Medicine (ASRA) 17th Annual Meeting, Invited Speaker and Panelist, Central Neurological Function Changes in CRPS, fMRI Directed Diagnosis and Treatment: Ethical and Practical Implications for Clinical Use, San Antonio, TX, November 2018
13. AAPM One Day Workshop Hot Topics in Pain Management, Invited Speaker, Shared Solutions for Our Pain and Opioid Crises, The Importance of Measuring the Multidimensional Nature of Pain using State-of-the-Art Tools, Chicago, IL, December 2018

2017

1. Kauai Pain Conference, Invited Speaker, Neuroimaging and Pain, Pain as a National Health Problem, Lihue, HI, February 2017
2. University of North Carolina School of Medicine, Visiting Professor and Grand Rounds Speaker, Pain as a Public Health Problem: Lessons from the IOM Pain Report and National Pain Strategy Report, Learning Health Systems: A New Dawn in Personalized Pain and Perioperative Care and Real-World Discovery Research, Chapel Hill, NC, March 2017
3. Duke University School of Medicine, Visiting Professor, Brain Based Biomarkers for Pain: Objective Measures of Pain or a Journey Down the Rabbit Hole? Durham, NC, March 2017

4. American Academy of Pain Medicine (AAPM) 2017 Annual Meeting, Moderator and Invited Speaker, Pain Psychology Task Force: Behavioral Pain Management Training for Health Care Professionals, Overview & Update on Collaborative Health Outcomes Information Registry (CHOIR): Clinical Treatment Lessons Learned from Analysis of the Data, Pain Medicine Journal & NIH: How to Succeed as an Academic Clinical Pain Researcher, The Career of a Clinician Scientist in Pain Research from the Early Stages to Senior Investigator, Orlando, FL, March 2017
5. 2017 Neuromodulation Society of Australia and New Zealand 12th Annual Scientific Meeting, Invited Speaker, Functional Neuroimaging of Pain, Panel Discussion: Mechanisms of Action, Debate: The Neuromodulated Human will Become Common Place by 2030, Adelaide, S. Australia, April 2017
6. 2017 Australian Pain Society 37th Annual Scientific Meeting, Invited Speaker, Brain Based Biomarkers of Acute and Chronic Pain, Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, Adelaide, S. Australia, April 2017
7. 2017 Society for Acupuncture Research Annual Symposium, Invited Speaker, Clinical/Policy Research on the Role of Acupuncture in Mainstream Medicine, San Francisco, CA, April 2017
8. International Anesthesia Research Society, International Science Symposium 2017, Panelist: Functional Neuroimaging of Pain, Affect and Cognition, Washington, DC, May 2017
9. American Psychiatric Association (APA) 2017 Annual Meeting, Invited Speaker, In the Wake of the CDC Opioid Guidelines and the National Pain Strategy: Treating the Patient With Pain and Addiction, San Diego, CA, May 2017
10. International Neuromodulation Society (INS) 13th World Congress, Invited Speaker, Lecture #1: Imaging Pain in the Brain, Lecture #2: Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, Edinburgh, Scotland, May 2017
11. Oregon Health & Science University (OHSU), Invited Speaker, Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, Portland, OR, June 2017
12. University of Kansas Health System, Invited Grand Rounds Speaker, Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, Kansas City, MO, October 2017
13. Stanford University, Virtual Reality Conference, Invited Speaker, Advances in Pain Management, Palo Alto, CA, October 2017
14. Annual Meeting of Israel Pain Society (IPS), Invited Speaker, Lecture #1: Brain Based Biomarkers for Pain: Objective Measures of Pain or a Journey Down the Rabbit Hole? Lecture #2: Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, Eilat, Israel, November, 2017
15. U.S. Department of Health and Human Services (HHS), Invited Speaker at HHS Opioid Symposium, How Data can lead to Insights in Understanding the Opioid Epidemic and in Considering Novel Solutions, Washington, DC, December 2017

2016

1. Pediatric Pain National/International Registry Communication Meeting, Invited Speaker, CHOIR System Presentation and Discussion, Toronto, Canada, February 2016
2. American Academy of Pain Medicine (AAPM) Annual Meeting, National Pain Strategy, Invited Speaker: 1. A Comprehensive Population Health Level Strategy for Pain, 2. The National Pain Strategy: Implications for Interdisciplinary Pain Care, 3. Naltrexone for Treatment of Fibromyalgia, 4. Best Pain Care at Lower Cost: CHOIR as a Model Platform for Learning Health System. Realizing the Institute of Medicine's Vision of Learning Health System, Palm Springs, CA, February 2016
3. Special Committee on Aging, Invited Speaker to testify to Congress, Opioids and Aging, Washington, DC, February 2016

4. Kauai Pain Conference, Invited Speaker, 1. The Strain in Pain Lies Mainly in the Brain: Neuroimaging & Pain, 2. A National Plan to Transform Pain Prevention, Care and Education, Kauai, Hawaii, March 2016
5. American Pain Society Annual Meeting, Invited Speaker, 1. Getting your research funded, 2. Transforming Care of Persons with Back Pain: Next Steps in Implementing the Recommendations of the National Pain Strategy, 3. Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research, 4. Measurement Based Pain Management for Best Care at Lowest Cost, Austin, TX 2016
6. Health Matters 2016, Invited Speaker, Management of Chronic Pain: Getting to the Root of Persistent Pain, Stanford CA, May 2016
7. American Psychiatric Association 2016, Invited Speaker, An Update on Diagnostic and Assessment Considerations for the Treatment of Comorbid Opioid Addiction and Chronic Pain, Atlanta, GA, May 2016
8. Association of University Anesthesiologists 63rd Annual Meeting, Poster Presentation, Collaborative Health Outcomes Information Registry (CHOIR): Open Source Platform for a Learning Health System and Informing Therapeutic Development, San Francisco, CA, May 2016
9. 2016 Annual Meeting and International Science Symposium IARS, Invited Speaker, Imaging for Chronic Pain: Can We Improve Patient Outcomes? San Francisco, CA, May 2016
10. WIP Congress 2016, Invited Speaker and Moderator, Pain Assessment and Clinical Outcomes: Collaborative Health Outcomes Information Registry (CHOIR): Open Source Platform for Measuring Health Outcomes and a Learning Based System, New York, NY, May 2016
11. European Pain School, Invited Professor, 1. Delivering a cultural transformation in pain prevention, care, education and research, 2. The strain in pain lies mainly in the brain: lessons learned from the neuroimaging of pain, Sienna, Italy, June 2016
12. NUIG mHealth Conference, Invited Speaker, Precision Surgical Care: Collaborative Health Outcomes Information, Registry (CHOIR) as a Perioperative Learning Health System and Platform to Deliver Targeted, Internet-based Health Interventions, Galway, Ireland, June 2016
13. Summer Pain Meeting – UNE, Invited Speaker, Learning Health Systems: A New Dawn in Personalized Pain Care and Real-World Discovery Research Presentation, Portland, ME, August 2016
14. Pain Week, Invited Speaker, In the Wake of the CDC Opioid Guidelines and The National Pain Strategy: Leveraging Pain Psychology and Platforms to Address the National Pain and Opioid Crises, Las Vegas, NV, September 2016
15. Stanford Medicine X, Invited Panelist, The Opioid Crisis Special Session, Palo Alto, CA, September 2016
16. 16th World Congress on Pain, Invited Speaker and Session Organizer, Neuroimaging Refresher Course, Imaging as a Biomarker for Pain, Neuroimaging Based Biomarkers of Acute and Chronic Pain, Realizing the US Institute of Medicine's Vision of Learning Health Systems for Pain Management, Yokohama, Japan, September 2013
17. ASA Annual Meeting, Invited Speaker, Pain Outcomes and Learning Health Systems: Delivery of Best Pain Care at Lower Cost, Chicago, IL, October 2016
18. James E. Eckenhoff Lectureship, Visiting Professor, Learning Health Systems: A New Dawn in Personalized Care and Real-World Discovery Research, Philadelphia, PA, November 2016
19. ASRA 2016 Pain Medicine Meeting, Moderator, Ask the Expert Interactive Session: Measuring Pain Data Outcomes and How This Influences Reimbursement. Invited Speaker, Imaging in Pain/Functional Brain Imaging in Pain: Overview and Clinical Significance, San Diego, CA, November 2016

20. 55th ACNP Annual Meeting, Study Group Speaker, Shared Solutions for Prescription Opioid Abuse and Pain, Hollywood, FL, December 2016

2015

1. Stanford University Parents' Weekend, Invited Speaker: The Strain in Pain Lies Mainly in the Brain, Palo Alto, CA, February 2015
2. PAP Summit (Programs and Policy, Integrated Healthcare Association), Invited Speaker, Patient-Reported Outcome Measures: What Will It Take To Realize The Promise? San Francisco, CA, March 2015
3. 1st Annual Kauai Pain Meeting, Invited Speaker, 1. When Does Acute Pain Become Chronic? 2. fMRI and Diagnosing Chronic Pain, Kauai, Hawaii, March 2015
4. AAPM Annual Meeting, Invited Speaker, 1. Understanding and Treating Neuropathic Pain, 2. National Pain Strategy Task Force: A Strategy to Transform Pain Prevention, Care, Education and Research, 3. Collaborative Health Outcomes Information Registry (CHOIR): Status and Update, National Harbor, MD, March 2015
5. American Pain Society's 34th Annual Scientific Meeting, Invited Speaker, 1. Perturbed Connectivity of the Amygdala and its Subregions with the Central Executive and Default Mode Networks in Chronic Pain, 2. National Pain Strategy Session, Palm Springs, CA, May 2015
6. UF Pain Research and Intervention Center of Excellence, Brain Imaging Biomarkers for Pain: Scientific Ethical and Legal Implications, Gainesville, FL, May 2015
7. INS 12th World Congress (International Neuromodulation Society), Invited Speaker, 1. Machine Learning Approaches for the Detection of Acute and Chronic Pain: Promises and Limitations, 2. fMRI, 3. The Current Practices: Functional Neuroimaging and the Use of Modulation, 4. Poster Presentation Collaborative Health Outcomes Information Registry (CHOIR): Open Source Cloud-Based Platform to Generate and Support Learning Healthcare Systems Montreal, Canada, June 2015
8. 21st Annual Meeting of the Organization for Human Brain Mapping, Invited Speaker/Organizer, 1. Identification of brain imaging biomarkers for pain, 2. New Developments and Horizons for Spinal Cord fMRI, Honolulu, Hawaii, June 2015
9. PAINS Project, Invited Speaker, Overview of the NPS planning process and major elements – Interagency Pain Research Coordinating Committee, Washington, DC, June 2015
10. Trigeminal Neuralgia Association of Australia, Invited Speaker, Rewiring the Brain to Ease Pain, Sydney, Australia, August 2015
11. University of California, San Francisco, Grand Rounds/Invited Speaker, 1. National Pain Strategy, 2. Collaborative Health Outcomes Information Registry (CHOIR): Open Source Learning Health System Platform to Deliver Best Care at Lower Cost, 3. Biomarkers, San Francisco, CA, October 2015
12. International Pelvic Pain Society (IPPS) Annual Meeting 2015, Invited Speaker, 1. Best Pain Care at Lower Cost: CHOIR as a Model Platform for Learning Health System, 2. Collaborative Health Outcomes Information Registry: Open Source Learning Health Systems Platform, 3. System To Enhance Patient Experience (STEPx): Network of patient experience touch points revealed by Bayesian network reconstruction suggests targets for intervention, San Diego, CA, October 2015
13. ASA Annual Meeting 2015, Invited Speaker, Refresher Course Lecture, Best Pain Care at Lower Cost: CHOIR as a Model Platform for Learning Health System, San Diego, CA, October 2015
14. ASRA 14th Annual Pain Medicine Meeting, Invited Speaker, 1. Best Pain Care at Lower Cost: CHOIR as a Model Platform for Learning Health Systems and Pain Registries, 2. Cognitive and Emotional Regulation of Pain: Lessons Learned from Neuroimaging of Pain, 3. Imaging safety and anatomic

correlations: assimilating the information and limiting patient risk: functional brain imaging in pain-overview and clinical significance, Miami, FL, November 2015

15. Medical College of Wisconsin, Visiting Professorship, 1. CHOIR: Open Sources Platform for Measuring Health Outcomes and a Learning Based System, 2. Brain Imaging Biomarkers for Pain: Objective Detection of Pain or a Journey Down the Rabbit Hole? Milwaukee, WI, December 2015
16. American College of Neuropsychopharmacology, Invited Speaker, rt-fMRI Neurofeedback: Are We There Yet? Hollywood, FL, December 2015

2014

1. American Academy of Pain Medicine Annual Meeting, Invited Speaker, 1. Essential Tools for Treating the Patient in Pain: What Every Primary Care and Pain Specialist Needs to Know, 2. Design and Implementation of an Open Source Pain Registry, 3. NIH Grant Writing: a Principal Investigator's Perspective, 4. The Essentials of Acute Pain Medicine, Phoenix, AZ, March 2014
2. NIH Pain Consortium, Research Standards for Chronic Low Back Pain, Bethesda, MD, May 2014
3. American Pain Society Annual Meeting, Invited Speaker, National and International Pain Registries: Analysis and Use of Practice-based Evidence, Tampa, FL, May 2014
4. American Psychiatry Association Annual Meeting, Invited Speaker, 1. Diagnostic and Assessment Considerations for the Treatment of Comorbid Opioid Addiction and Chronic Pain, 2. NIH NIDA Pain Consortium - Research Standards for Chronic Low Back Pain, 3. National and International Pain Registries: Analysis and Use of Practice-based Evidence, 4. Overview of the Treatment of Acute and Chronic Pain in the Patient with a History of Addiction, New York, NY, May 2014
5. PAINWEEK, Invited Speaker, 1. The Brain in Pain, 2. Neuropathic Pain, 3. The Psychology of Opioids, Las Vegas, NV September 2014
6. Napa Pain Conference, When Acute Pain Becomes Chronic, Napa, CA, September 2014
7. IASP Meeting, 15th World Congress on Pain, Invited Speaker, Brain-based Classification Algorithms for Acute and Chronic Pain, Buenos Aires, Argentina, October 2014
8. Acute Pain SIG Satellite Symposium, 1. Big data meets acute pain: where are the opportunities? 2. The new US National Pain Strategy, Buenos Aires, Argentina, October 2014
9. ASA Annual Conference, The Strain in Pain Lies Mainly in the Brain: Lessons Learned from the Neuroimaging of Pain, New Orleans, LA, October 2014
10. ASRA Pain Meeting, Invited Speaker, 1. Neuroimaging Based Pain Detection, 2. Brain Imaging Biomarkers for Pain: Objective Detection of Pain or a Journey Down the Rabbit Hole? San Francisco, CA, November 2014
11. ACR/ARHP Meeting, Invited Speaker, Treatment Considerations in Chronic Pain, Boston, MA, November 2014

2013

1. American Society of Anesthesiology Conference on Pain Management, Invited Speaker, *Pain: What to Report & Monitor*, Las Vegas, NV, January 2013
2. American Academy of Pain Medicine Annual Meeting, Invited Speaker, 1. Essential Tools for Treating the Patient in Pain, 2. Functional Neuroimaging of Chronic Pain: Promises and Pitfalls, 2. National Institutes of Health (NIH) Pain Research: Optimizing Funding Through Grant Writing, Fort Lauderdale, FL, April 2013
3. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Functional Neuroimaging of Chronic Pain: Promises and Pitfalls*, Fort Lauderdale, FL, April 2013

4. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *NIH Pain Research: Optimizing Funding Through Grant Writing*, Fort Lauderdale, FL, April 2013
5. American Association of Neurological Surgeons Annual Meeting, Invited Speaker, *Neuroimaging and Pain*, New Orleans, LA, April 2013
6. International Anesthesia Research Society Annual Meeting, Invited Speaker, *Neuroimaging-Based Pain Detection: Objective Measure of Pain or a Journey Down the Rabbit Hole?*, San Diego, CA, May 2013
7. American Pain Society Annual Meeting, NCCAM Pre-Conference Symposium, Invited Speaker, *Centers for Excellence for Research on CAM for Pain (CERC)*, New Orleans, LA, May 2013
8. American Pain Society Annual Meeting, Invited Speaker, *Objective Measures of Pain: Scientific, Legal & Ethical Considerations*, New Orleans, LA, May 2013
9. American Psychiatric Association Annual Meeting, Invited Speaker, *Overview of the Treatment of Acute & Chronic Pain in the Patient with a History of Addiction*, San Francisco, CA, May 2013
10. Neuropathy Action Foundation Annual Meeting, Invited Speaker, *Neuropathic Pain & Treatments*, Los Angeles, CA, June 2013
11. International Neuromodulation Society 11th World Congress, Invited Speaker, *Neuroimaging on the Future Treatment of Pain and Headache*, Berlin, Germany June 2013
12. NAF Neuropathy Meeting, Invited Speaker, *Neuropathic Pain and Pain Treatments*, Los Angeles, CA, June 2013
13. Trigeminal Neuralgia Association Australia, *Neuroimaging of Pain, Neuropathic Pain Treatments*, Queensland, Australia, August, 2013
14. PainWeek, Invited Speaker, *Understanding and Treating Neuropathic Pain, Opening Windows to the Brain: Lessons Learned from Neuroimaging of Pain*, Las Vegas, NV, September 2013
15. 4th Annual Aspen Brain Forum, Translational Neurotechnology Meeting, Invited Speaker, *Brain Imaging Biomarkers for Pain*, Aspen, CO, September 2013
16. California Society of Interventional Pain Physicians, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: Lessons Learned from Neuroimaging*, Palos Verdes, CA, September 2013
17. AAPM&R Meeting, Invited Speaker, 1. Neuroplasticity in Pain: What We Know From Experience With Amputation, 2. Neuroimaging of Pain, National Harbor, MD, October 2013
18. American Academy of Physical Medicine and Rehabilitation Annual Meeting, Invited Speaker, *Neuroimaging of Pain*, San Diego, CA, October 2013
19. American Society of Anesthesiologists, Invited Speaker, *Neuroimaging of Pain*, San Francisco, CA, October 2013
20. American College of Rheumatology Annual Meeting, Invited Speaker, *Future Perspectives for Persistent Pain Management*, San Diego, CA, October 2013
21. Northern California Association of Pain Psychologists, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: Lessons Learned from Neuroimaging of Pain*, San Francisco, CA, November 2013
22. Penn Pain Symposium, Invited Speaker, *Neuroimaging Based Pain Detection: Objective Measure of Pain or a Journey Down the Rabbit Hole?* Philadelphia, PA, December 2013

2012

1. University of Texas Arlington, Keynote Speaker, *Opening Windows to the Brain: Lessons Learned from Neuroimaging of Pain*, Arlington, TX, February 2012

2. World Institute of Pain Annual Meeting, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Miami, FL, February 2012
3. American Association of Orthopedic Surgeons, Invited Speaker, *Opioids for Pain Management, 2012 State of the Art*, San Francisco, CA, February 2012
4. Nevada Psychiatric Association 17th Annual Psychopharmacology Conference, Invited Speaker, *Substance Abuse: Treating Co-morbid Chronic Pain and Opioid Addiction*, Las Vegas, NV, February 2012
5. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Understanding and Treating Neuropathic Pain*, Palm Springs, CA, February 2012
6. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Pain Outcomes: What to Measure and Why*, Palm Springs, CA, February 2012
7. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Pain Research*, Palm Springs, CA, February 2012
8. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Optimizing Funding Through Grant Writing*, Palm Springs, CA, February 2012
9. American Pain Society Annual Meeting, Invited Speaker, *Virtual Reality & Pain Management*, Honolulu, HI, May 2012
10. American Pain Society Annual Meeting, Invited Speaker, *Brain Correlates of Temporal Summation and Conditioned Pain Modulation*, Honolulu, HI, May 2012
11. Oscher Center for Integrative Medicine, Invited Speaker, *Opening Windows to the Brain: Lessons Learned from the Neuroimaging of Pain*, San Francisco, CA, May 2012
12. FDA Chronic Pain Workshop, Invited Speaker, *Neuroimaging Biomarkers for Pain*, Washington, DC, May 2012
13. California Society of Industrial Medicine & Surgery Annual Meeting, Invited Speaker, *Neuroimaging of Pain*, San Diego, CA, June 2012
14. American Psychological Association Annual Meeting, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Orlando, FL, August 2012
15. Napa Pain Conference, Invited Speaker, *When Acute Pain Becomes Chronic: What We Know and How We Can Prevent It*, Napa, CA, September 2012
16. Napa Pain Conference, Invited Speaker, *Opioids: The Good, The Bad, and The Ugly*, Napa, CA, September 2012
17. Reflex Sympathetic Dystrophy Syndrome Association Conference, Invited Speaker, *Opening Windows to the Brain: Lessons Learned from the Neuroimaging of Pain*, Scottsdale, AZ, September 2012
18. Department of Defense Pain Care Symposium, Invited Speaker, *Neurobiology of Pain*, San Diego, CA, September 2012
19. Pain Therapeutics Summit, Invited Speaker, *Neuroimaging Based Pain Detection: Findings and Applications*, San Jose, CA, October 2012
20. American Society of Anesthesiology Annual Meeting, Invited Speaker, *Evaluating Pain Outcomes*, Washington DC, October 2012

2011

1. Washington University, Visiting Professor, Grand Rounds: *Opening Windows to the Brain: Lessons Learned from Neuroimaging of Pain*, St. Louis, MO, January 2011

2. Washington University, Visiting Professor, *The Strain in Pain Lies Mainly in the Brain*, St. Louis, MO, January 2011
3. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *When Acute Pain Becomes Chronic*, Washington, DC, March 2011
4. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *NIH Grant Writing from a Principle Investigator's Perspective*, Washington, DC, March 2011
5. California Society of Anesthesiologists, Invited Speaker, *Perioperative Patient on Chronic Opioids*. San Jose, CA, May 2011
6. American Psychiatric Association Annual Meeting, Invited Speaker, *Update on Treatment of Comorbid Opioid Addiction and Chronic Pain*. Honolulu, HI, May 2011
7. American Pain Society Annual Meeting, Invited Speaker, *Unraveling the Progression of Acute to Chronic Pain: New Research and Clinical Perspectives*. Austin, TX, May 2011
8. California Society of Interventional Pain Physicians Annual Meeting, Invited Speaker, Santa Barbara, CA, June 2011
9. International Brain Mapping & Intraoperative Surgical Planning Society World Congress, Invited Speaker, *Spinal fMRI and Detection of Pain: Recent Advances in Neuroimaging*. San Francisco, CA, June 2011
10. Neuropathy Action Foundation Annual Meeting, Invited Speaker, *Neuropathic Pain & Pain Treatments*. Sacramento, CA, June 2011
11. Walter Reed Army Medical Center, Grand Rounds, *Opening Windows to the Brain: Lessons Learned From the Neuroimaging of Pain*. Washington, DC, June 2011
12. National Marfan Foundation Symposium, Invited Speaker, Portland, OR, July 2011
13. Arizona Pain Society Annual Meeting, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*. Paradise Valley, AZ, September 2011
14. PAINWeek Conference, Invited Speaker, *Neuroimaging of Pain*. Las Vegas, NV, September 2011
15. PAINWeek Conference, Invited Speaker, *Opioids: The Good, the Bad and the Ugly*. Las Vegas, NV, September 2011
16. Western Occupational Health Conference, Invited Speaker, *Managing Opioids: Practice Guidelines, Appropriate Use of Drug Testing, Narcotic Contracts & Weaning*. Las Vegas, NV, September 2011
17. Napa Pain Conference, Invited Speaker, Napa, CA, September 2011
18. National Naval Medical Center Pain Symposium, Invited Speaker, *Neurobiology of Pain*. Washington, DC, September 2011
19. Western Pain Society Annual Meeting, Invited Speaker *Functional Neuroimaging of Pain*. Eugene, OR, September 2011
20. Breakthrough In Neurologic Therapies Conference, Invited Speaker, *Current Concepts in Chronic Pain Management*. San Francisco, CA, October 2011
21. Chinese Pain Society Annual Meeting, Invited Speaker, Shenzhen, October 2011
22. National Center for Complementary and Alternative Medicine Distinguished Lecture, Invited Speaker, *Opening Windows to the Brain: Lessons Learned from the Neuroimaging of Pain*. Washington, DC, November 2011
23. North American Neuromodulation Society Annual Meeting, Invited Speaker, *Neuroimaging of Pain*. Las Vegas, NV, December 2011

24. University of California San Francisco Pain Group, Invited Speaker, *Pain & Neuroimaging*. San Francisco, CA, December 2011

2010

1. American Academy of Pain Medicine 26th Annual Meeting, Invited Speaker, *Mechanisms & Neuroplasticity of Pain: Clinical Implications*, San Antonio, TX, February 2010
2. American Academy of Pain Medicine 26th Annual Meeting, Invited Speaker, *Human Brain Activity Identifies The Presence or Absence of Pain*, San Antonio, TX, February 2010
3. American Academy of Pain Medicine 26th Annual Meeting, Invited Speaker, *The NIH Review Process*, San Antonio, TX, February 2010
4. American Academy of Pain Medicine 26th Annual Meeting, Symposium Chair, *Introduction to NIH Grants*, San Antonio, TX, February 2010
5. Stanford 23rd Annual Anesthesia Update, Invited Speaker, *The Perioperative Patient on Chronic Opioids*, Big Sky, MT, February 2010
6. Stanford 23rd Annual Anesthesia Update, Invited Speaker, *The Challenges of Complex Regional Pain Syndrome*, Big Sky, MT, February 2010
7. University of Pennsylvania, Invited Speaker, *Central Pain Systems: Lessons From Functional Neuroimaging*, Philadelphia, PA, March 2010
8. American Academy of Neurology 62nd Annual Meeting, Invited Speaker, *How Functional Neuroimaging Will Transform the Diagnosis and Treatment of Central Neuropathic Pain Conditions*, Toronto, April 2010
9. Spring Pain Research Conference, Invited Speaker, *Prefrontal Cortical Systems in Low Back Pain Versus Generalized Anxiety Disorders*, Grand Cayman, April 2010
10. American Pain Society 29th Annual Meeting, Invited Speaker, *Virtual Reality & Pain Management*, Baltimore, MD, May 2010
11. American Pain Society 29th Annual Meeting, Symposium Chair, *Mechanisms & Neuroplasticity of Pain: Clinical Implications*, Baltimore, MD, May 2010
12. Potomac Center for Medical Education Symposium, Invited Speaker, *Mechanisms & Neuroplasticity of Pain: Clinical Implications*, Baltimore, MD, May 2010
13. American Psychiatric Association 163rd Annual Meeting, Invited Speaker, *Overview of the Treatment of Acute and Chronic Pain in the Patient with a History of Addiction*, New Orleans, LA, May 2010
14. Washington State Pharmacists Association Annual Meeting, Invited Speaker, *Addressing Regional Needs in the Management of Chronic Pain: A Focus on Opioid Misuse, Abuse, and Diversion*, Coeur d'Alene, ID, June 2010
15. Western Pain Society Annual Meeting, Invited Speaker, *Functional Imaging of Pain*, Seattle, WA, June 2010
16. Neural Interfaces Conference Chronic Pain Symposium, Invited Speaker, *Functional Imaging of Pain*, Long Beach, CA, June 2010
17. Case Western University, Visiting Professor, Grand Rounds, *Windows into the Brain: Lessons Learned about Pain From Neuroimaging*, Cleveland, OH, July 2010
18. International Association for the Study of Pain 13th World Congress on Pain, Invited Speaker, *CRPS: Where Are We Today?*, Montreal, August 2010
19. Irish Pain Society 10th Annual Scientific Meeting, Invited Speaker, *Fibromyalgia: Is This A Brain Problem?*, Dublin, September 2010
20. Walter Reed Army Medical Center, Waging War On Pain: New Strategies to Improve Pain Care for Military & VA Personnel, Invited Speaker, *Neurobiology of Pain*, Washington, DC, September 2010

21. American Association of Neuromuscular & Electrodiagnostic Medicine 57th Annual Meeting, Invited Speaker, *Pain in the Central Nervous System: What Have We Learned from Neuroimaging*, Quebec City, October 2010
22. American Society of Anesthesiologists Annual Meeting, Invited Speaker, *When Acute Pain Becomes Chronic: Mechanisms, Prevention & Treatment*, San Diego, CA, October 2010
23. American Society of Anesthesiologists Annual Meeting, Invited Speaker, *What Are the Outcomes We Need to Measure in Pain Medicine?* San Diego, CA, October 2010
24. Texas Pain Society Annual Meeting, Invited Speaker, *fMRI: Brain Re-Mapping - The Pain, It is Plain, Is Mainly in the Brain?* Austin, TX, October 2010
25. American Society of Regional Anesthesia Annual Pain Meeting, Invited Speaker, *Opening Windows to the Brain: Lessons Learned from Neuroimaging of Pain*, San Antonio, TX, November 2010
26. American Society of Regional Anesthesia Annual Pain Meeting, Invited Speaker, *How I Treat Neuropathic Pain*, San Antonio, TX, November 2010
27. American Society of Regional Anesthesia Annual Pain Meeting, Invited Speaker, *Polypharmacy in the Pain Clinic*, San Antonio, TX, November 2010
28. North American Neuromodulation Society Annual Meeting, Invited Speaker, *Fibromyalgia: Is This A brain Problem?* Las Vegas, NV, December 2010
29. NIH Pain & Musculoskeletal Disorder: Translating Scientific Advances into Practice Symposium, Invited Speaker, *Functional Neuroimaging Techniques in Pain*, Bethesda, MD, December 2010

2009

1. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Functional Imaging in CRPS*, Honolulu, HI, January 2009
2. Yale University, Visiting Professor, Grand Rounds, New Haven, CT, February 2009
3. Stanford 22nd Annual Anesthesia Update, Invited Speaker, *Neuropathic Pain: Current*
4. *Mechanisms and Treatments*, Big Sky, MT, February 2009
5. Stanford 22nd Annual Anesthesia Update, Invited Speaker, *Abuse of Prescription Pain Meds*
6. *and How to Stay Out of Trouble While Prescribing Them*, Big Sky, MT, February 2009
7. Stanford 22nd Annual Anesthesia Update, Invited Speaker, *When Acute Pain Becomes Chronic – What Do We Know and How Can We Prevent It?*, Big Sky, MT, February 2009
8. Society for Urodynamics and Female Urology Annual Meeting, Invited Panelist, *Cortical*
9. *Restructuring in Patients with Chronic Pain*, Las Vegas, NV, February 2009
10. Google Tech Talk Seminar Series, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*,
11. Mountain View, CA, March 2009
12. Western Pain Society Annual Meeting, Invited Speaker, *Functional Imaging of Pain*,
13. Englewood, CO, April 2009
14. American Pain Society 28th Annual Meeting, Invited Speaker, *Cognitive Aspects of Pain*, San
15. Diego, CA, May 2009
16. University of Pittsburgh, Visiting Professor, *The Strain in Pain Lies Mainly in the Brain: Lessons*
17. *Learned from Functional Neuroimaging*, Pittsburgh, PA, May 2009

18. National Institutes of Health, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: What*
19. *Have We Learned from the Neuroimaging of Pain?*, Bethesda, MD, May 2009
20. Integrative Pain Medicine Course, Invited Speaker, *Viewing the Brain in Pain through Neuroimaging: Understanding and Treating Neuropathic Pain*, San Francisco, CA, July 2009
21. Southwestern Medical Center, Visiting Professor, Grand Rounds, Dallas, TX, September 2009
22. Annual Innovations in Pain Management Symposium, Invited Speaker, *Introduction to Pain Management*, Palo Alto, CA, October 2009
23. University of California, Irvine, Visiting Professor, Grand Rounds, Irvine, CA, November 2009
24. 12th Annual International Conference on the Mechanisms & Treatment of Neuropathic Pain, Invited Speaker, *Brain Mechanisms of Neuropathic Pain*, San Francisco, CA, November 2009
25. American Society of Regional Anesthesia & Pain Medicine 2009 Annual Pain Meeting, Invited Speaker, *Can Imaging Identify Analgesics for Chronic Pain; Opioids: The Good, the Bad and the Ugly*, San Antonio, TX, November 2009
26. North American Neuromodulation Society 13th Annual Meeting, Invited Speaker, *Fibromyalgia – Is This a Brain Problem?; Functional Imaging of CRPS*, Las Vegas, NV, December 2009

2008

1. Neuroscience Institute at Stanford, Lecture for First Year Students, *The Strain in Pain Lies Mainly in the Brain*, Stanford, CA, January 2008
2. Stanford Neuroscience, Behavior & Cognition Journal Club, Stanford, CA, January 2008
3. Stanford Department of Anesthesia Senior Resident Lecture Series, *Acute Pain Management*, Stanford, CA, February 2008
4. Stanford Department of Neurology Resident Lecture Series, *Overview of Pain Systems and Management*, Stanford, CA, February 2008
5. Stanford University School of Medicine 21st Annual Anesthesia Update, Invited Speaker, *Update on Regional Anesthesia*, Big Sky, MT, February 2008
6. Stanford University School of Medicine 21st Annual Anesthesia Update, Invited Speaker, *Current Concepts in Perioperative Pain Management*, Big Sky, MT, February 2008
7. Stanford University School of Medicine 21st Annual Anesthesia Update, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Big Sky, MT, February 2008
8. Stanford University School of Medicine 21st Annual Anesthesia Update, Invited Speaker, *Opioids: The Good, the Bad, and the Ugly*, Big Sky, MT, February 2008
9. Stanford Department of Anesthesia, ANES 202 Anesthesiology & Pathophysiologic Implications for the Perioperative Patient, *Pain Management in the 21st Century*, Stanford, CA, February 2008
10. Stanford University School of Medicine, Med School 101 Lecture to High School Students, Stanford, CA, February 2008
11. Stanford Department of Anesthesia, Resident Journal Club, *Pain Management*, Stanford, CA, March 2008
12. Stanford Neuroscience, Behavior & Cognition Scholarly Concentration Journal Club, Stanford, CA April 2008
13. American Pain Society Annual Meeting, Invited Speaker, *Biofeedback: Past, Present and Future*, Tampa, FL, May 2008

14. Stanford Center for Education 2nd Annual Innovations with Pain Management Course, Invited Speaker, *Introduction and Overview of Pain Management*, Palo Alto, CA, August 2008
15. Stanford Center for Education 2nd Annual Innovations with Pain Management Course, Invited Speaker, *Current Research/Future Trends*, Palo Alto, CA, August 2008
16. International Association for the Study of Pain 12th World Congress on Pain, Invited Speaker, Pain Info Exchange Symposium, *What Neuroimaging Reveals About Pain*, Glasgow, August 2008
17. 12th Congress of the European Federation of Neurological Sciences, Invited Speaker, Pain Info Exchange Symposium, *Illuminating our Understanding of Pain*, Madrid, August 2008
18. University of California San Diego, Visiting Professor, *The Strain in Pain Lies Mainly in the Brain*, San Diego, CA, September 2008
19. University of California San Diego, Visiting Professor, *Cortical Changes in Neuropathic Pain*, San Diego, CA, September 2008
20. Massachusetts General Hospital, Visiting Professor, Grand Rounds, Boston, MA, September 2008
21. Stanford Hospital & Clinics CME 3rd Annual Focus on Complex Care for Case Managers, Invited Speaker, *Pain Management*, Stanford, CA, September 2008
22. Stanford Hospital & Clinics Community Lecture Series, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Stanford, CA, September 2008
23. Stanford University Sleep Grand Rounds, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: Lessons Learned Through Neuroimaging*, Stanford, CA, September 2008
24. California Society of Physical Medicine & Rehabilitation, Invited Speaker, *Fibromyalgia: From Mechanisms to Treatment*, San Jose, CA, October 2008
25. Stanford Health Library Community Lecture, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: Lessons Learned Through Neuroimaging*, Stanford, CA, October 2008
26. Stanford University Sleep Clinic, Grand Rounds, *The Strain in Pain Lies Mainly in the Brain: Lessons Learned Through Neuroimaging*, Stanford, CA, October 2008
27. American Society of Anesthesiologists Annual Meeting, Invited Speaker, *Evaluating Outcomes in Pain Medicine*, Orlando, FL, October 2008
28. American Society of Anesthesiologists Annual Meeting, Forum Moderator, How Do I Treat Neuropathic Pain and Complex Regional Pain Syndrome, Orlando, FL, October 2008
29. Science Writers New Horizons in Science Conference, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Stanford, CA, October 2008
30. Wake Forest University Advances in Physiology and Pharmacology in Anesthesia and Critical Care, Invited Speaker, *Brain Imaging and Pain Perception*, Sulphur Springs, WV, November 2008
31. Stanford Center for Law & The Biosciences, Neuroimaging, Pain & The Law Conference, Invited Speaker, *The Neuroscience of Pain*, Stanford, CA, December 2008
32. North American Neuromodulation Society Annual Meeting, Invited Speaker, *Neural Circuits of Pain*, Las Vegas, NV, December 2008
33. North American Neuromodulation Society Annual Meeting, Invited Speaker, *Clinical Trial Designs*, Las Vegas, NV, December 2008

2007

1. University of Washington, 25th Annual Bonica Visiting Professor, *Changing Pain in the Brain*, Seattle, WA, March 2007

2. Emory University, *Pain and the Brain – What has Neuroimaging Taught Us?*, Steamboat Springs, CO, February 2007
3. Emory University, *Neuropathic Pain*, Steamboat Springs, CO, February 2007
4. Emory University, *Current Concepts in Perioperative Pain Management*, Steamboat Springs, CO, February 2007
5. Emory University, *New Ideas for Regional Anesthesia in Extremity*, Steamboat Springs, CO, February 2007
6. American Academy of Pain Medicine Annual Meeting, Invited Speaker, *Neuroimaging of the Brain: Changes Due to CRPS*, New Orleans, LA, February 2007
7. Santa Clara Valley Medical Center, Neuroscience Grand Rounds, *The Strain in Pain Lies Mainly in the Brain*, San Jose, CA, March 2007
8. National Institutes of Health, Invited Speaker, *Emotional and Cognitive Factors in Pain*, Bethesda, MD, April 2007
9. American Pain Society Annual Meeting, Invited Speaker, *Opening Windows Into the Brain: Advances in Neuroimaging of Pain*, Washington, DC, May 2007
10. Marin Pain Consortium, Invited Speaker, *Pain and the Brain – What Have We Learned from Neuroimaging?*, Mill Valley, CA, May 2007
11. Juvenile/Adolescent CRPS Consensus Conference, Invited Speaker, *fMRI Imaging CRPS in Adults*, Stanford, CA, May 2007
12. National Marfan Foundation National Conference, Invited Speaker, *Adult Pain Management*, Stanford, CA July 2007
13. Stanford Department of Anesthesia Grand Rounds, *Changing Pain in the Brain*, Stanford, CA, August 2007
14. Stanford Reunion Homecoming, Classes Without Quizzes, *The Strain in Pain Lies Mainly in the Brain*, Stanford, CA, October 2007
15. American Society of Anesthesiologists Annual Meeting, Invited Speaker, *Evaluating Outcomes in Pain Medicine*, San Francisco, CA, October 2007
16. American Society of Anesthesiologists Annual Meeting, Invited Speaker, *Cervicogenic Headache: More Than Just a Pain in the Neck*, San Francisco, CA, October 2007
17. Johns Hopkins University School of Medicine, *Cases and Conversations: A Fibromyalgia Workshop*, Marina del Rey, CA, October 2007
18. IASP 10th International Conference on the Mechanisms & Treatment of Neuropathic Pain, Invited Speaker, *Mechanisms and Treatment of Chronic Low Back Pain*, Salt Lake City, UT, November 2007
19. Stanford Department of Neurosurgery Grand Rounds, *Pain and the Brain: What Has Neuroimaging Taught Us?*, Stanford, CA, November 2007
20. Lockheed Martin Palo Alto Colloquium, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain*, Palo Alto, CA, November 2007

2006

1. American Academy of Pain Management National Conference, *Functional Neuroimaging of Pain*, San Diego, CA, January, 2006
2. UCSF Pain Symposium, Invited Speaker, *Psychopharmacology of Pain Management*, San Francisco, CA, January, 2006
3. San Jose Regional Medical Center, Grand Rounds, *Neuropathic Pain*, San Jose, CA, January, 2006

4. Stanford Internal Medicine Department, Grand Rounds, *Pain and the Brain – What has Neuroimaging Taught Us?*, Stanford, CA, March 2006
5. American Society of Pain Educators, CME, *Pain Mechanisms: The Basis for Optimizing Outcomes*, Los Angeles, CA, May, 2006
6. Good Samaritan Hospital, Grand Rounds, *Neuropathic Pain*, San Jose, CA, May, 2006
7. American Pain Society Meeting, Invited Speaker, *Pain and the Brain: What Has Neuroimaging Taught Us?* Talk broadcast nationally to 4,000 physicians, San Antonio, TX, May, 2006
8. American Pain Society Meeting, Invited Speaker, *Prevalence and Pathophysiology of Chronic Pain*, San Antonio, TX, May 2006
9. California Society of Industrial Medicine Annual Meeting, *The Strain in Pain Lies Mainly in the Brain*, Lake Tahoe, NV, June 2006
10. Los Gatos Community Hospital, Grand Rounds, *Multidisciplinary Pain Management*, Los Gatos, CA, August 2006
11. American Association Physicians Indian Origin, Guest Speaker, *What has Neuroimaging Taught us About Pain and the Brain?* Newark, CA, August 2006
12. Swedish Hospital Annual Pain Management Symposium, Invited Speaker, *Pain and the Brain – Functional Studies and Potential New Therapies*, Seattle, WA, September 2006
13. UCSF Pain Group, Invited Speaker, *Neuroimaging and Pain: Results from the Spinal Cord to the Brain*, San Francisco, CA, September 2006
14. American Society of Anesthesiologists Annual Meeting – Refresher Course, Outcomes in Pain Management, Chicago, October 2006
15. Johns Hopkins, Visiting Professorship, *Pain and the Brain – What has Neuroimaging Taught Us?*, Baltimore, MD, October, 2006
16. American Society of Pain Educators, CME, *Pain Mechanisms: The Basis for Optimizing Outcomes*, Palo Alto, CA, November 2006
17. American Society of Regional Anesthesia and Pain Medicine Annual Meeting, *Neuroimaging of Pain*, San Francisco, CA, November 2006
18. North American Neuromodulation Society Annual Meeting, *Functional Brain Imaging: Neural Circuitry of Pain, Movement Disorders, and Psychiatric Disorders*, Las Vegas, NV, December 2006
19. Stanford Department of Otolaryngology/Head and Neck Surgery, Grand Rounds, *Pain and the Brain: Insights through Neuroimaging*, Palo Alto, CA, December 2006

2005

1. Stanford Department of Orthopedics, Division of Hand Surgery, Invited Speaker, *Complex Regional Pain Syndrome*, January 2005
2. UCSF Memory and Aging Group, Grand Rounds, *The Strain in Pain is Felt Mainly in the Brain – The Imaging of Pain Processing*, January 2005
3. Stanford Department of Anesthesia/Medical College of Wisconsin Annual Anesthesia Meeting, Invited Speaker, *Current Concepts in Perioperative Pain Management*, Copper Mountain, Colorado, February 2005
4. Stanford Department of Anesthesia/Medical College of Wisconsin Annual Anesthesia Meeting, Invited Speaker, *New Ideas in Regional Anesthesia for Extremity Surgery*, Copper Mountain, Colorado, February 2005
5. Stanford Department of Anesthesia, Grand Rounds, *Chronic Pain Management – An Overview and Update on Multidisciplinary Treatment*, March 2005

6. Pain Management CME Lecture, *Chronic Pain Management – Focus on Multidisciplinary Treatment and Opiates*, Hayward CA, April, 2005
7. Northern California Orthopedics Association Annual Meeting, Invited Speaker, *Current Concepts in Perioperative Management for the Orthopedic Surgeon*, Aptos, CA, May 2005
8. Association for University Anesthesiologists, *Control of Brain Activation and Pain Perception Through Real-Time fMRI Feedback*, Baltimore, MD, May 2005
9. Kaiser Annual Pain Management Symposium, *Chronic Pain Management: A Focus on Multidisciplinary Treatment and Opiates*, Stockton, CA June 2005
10. Stanford Department of Surgery, Invited Speaker, *Perioperative Pain Management*, Stanford CA, August 2005
11. American Society of Pain Educators Annual Meeting, Keynote Speaker, *Pain: A Focus on Central Sensitization*, August 2005
12. Stanford Pain and Palliative Care Conference, Invited Speaker, *Pain Clinic Referrals and Outpatient Interventions*, Stanford, CA, September 2005
13. Swedish Hospital Annual Pain Management Symposium, Invited Speaker, *Opiates – The Good, The Bad and The Really Ugly*, September 2005
14. American College of Surgeons Annual Conference, Invited Speaker, *Perioperative Pain in the Anticoagulated Patient*, San Francisco, CA, October 2005
15. Stanford Neurology Grand Rounds, *Functional Neuroimaging of Pain*, Stanford, CA, October, 2005
16. American Society of Regional Anesthesia and Pain Medicine, Invited Speaker, *Outcomes in Pain Management*, Miami, FL, November 2005
17. American Medical Association Science Writers Conference, Featured Speaker, *Improving Quality of Life when Battling Diabetic Peripheral Neuropathy*, Washington, DC, November 2005

2004

1. Stanford University Neurosciences Institute, Invited Speaker – Meet the Press, *Chronic Pain – Seeking a Solution in the 21st Century*, March 2004
2. American Academy of Orthopedic Surgeons Annual Meeting, Invited Speaker, *Chronic Pain Management – Focus on Opiates*, San Francisco, CA, March 2004
3. Oregon Health Sciences Center, Grand Rounds, *The Imaging of Pain Processing*, Portland, OR, April 2004
4. Stanford Department of OB/GYN, Grand Rounds, *Perioperative Pain Management*, April 2004
5. University of Wisconsin, Visiting Professorship, Madison WI, April 2004
6. *Chronic Pain Management – Focus on Interdisciplinary Treatment and Opiates*
7. *The Strain in Pain is Felt Mainly in the Brain – The Imaging of Pain Processing*
8. American Pain Society Meeting, Invited Speaker – Psychosocial Data Blitz, *Augmented Control of Brain Activity and Pain Through Real Time fMRI Feedback*, Vancouver, Canada, May 2004
9. Marin General Hospital Pain Management Symposium, Invited Speaker, *Chronic Pain Management – Focus on Multidisciplinary Treatment and Opiates*, Marin, CA, May 2004
10. Stanford Annual Physical Therapy Conference, *Complex Regional Pain Syndrome*, May 2004
11. Santa Clara Valley Medical Center Department of Urology, Grand Rounds, *Perioperative Pain Management for the Urologic Surgeon*, San Jose, CA May 2004

12. Emory University Department of Anesthesia, Visiting Professor, *Current Concepts in Perioperative Pain Management, The Strain in Pain is Felt Mainly in the Brain – The Imaging of Pain Processing*, Invited Speaker, Functional imaging and the neural systems of chronic pain, , Atlanta Georgia, May 2004
13. California Society of Industrial Medicine, Invited Speaker, Chronic Pain Management – Focus on Multidisciplinary Treatment and Opiates, San Diego, CA June 2004
14. University of Utah Pain Management, Grand Rounds, *An Update on Neuroimaging of Pain*, Salt Lake City, Utah, September 2004
15. Latter Day Saints Hospital, Invited Speaker, *Chronic Pain Management – Focus on Coxibs and Opiates*, Salt Lake City, Utah, September 2004
16. Bay Area Podiatry Association, Invited Speaker, *Perioperative Pain Management*, Los Gatos, CA, September 2004
17. Stanford University Community Lecture Series, *Pain in the Brain: Novel Treatments Made Possible by Neuroimaging*, November 2004

2003

1. University of Utah Pain Management Center, *Functional Neuroimaging of Pain Processing*, Grand Rounds, Salt Lake City, UT, February 2003
2. McKay General Hospital, Grand Rounds, *Current Concepts in Chronic Pain Management*, Utah, February 2003
3. Stanford Brain Research Center, Invited Speaker, *The Imaging of Pain Processing – Future Directions in Pain Research*, Stanford, CA, March 2003
4. California Society of Industrial Medicine, Invited Speaker, *Management of Chronic Pain – Focus on Opiates*, July 2003
5. John Muir Hospital, Grand Rounds, *The Strain in Pain Lies Mainly in the Brain – Insights into Chronic Pain through Functional Neuroimaging*, August 2003
6. American College of Rheumatology (ACR) Annual Meeting, Invited Speaker for Advances in Rheumatology Symposium, *Mechanisms of Inflammatory Pain*, Orlando, Florida, November 2003
7. Marin General Hospital Annual Pain Symposium, Invited Speaker, Multimodal Perioperative Pain Management, December 2003

2002

1. Education for Physicians on End-of-life Care, Invited Speaker, *Management of Chronic Pain*, San Mateo, California, January 2002
2. Mercy San Juan Hospital, Grand Rounds, *Management of Patients in Acute Pain*, Mercy, California, January 2002
3. Pain Management Symposium, *Perioperative Management of Pain*, Sacramento, California, January 2002
4. American Academy of Pain Medicine (AAPM) Annual Meeting, Invited Speaker, *Acute Pain Management*, February 2002
5. Stanford Department of Anesthesia, Grand Rounds, *Advanced Imaging Techniques for Pain Research*, March 2002
6. Education for Physicians on End-of-life Care, Invited Speaker, *Current Concepts in Chronic Pain Management*, San Mateo, California, March 2002

7. Société Internationale de Chirurgie Orthopédique et de Traumatologie (SICOT), Keynote Speaker *Perspectives in Pain for the Orthopaedic Surgeon – Optimizing the Management of Surgical Pain : Recent Advances and Current Trends*, San Diego, CA, August 2002
8. Swedish Medical Center Annual Medical Meeting, Invited Speaker, *The Strain in Pain Lies Mainly in the Brain: The Imaging of Pain Processing*, Seattle, WA, 2002
9. New York Post Graduate Assembly (PGA) Annual Anesthesia Meeting, *Perioperative Pain: Novel Approaches to Management*, New York, NY, December 2002

2001

1. Stanford University Department of Urology, Grand Rounds, *Perioperative Pain Management of the Urologic Patient*, January 2001
2. Travis Air Force Base, Department of Surgery, Grand Rounds, *Current Concepts in Perioperative Pain Management*; Department of Orthopedic Surgery, Invited Speaker, *Acute Pain Management for Orthopedic Patients*; Department of Anesthesiology, Invited Speaker, *Multimodality Perioperative Pain Management*, January 2001
3. Stanford University Department of Internal Medicine, *Current Concepts in Chronic Pain Management*, March 2001
4. Palo Alto VA Hospital Department of Internal Medicine, *Multidisciplinary Chronic Pain Management*, April 2001
5. Pain Management Symposium, *Perioperative Orthopedic Pain Management*, Lake Tahoe, Nevada, March 2001
6. Queens Medical Center Department of Obstetrics and Gynecology, Grand Rounds, *Multimodality Perioperative Pain Management*, Hawaii, April 2001
7. Stanford University Annual Hand Physical Therapy Symposium, Invited Speaker, *Management of the Patient with Complex Regional Pain Syndrome*, Stanford, California, June 2001
8. Pain Symposium, *Current Concepts in Perioperative Pain Management*, Stockton, California, July 2001
9. Pain Management Symposium, *Multimodality Perioperative Pain Management*, Modesto, California, July 2001
10. San Mateo Medical Center, Grand Rounds, *Current Strategies in Acute Pain Management*, July 2001
11. Kern Hospital Department of Anesthesiology Grand Rounds, *Perioperative Pain Management Techniques*, August 2001
12. Pain Symposium, *Multimodality Acute Pain Management*, Walnut Creek, California, September 2001
13. Stanford University Annual Hand Physical Therapy Symposium, Invited Speaker, *Management of Patients with Complex Regional Pain Syndrome*, Stanford, California, October 2001
14. Tacoma Valley Medical Center, Grand Rounds, *Current Concepts in Perioperative Pain Management*, Tacoma, Washington, October 2001
15. Pain Management Symposium, *Acute Pain Management*, Tacoma, Washington, October 2001
16. Pain Management Symposium, *Mechanistic Approach to Neuropathic Pain Management*, Oakland California, November 2001
17. Santa Clara County Medical Center, Grand Rounds, *Current Strategies in Perioperative Pain Management*, Santa Clara, California, November 2001
18. American College of Rheumatology (ACR) Annual Meeting, Invited Speaker for Advances in Rheumatology Symposium, *Perioperative Pain Management*, San Francisco, California, November 2001

19. Stanford University Pain Management Symposium, Stanford, California, December 2001 *Acute Pain Management Physiology of Pain*

2000

1. Continuing Medical Education, Invited Speaker, *Management of Pain Using NSAIDs and Cox-2 Inhibitors*, Menlo Park, CA April 2000
2. Stanford University Annual Hand Physical Therapy Symposium, Invited Speaker, *Complex Regional Pain Syndrome*, Stanford, California, June 2000
3. Oregon Health Sciences Center, Invited Speaker, *Management of Acute Pain*, Portland Oregon, September 2000
4. Spokane Washington VA Medical Center, Invited Speaker, *Management of Acute and Chronic Pain*, Spokane, Washington, September 2000
5. Stanford University Department of Neurosurgery, Grand Rounds, *Current Concepts in Acute Pain Management*, October 2000
6. UC Davis Department of Orthopedics, Grand Rounds, *Management of Acute Pain in Orthopedic Patients*, Davis, California, November 2000
7. UC Davis Department of Physical Medicine and Rehabilitation, Invited Speaker, *Physiology and Pharmacology of Pain Management*, Davis, California, November 2000
8. UC Davis Department of Anesthesiology, Invited Speaker, Division of Pain Management, *Multimodality Acute Pain Management*, Davis, California, November 2000
9. Pain Management Symposium, Invited Speaker, *New Concepts in the Management of Acute Pain*, Los Gatos, California, December 2000
10. Stanford University Department of Orthopedics Annual Research Forum, Keynote Speaker, *Multimodality Pain Management and Rehabilitation in Orthopedic Patients*, December 2000
11. Continuing Medical Education, Invited Speaker, *Current Concepts in the Management of Acute Pain*, San Francisco, California, December 2000

1991-1997

1. Arizona Health Sciences Center Student Research Forum, *An Automated Data Analysis and Collection System for Measuring Isolated Atrial Contractility*, May 1991 (Second Prize, 11th Annual Medical Student Research Forum, 1991)
2. American Federation for Clinical Research Western Regional Conference, *An Automated Data Analysis and Collection System for Measuring Isolated Atrial Contractility* Carmel, CA, February 1992
3. American Federation for Clinical Research National Conference, *An Automated Data Analysis and Collection System for Measuring Isolated Atrial Contractility* Baltimore, MA, May 1992
4. Arizona Health Sciences Center Student Research Forum, Featured Speaker, *Characterization and Optimization of Radiofrequency Catheter Ablation for the Treatment of Cardiac Arrhythmias*, May 1992
5. American Heart Association National Conference, *Delivery of Radiofrequency Energy to All Four Poles of a Catheter Increases Lesion Size*, New Orleans, Louisiana, October 1992
6. Yuma Friends of Arizona Health Sciences Center, Keynote Speaker, *Radiofrequency Catheter Ablation as a New Treatment for Cardiac Arrhythmias*, March 1993
7. American Heart Association National Conference, *RF Power Losses in the Energy Delivery System During Ablation*, Atlanta, Georgia, November 1993

8. American Heart Association National Conference, *Frequency Dependent Impedance Measurements: An Indicator of Catheter Contact*, Atlanta, Georgia, November 1993
9. Arizona Health Sciences Center Student Research Forum, *A Thermodynamic Model of Radiofrequency Catheter Ablation for the Treatment of Cardiac Arrhythmias*, May 1994 (First Prize, 14th Annual Medical Student Research Forum, 1994)
10. Pacing and Cardiac Electrophysiology National Conference, *Tip Temperature is not an Indicator of Myocardial Temperature*, Boston, March, 1995
11. Western Anesthesia Residents Conference, *Choosing a DLT: Is There a Racial Difference in Airway Size?*, Universal City, California, April 1997
12. Western Anesthesia Residents Conference, *Magnetic Resonance Therapy Guided Stellate Ganglion Block*, April 1997 (Finalist)
13. American Society of Anesthesiologists, *Choice and Placement of DLTs in Asian Patients*, October, 1997
14. Bard, Electrophysiology Division, *New Directions in Radiofrequency Catheter Ablation* Billerica, MA, October 1997
15. California Society of Anesthesiologists, *Magnetic Resonance Therapy Guided Stellate Ganglion Block*, San Francisco, CA June 1998
16. Mackey, S., Sze, D., Gaeta, R., *Magnetic Resonance Therapy Guided Regional Blockade for Pain Management* American Society of Anesthesiologists, October 1999

TEACHING ACTIVITIES

2021-2025	Medical School Course	PTD-A; Local Anesthetics
2011-2025	Medical School Course	Neurobiology NBIO206; Somatosensation and Pain
2020	Medical School Course	PTD-A; Treatment of Pain II, III Opioid Agonists, Chronic Pain
2011-2016	Medical School Course	Human Health & Disease 223; Opioids 1 & 2
2009, 2011-2016	Medical School Course	Human Health & Disease 223; Local Anesthetics
2009-2015	Medical School Course	Anesthesia 202; Pain Management in the 21 st Century
2007, 2011-2016	Medical School Course	Neurobiology of Disease NEN 205; Neurobiology of Pain
2006	Class	Human Biology 100; Pain & the Brain
2006	Class	Psychology 202; Cognitive Neuroscience; Functional Neuroimaging of Pain

2006	Medical School Course	Spinal Cord. Neurosciences Lab
2004-Present	Fellowship	Post-Doctoral Research
2003-2011	Fellowship	Graduate Students
2003-2005	Class	Resident Refresher Course. Dept. of Anesthesia
2002-2005	Class	Upper Extremity Regional Blocks
2002		Department of Anesthesia; Stanford School of Medicine, Call Committee
2002	Class	Chronic Pain Management
2001-2002	Class	Pharmacology for Pain Management-Neuropathic Agents. Dept. of Physical Medicine and Rehabilitation
2000- Present	Medical School Course	Anesthesia Medical Student Clerkship #304A; Acute Pain
2000- Present	Class	IASP Pain Management Fellow Lecture Series
2000-2013	Fellowship	Faculty, Pain Management Fellowship
2000-2006	Fellowship	Founder & Director, Regional Anesthesia Program, Department of Anesthesiology
2000-2005	Class	Lower Extremity Regional Blockade
2000	Class	Current Concepts in Acute Pain Management
2000	Class	Current Concepts in Acute Pain Management. Dept. of General Surgery
2000	Class	Lumbar Sympathetic Blockade-A Review
1999-2006	Class	Annual Regional Anesthesia Workshop

1999-2000	Class	Complex Regional Pain Syndrome
1999	Class	Outcomes in Spinal Cord Stimulation

COMMITTEES

2020-2022	Nominating Committee	American Academy of Pain Medicine (AAPM)
2020	Steering Group	Pain Registries SIG, International Association for the Study of Pain (IASP)
2020	Advisory Board Member HSRD Naloxone Distribution IIR	Veterans Affairs (VA)
2020	Invited Member	Network of Digital Health Experts program, (FDA) & Center for Devices & Radiological Health (CDRH)
2020	Technical Expert Panel Member PCOR TEP Pain/ODD	National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
2018-2023	Delegate	California Medical Association, (CMA)
2019-2024	Council Member	Council on Science & Public Health, (CMA)
2019-2020	Vice-Chair - Committee on Temporomandibular Disorders (TMD)	National Academies of Sciences, National Institutes of Health, (NAS)/(NIH)
2018, 2019	Advisory Committee Member	Drug Safety and Risk Management Advisory Committee, Anesthetic and Analgesic Drug Products Advisory Committee (DSaRM/AADPAC)/(FDA)
2018	Committee Member Innovations in Medical Devices to Prevent Opioid Use Disorder (ODD)	Analgesic, Anesthetic, and Addiction Clinical Trial Translations, Innovations, Opportunities, and Networks (ACTTION)

2018	Committee Member	Committee on Electronic Media & Informatics Technology (EMIT), ASA
2017	Panelist at Workshop – Advancing Therapeutic Development for Pain and Opioid Use Disorders through Public-Private Partnerships	National Academies of Sciences, Engineering, and Medicine, (NASEM) / NIH
2017, 2018	Board Member	Association of Pain Program Directors (APPD)
2017-2022	Committee Member	American Society of Anesthesiologists Committee on Research (ASA)
2017	Oversight Committee	Analgesic, Anesthetic, and Addiction Clinical Trial Translations, Innovations, Opportunities, and Networks (ACTTION)
2017	Committee Member	National Academy of Medicine, Marshaling Physician Leadership to Counter the Opioid Epidemic
2016-2018	Member	NIH Chronic Overlapping Pain Working Group
2016-2017	Working Group Member to add Pain questions to National Health Interview Survey	Centers for Disease Control and Prevention (CDC)
2016	Testimony to Senate Special Committee on Aging – Pain and Opioids	National Academy of Medicine
2015-2016	Immediate Past-President	American Academy of Pain Medicine
2014-2015	President	American Academy of Pain Medicine
2017-2018	Member	NIH Healthy People 2030 Chronic Pain Workgroup
2014-2016	Member	NIH Healthy People 2020 Chronic Pain Workgroup
2014	Member	Healthy People 2020 Pain Task Force

2013	Chair	Department of Anesthesia; Stanford School of Medicine, Faculty & Development and Mentoring Committee
2013-Present	Member of Clinical Practice Guidelines in Oncology, Adult Cancer Pain	National Comprehensive Cancer Network, Adult Cancer Pain Committee
2013-2016	Co-Chair	Prevention and Care Working Group; National Pain Strategy Task Force NPSTF
2012-Present	Member	Department of Anesthesia; Stanford School of Medicine, Finance Committee
2012-2013	Member	NIH Pain Consortium Chronic Low Back Pain Research Task Force
2012-2013	Member	NIH Interagency Pain Research Coordinating Committee
2012-2016	Co-Chair	Oversight Committee; National Pain Strategy Task Force NPSTF
2012	Co-Chair	American Academy of Pain Medicine Annual Meeting
2012	Member	FDA Chronic Pain Workshop
2011-2013	Vice President Scientific Affairs	American Academy of Pain Medicine
2010-2011	Committee Member & Author	IOM (Institute of Medicine) 2011 Committee on Advancing Pain Research, Care, and Education
2009-Present	Member	American Academy of Pain Medicine CME Oversight Committee
2009-Present	Member	American Academy of Pain Research Committee
2009-2015	Member	American Academy of Pain Medicine Executive Committee
2009-2011	Member	American Pain Society Nominating Committee

2008-2015	Director at Large	American Academy of Pain Medicine
2008-Present	Member	Department of Anesthesia; Stanford School of Medicine, Appointments & Promotions Committee
2008-2020		Association of Pain Program Directors
2008-2009		California Neuropathy Task Force
2008	Board of Directors	International Association of Pain Clinic Guidelines Taskforce
2007-Present		California Department of Workers Compensation
2007-Present		American Society of Anesthesiology Pain Directors
2007-Present		American Society of Anesthesiology Pain Committee
2007		NHLBI Workshop on Sickle Cell Disease Sub-Committee on Pain
2005-Present		Department of Anesthesia; Stanford School of Medicine, Research Committee
2005-2012		Stanford University, American Society of Anesthesiology; Continuing Education
2005-2008		Stanford University, Electronic Medical Record Committee
2005-2006		Stanford University, Clinical Commitment Committee
2004-Present		Stanford University, Neuroscience Committee
2004-2005		Stanford University, Deep Venous Thrombosis Committee

2003-Present		Department of Anesthesia; Stanford School of Medicine, Governance Committee
2003-2010		Stanford University, Medical School Committee
2002		Department of Anesthesia; Stanford School of Medicine, Call Committee
2000		Department of Anesthesia; Stanford School of Medicine, Incentive Committee
1999-Present		Department of Anesthesia; Stanford School of Medicine, Residency Selection Committee
1999-2006		Department of Anesthesia; Stanford School of Medicine, Information Technology Committee
1997-1998		Stanford University Medical Center; General Medical Education Committee
1996-1998		Department of Anesthesia; Stanford School of Medicine, Education Committee
1992-1994	Founding Member	University of Arizona, MD/PhD Committee

MEMBERSHIPS

American Society of Anesthesiologists (ASA)
 American Pain Society (APS)
 American Society of Regional Anesthesia and Pain Medicine
 American Academy of Pain Medicine (AAPM)
 National Academy of Medicine
 International Association for the Study of Pain (IASP)
 United States Association for the Study of Pain (ASASP)
 International Anesthesia Research Society
 California Society of Anesthesiologists
 California Medical Association
 Institute of Electrical and Electronic Engineers
 Eta Kappa Nu (Electrical Engineering Honor Society – Founder Univ Arizona Chapter)
 Society for Neuroscience

LICENSES

Diplomat - Pain Medicine Subspecialty, American Board of Anesthesiologists 2000, Recertified 2010
 Diplomat of American Board of Anesthesiologists 1999, Recertified 2009
 California Medical License A055270
 DEA BM4962848
 ACLS Certification 2009

LANGUAGES

Computer Languages: C, Visual Basic, Pascal, FORTRAN

Web Sites Developed and Administered

<http://paincenter.stanford.edu/> - Developed and maintain Stanford Pain Management Center Web Site

<http://snapl.stanford.edu/> - Developed and maintain Stanford Systems Neuroscience & Pain Lab Web Site

<http://anesthesia.stanford.edu/> - Developed and maintain an internal Stanford Department of Anesthesia web site focused on resident, faculty, and staff education

<http://anesthesia.stanford.edu/regionalanesthesia> - Developed and maintain internal Stanford site focused on the principles and practices of regional anesthesia

PUBLIC & PROFESSIONAL SERVICES

1997-2000	Board of Medical Directors	Interplast
1991-1993	Co-Founder & President, University of Arizona	MD/PhD Club, College of Medicine
1987-1993	Founding Member, University of Arizona	Etta Kappa Nu, Electrical Honor Society

OTHER EMPLOYMENT AND CONSULTING

Member - Board of Directors, Acoustic Technologies Inc., 1997-2006.

A company whose goal is to bring medical technologies to market and provide an environment to pursue innovative research.

Project Leader/ Consultant to IREF Inc., San Francisco, CA., 1996 – 1998.

Co-investigator with Dr. Christina Mora-Mangono on project to develop multimodality neurological monitoring system. Development of a system will to study the effects of cardiac surgery and anesthesia on neurologic and psychiatric outcomes in patients. Supervise engineers, manage budget, coordinate purchasing, conduct experiments, analyze and prepare data for publication.

Owner and Founder - Altech Consultants, Sunnyvale, California, 1987-Present

Operate an engineering consulting company specializing in medical electronics, computer systems and their integration to medical instrumentation. Designed hardware and software, operated day to day business including accounting, subcontracted work, negotiated with clients, delegated assignments, developed consulting plans.

Principal Investigator/Consultant to C.R. Bard Inc., 1987 - 1998. Directed several projects using radiofrequency catheter ablation to treat cardiac arrhythmias at the Department of Internal Medicine, Section of Cardiology, Tucson, Arizona. Work focused on the treatment and cure of atrial fibrillation. These projects include determining optimal delivery parameters for delivery of radiofrequency energy, computer modeling of ablation energy and its effect on the myocardium, characterizing energy losses in delivery system, and determining temperatures within myocardium during ablation. Write protocols, obtain grants, manage budget, coordinate purchasing, coordinate and supervise multiple studies, supervise engineers and medical students, conduct experiments, analyze and prepare data for publication and presentation at national conferences.

Research Assistant/Electrical Engineer - University Medical Center - Department of Anesthesiology, Tucson, Arizona. 1987-93. Designed and built automated system to measure contractility effects of anesthetic agents on guinea pig heart tissue *in vitro*. Assisted with anesthesia, delivery and monitoring during bovine artificial heart (Jarvik 7) replacement.

Research Associate/Biomedical Engineer - Philadelphia VA Hospital, Department of Pulmonary Medicine, Philadelphia, Pennsylvania. 1985-86.

Principal Investigator - Designed automated system to determine thoracoabdominal configuration in patients with COPD.

Co-investigator - Designed protocol and implemented study to determine optimal flow parameters in jet nebulizers delivering bronchodilator agents to patients with COPD.

Research Engineer/Technician - La Jolla Technology, La Jolla, California, 1985. Performed feasibility study on electrical stimulation for soft tissue healing. Initiated design and development of microprocessor-based muscle stimulator/TENS. Assisted development of devices to promote osteogenesis in non-unions through the use of electrical stimulation. Conducted experiments for the University Of Pennsylvania Orthopedic Research Department to test these devices.

VOLUNTEER ACTIVITIES

1997	Thailand	Volunteer Trips
1989, 2009-2011	Chicago, Illinois	American Pain Society
1988-1993	Tucson, Arizona	University Medical Center, Section of Cardiology
1987-1991	Tucson, Arizona	University Medical Center, Department of Anesthesiology
1985-1986	Philadelphia, Pennsylvania	VA Hospital, Department of Pulmonary Medicine