

Stanford



David C. Yeomans

Associate Professor of Anesthesiology, Perioperative and Pain Medicine

 Curriculum Vitae available Online

CONTACT INFORMATION

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Bio

ACADEMIC APPOINTMENTS

- Associate Professor, Anesthesiology, Perioperative and Pain Medicine
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Research Assistant Professor of Pharmacology, University of Illinois at Chicago, (1992-1995)
- Assistant Professor of Anatomy and Cell Biology, University of Illinois at Chicago, (1996-2000)
- Associate Professor, Anesthesia, (2000- present)
- Director of Pain Research, Anesthesia, (2000- present)
- Executive Committee, Neuroscience Institute at Stanford, (2002-2005)
- Vice Chair, Animal Care and Use Committee, (2002-2005)

HONORS AND AWARDS

- National Grant Review Committee, NIH IRG - ZRG1 IFCN - 7 (2005)
- National Grant Review Committee, NSF IBN - ad hoc (2005)
- National Grant Review Committee, Veterans Administration (2005)
- Pfizer Professor of Pain Medicine, Pfizer Foundation (2002-2003)
- Lundbeck Visiting Professor Of Neurosurgery, Aarhus University (2014)

PROFESSIONAL EDUCATION

- AB, Dartmouth College , Psychology (1979)
- PhD, University of Florida , Neuroscience (1989)

PATENTS

- Lawrence R. Toll, David C. Yeomans, Martin S. Angst, Daniel I. Jacobs. "United States Patent 8,551,949 Methods for treatment of pain", Nocicepta, LLC, Jul 27, 2010
- David C. Yeomans, Martin S. Angst, H. Frey II William, Daniel I. Jacobs. "United States Patent 8,198,240 Methods for treatment of headaches by administration of oxytocin", Leland Stanford Junior University, Aug 26, 2005
- David Yeomans. "United States Patent 8,202,838 Methods for treatment of headaches by administration of oxytocin", David C. Yeomans, Martin S. Angst, H. Frey II William, Daniel I. Jacobs, Aug 26, 2005
- David C. Yeomans, H. Frey II William, Daniel I. Jacobs, Martin S. Angst. "United States Patent 8,258,096 Therapy procedure for drug delivery for trigeminal pain", Leland Stanford Junior University, Aug 26, 2005
- David C. Yeomans, Martin S. Angst, H. Frey II William, Daniel I. Jacobs. "United States Patent 8,501,691 Methods for treatment of headaches by administration of oxytocin", Leland Stanford Junior University, Aug 26, 2005
- David C. Yeomans, Martin S. Angst, H. Frey II William, Daniel I. Jacobs. "United States Patent 8,252,745 Methods for treatment of headaches by administration of oxytocin", Leland Stanford Junior University, Aug 26, 2005
- Daria Mochly-Rosen, Sarah M. Sweitzer, Joan J. Kendig, David C. Yeomans. "United States Patent 7,459,424 Peptide inhibitors of protein kinase C gamma for pain management", Leland Stanford Junior University, Apr 22, 2003

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My laboratory's research is centered on achieving a better understanding of and improving the management of pain. This work can be roughly divided into two distinct parts: pain physiology and diagnosis and pain therapy. In terms of pain diagnosis, my laboratory is focused on identifying biomolecular and physiological markers that are indicative of different pain pathologies and can be directive in choosing therapies for that pain state. Thus, we are examining changes in pain nerve (nociceptor) gene expression in skin and nerve tissue. For example, we have recently investigated changes in expression of voltage gated sodium channels under inflammatory and post-incisional conditions. We have also studied the release of neuropeptide, cytokine, and trophic biomarkers into skin and into the spinal epidural space during different pain and inflammatory states in rodents and humans and the effects of treatments on this release. This biomarker methodology is very useful in the process of analgesic and anti-inflammatory therapy development.

Pain Physiology

Pain is primarily subtended by two distinct nociceptor types. When activated, the thinly myelinated A-delta pain fibers create the sensation of sharp, pricking pain, whereas activation of unmyelinated C fibers produces a burning or aching sensation. One or the other type of nociceptor is thought to be dominant in different human pain states. Several years ago, we developed simple methods for differentiating pain or responses evoked by the activation of A-delta or C fiber nociceptors in humans and animals. Using a laser-based stimulation system, we are performing experiments examining both electrophysiological and biochemical responses to these two pain types. Some of this work is done in rodents, wherein we perform both single unit nociceptor recordings, as well as recordings from nociceptive neurons in the spinal cord. We are also using a combination of cortical evoked potential responses to laser pulsed pain stimuli as well as functional magnetic resonance imaging (fMRI) of the brain of volunteers (and eventually patients) to determine the cortical representation of these A-delta and C fiber mediated pain. The hope is that after defining these brain maps for the two pain physiologies, we will be better able to determine the physiology of clinical pain of unknown nociceptor dominance.

Gene Therapy for Pain

Over the last 10 years, we have developed herpes simplex I-based vectors to carry analgesic genes, antisense, or siRNAs into nociceptors. For example, we have developed a recombinant vector which, when placed on or in tissue of rodents or monkeys, is picked up by the nociceptors innervating that tissue and transported along the peripheral nerve back to the cell bodies of these nerve fibers. The inserted transgene is then expressed. For example, nociceptors exposed to vectors encoding human enkephalins begin to make this endorphin-like peptide. These enkephalins selectively inhibit the nociceptors exposed to these viruses for at least 20 weeks (in monkeys). Thus, this method may provide a means of long-term treatment of chronic, localized pain conditions. To this end, we are developing the bases for clinical trials wherein our vector is applied to painful metastatic sites of cancer patients.

In summary, we perform laboratory and clinical research in the area of pain and analgesia. Some of this work centers on improving our understanding of the mechanisms underlying clinical pain states, hopefully leading to more accurate diagnosis and treatment. It also centers on the development of a completely new way to

treat chronic pain, namely gene therapy. The environment in which these studies are performed, that of the Department of Anesthesia and the Pain Working Group of the Neuroscience Institute at Stanford, is an ideal one in which to do this work.

Teaching

COURSES

2019-20

- Journal Club for Neuroscience, Behavior and Cognition Scholarly Concentration: ANES 215 (Win)

2018-19

- Journal Club for Neuroscience, Behavior and Cognition Scholarly Concentration: ANES 215 (Win)

2017-18

- Journal Club for Neuroscience, Behavior and Cognition Scholarly Concentration: ANES 215 (Win)

2016-17

- Journal Club for Neuroscience, Behavior and Cognition Scholarly Concentration: ANES 215 (Win)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Justin Meyerowitz

Postdoctoral Research Mentor

Justin Meyerowitz

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Anesthesia (Fellowship Program)
- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **Ex Vivo Whole Nerve Electrophysiology Setup, Action Potential Recording, and Data Analyses in a Rodent Model.** *Current protocols in neuroscience*
Sun, S., Delgado, J., Behzadian, N., Yeomans, D., Anderson, T. A.
2020; 93 (1): e99
- **Migraine Attack Probability Is Modulated by Oxytocin Receptor Activity on Trigeminal Neurons**
Yeomans, D. C., Kori, S. H.
WILEY.2020: 21
- **The Chemokine Receptor CXCR2 Supports Nociceptive Sensitization after Traumatic Brain Injury.** *Molecular pain*
Liang, D. Y., Shi, X., Liu, P., Sun, Y., Sahbaie, P., Li, W. W., Yeomans, D. C., Clark, J. D.
; 13: 1744806917730212
- **Association between Anterior Cingulate Neurochemical Concentration and Individual Differences in Hypnotizability.** *Cerebral cortex (New York, N.Y. : 1991)*
DeSouza, D. D., Stimpson, K. H., Baltusis, L., Sacchet, M. D., Gu, M., Hurd, R., Wu, H., Yeomans, D. C., Williams, N., Spiegel, D.
2020
- **Intrathecal administration of AYY2 DNA-decoy produces a long-term pain treatment in rat models of chronic pain by inhibiting the KLF6, KLF9 and KLF15 transcription factors.** *Molecular pain*
Mamet, J., Klukinov, M., Harris, S., Manning, D. C., Xie, S., Pascual, C., Taylor, B. K., Donahue, R. R., Yeomans, D. C.
; 13: 1744806917727917

- **Analgesic Effect of Intranasal Oxytocin in a Rat Model of Trigeminal Neuralgia**
Kluginov, M., Yeomans, D. C.
WILEY.2019: 156–57
- **Effect of Nasal Oxytocin on Pain Following Traumatic Brain Injury in Rats**
Yeomans, D. C., Meidahl, A., Eisenried, A., Kluginov, M., Tzabazis, A.
WILEY.2018: 1336
- **Evaluation of Selective Na(V)1.7 Inhibitors for the Treatment of Ocular Pain**
Delwig, A., Pajouhesh, H., Yeomans, D., Du Bois, J., Miljanich, G., Mulcahy, J.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Intranasal Oxytocin Attenuates Reactive and Ongoing, Chronic Pain in a Model of Mild Traumatic Brain Injury.** *Headache*
Meidahl, A. C., Eisenried, A., Kluginov, M., Cao, L., Tzabazis, A. Z., Yeomans, D. C.
2018; 58 (4): 545–58
- **Wavelet analysis of heart rate variability: Impact of wavelet selection** *BIOMEDICAL SIGNAL PROCESSING AND CONTROL*
Tzabazis, A., Eisenried, A., Yeomans, D. C., Moore, H.
2018; 40: 220–25
- **Correlation of changes in hemodynamic response as measured by cerebral optical spectrometry with subjective pain ratings in volunteers and patients: a prospective cohort study** *JOURNAL OF PAIN RESEARCH*
Eisenried, A., Austin, N., Cobb, B., Akhbardeh, A., Carvalho, B., Yeomans, D. C., Tzabazis, A. Z.
2018; 11: 1991–98
- **Correlation of changes in hemodynamic response as measured by cerebral optical spectrometry with subjective pain ratings in volunteers and patients: a prospective cohort study.** *Journal of pain research*
Eisenried, A., Austin, N., Cobb, B., Akhbardeh, A., Carvalho, B., Yeomans, D. C., Tzabazis, A. Z.
2018; 11: 1991–98
- **Modulation of the Neural Circuitry Underlying Trait Hypnotizability With Spaced Continuous Theta-Burst Stimulation**
Williams, N., Sudheimer, K., Stimpson, K., Duvio, D., Chung, C., DeSouza, D., Jo, B., Williams, L., Yeomans, D., Spiegel, D.
NATURE PUBLISHING GROUP.2017: S508–S509
- **Nervous system delivery of antilyso-phosphatidic acid antibody by nasal application attenuates mechanical allodynia after traumatic brain injury in rats** *PAIN*
Eisenried, A., Meidahl, A. N., Kluginov, M., Tzabazis, A. Z., Sabbadini, R. A., Clark, J., Yeomans, D. C.
2017; 158 (11): 2181–88
- **Formulation and Toxicology Evaluation of the Intrathecal AXY1 DNA-Decoy in Sprague Dawley Rats** *TOXICOLOGICAL SCIENCES*
Mamet, J., Yeomans, D. C., Yaksh, T. L., Manning, D. C., Harris, S.
2017; 159 (1): 76–85
- **Opioid-induced hyperalgesia in clinical anesthesia practice: what has remained from theoretical concepts and experimental studies?** *Current opinion in anaesthesiology*
Weber, L., Yeomans, D. C., Tzabazis, A.
2017
- **Antihyperalgesic effect by herpes vector-mediated knockdown of NaV1.7 sodium channels after skin incision.** *Neuroreport*
Eisenried, A., Kluginov, M., Yeomans, D. C., Tzabazis, A. Z.
2017
- **Oxytocin and Migraine Headache** *HEADACHE*
Tzabazis, A., Kori, S., Mechanic, J., Miller, J., Pascual, C., Manering, N., Carson, D., Kluginov, M., Spierings, E., Jacobs, D., Cuellar, J., Frey, W. H., Hanson, et al
2017; 57: 64-75
- **Pharmacology, pharmacokinetics, and metabolism of the DNA-decoy AXY1 for the prevention of acute and chronic post-surgical pain** *MOLECULAR PAIN*
Mamet, J., Harris, S., Kluginov, M., Yeomans, D. C., Donahue, R. R., Taylor, B. K., Eddinger, K., Yaksh, T., Manning, D. C.
2017; 13

- **Nasal application of HSV encoding human preproenkephalin blocks craniofacial pain in a rat model of traumatic brain injury.** *Gene therapy*
Meidahl, A. C., Klukinov, M., Tzabazis, A. Z., Sorensen, J. C., Yeomans, D. C.
2017; 24 (8): 482–86
- **TBI-induced nociceptive sensitization is regulated by histone acetylation.** *IBRO reports*
Liang, D. Y., Sahbaie, P., Sun, Y., Irvine, K. A., Shi, X., Meidahl, A., Liu, P., Guo, T. Z., Yeomans, D. C., Clark, J. D.
2017; 2: 14–23
- **Visualizing Nerve Injury in a Neuropathic Pain Model with [(18F)FTC-146 PET/MRI.** *Theranostics*
Shen, B., Behera, D., James, M. L., Reyes, S. T., Andrews, L., Cipriano, P. W., Klukinov, M., Lutz, A. B., Mavlyutov, T., Rosenberg, J., Ruoho, A. E., McCurdy, C. R., Gambhir, et al
2017; 7 (11): 2794–2805
- **Analgesic Microneedle Patch for Neuropathic Pain Therapy** *ACS NANO*
Xie, X., Pascual, C., Lieu, C., Oh, S., Wang, J., Zou, B., Xie, J., Li, Z., Xie, J., Yeomans, D. C., Wu, M. X., Xie, X. S.
2017; 11 (1): 395-406
- **Oxytocin alleviates orofacial mechanical hypersensitivity associated with infraorbital nerve injury through vasopressin-1A receptors of the rat trigeminal ganglia.** *Pain*
Kubo, A., Shinoda, M., Katagiri, A., Takeda, M., Suzuki, T., Asaka, J., Yeomans, D. C., Iwata, K.
2017; 158 (4): 649–59
- **Oxytocin receptor: Expression in the trigeminal nociceptive system and potential role in the treatment of headache disorders.** *Cephalalgia*
Tzabazis, A., Mechanic, J., Miller, J., Klukinov, M., Pascual, C., Manering, N., Carson, D. S., Jacobs, A., Qiao, Y., Cuellar, J., Frey, W. H., Jacobs, D., Angst, et al
2016; 36 (10): 943-950
- **Postoperative Analgesia Due to Sustained-Release Buprenorphine, Sustained-Release Meloxicam, and Carprofen Gel in a Model of Incisional Pain in Rats (*Rattus norvegicus*)** *JOURNAL OF THE AMERICAN ASSOCIATION FOR LABORATORY ANIMAL SCIENCE*
Seymour, T. L., Adams, S. C., Felt, S. A., Jampachaisri, K., Yeomans, D. C., Pacharinsak, C.
2016; 55 (3): 300-305
- **Nociceptive sensitization and BDNF up-regulation in a rat model of traumatic brain injury** *NEUROSCIENCE LETTERS*
Feliciano, D. P., Sahbaie, P., Shi, X., Klukinov, M., Clark, J. D., Yeomans, D. C.
2014; 583: 55-59
- **Nociceptive sensitization and BDNF up-regulation in a rat model of traumatic brain injury.** *Neuroscience letters*
Feliciano, D. P., Sahbaie, P., Shi, X., Klukinov, M., Clark, J. D., Yeomans, D. C.
2014; 583: 55-59
- **Opioid induced hyperalgesia in anesthetic settings.** *Korean journal of anesthesiology*
Lee, H. J., Yeomans, D. C.
2014; 67 (5): 299-304
- **Visualizing Dermal Permeation of Sodium Channel Modulators by Mass Spectrometric Imaging** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Eberlin, L. S., Mulcahy, J. V., Tzabazis, A., Zhang, J., Liu, H., Logan, M. M., Roberts, H. J., Lee, G. K., Yeomans, D. C., Du Bois, J., Zare, R. N.
2014; 136 (17): 6401-6405
- **Gene therapy for trigeminal pain in mice.** *Gene therapy*
Tzabazis, A. Z., Klukinov, M., Feliciano, D. P., Wilson, S. P., Yeomans, D. C.
2014; 21 (4): 422-426
- **Single intrathecal administration of the transcription factor decoy AYYX1 prevents acute and chronic pain after incisional, inflammatory, or neuropathic injury** *PAIN*
Mamet, J., Klukinov, M., Yaksh, T. L., Malkmus, S. A., Williams, S., Harris, S., Manning, D. C., Taylor, B. K., Donahue, R. R., Porreca, F., Xie, J. Y., Oyarzo, J., Brennan, et al
2014; 155 (2): 322-333
- **Antinociceptive Effects of Sustained-Release Buprenorphine in a Model of Incisional Pain in Rats (*Rattus norvegicus*).** *Journal of the American Association for Laboratory Animal Science*
Chum, H. H., Jampachaisri, K., McKeon, G. P., Yeomans, D. C., Pacharinsak, C., Felt, S. A.

2014; 53 (2): 193-197

- **A (18)F-Labeled Saxitoxin Derivative for in Vivo PET-MR Imaging of Voltage-Gated Sodium Channel Expression Following Nerve Injury.** *Journal of the American Chemical Society*
Hoehne, A., Behera, D., Parsons, W. H., James, M. L., Shen, B., Borgohain, P., Bodapati, D., Prabhakar, A., Gambhir, S. S., Yeomans, D. C., Biswal, S., Chin, F. T., Bois, et al
2013; 135 (48): 18012-18015
- **A F-18-Labeled Saxitoxin Derivative for in Vivo PET-MR Imaging of Voltage-Gated Sodium Channel Expression Following Nerve Injury** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Hoehne, A., Behera, D., Parsons, W. H., James, M. L., Shen, B., Borgohain, P., Bodapati, D., Prabhakar, A., Gambhir, S. S., Yeomans, D. C., Biswal, S., Chin, F. T., Du Bois, et al
2013; 135 (48): 18012-18015
- **Shaped magnetic field pulses by multi-coil repetitive transcranial magnetic stimulation (rTMS) differentially modulate anterior cingulate cortex responses and pain in volunteers and fibromyalgia patients** *MOLECULAR PAIN*
Tzabazis, A., Aparici, C. M., Rowbotham, M. C., Schneider, M. B., Etkin, A., Yeomans, D. C.
2013; 9
- **Effect of High-Frequency Alternating Current on Spinal Afferent Nociceptive Transmission** *NEUROMODULATION*
Cuellar, J. M., Alataris, K., Walker, A., Yeomans, D. C., Antognini, J. F.
2013; 16 (4): 318-327
- **High-dose remifentanyl prevents development of thermal hyperalgesia in a neuropathic pain model** *BRITISH JOURNAL OF ANAESTHESIA*
Manering, N. A., Reuter, T., Ihmsen, H., Yeomans, D. C., Tzabazis, A.
2013; 110 (2): 287-292
- **Cytokine Expression in the Epidural Space A Model of Noncompressive Disc Herniation-Induced Inflammation** *SPINE*
Cuellar, J. M., Borges, P. M., Cuellar, V. G., Yoo, A., Scuderi, G. J., Yeomans, D. C.
2013; 38 (1): 17-23
- **Shaped magnetic field pulses by multi-coil repetitive transcranial magnetic stimulation (rTMS) differentially modulate anterior cingulate cortex responses and pain in volunteers and fibromyalgia patients.** *Molecular pain*
Tzabazis, A., Aparici, C. M., Rowbotham, M. C., Schneider, M. B., Etkin, A., Yeomans, D. C.
2013; 9 (1): 33
- **Preprotachykinin-A Gene Disruption Attenuates Nociceptive Sensitivity After Opioid Administration and Incision by Peripheral and Spinal Mechanisms in Mice** *JOURNAL OF PAIN*
Sahbaie, P., Shi, X., Li, X., Liang, D., Guo, T., Qiao, Y., Yeomans, D. C., Kingery, W. S., Clark, J. D.
2012; 13 (10): 997-1007
- **Collecting And Measuring Wound Exudate Biochemical Mediators In Surgical Wounds** *JOVE-JOURNAL OF VISUALIZED EXPERIMENTS*
Carvalho, B., Clark, D. J., Yeomans, D., Angst, M. S.
2012
- **Analgesic Effects of Sustained Release Buprenorphine in an Incisional Model of Hyperalgesia in Rats (Rattus norvegicus)**
Chum, H., McKeon, G., Yeomans, D. C., Jampachaisri, K., Pacharinsak, C., Felt, S.
AMER ASSOC LABORATORY ANIMAL SCIENCE.2012: 692-92
- **Oral manganese as an MRI contrast agent for the detection of nociceptive activity** *NMR IN BIOMEDICINE*
Jacobs, K. E., Behera, D., Rosenberg, J., Gold, G., Moseley, M., Yeomans, D., Biswal, S.
2012; 25 (4): 563-569
- **A rodent model of trigeminal neuralgia.** *Methods in molecular biology (Clifton, N.J.)*
Yeomans, D. C., Klukinov, M.
2012; 851: 121-131
- **Opioid Modulation of Nociceptive Afferents in vivo** *Encyclopedic Reference of Pain*
Tzabazis, A. Z., Yeomans, D. C.
2012; 2

- **Collecting and measuring wound exudate biochemical mediators in surgical wounds.** *Journal of visualized experiments : JoVE*
Carvalho, B., Clark, D. J., Yeomans, D., Angst, M. S.
2012
- **A rodent model of Trigeminal Neuralgia** *Pain Research: Methods and Protocols*
Yeomans, D. C., Klukinov, M., Levinson, S. R.
2012; 2
- **The Orofacial Formalin Test in Mice Revisited-Effects of Formalin Concentration, Age, Morphine and Analysis Method** *JOURNAL OF PAIN*
Bornhof, M., Ihmsen, H., Schwilden, H., Yeomans, D. C., Tzabazis, A.
2011; 12 (6): 633-639
- **Selective nociceptor activation in volunteers by infrared diode laser** *MOLECULAR PAIN*
Tzabazis, A. Z., Klukinov, M., Crottaz-Herbette, S., Nemenov, M. I., Angst, M. S., Yeomans, D. C.
2011; 7
- **Analgesic Effects of Tramadol, Tramadol-Gabapentin, and Buprenorphine in an Incisional Model of Pain in Rats (Rattus norvegicus)** *JOURNAL OF THE AMERICAN ASSOCIATION FOR LABORATORY ANIMAL SCIENCE*
McKeon, G. P., Pacharinsak, C., Long, C. T., Howard, A. M., Jampachaisri, K., Yeomans, D. C., Felt, S. A.
2011; 50 (2): 192-197
- **Continuous Subcutaneous Instillation of Bupivacaine Compared to Saline Reduces Interleukin 10 and Increases Substance P in Surgical Wounds After Cesarean Delivery** *ANESTHESIA AND ANALGESIA*
Carvalho, B., Clark, D. J., Yeomans, D. C., Angst, M. S.
2010; 111 (6): 1452-1459
- **The Role of Interleukin-1 in Wound Biology. Part II: In Vivo and Human Translational Studies** *ANESTHESIA AND ANALGESIA*
Hu, Y., Liang, D., Li, X., Liu, H., Zhang, X., Zheng, M., Dill, D., Shi, X., Qiao, Y., Yeomans, D., Carvalho, B., Angst, M. S., Clark, et al
2010; 111 (6): 1534-1542
- **The Role of Interleukin-1 in Wound Biology. Part I: Murine In Silico and In Vitro Experimental Analysis** *ANESTHESIA AND ANALGESIA*
Hu, Y., Liang, D., Li, X., Liu, H., Zhang, X., Zheng, M., Dill, D., Shi, X., Qiao, Y., Yeomans, D., Carvalho, B., Angst, M. S., Clark, et al
2010; 111 (6): 1525-1533
- **Cytokine Profiling in Acute Anterior Cruciate Ligament Injury** *ARTHROSCOPY-THE JOURNAL OF ARTHROSCOPIC AND RELATED SURGERY*
Cuellar, V. G., Cuellar, J. M., Golish, S. R., Yeomans, D. C., Scuderi, G. J.
2010; 26 (10): 1296-1301
- **Caspase-1 Modulates Incisional Sensitization and Inflammation** *ANESTHESIOLOGY*
Liang, D., Li, X., Li, W., Fiorino, D., Qiao, Y., Sahbaie, P., Yeomans, D. C., Clark, J. D.
2010; 113 (4): 945-956
- **Thermal nociceptive properties of trigeminal afferent neurons in rats** *MOLECULAR PAIN*
Cuellar, J. M., Manering, N. A., Klukinov, M., Nemenov, M. I., Yeomans, D. C.
2010; 6
- **Trigeminal antihyperalgesic effect of intranasal carbon dioxide** *LIFE SCIENCES*
Tzabazis, A. Z., Niv, S. H., Manering, N. A., Klyukinov, M., Cuellar, J. M., Bhatnagar, A., Yeomans, D. C.
2010; 87 (1-2): 36-41
- **Identification of a complex between fibronectin and aggrecan G3 domain in synovial fluid of patients with painful meniscal pathology** *CLINICAL BIOCHEMISTRY*
Scuderi, G. J., Woolf, N., Dent, K., Golish, S. R., Cuellar, J. M., Cuellar, V. G., Yeomans, D. C., Carragee, E. J., Angst, M. S., Bowser, R., Hanna, L. S.
2010; 43 (10-11): 808-814
- **Cytokine evaluation in individuals with low back pain using discographic lavage** *SPINE JOURNAL*
Cuellar, J. M., Golish, S. R., Reuter, M. W., Cuellar, V. G., Angst, M. S., Carragee, E. J., Yeomans, D. C., Scuderi, G. J.
2010; 10 (3): 212-218
- **Diagnostic utility of cytokine biomarkers in the evaluation of acute knee pain.** *journal of bone and joint surgery. American volume*

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2009; 91 (10): 2313-2320
- **Diagnostic Utility of Cytokine Biomarkers in the Evaluation of Acute Knee Pain** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*
Cuellar, J. M., Scuderi, G. J., Cuellar, V. G., Golish, S. R., Yeomans, D. C.
2009; 91A (10): 2313-2320
 - **Epidural Interferon Gamma-Immunoreactivity A Biomarker for Lumbar Nerve Root Irritation** *SPINE*
Scuderi, G. J., Cuellar, J. M., Cuellar, V. G., Yeomans, D. C., Carragee, E. J., Angst, M. S.
2009; 34 (21): 2311-2317
 - **Role of substance P signaling in enhanced nociceptive sensitization and local cytokine production after incision** *PAIN*
Sahbaie, P., Shi, X., Guo, T., Qiao, Y., Yeomans, D. C., Kingery, W. S., Clark, J. D.
2009; 145 (3): 341-349
 - **Herpes virus-based recombinant herpes vectors: gene therapy for pain and molecular tool for pain science** *GENE THERAPY*
Yeomans, D. C., Wilson, S. P.
2009; 16 (4): 502-508
 - **Cytokine profile in human skin in response to experimental inflammation, noxious stimulation, and administration of a COX-inhibitor: A microdialysis study** *PAIN*
Angst, M. S., Clark, J. D., Carvalho, B., Tingle, M., Schmelz, M., Yeomans, D. C.
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Sabsovich, I., Wei, T., Guo, T., Zhao, R., Shi, X., Li, X., Yeomans, D. C., Klyukin, M., Kingery, W. S., Clark, J. D.
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 - **Joint capsule treatment with enkephalin-encoding HSV-1 recombinant vector reduces inflammatory damage and behavioural sequelae in rat CFA monoarthritis** *EUROPEAN JOURNAL OF NEUROSCIENCE*
Lu, Y., McNearney, T. A., Wilson, S. P., Yeomans, D. C., Westlund, K. N.
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