



Ian Carroll, MD, MS

Associate Professor of Anesthesiology, Perioperative and Pain Medicine (Adult Pain) at the Stanford University Medical Center

 Curriculum Vitae available Online

CLINICAL OFFICES

- **Stanford Headache Clinic at Hoover Pavilion**

211 Quarry Rd

MC 5992 2nd Fl

Stanford, CA 94305

Tel (650) 723-6469

Fax (650) 725-0390

Bio

BIO

In 2015 Dr. Carroll collaborated With Stanford's Neuroradiology and Neurology Headache divisions to create the Stanford CSF Leak Headache Program after his daughter suffered through an initially-undiagnosed CSF leak. This experience left him with a passion for helping patients experiencing CSF leaks around the world. He is board-certified in four different specialties: Headache Medicine by the United Council for Neurologic Subspecialties; Addiction Medicine by the American Board of Addiction Medicine; Pain Medicine by the American Board of Anesthesiology; and Anesthesiology by the American Board of Anesthesiology. His primary focus is on spinal cerebrospinal fluid (CSF) leaks. He has spoken at numerous national meetings on CSF leaks, management of the pain from nerve injuries, and factors influencing opioid cessation. He has conducted visiting professorships at Johns Hopkins University, Vanderbilt University, Cedar-Sinai Medical Center, Yale University, University of California at Davis Medical Center, and others.

Dr. Carroll graduated summa cum laude and Phi Beta Kappa from Columbia University, and then graduated with an M.D. from Columbia University. He was a Research Fellow at the Experimental Immunology Branch at the National Cancer Institute at the National Institutes of Health in Bethesda Maryland. He completed his internship in Internal Medicine, residency in Anesthesiology, fellowship in Pain Medicine, and was elected Chief Resident of Anesthesiology from 2001-2002 at Stanford University Medical Center. He joined Stanford's Department of Anesthesiology as a primary teaching and research faculty in the Pain Management clinic in 2004.

Dr. Carroll completed Stanford's two-year Clinical Research training program earning a M.S. degree in clinical epidemiology from Stanford in 2006. He has published over 50 original articles including research funded by the Foundation for Anesthesia Education and Research (FAER); the National Institute for Drug Abuse (NIDA); and the Stanford Institute for Neuro-Innovation & Translational Neurosciences (SINTN).

In addition to his clinical and research responsibilities, Dr. Carroll helps select and train Stanford Anesthesia residents, Pain Management Fellows and Neurology Headache Fellows.

CLINICAL FOCUS

- Cerebrospinal fluid (CSF) Leaks
- Postural Orthostatic Tachycardia Syndrome (POTS)
- Anesthesia

ACADEMIC APPOINTMENTS

- Associate Professor - Med Center Line, Anesthesiology, Perioperative and Pain Medicine
- Member, Stanford Cancer Institute
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Stanford Department of Anesthesiology Departmental Research Award, Stanford Department of Anesthesiology (2008)
- Award for Teaching Excellence, Stanford Department of Anesthesiology (2004-2005)
- Chief Resident, Stanford Department of Anesthesiology (2001-2002)
- Best Anesthesia-Resident Teacher Award, Stanford Department of Anesthesiology (2001)
- Best Anesthesia-Resident Teacher Award, Stanford Department of Anesthesiology (2000)
- Intramural Research Training Award Fellowship-Pre-doctoral, National Cancer Institute, National Institutes of Health (1996-1997)
- Phi Beta Kappa, Columbia University (1993)
- Summa Cum Laude, Columbia University (1993)
- Edwin Robbins Scholarship for Public Service, Columbia University (1991)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Medical Advisory Board Member, Spinal CSF Leak Foundation (2016 - present)

PROFESSIONAL EDUCATION

- Board Certification: Headache Medicine, United Council for Neurologic Subspecialties (2016)
- Fellowship: Stanford University School of Medicine Registrar (2004) CA
- Residency: Stanford University School of Medicine Registrar (2002) CA
- Board Certification, United Council for Neurologic Subspecialties (UCNS) , Headache Medicine (2016)
- Board Certification, American Board of Addiction Medicine , Addiction Medicine (2009)
- M.S., Stanford University , Clinical Epidemiology (2006)
- Board Certification: Pain Medicine, American Board of Anesthesiology (2004)
- Board Certification: Anesthesia, American Board of Anesthesiology (2003)
- Internship: Stanford School of Medicine (1999) CA
- M.D., Columbia University; College of Physicians and Surgeons (1998)

LINKS

- Scholarly Articles on CSF Leaks for Doctors and Patients: <https://drive.google.com/open?id=1vAVpx4o-ewNYfPJUXyYKSIVuQbwsY7P>
- Dr. Carroll Lectures on Spinal Fluid Leaks: <https://www.youtube.com/watch?v=QyvWxobqKrc>
- Dr. Carroll addresses more advanced questions for the Spinal CSF Leak Foundation: <http://spinalcsfleak.org/resources/video-q-a-sessions/>
- Dr. Carroll and Patient discuss the diagnosis: <https://youtu.be/OdFMcSo31fw>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Cerebrospinal fluid (CSF) leaks are a treatable disease that can cause a myriad of symptoms including chronic head pain, headache, migraine, neck pain, nausea, vomiting, ringing in the ears (tinnitus), difficulty concentrating, difficulty with memory, and fatigue. One of the cardinal features of cerebrospinal fluid leaks is that symptoms tend to be worse depending on the posture of the body-with headaches being more prominent when upright, and relieved when lying down (orthostatic headaches). Among people who are leaking chronically, a person may need to be upright or flat for a protracted period of time in order for symptoms to be exacerbated or relieved. Therefore, many patients with cerebrospinal fluid leaks experience a typical daily pattern in which the mornings are better-especially before arising from bed, but things get progressively worse as the day goes on with prolonged upright activity.

Because patients with cerebrospinal fluid leaks often feel significantly worse when they are upright, patients with cerebrospinal fluid leaks may be misdiagnosed with an alternative diagnosis associated with increased symptoms depending on body posture such as postural orthostatic tachycardia syndrome (POTS). In addition because of reduced spinal fluid pressure the brain may sag resulting in a misdiagnosis of Chiari malformation. Other patients have been diagnosed with New Daily persistent Headache (NDPH), Chronic migraine, Occipital Neuralgia, and Chronic Fatigue Syndrome.

Cerebrospinal fluid leaks should be considered as a diagnostic possibility in any patient who has previously undergone an injection into the spine, or the placement of a needle into the spinal fluid and is then experiencing symptoms that are worse when the patient is upright and relieved when the patient is flat. In addition, it is well recognized that spine surgery can precipitate cerebrospinal fluid leaks related to the surgery.

CSF leaks are understood to be much more frequent among people with genes that make their connective tissue less strong. These patients may be notably flexible, unusually tall or unusually short, may appear to be double-jointed, or have unusually stretchy skin. Clinically, these patients often have multiple joint dislocations, or joint sprains at different times of their life, may have early arthritis in multiple joints, and may have multilevel spine pain from degenerative joint disease or degenerative disc disease. Subsequently many patients have been misdiagnosed as having fibromyalgia, chronic fatigue syndrome, and other conditions. Some hereditary disorders of connective tissue are named such as Marfan syndrome, or Ehlers-Danlos syndrome (EDS), but other people may have a number of signs and symptoms associated with hereditary disorders of connective tissue, and are more likely to experience spinal fluid leaks, but don't have these named syndromes.

Dr. Carroll's current clinical and research work are oriented towards ensuring that all patients with cerebrospinal fluid leaks receive prompt diagnosis and effective treatment.

Patients and physicians may find the following lecture on cerebrospinal fluid leaks helpful and informative:

<https://www.youtube.com/watch?v=QyvWxobqKrc>

Giving: Gifts to support innovative patient care, research and education programs will make a difference in the lives of patients now and in the future. If you need assistance or more information on giving options such as a gift of securities or a planned gift, please call Medical Center Development at (650) 725-2504 or email us at medicalgiving@stanford.edu. In the memo line indicate For Dr. Ian Carroll CSF Leak Research.

CLINICAL TRIALS

- Use of PET/MR Imaging in Chronic Pain, Recruiting
- [18F]FTC-146 PET/MRI in Healthy Volunteers and in CRPS and Sciatica, Not Recruiting

- Stanford Accelerated Recovery Trial (START), Not Recruiting

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Anesthesia (Fellowship Program)
- Epidemiology (Masters Program)
- Pain Management (Fellowship Program)

Publications

PUBLICATIONS

- **Abnormal [18F]FDG PET MRI Findings in Paraspinal Muscles of Patients with Suspected Cerebrospinal Fluid Leak**
Cipriano, P., Yoon, D., Carroll, I., Penticuff, R., Xu, Y., Biswal, S.
SOC NUCLEAR MEDICINE INC.2019
- **Correlation Between Ehlers-Danlos Syndrome (EDS), Spontaneous and Cerebral Spinal Fluid (CSF) Leaks, and GI Motility Disorders**
Schoenfeld, E., Hendler, S., Carroll, I., Linda Anh Nguyen
NATURE PUBLISHING GROUP.2017: S1397
- **Sympathetic Block with Botulinum Toxin to Treat Complex Regional Pain Syndrome** *ANNALS OF NEUROLOGY*
Carroll, I., Clark, J. D., Mackey, S.
2009; 65 (3): 348-351
- **Integrating Adjuvant Analgesics into Perioperative Pain Practice: Results from an Academic Medical Center** *PAIN MEDICINE*
Chin, K., Carroll, I., Desai, K., Asch, S., Seto, T., McDonald, K. M., Curtin, C., Hernandez-Boussard, T.
2020; 21 (1): 161–70
- **Trajectory analysis for postoperative pain using electronic health records: A nonparametric method with robust linear regression and K-medians cluster analysis.** *Health informatics journal*
Weng, Y., Tian, L., Tedesco, D., Desai, K., Asch, S. M., Carroll, I., Curtin, C., McDonald, K. M., Hernandez-Boussard, T.
2019: 1460458219881339
- **Perioperative opioid use and pain-related outcomes in the Veterans Health Administration.** *American journal of surgery*
Hernandez-Boussard, T., Graham, L. A., Carroll, I., Dasinger, E. A., Titan, A. L., Morris, M. S., Hawn, M. T.
2019
- **18F-FDG PET/MRI of patients with chronic pain alters management.**
Cipriano, P., Yoon, D., Carroll, I., Curtin, C., Tawfik, V., Xu, Y., Biswal, S.
SOC NUCLEAR MEDICINE INC.2019
- **Musculoskeletal changes on [18F]FDG PET/MRI from complex regional pain syndrome in foot**
Yoon, D., Xu, Y., Cipriano, P., Tawfik, V., Curtin, C., Carroll, I., Biswal, S.
SOC NUCLEAR MEDICINE INC.2019
- **Integrating Adjuvant Analgesics into Perioperative Pain Practice: Results from an Academic Medical Center.** *Pain medicine (Malden, Mass.)*
Chin, K., Carroll, I., Desai, K., Asch, S., Seto, T., McDonald, K. M., Curtin, C., Hernandez-Boussard, T.
2019
- **Diagnosis and Successful Management of an Unusual Presentation of Chronic Foot Pain Using Positron Emission Tomography/Magnetic Resonance Imaging and a Simple Surgical Procedure.** *Clinical journal of sport medicine : official journal of the Canadian Academy of Sport Medicine*
Cipriano, P. W., Yoon, D., Holley, D., Hargreaves, B. A., Carroll, I. R., Curtin, C. M., Biswal, S.
2019
- **Factors Associated With Acute Pain Estimation, Postoperative Pain Resolution, Opioid Cessation, and Recovery Secondary Analysis of a Randomized Clinical Trial** *JAMA NETWORK OPEN*

- Hah, J. M., Cramer, E., Hilmoe, H., Schmidt, P., McCue, R., Trafton, J., Clay, D., Sharifzadeh, Y., Ruchelli, G., Goodman, S., Huddleston, J., Maloney, W. J., Dirbas, et al
2019; 2 (3)
- **Predicting inadequate postoperative pain management in depressed patients: A machine learning approach** *PLOS ONE*
Parthipan, A., Banerjee, I., Humphreys, K., Asch, S. M., Curtin, C., Carroll, I., Hernandez-Boussard, T.
2019; 14 (2)
 - **Extremely large outlier treatment effects may be a footprint of bias in trials from less developed countries: randomized trials of gabapentinoids** *JOURNAL OF CLINICAL EPIDEMIOLOGY*
Desai, K., Carroll, I., Asch, S., Hernandez-Boussard, T., Ioannidis, J. A.
2019; 106: 80–87
 - **Utilization and effectiveness of multimodal discharge analgesia for postoperative pain management.** *The Journal of surgical research*
Desai, K., Carroll, I., Asch, S. M., Seto, T., McDonald, K. M., Curtin, C., Hernandez-Boussard, T.
2018; 228: 160–69
 - **Ondansetron does not prevent physical dependence in patients taking opioid medications chronically for pain control.** *Drug and alcohol dependence*
Chu, L. F., Rico, T., Cornell, E., Obasi, H., Encisco, E. M., Vertelney, H., Gamble, J. G., Crawford, C. W., Sun, J., Clemenson, A., Erlendson, M. J., Okada, R., Carroll, et al
2018; 183: 176–83
 - **Ondansetron Does Not Reduce Withdrawal in Patients With Physical Dependence on Chronic Opioid Therapy.** *Journal of addiction medicine*
Chu, L. F., Sun, J., Clemenson, A., Erlendson, M. J., Rico, T., Cornell, E., Obasi, H., Sayyid, Z. N., Encisco, E. M., Yu, J., Gamble, J. G., Carroll, I., Clark, et al
2017
 - **A Randomized Trial of Perioperative Gabapentin to Promote Pain Resolution and Opioid Cessation in a Mixed Surgical Cohort**
Hah, J., Mackey, S., Efron, B., Mccue, R., Goodman, S., Curtin, C., Carroll, I.
LIPPINCOTT WILLIAMS & WILKINS.2017: 813–17
 - **A Double-Blind Placebo Randomized Controlled Trial of Minocycline to Reduce Pain After Carpal Tunnel and Trigger Finger Release.** *journal of hand surgery*
Curtin, C. M., Kenney, D., Suarez, P., Hentz, V. R., Hernandez-Boussard, T., Mackey, S., Carroll, I. R.
2017; 42 (3): 166-174
 - **Drug-Free Interventions to Reduce Pain or Opioid Consumption After Total Knee Arthroplasty: A Systematic Review and Meta-analysis.** *JAMA surgery*
Tedesco, D., Gori, D., Desai, K. R., Asch, S., Carroll, I. R., Curtin, C., McDonald, K. M., Fantini, M. P., Hernandez-Boussard, T.
2017: e172872
 - **Effect of Perioperative Gabapentin on Postoperative Pain Resolution and Opioid Cessation in a Mixed Surgical Cohort: A Randomized Clinical Trial.** *JAMA surgery*
Hah, J., Mackey, S. C., Schmidt, P., McCue, R., Humphreys, K., Trafton, J., Efron, B., Clay, D., Sharifzadeh, Y., Ruchelli, G., Goodman, S., Huddleston, J., Maloney, et al
2017
 - **[18F]FDG PET/MRI of patients with chronic pain alters management: Early experience.**
Xu, Y., Yoon, D., Behera, D., Holley, D., Carroll, I., Smuck, M., Hargreaves, B., Mittra, E., Biswal, S.
SOC NUCLEAR MEDICINE INC.2016
 - **Pharmacologic Management of Upper Extremity Chronic Nerve Pain.** *Hand clinics*
Carroll, I.
2016; 32 (1): 51-61
 - **Pain Duration and Resolution following Surgery: An Inception Cohort Study** *PAIN MEDICINE*
Carroll, I. R., Hah, J. M., Barelka, P. L., Wang, C. K., Wang, B. M., Gillespie, M. J., McCue, R., Younger, J. W., Trafton, J., Humphreys, K., Goodman, S. B., Dirbas, F. M., Mackey, et al
2015; 16 (12): 2386-2396
 - **[18F]FDG PET/MRI of patients with chronic pain alters management: early experience.** *EJNMMI physics*
Biswal, S., Behera, D., Yoon, D. H., Holley, D., Ith, M. A., Carroll, I., Smuck, M., Hargreaves, B.
2015; 2: A84-?

- **Pain Duration and Resolution following Surgery: An Inception Cohort Study.** *Pain medicine*
Carroll, I. R., Hah, J. M., Barelka, P. L., Wang, C. K., Wang, B. M., Gillespie, M. J., McCue, R., Younger, J. W., Trafton, J., Humphreys, K., Goodman, S. B., Dirbas, F. M., Mackey, et al
2015; 16 (12): 2386-2396
- **Opioids and Lactation: Insufficient Evidence of Safety** *PAIN MEDICINE*
Carroll, I. R.
2015; 16 (4): 628–30
- **Factors Associated with Opioid Use in a Cohort of Patients Presenting for Surgery.** *Pain research and treatment*
Hah, J. M., Sharifzadeh, Y., Wang, B. M., Gillespie, M. J., Goodman, S. B., Mackey, S. C., Carroll, I. R.
2015; 2015: 829696-?
- **In reply.** *Anesthesiology*
Schmidt, P. C., Ruchelli, G., Mackey, S. C., Carroll, I. R.
2014; 121 (2): 424-426
- **Self-Loathing Aspects of Depression Reduce Postoperative Opioid Cessation Rate** *PAIN MEDICINE*
Hah, J. M., Mackey, S., Barelka, P. L., Wang, C. K., Wang, B. M., Gillespie, M. J., McCue, R., Younger, J. W., Trafton, J., Humphreys, K., Goodman, S. B., Dirbas, F. M., Schmidt, et al
2014; 15 (6): 954-964
- **Self-loathing aspects of depression reduce postoperative opioid cessation rate.** *Pain medicine*
Hah, J. M., Mackey, S., Barelka, P. L., Wang, C. K., Wang, B. M., Gillespie, M. J., McCue, R., Younger, J. W., Trafton, J., Humphreys, K., Goodman, S. B., Dirbas, F. M., Schmidt, et al
2014; 15 (6): 954-964
- **Perioperative Gabapentinoids Choice of Agent, Dose, Timing, and Effects on Chronic Postsurgical Pain** *ANESTHESIOLOGY*
Schmidt, P. C., Ruchelli, G., Mackey, S. C., Carroll, I. R.
2013; 119 (5): 1215-1221
- **Management of Chronic Pain Following Nerve Injuries/CRPS Type II** *HAND CLINICS*
Carroll, I., Curtin, C. M.
2013; 29 (3): 401-?
- **Perioperative interventions to reduce chronic postsurgical pain.** *Journal of reconstructive microsurgery*
Carroll, I., Hah, J., Mackey, S., Ottestad, E., Kong, J. T., Lahidji, S., Tawfik, V., Younger, J., Curtin, C.
2013; 29 (4): 213-222
- **Daily cytokine fluctuations, driven by leptin, are associated with fatigue severity in chronic fatigue syndrome: evidence of inflammatory pathology** *JOURNAL OF TRANSLATIONAL MEDICINE*
Stringer, E. A., Baker, K. S., Carroll, I. R., Montoya, J. G., Chu, L., Maecker, H. T., Younger, J. W.
2013; 11
- **Exploratory factor analysis of the beck depression inventory: predictors of delayed opioid cessation after surgery in a pilot cohort study**
Hah, J., Carroll, I., Younger, J., Mackey, S.
CHURCHILL LIVINGSTONE.2013: S25–S25
- **Daily cytokine fluctuations, driven by leptin, are associated with fatigue severity in chronic fatigue syndrome: evidence of inflammatory pathology.** *Journal of translational medicine*
Stringer, E. A., Baker, K. S., Carroll, I. R., Montoya, J. G., Chu, L., Maecker, H. T., Younger, J. W.
2013; 11: 93-?
- **Local anesthetics and other interventional approaches** *NEUROPATHIC PAIN: CAUSES, MANAGEMENT, AND UNDERSTANDING*
Carroll, I., Hah, J., Nicholson, D., Coleman, S., Toth, C., Moulin, D. E.
2013: 267–72
- **A Pilot Cohort Study of the Determinants of Longitudinal Opioid Use After Surgery** *ANESTHESIA AND ANALGESIA*
Carroll, I., Barelka, P., Wang, C. K., Wang, B. M., Gillespie, M. J., McCue, R., Younger, J. W., Trafton, J., Humphreys, K., Goodman, S. B., Dirbas, F., Whyte, R. I., Donington, et al

2012; 115 (3): 694-702

- **Sensory Pain Qualities in Neuropathic Pain** *JOURNAL OF PAIN*
Mackey, S., Carroll, I., Emir, B., Murphy, T. K., Whalen, E., Dumenci, L.
2012; 13 (1): 58-63
- **Human Response to Unintended Intrathecal Injection of Botulinum Toxin** *PAIN MEDICINE*
Carroll, I., Fischbein, N., Barad, M., Mackey, S.
2011; 12 (7): 1094-1097
- **Chronic Pain After Surgery for Breast Cancer** *BREAST SURGICAL TECHNIQUES AND INTERDISCIPLINARY MANAGEMENT*
Barelka, P., Carroll, I. R., Dirbas, F. M., ScottConner, C. E.
2011: 1029-37
- **Variable expression of soluble fms-like tyrosine kinase 1 in patients at high risk for preeclampsia** *JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE*
Dwyer, B. K., Krieg, S., Balise, R., Carroll, I. R., Chueh, J., Nayak, N., Druzin, M.
2010; 23 (7): 705-711
- **Pain Quality Predicts Lidocaine Analgesia among Patients with Suspected Neuropathic Pain** *PAIN MEDICINE*
Carroll, I. R., Younger, J. W., Mackey, S. C.
2010; 11 (4): 617-621
- **A Novel CT-Guided Transpsaos Approach to Diagnostic Genitofemoral Nerve Block and Ablation** *PAIN MEDICINE*
Parris, D., Fischbein, N., Mackey, S., Carroll, I.
2010; 11 (5): 785-789
- **Cutaneous neuroma physiology and its relationship to chronic pain.** *journal of hand surgery*
Curtin, C., Carroll, I.
2009; 34 (7): 1334-1336
- **Cutaneous Neuroma Physiology and Its Relationship to Chronic Pain** *JOURNAL OF HAND SURGERY-AMERICAN VOLUME*
Curtin, C., Carroll, I.
2009; 34A (7): 1334-1336
- **Factors contributing to pain chronicity** *CURRENT PAIN AND HEADACHE REPORTS*
Wang, C. K., Hah, J. M., Carroll, I.
2009; 13 (1): 7-11
- **Serratus muscle stimulation effectively treats notalgia paresthetica caused by long thoracic nerve dysfunction: a case series.** *Journal of brachial plexus and peripheral nerve injury*
Wang, C. K., Gowda, A., Barad, M., Mackey, S. C., Carroll, I. R.
2009; 4: 17-?
- **Postoperative Pain Following Foot and Ankle Surgery: A Prospective Study** *FOOT & ANKLE INTERNATIONAL*
Chou, L. B., Wagner, D., Witten, D. M., Martinez-Diaz, G. J., Brook, N. S., Toussaint, M., Carroll, I. R.
2008; 29 (11): 1063-1068
- **Reduced Cold Pain Tolerance in Chronic Pain Patients Following Opioid Detoxification** *PAIN MEDICINE*
Younger, J., Barelka, P., Carroll, I., Kaplan, K., Chu, L., Prasad, R., Gaeta, R., Mackey, S.
2008; 9 (8): 1158-1163
- **Prenatal diagnosis of placenta accreta - Sonography or magnetic resonance imaging?** *JOURNAL OF ULTRASOUND IN MEDICINE*
Dwyer, B. K., Belogolovkin, V., Tran, L., Rao, A., Carroll, I., Barth, R., Chitkara, U.
2008; 27 (9): 1275-1281
- **Urinalysis vs urine protein-creatinine ratio to predict significant proteinuria in pregnancy** *JOURNAL OF PERINATOLOGY*
Dwyer, B. K., Gorman, M., Carroll, I. R., Druzin, M.
2008; 28 (7): 461-467
- **Mexiletine therapy for chronic pain: Survival analysis identifies factors predicting clinical success** *JOURNAL OF PAIN AND SYMPTOM MANAGEMENT*

Carroll, I. R., Kaplan, K. M., Mackey, S. C.

2008; 35 (3): 321-326

- **Multivariate analysis of chronic pain patients undergoing lidocaine infusions: Increasing pain severity and advancing age predict likelihood of clinically meaningful analgesia** *CLINICAL JOURNAL OF PAIN*

Carroll, I., Gaeta, R., Mackey, S.

2007; 23 (8): 702-706

- **Intravenous lidocaine for neuropathic pain: diagnostic utility and therapeutic efficacy.** *Current pain and headache reports*

Carroll, I.

2007; 11 (1): 20-24

- **Celiac plexus block for visceral pain.** *Current pain and headache reports*

Carroll, I.

2006; 10 (1): 20-25

- **A vaccine to prevent herpes zoster** *NEW ENGLAND JOURNAL OF MEDICINE*

Carroll, I., Gaeta, R., Mackey, S.

2005; 353 (13): 1414-1415

- **Management of perioperative pain in patients chronically consuming opioids** *REGIONAL ANESTHESIA AND PAIN MEDICINE*

Carroll, I. R., Angst, M. S., Clark, J. D.

2004; 29 (6): 576-591

- **HIV Tat represses transcription of the beta(2)-microglobulin promoter** *MOLECULAR IMMUNOLOGY*

Carroll, I. R., Wang, J., Howcroft, T. K., Singer, D. S.

1998; 35 (18): 1171-1178