Stanford



Ian Carroll, MD, MS

Associate Professor of Anesthesiology, Perioperative and Pain Medicine (Adult Pain)

Curriculum Vitae available Online

CLINICAL OFFICE (PRIMARY)

- **Stanford Headache Clinic at Hoover Pavilion**

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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, 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)
- Pain Medicine

ACADEMIC APPOINTMENTS

- Associate Prof-Univ Med 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

- Fellowship: Stanford University School of Medicine (2004) CA
- Residency: Stanford University School of Medicine (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 Surgions (1998)

LINKS

- Scholarly Articles on CSF Leaks for Doctors and Patients: https://drive.google.com/open?id=1vAVpx4o-ewNYfPJUXyYKSlVuQbwdsY7P
- 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

- 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

- **A causative role for remote dural puncture and resultant arachnoid bleb in new daily persistent headache: A case report.** *Headache*
  Callen, A. L., Lennarson, P., Carroll, I. R.
  2023
- **Relationship of Bern Score, Spinal Elastance, and Opening Pressure in Patients With Spontaneous Intracranial Hypotension.** *Neurology*
  Callen, A., Pattee, J., Thaker, A. A., Timpone, V. M., Zander, D., Turner, R., Birlea, M., Wilhour, D., O'Brien, C., Evan, J., Grassia, F., Carroll, I.
  2023
- **Phase Contrast Spine MRI for the Evaluation of CSF Leak, and Why It Matters.** *Neurology*
  Carroll, I., Callen, A.
  2022
- **Popping the balloon** *Headache*
  Carroll, I.
  2022; 62 (2): 120-121
- **Pearls and Oy-sters: Dural defect repair as treatment for refractory headache from CSF leak.** *Neurology*
  Chan, T. L., Kim, D. D., Hashmi, S., Carrol, I.
  2020
- **Cerebrospinal Fluid Leak in the context of Pars Interarticularis Fracture: A Case Series**
  Chan, L., Cowan, R., Hindiyeh, N., Hashmi, S., Lanzman, B., Carroll, I.
  LIPPINCOTT WILLIAMS & WILKINS.2020
- **Abnormal [18F]FDG PET MRI Findings in Paraspmal 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
- **Recommendations for the Management of Spontaneous Intracranial Hypotension With Spinal Longitudinal Epidural CSF Collection: A Delphi Study.** *Neurology*
  Choi, S., Carroll, I., Friedman, D. I., Kranz, P. G., Lee, E., Matharu, M., Parikh, S., Schytz, H. W., Souza, M. N., Wang, Y. F., Yuan, H., Lee, M. J.
  2026; 107 (9): e218638
- **Advanced Practice Providers in Spinal CSF Leak Programs: A Multi-Institutional Study of Current Roles and Perceived Impact on Patient Care.** *AJNR. American journal of neuroradiology*

Madhavan, A. A., Kodet, M. L., Kranz, P. G., Amrhein, T. J., Mamlouk, M. D., Callen, A., Salama, G., Chazen, J. L., Shah, V., Schievink, W. I., Tache, R., Mark, I. T., Sayah, et al

2026

- **Percutaneous Cervical Cordotomy for Refractory Cancer Pain With General Anesthesia and Neuromonitoring: A Case Report.** *Pain practice : the official journal of World Institute of Pain*

  Ahmed, S., Huang, Y., Polat, M., Chang, F., Lopez, J. R., McGeoch, P. D., Buch, V. P., Heidari, S. N., Wu, A., Neugarten, C., Carroll, I., Brose, W. G., Lanzman, et al

  2026; 26 (7): e70193

- **Canadian Consensus Guidelines for the Diagnosis and Management of Spontaneous Intracranial Hypotension.** *The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques*

  Amoozegar, F., Cloutier, B. N., Brown, N., Callen, A., Carroll, I., Curtis, K., Farb, R., Friedman, D. I., Hamilton, M. G., Hoydonckx, Y., Hu, W., Kapadia, A., Knash, et al

  2026: 1-127

- **Optic Tract Edema on MRI in Spontaneous Intracranial Hypotension with Sagging Brain.** *AJNR. American journal of neuroradiology*

  Smilkov, E., Tolnai, D., Jensen, R. H., Grundtvig, N., Baram, A., Carlsen, J., Worsaae Dalby, S., Clausen, T. C., Carroll, I., Hansen, M. L., Schytz, H. W.

  2026

- **Toward quantifying disability in spontaneous intracranial hypotension: A patient-derived disability weight.** *Cephalalgia : an international journal of headache*

  Volz, F., Omer, M., Overstijns, M., Rahal, A. E., Hohenhaus, M., Klingler, J., Lutzen, N., Urbach, H., Zander, C., Carroll, I., Beck, J., Wolf, K.

  2026; 46 (4): 3331024261444662

- **Consensus Guidelines on Diagnostic Brain and Spine Imaging of Spontaneous Intracranial Hypotension.** *AJNR. American journal of neuroradiology*

  Kranz, P. G., Amrhein, T. J., Brinjikji, W., Callen, A. L., Carroll, I., Chazen, J. L., Cutsforth-Gregory, J., Friedman, D. I., Hutchins, T. A., Lehman, V. T., Madhavan, A. A., Mamlouk, M. D., Mark, et al

  2025

- **The contribution of lumbar puncture opening pressure in the diagnosis of spontaneous intracranial hypotension: A systematic literature review and meta-analysis.** *Headache*

  Parikh, S. K., Deline, C. R., McCreary, M., Amoozegar, F., Amrhein, T. J., Carroll, I. R., Cutsforth-Gregory, J. K., Leithe, L. G., Kranz, P. G., Louy, C., Maya, M. M., Moghekar, A., Rau, et al

  2025

- **No evidence of intracranial hypotension in persistent post-traumatic headache: A magnetic resonance imaging study.** *Cephalalgia : an international journal of headache*

  Schytz, H. W., Smilkov, E., Carroll, I., Dobrocky, T., Al-Khazali, H. M., Tolnai, D., Jensen, R. H., Amin, F. M.

  2025; 45 (4): 3331024251325556

- **Patterns of clinical and imaging presentations in patients with spontaneous intracranial hypotension due to spinal cerebrospinal fluid venous fistula: A single-center retrospective cross-sectional study.** *Headache*

  Callen, A. L., Han, L., Pisani Petrucci, S. L., Andonov, N., Lennarson, P., Birlea, M., O'Brien, C., Wilhour, D., Anderson, A., Bennett, J. L., Carroll, I. R.

  2024

- **Improving postsurgical fall detection for older Americans using LLM-driven analysis of clinical narratives.** *medRxiv : the preprint server for health sciences*

  Pillai, M., Blumke, T. L., Studnia, J., Wang, Y., Veigulis, Z. P., Ware, A. D., Hoover, P. J., Carroll, I. R., Humphreys, K., Osborne, T. F., Asch, S. M., Hernandez-Boussard, T., Curtin, et al

  2024

- **Long-Term Epidural Patching Outcomes and Predictors of Benefit in Patients With Suspected CSF Leak Nonconforming to ICHD-3 Criteria.** *Neurology*

  Carroll, I., Han, L., Zhang, N., Cowan, R. P., Lanzman, B., Hashmi, S., Barad, M. J., Peretz, A., Moskatel, L., Ogunlaja, O., Hah, J. M., Hindiyeh, N., Barch, et al

  2024; 102 (12): e209449

- **Diagnosis and Treatment of Spontaneous Intracranial Hypotension: Role of Epidural Blood Patching.** *Neurology. Clinical practice*

Callen, A. L., Friedman, D. I., Parikh, S., Rau, J. C., Schievink, W. I., Cutsforth-Gregory, J. K., Amrhein, T. J., Haight, E., Cowan, R. P., Barad, M. J., Hah, J. M., Jackson, T., Deline, et al
2024; 14 (3): e200290

- **Progressive superficial siderosis despite complete remission of intracranial hypotension symptoms following epidural patching: Case report.** *Headache*
  Carroll, I., Schievink, W.
  2024
- **Impact of Spinal CSF Leaks on Quality of Life and Mental Health and Long-Term Reversal by Surgical Closure.** *Neurology. Clinical practice*
  Volz, F., Wolf, K., Fung, C., Carroll, I., Lahmann, C., Lutzen, N., Urbach, H., Klingler, J., Beck, J., El Rahal, A.
  2024; 14 (2): e200272
- **Beyond myths: Transformative insights into spinal cerebrospinal fluid leaks and their role in persistent headache syndromes.** *Headache*
  Carroll, I., Callen, A. L.
  2024
- **Mechanism of chronic iatrogenic CSF leak following dural puncture-ventral dural leak: case report.** *Regional anesthesia and pain medicine*
  Carroll, I. R., Lansinger, O., Do, H. M., Dodd, R., Mahaney, K., Li, D.
  2024
- **Preoperative Versus Perioperative Risk Factors for Delayed Pain and Opioid Cessation After Total Joint Arthroplasty: A Prospective Cohort Study.** *Pain and therapy*
  Hah, J. M., Vialard, J. D., Efron, B., Mackey, S. C., Carroll, I. R., Amanatullah, D. F., Narasimhan, B., Hernandez-Boussard, T.
  2023; 12 (5): 1253-1269
- **Postoperative opioid prescribing patients with diabetes: Opportunities for personalized pain management.** *PloS one*
  Zammit, A., Coquet, J., Hah, J., El Hajouji, O., Asch, S. M., Carroll, I., Curtin, C. M., Hernandez-Boussard, T.
  2023; 18 (8): e0287697
- **Prediction of opioid-related outcomes in a medicaid surgical population: Evidence to guide postoperative opiate therapy and monitoring.** *PLoS computational biology*
  El Hajouji, O., Sun, R. S., Zammit, A., Humphreys, K., Asch, S. M., Carroll, I., Curtin, C. M., Hernandez-Boussard, T.
  2023; 19 (8): e1011376
- **Erratum to 'successful epidural fibrin glue patch to treat intracranial hypotension in a patient with bacteraemia and malignancy' [BJAOpen 4 (2022) 100091].** *BJA open*
  Gupta, A., Madriz, V. C., Carroll, I. R., Tawfik, V. L.
  2023; 5: 100129
- **Successful epidural fibrin glue patch to treat intracranial hypotension in a patient with bacteraemia and malignancy.** *BJA open*
  Gupta, A., Madriz, V. C., Carroll, I. R., Tawfik, V. L.
  2022; 4: 100091
- **Effect of Perioperative Gabapentin on Postoperative Pain Resolution and Opioid Cessation in a Mixed Surgical Cohort: A Randomized Clinical Trial (vol 153, pg 303, 2018)** *JAMA SURGERY*
  Hah, J., Mackey, S. C., Schmidt, P.
  2022
- **Prescription quantity and duration predict progression from acute to chronic opioid use in opioid-naive Medicaid patients.** *PLOS digital health*
  Johnson, D. G., Ho, V. T., Hah, J. M., Humphreys, K., Carroll, I., Curtin, C., Asch, S. M., Hernandez-Boussard, T.
  2022; 1 (8)
- **Association of Postoperative Opioid Misuse with Prolonged Postoperative Pain, Opioid Use, and Delayed Recovery**
  Nwaneshiudu, C., Cramer, E., Mackey, S., Carroll, I., Hah, J.
  LIPPINCOTT WILLIAMS & WILKINS.2021: 634
- **Acute Pain Predictors of Remote Postoperative Pain Resolution After Hand Surgery.** *Pain and therapy*
  Hah, J. M., Nwaneshiudu, C. A., Cramer, E. M., Carroll, I. R., Curtin, C. M.
  2021

- **Cerebellar tonsillar descent: A diagnostic dilemma between Chiari malformation type 1 and spinal cerebrospinal fluid leak.** *Heliyon*
  Chan, T. L., Vuong, K., Chugh, T., Carroll, I.
  2021; 7 (4): e06795

- **Neuroimaging for Spontaneous Intracranial Hypotension Turned on its Side.** *Neurology*
  Carroll, I. R., Friedman, D. I.
  2021

- **Did she have an epidural? The long-term consequences of postdural puncture headache and the role of unintended dural puncture.** *Headache*
  Barad, M., Carroll, I., Reina, M. A., Ansari, J., Flood, P.
  2021

- **Return to work and productivity loss after surgery: A health economic evaluation.** *International journal of surgery (London, England)*
  M Hah, J., Lee, E., Shrestha, R., Pirrotta, L., Huddleston, J., Goodman, S., Amanatullah, D. F., Dirbas, F. M., Carroll, I. R., Schofield, D.
  2021: 106100

- **Characteristics of Patients With Complex Limb Pain Evaluated Through an Interdisciplinary Approach Utilizing Magnetic Resonance Neurography** *Frontiers in Pain Research*
  Johnson, E. M., Yoon, D., Biswal, S., Curtin, C., Fox, P., Wilson, T. J., Carroll, I., Lutz, A., Tawfik, V.
  2021

- **Abnormal [18F]FDG PET/MRI findings in paraspinal structures of patients with suspected cerebrospinal fluid leak.** *Scientific reports*
  Yoon, D., Cipriano, P. W., Penticuff, R., Castillo, J. B., Xu, Y., Carroll, I. R., Biswal, S.
  2021; 11 (1): 15926

- **Neurovascular, muscle, and skin changes on [18F]FDG PET/MRI in complex regional pain syndrome of the foot: A Prospective Clinical Study.** *Pain medicine (Malden, Mass.)*
  Yoon, D., Xu, Y., Cipriano, P. W., Alam, I. S., Mari Aparici, C. A., Tawfik, V. L., Curtin, C. M., Carroll, I. R., Biswal, S.
  2021

- **Efficacy of motivational-interviewing and guided opioid tapering support for patients undergoing orthopedic surgery (MI-Opioid Taper): A prospective, assessor-blind, randomized controlled pilot trial.** *EClinicalMedicine*
  Hah, J. M., Trafton, J. A., Narasimhan, B., Krishnamurthy, P., Hilmoe, H., Sharifzadeh, Y., Huddleston, J. I., Amanatullah, D., Maloney, W. J., Goodman, S., Carroll, I., Mackey, S. C.
  2020; 28: 100596

- **Of mice, microglia, and (wo)men: a case series and mechanistic investigation of hydroxychloroquine for complex regional pain syndrome.** *Pain reports*
  Haight, E. S., Johnson, E. M., Carroll, I. R., Tawfik, V. L.
  2020; 5 (5): e841

- **Abnormal [18F]FDG PET/MRI Findings In Paraspinal Muscles of Patients with Suspected Cerebrospinal Fluid Leak.**
  Cipriano, P., Yoon, D., Xu, Y., Carroll, I., Biswal, S.
  SOC NUCLEAR MEDICINE INC.2020

- **Sigma-1 receptor PET/MRI for identifying nociceptive sources of radiating low back pain**
  Yoon, D., Cipriano, P., Carroll, I., Curtin, C., Roh, E., Wilson, T., Biswal, S.
  SOC NUCLEAR MEDICINE INC.2020

- **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.2020

- **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

- **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*
  Cipriano, P., Yoon, D., Holley, D., Hargreaves, B., Carroll, I., Curtin, C., Biswal, S.

2020; 30 (1): E11–E14

- **Preoperative Factors Associated with Remote Postoperative Pain Resolution and Opioid Cessation in a Mixed Surgical Cohort: Post Hoc Analysis of a Perioperative Gabapentin Trial.** *Journal of pain research*
  Hah, J. M., Hilmoe, H. n., Schmidt, P. n., McCue, R. n., Trafton, J. n., Clay, D. n., Sharifzadeh, Y. n., Ruchelli, G. n., Hernandez Boussard, T. n., Goodman, S. n., Huddleston, J. n., Maloney, W. J., Dirbas, et al
  2020; 13: 2959–70

- **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*
  Cipriano, P., Yoon, D., Holley, D., Hargreaves, B., Carroll, I., Curtin, C., Biswal, S.
  2020; 30 (1): E11–E14

- **Preoperative Factors Associated with Remote Postoperative Pain Resolution and Opioid Cessation in a Mixed Surgical Cohort: Post Hoc Analysis of a Perioperative Gabapentin Trial.** *Journal of pain research*
  Hah, J. M., Hilmoe, H. n., Schmidt, P. n., McCue, R. n., Trafton, J. n., Clay, D. n., Sharifzadeh, Y. n., Ruchelli, G. n., Hernandez Boussard, T. n., Goodman, S. n., Huddleston, J. n., Maloney, W. J., Dirbas, et al
  2020; 13: 2959–70

- **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. P. 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., Rico, T., Cornell, E., Obasi, H., Encisco, E., Vertelney, H., Gamble, J., Crawford, C., Sun, J., Clemenson, A., Erlendson, M., Okada, R., Carroll, et al
  2018; 183: 176-183
- **Ondansetron Does Not Reduce Withdrawal in Patients With Physical Dependence on Chronic Opioid Therapy.** *Journal of addiction medicine*
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