

Ian Carroll, M.D., M.S.epi.

Contact:

Stanford University
430 Broadway st.
Pavilion C, 3rd Floor, C-302; MC 6343
Redwood City, CA 94063

Work Experience

1/2010 – Present Assistant Professor of Pain Management & Anesthesia (MCL), Stanford University
1/2004 – 1/2010 Instructor of Pain Management and Anesthesia, Stanford University
10/2002 – 1/2003 Staff Physician, Stanford University Department of Anesthesia
9/1996 – 8/1997 Pre-doctoral Intramural Research Training Award Fellowship,
Dinah Singer Lab, Experimental Immunology Branch, National Cancer Institute,
National Institutes of Health

Board Certification

2016 **Headache Medicine:** United Council for Neurologic Subspecialties
2009 **Addiction Medicine:** American Board of Addiction Medicine
2004 **Pain Medicine:** American Board of Anesthesiology (recertified 2014)
2003 **Anesthesiology:** American Board of Anesthesiology (recertified 2013)

Graduate Education

9/2004 – 9/2006 **M.S. Clinical Epidemiology,** Stanford University
1/2003 – 1/2004 Fellow in Pain Management, Stanford University
7/2001 – 7/2002 Chief Resident, Stanford University Department of Anesthesia
7/1999 – 7/2001 Resident, Stanford University Department of Anesthesia
7/1998 – 7/1999 Internship, Stanford University Department of Anesthesia
8/1993 – 5/1998 **M.D.** College of Physicians and Surgeons, Columbia University

Undergraduate Education

8/1989 – 5/1993 B.A. Columbia College, Columbia University
 Major: Political Science
 Honors: *summa cum laude*, *Phi Beta Kappa*,
 1991 Robbins Scholarship for Public Service

Publications

1. **Carroll IR**, Wang J, Howcroft TK, Singer DS. HIV Tat represses transcription of the beta 2-microglobulin promoter. *Mol Immunol* 1998;35:1171-1178.
2. **Carroll IR**, Angst MS, Clark JD. Management of perioperative pain in patients chronically consuming opioids. *Reg Anesth Pain Med* 2004;29:576-591.
3. **Carroll I**, Gaeta R, Mackey S. A vaccine to prevent herpes zoster. *N Engl J Med* 2005;353: {letter} 1414-1415
4. **Carroll I**. Celiac plexus block for visceral pain. *Curr Pain Headache Rep* 2006;10:20-25.
5. **Carroll I**. Intravenous lidocaine for neuropathic pain: diagnostic utility and therapeutic efficacy. *Curr Pain Headache Rep* 2007;11:20-24.
6. **Carroll I**, Mackey S, Gaeta R. "The role of adrenergic receptors and pain: The good, the bad, and the unknown." *Sem Anes Periop Pain* 2007 March 26 (1): 17-21.
7. **Carroll I**, Gaeta R, Mackey S: "Multivariate analysis of chronic pain patients undergoing lidocaine infusions: increasing pain severity and advancing age predict likelihood of clinically meaningful analgesia." *Clin J Pain* 2007; 23: 702-6
8. **Carroll IR**, Kaplan KM, Mackey SC: Mexiletine therapy for chronic pain: survival analysis identifies factors predicting clinical success. *J Pain Symptom Manage* 2008; 35:321-6. PMC pending
9. Chou LB, Wagner D, Witten DM, Martinez-Diaz GJ, Brook NS, Toussaint M, **Carroll IR**: Postoperative pain following foot and ankle surgery: a prospective study. *Foot Ankle Int* 2008; 29:1063-8. PMC2743476
10. Dwyer BK, Belogolovkin V, Tran L, Rao A, **Carroll I**, Barth R, Chitkara U: Prenatal diagnosis of placenta accreta: sonography or magnetic resonance imaging? *J Ultrasound Med* 2008; 27:1275-81. PMC2743470
11. Dwyer BK, Gorman M, **Carroll IR**, Druzin M: Urinalysis vs urine protein-creatinine ratio to predict significant proteinuria in pregnancy. *J Perinatol* 2008; 28:461-7. PMC2743480
12. Younger J, Barelka P, **Carroll I**, Kaplan K, Chu L, Prasad R, Gaeta R, Mackey S: Reduced cold pain tolerance in chronic pain patients following opioid detoxification. *Pain Med* 2008; 9:1158-63. PMC2751584
13. Wang CK, Myunghae Hah J, **Carroll I**: Factors contributing to pain chronicity. *Curr Pain Headache Rep* 2009; 13:7-11. PMC2743454
14. **Carroll IR**, Clark DJ, Mackey SC: Sympathetic Block with Botulinum Toxin to Treat Complex Regional Pain Syndrome. *Annals of Neurology*, 2009; 65(3):348-51. PMC2763598
15. Curtin C, **Carroll I**, Cutaneous neuroma physiology and its relationship to chronic pain. *J Hand Surg Am*, 2009; 34(7):1334-6. PMC pending
16. Wang C, Gowda A, Barad M, Mackey S, and **Carroll I.**: Serratus muscle stimulation effectively treats notalgia paresthetica caused by long thoracic nerve dysfunction: a case series. *Journal of Brachial Plexus and Peripheral Nerve Injury* 2009; 4:17-17. PMC2758879
17. **Carroll IR**, Younger J, Mackey S: Pain Quality Predicts Lidocaine Analgesia Among Patients with Suspected Neuropathic Pain. *Pain Medicine* 2010; 11(4):617-21.
18. Parris D, Fischbein N, Mackey S, **Carroll I**. A Novel CT-Guided Transpsoas Approach to Diagnostic Genitofemoral Nerve Block and Ablation. *Pain Medicine* 2010;11(5):785-9. PMC pending

19. Dwyer B, Krieg S, Balise R, **Carroll IR**, Chueh J, Nayak N, Druzin M: Variable expression of soluble fms-like tyrosine kinase 1 in patients at high risk for preeclampsia. *Journal of Maternal Fetal Neonatal Medicine* 2010; 23(7):705-11. PMC pending
20. **Carroll IR**, Fischbein N, Barad M, Mackey S. Human Response to Unintended Intrathecal Injection of Botulinum Toxin. *Pain Med*, 2011; 12(7):1094-7.
21. Mackey S, **Carroll IR**, Emir B, Murphy TK, Whalen E, Dumenci L. Sensory Pain Qualities in Neuropathic Pain. *The journal of pain*. 2012;13(1):58-63.
22. **Carroll I**, Barelka P, Wang CK, Wang BM, Gillespie MJ, McCue R, Younger JW, Trafton J, Humphreys K, Goodman SB, Dirbas F, Whyte RI, Donington JS, Cannon WB, Mackey SC. A pilot cohort study of the determinants of longitudinal opioid use after surgery. *Anesth Analg*. 2012 Sep;115(3):694-702.
23. **Carroll I**, Hah J, Mackey S, Ottestad E, Kong JT, Lahidji S, Tawfik V, Younger J, Curtin C. Perioperative interventions to reduce chronic postsurgical pain. *J Reconstr Microsurg*. 2013 May;29(4):213-22.
24. Stringer EA, Baker KS, **Carroll IR**, Montoya JG, Chu L, Maecker HT, Younger JW. Daily cytokine fluctuations, driven by leptin, are associated with fatigue severity in chronic fatigue syndrome: evidence of inflammatory pathology. *J Transl Med*. 2013 Apr 9;11:93. doi: 10.1186/1479-5876-11-93
25. **Carroll I**, Curtin CM: Management of chronic pain following nerve injuries/CRPS type II. *Hand Clin* 2013; 29: 401-8
26. Schmidt PC, Ruchelli G, Mackey SC, **Carroll IR**: Perioperative Gabapentinoids: Choice of Agent, Dose, Timing, and Effects on Chronic Postsurgical Pain. *Anesthesiology* 2013
27. Hah JM, Mackey S, Barelka PL, Wang CK, Wang BM, Gillespie MJ, McCue R, Younger JW, Trafton J, Humphreys K, Goodman SB, Dirbas FM, Schmidt PC, **Carroll IR**: Self-loathing aspects of depression reduce postoperative opioid cessation rate. *Pain Med* 2014; 15: 954-64
28. Schmidt PC, Ruchelli G, Mackey SC, **Carroll IR**. In reply. *Anesthesiology*. 2014;121(2):424-6. doi: 10.1097/ALN.0000000000000299. PubMed PMID: 25050501.
29. **Carroll IR**. Opioids and lactation: insufficient evidence of safety. *Pain Med*. 2015;16(4):628-30. doi: 10.1111/pme.12718_2. PubMed PMID: 25833473.
30. **Carroll IR**, Hah JM, Barelka PL, Wang CK, Wang BM, Gillespie MJ, McCue R, Younger JW, Trafton J, Humphreys K, Goodman SB, Dirbas FM, Mackey SC. Pain Duration and Resolution following Surgery: An Inception Cohort Study. *Pain Med*. 2015;16(12):2386-96. doi: 10.1111/pme.12842. PubMed PMID: 26179223; PMCID: PMC4706803.
31. Hah JM, Sharifzadeh Y, Wang BM, Gillespie MJ, Goodman SB, Mackey SC, **Carroll IR**. Factors Associated with Opioid Use in a Cohort of Patients Presenting for Surgery. *Pain Res Treat*.
32. **Carroll I**. Pharmacologic Management of Upper Extremity Chronic Nerve Pain. *Hand Clin*. 2016;32(1):51-61. doi: 10.1016/j.hcl.2015.08.011. PubMed PMID: 26611389.
33. Biswal, S., Behera, D., Yoon, D. H., Holley, D., Ith, M. A., **Carroll, I.**, . . . Hargreaves, B. (2015). [18F]FDG PET/MRI of patients with chronic pain alters management: early experience. *EJNMMI Phys*, 2(Suppl 1), A84. doi:10.1186/2197-7364-2-S1-A84
34. Curtin, C. M., Kenney, D., Suarez, P., Hentz, V. R., Hernandez-Boussard, T., Mackey, S., & **Carroll, I. R.** (2017). A Double-Blind Placebo Randomized Controlled Trial of Minocycline to Reduce Pain After Carpal Tunnel and Trigger Finger Release. *J Hand Surg Am*, 42(3), 166-174. doi:10.1016/j.jhsa.2016.12.011

Presentations & Abstracts

Carroll IR. Invited Guest Speaker: *“Non-Operative SURGICAL Prevention of Chronic pain”*. American Academy of Orthopaedic Surgeons. **Annual national meeting**. San Diego, CA March 15th 2017.

Carroll IR. Invited Guest Speaker: *“Why your headache exam should include the hands: CSF leaks, intracranial hypotension, and the role of hereditary disorders of connective tissue.”* Headache Cooperative of the Pacific (HCOP). **Annual national meeting**. Ojai, CA January 27th 2017.

Carroll IR, Mallick-Searle T. Invited Guest Speakers: *“Low Pressure Headaches: What are you missing?”*. Pain Week; **Annual national meeting**: Las Vegas. September 9, 2016.

Carroll IR. Invited Guest Speaker: *“Pre-Surgical Management of Neuropathic Pain”*. American Society for peripheral nerve. **Annual national meeting**. Scottsdale, Az January 17th 2016.

Carroll IR. Invited lecture: Fibrin glue injection under CT guidance for CSF leak. Grand rounds Stanford University Department of Interventional Neuroradiology. November 30th 2015

Carroll IR. Invited lecture “Prevention of Chronic Surgical Pain” Stanford Department of Surgery Grand Rounds April 8, 2014.

Carroll IR. Invited lecture “Strategies to Reduce and Manage Chronic Post-operative Pain” October 4, 2013. 68th American Society for Surgery of the Hand (ASSH) **Annual national meeting** in San Francisco.

Carroll IR. Invited Lecture “Discontinuing Opioids Among Patients with Ongoing Pain” NIDA sponsored symposium. **Annual national meeting** American Psychiatric Association’s, San Francisco. June 4, 2013.

Carroll IR. Invited Lecture. “Postoperative pain management in the opioid tolerant patient: Tolerance and opioid induced hyperalgesia ” **Annual national meeting** of the American Society of Anesthesiologists (ASA), Washington DC October 16, 2012.

Carroll IR. Invited Lecture. “Chronic pain treatment of nerve patients.” **Annual national meeting** of the Association of Extremity Nerve Surgeons (AENS), Las Vegas, NV November 5, 2011.

Carroll IR. Invited Lecture. “Unraveling the Progression of Acute to Chronic Pain: New Research and Clinical Perspectives.” American Pain Society **Annual national meeting**, Austin, TX, May 19, 2011 corporate symposium.

Carroll IR. Invited Lecture. “Update on Treatment of Comorbid Opioid Addiction and Chronic Pain.” American Psychiatric Association **Annual national meeting**, Honolulu, HI, May 17, 2011.

Carroll IR. Invited Lecture. “The Transition from Acute to Chronic Pain.” American Academy of Pain Medicine **Annual national meeting**, Washington DC, March 26, 2011.

Jennifer Hah MD, Jarred Younger PhD, Sean Mackey MD PhD, **Ian Carroll MD MS epi** “Exploratory Factor Analysis of the Beck Depression Inventory: Predictors of Delayed Opioid Cessation After Surgery in a Pilot Cohort Study” April 2013 American Pain Society, New Orleans

Gabriela Ruchelli, Peter Schmidt MD, Debra Clay BSN RN, Keith Humphreys, Jodie Trafton PhD, Fredrick Dirbas MD, Nicholas Giori MD, Stuart Goodman MD, Chuong Hoang MD5, James Huddleston MD, William Maloney MD, Robert Merritt MD, Matthew Miller MD, Joseph Shrager MD, Richard Whyte MD, Sean Mackey MD, **Ian Carroll MD** “Determinants of Time to Opioid Cessation Post-Surgery” April 2013 American Pain Society, New Orleans

Peter Schmidt, Jennifer Hah, Rebecca McCue, Sean Mackey, **Ian Carroll** “Correlates of Sleep Recovery after Surgery” April 2013 American Pain Society, New Orleans

Elizabeth Ann Stringer, Katharine Susanne Baker, **Ian Carroll**, Jarred Younger “Daily Cytokine Fluctuations Distinguish High Pain from Low Pain Days in Women with Fibromyalgia” April 2013 American Pain Society, New Orleans

Epifanio Bagarinao, **Ian Carroll**, Neil Chatterjee, Hoameng Ung, Charlie Wang, Rachel Moericke, Sean Mackey “Changes in resting state networks in patients with neuropathic pain: A template-based approach” 2013 Organization for Human Brain Mapping (OHBM) – June 2013, Seattle

Epifanio Bagarinao, **Ian Carroll**, Neil Chatterjee, Hoameng Ung, Charlie Wang, Rachel Moericke, Sean Mackey “Changes in low frequency oscillations in patients with neuropathic pain: a resting state fMRI study” 2013 Society for Neuroscience – November 2013, San Diego

Ian R Carroll MD, MS; Peter Barelka MD; Charlie Kiat Meng Wang, BS; Bing Mei Wang; Matthew John Gillespie; Rebecca McCue BA; Jarred Younger PhD; Jodie Trafton PhD; Keith Humphreys; Stuart B Goodman MD, PhD; Fredrick M. Dirbas MD; Richard I Whyte MD, MBA; Jessica S Donington MD, Walter B Cannon MD; Sean C Mackey MD, PhD. “Why Patients Consume Opioids Post Surgery” 2012 American Pain Society – May 2012, Hawaii

Rachel Moericke, **Ian Carroll** “An evaluation of the predictive validity of different pain intensity measures in a prospective, longitudinal, observational study of a post-surgical patient cohort” 2012 American Pain Society – May 2012, Hawaii

Ung, Hoameng; Mackey, Sean; Chatterjee, Neil; Tieu, Meghan; Moericke, Rachel; Carroll, Ian “Neural Effects of Systemic Lidocaine on Chronic Neuropathic Pain Patients.” American Pain Society – May 2011, Austin, Tx

Wang C, Hah J, Mackey S, **Carroll IR**. *Quantitative Sensory Abnormalities in Post-Surgical Cutaneous Nerve Injuries*. American Pain Society (APS) 29th Annual Meeting, Baltimore, MD, May 7-9, 2010.

Carroll IR. Invited Grand Rounds. “Chronic Post-Surgical Pain.” Department of Plastic Surgery, Johns Hopkins University, Baltimore, MD, May 6 2010.

Carroll IR. Invited Poster Presentation. “Psychological Impairment Influences Pain Duration Following Surgical Injury.” NIH Symposium on Advances in Pain Research, Bethesda, MD, May 5, 2010.

Carroll IR. Invited Lecture. “Pain Management: An Overview for the Marfan Symposium.” 3rd Annual Regional Marfan Educational Symposium, Rocklin, CA, May 1, 2010.

Carroll IR. Invited Lecture. “Pharmacologic and Interventional Management of Cutaneous Nerve

Injuries." Association of Extremity Nerve Surgeons Meeting, Portsmouth, NH, April 25, 2010.

Carroll IR. Invited Visiting Professorship and Grand Rounds. "Duration of Pain (and Opioid Use) Following Surgery: an Ongoing Story" Department of Anesthesiology; Vanderbilt University Medical Center. October 23, 2009

Wang C, Mull D, Gowda A, Mackey S, **Carroll I.** *Treatment of Notalgia Paresthetica with Direct Electrical Stimulation of Serratus Anterior Muscle.* American Pain Society (APS) 28th Annual Meeting, San Diego, CA, May 7-9, 2009.

Carroll IR. Invited Grand Rounds: "Treatment of Neuropathic Pain" Department of Endocrinology; Stanford University Hospital. March 12, 2009

Carroll IR. Invited Visiting Professorship and Grand Rounds. "Duration of Pain (and Opioid Use) Following Surgery: an Ongoing Story" Department of Anesthesiology; Johns Hopkins University Medical Center. February 25 2009

U Maeda, **Carroll, I.,** A Mackey, J Younger, S Mackey "*Pain quality predicts response to sodium channel blockade with lidocaine*" American Pain Society, May 2008

Carroll, I., McCue, R., Mackey, S "*Botulinum Toxin type A markedly prolongs pain relief following lumbar sympathetic block: a prospective, placebo controlled, double blind, randomized, crossover study*" International Association for the Study of Pain, international meeting, Glasgow Scotland, August 2008

Carroll, I., Wang, J., Barelka, P., Goodman, S., Whyte, R., Dirbas, F., Wang, C., Mackey S. "*Psychological factors contributing to persistent opioid use: a prospective, longitudinal, observational study of a post-surgical patient cohort.*" American Pain Society, May 2008

Carroll, I., Wang, J., Barelka, P., Goodman, S., Whyte, R., Dirbas, F., Wang, C., Mackey S. "*On the nature and origins of chronic pain: a prospective, longitudinal, observational cohort study of pain duration in post-surgical patients.*" American Pain Society, May 2008

Pain Control in the Chronic Opioid Consuming Patient Invited Lecture. American Society of Peri Anesthesia Nurses (ASPAN) Annual national meeting. Anaheim, California, April 18, 2007.

Dondee Almazan, MD, Ian Carroll, MD, and Kelley Skeff, MD, MACP "Surgical Neuroma: Cause of Chronic Pain" Poster presentation. American College of Physicians Northern California Regional Conference, Monterey, CA Nov 10-12 2006.

Ian Carroll, Kim Kaplan, Sean Mackey. "Systemic Lidocaine selectively reduces tension-anxiety and vigor-activity but not other mood subdomains during analgesic infusions" Poster presentation. American Pain Society 25th Annual National Meeting. San Antonio, Texas May 3-6, 2006.

Ian Carroll, Mike Leong. "Botulinum Toxin Type B: Treatment of Neuropathic pain: Scar Neuromas" Poster presentation. American Society of Regional Anesthesiology 2006 Annual National Regional

Anesthesia Meeting. Palm Springs, California April 8, 2006

Pain Control in the Chronic Opioid Consuming Patient Invited Lecture. PeriAnesthesia Nurses Association of California (PANAC) annual meeting. Fresno, California, March 4, 2006.

Ian Carroll, William Baumgartl, Michael Leong. "Botulinum Toxin Type B:Treatment for Multiple Neuropathic Pain Conditions: Scar Neuromas, Post-Herpetic Neuralgia, Stump Neuroma." Poster Presentation, Eighth International Conference on the Mechanisms and Treatment of Neuropathic Pain. San Francisco. November 5, 2005

"Peri-operative Pain in Patients Consuming Chronic Opiates" Invited Lecture. American College of Surgery Clinical Congress-Annual national meeting, October 19 2005

Carroll, Ian R. "Pain Management Review Questions." Clinical Anesthesiology Board Review. Ed. Larry F. Chu, MD, MS. New York, NY: McGraw-Hill Medical Publishing, 2005.

"Interventional pain management: the latest and greatest" Invited lecture. Stanford University Pain and Palliative Care Conference. September 23, 2005

"Current Concepts in Peri-operative Pain Management" Invited lecture. American College of Surgery: plenary session. San Francisco May 7 2005

Grand Rounds, Department of Anesthesia, Stanford University Medical Center. "Botox and its Uses in Pain" Sept 22, 2003.

Anesthesiologist Manual of Surgical Procedures 3rd edition, Richard Jaffe and Stanley Samuels. Lippincott Williams and Wilkins, 2004

Grants & Honors

Current research Support:

6/2015 Co-PI STTR Grant Phase I "Technology-Guided Opioid Cessation for Post-Operative Pain" 1R41DA039640-01 Total amount \$243,321

Completed Research Support:

4/2011 Awarded **NIH grant R01DA029078 (PI: Chu)**
"5HT3 Antagonists to Treat Opioid Withdrawal and to Prevent the Progression of Physical Dependence"

8/2010 **Stanford Institute for Neuro-Innovation & Translational Neurosciences (SINTN)** (Co-PI's Carroll and Shamloo) \$100,000
"Determinants of Time to Pain Resolution Following Surgery: Complimentary Clinical and Preclinical Models" 2011-2013

9/2008 Awarded **NIH grant K23DA025152** \$900,000 9/2008- 9/2013

“Prescription Opioid Use, Misuse and Pain in Post-Surgical Patients”

- 1/2007 **Foundation for Anesthesia Education and Research (FAER) MRTG** \$250,000
PI: Carroll *Mechanisms of Analgesic Response During IV Lidocaine Infusion in Neuropathic Pain Patients*
- 2007 **Unrestricted Educational Grant** Allergan \$250,000 *Botulinum Toxin for Cutaneous Neuromas:*
PI Carroll,
- 5/2008 Stanford University, Department of Anesthesia Departmental Research Award
- 2004 - 2005 Stanford Pain Management fellowship “Award for Teaching Excellence”
- 2001 - 2002 Elected Chief Resident Stanford Department of Anesthesia
- 2000 - 2001 Best resident-teaching award: voted by Stanford Medical Students
- 1999 - 2000 Best resident-teaching award: voted by Stanford Medical Students
- 1996 - 1997 Pre-doctoral Intramural Research Training Award Fellowship, National Cancer Institute, N.I.H.

Professional Societies

- 2007 - present Member, California Society of Addiction Medicine
- 2007 - present Member, American Society of Addiction Medicine
- 2005 - present Member, American Pain Society
- 2004 - present Member, California Society of Anesthesiologists
- 2004 - present Member, American Society of Anesthesiologists

Professional Service

- 2010 – present Ad Hoc Reviewer, *Annals of neurology*
- 2010 – present Ad Hoc Reviewer, *Anesthesia and Analgesia*
- 2007 – present Ad Hoc Reviewer, *Anesthesiology*
- 2008 – present Ad Hoc Reviewer, *Annals of Internal Medicine*

2008 – present

Ad Hoc Reviewer, *Pain Medicine*

2008 – 2014

Associate Editor, *ACE: Anesthesia Continuing Education*.

Writing and editing questions on Pain and Opioids for the continuing education division of the

American Society of Anesthesiology