

Stanford



Martin S. Angst

Professor of Anesthesiology, Perioperative and Pain Medicine at the Stanford University Medical Center

 Curriculum Vitae available Online

CLINICAL OFFICES

- **Anesthesia**

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ACADEMIC CONTACT INFORMATION

- **Administrative Contact**

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Bio

CLINICAL FOCUS

- Anesthesia for Liver Transplantation
- Neuroanesthesia
- Anesthesia
- Perioperative Recovery

ACADEMIC APPOINTMENTS

- Professor - Med Center Line, Anesthesiology, Perioperative and Pain Medicine
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Research Committee, Stanford University School of Medicine, Department of Anesthesiology, (2020- present)
- Appointments and Promotions Committee, Stanford University School of Medicine, (2014- present)
- Finance Committee, Stanford University School of Medicine, Department of Anesthesiology, (2019- present)
- Governance Committee, Stanford University School of Medicine, Department of Anesthesiology, (2019- present)
- CVH Operations Leadership Group, Stanford University School of Medicine, CV Health Service Line, (2019- present)
- Director of CTA Strategic Initiatives and Operations, Stanford University School of Medicine, (2019- present)

PROFESSIONAL EDUCATION

- Board Certification: Anesthesia, Swiss Medical Federation FMH (1993)
- Residency: University of Bern - Switzerland (1994) Switzerland
- Residency: Regionalspital Burgdorf (1990) Switzerland
- Medical Education: Berne University School of Medicine (1987) Switzerland

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our laboratory's current transformative research efforts focus on studying immune health in the context of surgery and anesthesia. Our interest stems from previous work elucidating the modulation of inflammatory responses by anesthetic and analgesic drugs.

The aim of studying immunity in patients undergoing surgery is to identify immune phenotypes predictive of aversive postoperative outcomes including protracted recovery and infection. Our major working hypotheses are that 1) specific immune phenotypes will predict the risk for developing postoperative complications, 2) immune phenotyping will lead to the discovery of mechanisms aggravating or alleviating such risk, and 3) gained knowledge will allow devising immune-modulatory strategies mitigating such risk. Mass cytometry (CyTOF), proteomics, and functional ex-vivo immune assays are the major molecular tools for the systems-based numerical and functional exploration of the circulating immune system.

CLINICAL TRIALS

- Cocoa Flavanols for Modulating Immune Response and Accelerating Recovery, Recruiting
- Detection of Immune Changes as a Result of Surgical Trauma in Human Subject, Recruiting
- A Human In-vivo Model for the Detection of Inflammatory and Nociceptive Biomarkers, Not Recruiting
- A Study to Evaluate the Effect of GRF6021 on Postoperative Recovery Following Primary Hip or Knee Arthroplasty, Not Recruiting
- Effects of a Peripheral Nerve Block on Biomarkers of Pain and Inflammation, Not Recruiting
- Evaluation of Immune Signaling Networks in Healthy Human Volunteers, Not Recruiting
- Evaluation of Propranolol's Effect on Pain and Inflammation., Not Recruiting
- Heritability of Opioid Effects: A Twin Study, Not Recruiting
- Immune Modulation by Enhanced vs Standard Prehabilitation Program Before Major Surgery, Not Recruiting
- Immune-modulation Effects of an Arginine Rich Nutritional Supplement in Surgical Patients, Not Recruiting
- Optimization of Time-of-Flight Mass Cytometry (CyTOF) Analysis for Evaluation of Immune Changes Following Surgery, Not Recruiting
- Study of Experimental Models of Pain and Inflammation., Not Recruiting

Publications

PUBLICATIONS

- **Towards personalized medicine in maternal and child health: integrating biologic and social determinants.** *Pediatric research*
Stevenson, D. K., Wong, R. J., Aghaeepour, N., Maric, I., Angst, M. S., Contrepois, K., Darmstadt, G. L., Druzin, M. L., Eisenberg, M. L., Gaudilliere, B., Gibbs, R. S., Gotlib, I. H., Gould, et al
2020
- **Peritoneal Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Schmiesing, C. A., Golianu, B.
Lippincott, Williams & Wilkins.2020; 6: 707–728
- **Discovery and validation of biomarkers to aid the development of safe and effective pain therapeutics: challenges and opportunities.** *Nature reviews. Neurology*
Davis, K. D., Aghaeepour, N., Ahn, A. H., Angst, M. S., Borsook, D., Brenton, A., Burczynski, M. E., Crean, C., Edwards, R., Gaudilliere, B., Hergenroeder, G. W., Iadarola, M. J., Iyengar, et al
2020
- **A longitudinal study of the post-stroke immune response and cognitive functioning: the StrokeCog study protocol.** *BMC neurology*
Drag, L. L., Mlynash, M., Nassar, H., Osborn, E., Kim, D. E., Angst, M. S., Aghaeepour, N., Buckwalter, M., Lansberg, M. G.

2020; 20 (1): 313

- **Systematic Immunophenotyping Reveals Sex-Specific Responses After Painful Injury in Mice.** *Frontiers in immunology*
Tawfik, V. L., Huck, N. A., Baca, Q. J., Ganio, E. A., Haight, E. S., Culos, A., Ghaemi, S., Phongpreecha, T., Angst, M. S., Clark, J. D., Aghaeepour, N., Gaudilliere, B.
2020; 11: 1652
- **Preferential inhibition of adaptive immune system dynamics by glucocorticoids in patients after acute surgical trauma.** *Nature communications*
Ganio, E. A., Stanley, N., Lindberg-Larsen, V., Einhaus, J., Tsai, A. S., Verdonk, F., Culos, A., Gahemi, S., Rumer, K. K., Stelzer, I. A., Gaudilliere, D., Tsai, E., Fallahzadeh, et al
2020; 11 (1): 3737
- **Changes in pregnancy-related serum biomarkers early in gestation are associated with later development of preeclampsia.** *PloS one*
Hao, S., You, J., Chen, L., Zhao, H., Huang, Y., Zheng, L., Tian, L., Maric, I., Liu, X., Li, T., Bianco, Y. K., Winn, V. D., Aghaeepour, et al
2020; 15 (3): e0230000
- **VoPo leverages cellular heterogeneity for predictive modeling of single-cell data.** *Nature communications*
Stanley, N., Stelzer, I. A., Tsai, A. S., Fallahzadeh, R., Ganio, E., Becker, M., Phongpreecha, T., Nassar, H., Ghaemi, S., Maric, I., Culos, A., Chang, A. L., Xenochristou, et al
2020; 11 (1): 3738
- **Pancreatic Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Schmiesing, C. A., Golianu, B.
Lippincott, Williams & Wilkins.2020; 6: 687–706
- **Multiomeric immune clockworks of pregnancy.** *Seminars in immunopathology*
Peterson, L. S., Stelzer, I. A., Tsai, A. S., Ghaemi, M. S., Han, X., Ando, K., Winn, V. D., Martinez, N. R., Contrepolis, K., Moufarrej, M. N., Quake, S., Relman, D. A., Snyder, et al
2020
- **CytoNorm: A Normalization Algorithm for Cytometry Data.** *Cytometry. Part A : the journal of the International Society for Analytical Cytology*
Van Gassen, S., Gaudilliere, B., Angst, M. S., Saeys, Y., Aghaeepour, N.
2019
- **In Response.** *Anesthesia and analgesia*
Berger, M., Angst, M. S., Culley, D. J., Price, C. E., Scott, D. A., Whittington, R. A., Eckenhoff, R. G., Perioperative Neurotoxicity Working Group
2019
- **Differential Dynamics of the Maternal Immune System in Healthy Pregnancy and Preeclampsia** *FRONTIERS IN IMMUNOLOGY*
Han, X., Ghaemi, M. S., Ando, K., Peterson, L. S., Ganio, E. A., Tsai, A. S., Gaudilliere, D. K., Stelzer, I. A., Einhaus, J., Bertrand, B., Stanley, N., Culos, A., Tanada, et al
2019; 10
- **A year-long immune profile of the systemic response in acute stroke survivors.** *Brain : a journal of neurology*
Tsai, A. S., Berry, K., Beneyto, M. M., Gaudilliere, D., Ganio, E. A., Culos, A., Ghaemi, M. S., Choisy, B., Djebali, K., Einhaus, J. F., Bertrand, B., Tanada, A., Stanley, et al
2019
- **Deep Immune Profiling of the Post-Stroke Peripheral Immune Response Reveals Tri-phasic Response and Correlations With Long-Term Cognitive Outcomes**
Tsai, A. S., Berry, K., Beneyto, M. M., Gaudilliere, D., Ganio, E. A., Choisy, B., Djebali, K., Baca, Q., Quach, L., Drag, L., Lansberg, M. G., Angst, M. S., Gaudilliere, et al
LIPPINCOTT WILLIAMS & WILKINS.2019
- **Design Thinking Pain Management: Tools to Improve Human-centered Communication between Patients and Providers** *Design Thinking Research - Understanding Innovation.*
Berte, N., Shluzas, L. A., Beigi, B., Albaniel, M., Angst, M. S., Pickham, D., Leifer, L.
edited by Meinel, C.
Springer Cham.2019: 179–197

- **Multimomics modeling of the immunome, transcriptome, microbiome, proteome and metabolome adaptations during human pregnancy.** *Bioinformatics (Oxford, England)*
Ghaemi, M. S., DiGiulio, D. B., Contrepois, K., Callahan, B., Ngo, T. T., Lee-McMullen, B., Lehallier, B., Robaczewska, A., Mcilwain, D., Rosenberg-Hasson, Y., Wong, R. J., Quaintance, C., Culos, et al
2019; 35 (1): 95–103
- **Systemic Immunologic Consequences of Chronic Periodontitis.** *Journal of dental research*
Gaudilliere, D. K., Culos, A., Djebali, K., Tsai, A. S., Ganio, E. A., Choi, W. M., Han, X., Maghaireh, A., Choisy, B., Baca, Q., Einhaus, J. F., Hedou, J. J., Bertrand, et al
2019: 22034519857714
- **Predicting Acute Pain After Surgery: A Multivariate Analysis.** *Annals of surgery*
Baca, Q., Marti, F., Poblete, B., Gaudilliere, B., Aghaeepour, N., Angst, M. S.
2019
- **Nociceptive Physiology** *Pharmacology and Physiology for Anesthesia*
Riegelhaupt, P. M., Angst, M. S.
edited by Hemmings, H. H., Egan, T. D.
Elsevier.2019; 2: 311–331
- **Understanding health disparities.** *Journal of perinatology : official journal of the California Perinatal Association*
Stevenson, D. K., Wong, R. J., Aghaeepour, N., Angst, M. S., Darmstadt, G. L., DiGiulio, D. B., Druzin, M. L., Gaudilliere, B., Gibbs, R. S., B Gould, J., Katz, M., Li, J., Moufarrej, et al
2018
- **GateFinder: Projection-based Gating Strategy Optimization for Flow and Mass Cytometry.** *Bioinformatics (Oxford, England)*
Aghaeepour, N., Simonds, E. F., Knapp, D. J., Bruggner, R., Sachs, K., Culos, A., Gherardini, P. F., Samusik, N., Fragiadakis, G., Bendall, S., Gaudilliere, B., Angst, M. S., Eaves, et al
2018
- **Best Practices for Postoperative Brain Health: Recommendations From the Fifth International Perioperative Neurotoxicity Working Group.** *Anesthesia and analgesia*
Berger, M., Schenning, K. J., Brown, C. H., Deiner, S. G., Whittington, R. A., Eckenhoff, R. G., Angst, M. S., Avramescu, S., Bekker, A., Brzezinski, M., Crosby, G., Culley, D. J., Eckenhoff, et al
2018
- **Oxytocin and Migraine Headache** *HEADACHE*
Tzabazis, A., Kori, S., Mechanic, J., Miller, J., Pascual, C., Manering, N., Carson, D., Klukinov, M., Spierings, E., Jacobs, D., Cuellar, J., Frey, W. H., Hanson, et al
2017; 57: 64-75
- **Human umbilical cord plasma proteins revitalize hippocampal function in aged mice** *NATURE*
Castellano, J. M., Mosher, K. I., Abbey, R. J., McBride, A. A., James, M. L., Berdnik, D., Shen, J. C., Zou, B., Xie, X. S., Tingle, M., Hinkson, I. V., Angst, M. S., Wyss-Coray, et al
2017; 544 (7651): 488-?
- **Multicenter Systems Analysis of Human Blood Reveals Immature Neutrophils in Males and During Pregnancy.** *Journal of immunology*
Blazkova, J., Gupta, S., Liu, Y., Gaudilliere, B., Ganio, E. A., Bolen, C. R., Saar-Dover, R., Fragiadakis, G. K., Angst, M. S., Hasni, S., Aghaeepour, N., Stevenson, D., Baldwin, et al
2017; 198 (6): 2479-2488
- **Deep Immune Profiling of an Arginine-Enriched Nutritional Intervention in Patients Undergoing Surgery.** *Journal of immunology (Baltimore, Md. : 1950)*
Aghaeepour, N., Kin, C., Ganio, E. A., Jensen, K. P., Gaudilliere, D. K., Tingle, M., Tsai, A., Lancero, H. L., Choisy, B., McNeil, L. S., Okada, R., Shelton, A. A., Nolan, et al
2017
- **An immune clock of human pregnancy.** *Science immunology*
Aghaeepour, N., Ganio, E. A., Mcilwain, D., Tsai, A. S., Tingle, M., Van Gassen, S., Gaudilliere, D. K., Baca, Q., McNeil, L., Okada, R., Ghaemi, M. S., Furman, D., Wong, et al
2017; 2 (15)
- **Deep Immune Profiling in Trauma and Sepsis: Flow Is the Way to Go!** *Critical care medicine*

- Gaudilliere, B., Angst, M. S., Hotchkiss, R. S.
2017; 45 (9): 1577–78
- **A Proteomic Clock of Human Pregnancy.** *American journal of obstetrics and gynecology*
Aghaeepour, N., Lehallier, B., Baca, Q., Ganio, E. A., Wong, R. J., Ghaemi, M. S., Culos, A., El-Sayed, Y. Y., Blumenfeld, Y. J., Druzin, M. L., Winn, V. D., Gibbs, R. S., Tibshirani, et al
2017
 - **Risky Business: Meeting the Structural Needs of Transdisciplinary Science.** *The Journal of pediatrics*
Wise, P. H., Shaw, G. M., Druzin, M. L., Darmstadt, G. L., Quaintance, C., Mäkinen, E., Relman, D. A., Quake, S. R., Butte, A. J., Angst, M. S., Muglia, L. J., Macones, G., Driscoll, et al
2017; 191: 255–58
 - **Mapping the Fetomaternal Peripheral Immune System at Term Pregnancy.** *Journal of immunology*
Fragiadakis, G. K., Baca, Q. J., Gherardini, P. F., Ganio, E. A., Gaudilliere, D. K., Tingle, M., Lancero, H. L., McNeil, L. S., Spitzer, M. H., Wong, R. J., Shaw, G. M., Darmstadt, G. L., Sylvester, et al
2016
 - **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
 - **Patient phenotyping in clinical trials of chronic pain treatments: IMMPACT recommendations** *PAIN*
Edwards, R. R., Dworkin, R. H., Turk, D. C., Angst, M. S., Dionne, R., Freeman, R., Hansson, P., Haroutounian, S., Arendt-Nielsen, L., Attal, N., Baron, R., Brell, J., Bujanover, et al
2016; 157 (9): 1851-1871
 - **In Reply.** *Anesthesiology*
Angst, M. S., Fragiadakis, G. K., Gaudilliere, B., Aghaeepour, N., Nolan, G. P.
2016; 124 (6): 1414-1415
 - **Patient-specific Immune States before Surgery Are Strong Correlates of Surgical Recovery** *ANESTHESIOLOGY*
Fragiadakis, G. K., Gaudilliere, B., Ganio, E. A., Aghaeepour, N., Tingle, M., Nolan, G. P., Angst, M. S.
2015; 123 (6): 1241-1255
 - **Implementing Mass Cytometry at the Bedside to Study the Immunological Basis of Human Diseases: Distinctive Immune Features in Patients with a History of Term or Preterm Birth** *CYTOMETRY PART A*
Gaudilliere, B., Ganio, E. A., Tingle, M., Lancero, H. L., Fragiadakis, G. K., Baca, Q. J., Aghaeepour, N., Wong, R. J., Quaintance, C., El-Sayed, Y. Y., Shaw, G. M., Lewis, D. B., Stevenson, et al
2015; 87A (9): 817-829
 - **Intraoperative Use of Remifentanyl for TIVA: Postoperative Pain, Acute Tolerance, and Opioid-Induced Hyperalgesia** *JOURNAL OF CARDIOTHORACIC AND VASCULAR ANESTHESIA*
Angst, M. S.
2015; 29: S16-S22
 - **Editorial comment: challenges in the perioperative management of the patient receiving extended-release naltrexone.** *A & A case reports*
Angst, M. S.
2014; 3 (11): 145-?
 - **Clinical recovery from surgery correlates with single-cell immune signatures.** *Science translational medicine*
Gaudilliere, B., Fragiadakis, G. K., Bruggner, R. V., Nicolau, M., Finck, R., Tingle, M., Silva, J., Ganio, E. A., Yeh, C. G., Maloney, W. J., Huddleston, J. I., Goodman, S. B., Davis, et al
2014; 6 (255): 255ra131-?
 - **Pancreatic Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Schmiesing, C. A., Golianu, B.
Lippincott, Williams & Wilkins.2014; 5: 623–638
 - **Peritoneal Surgery** *Anesthesiologist's Manual of Surgical Procedures*

- Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Schmiesing, C. A., Golianu, B.
Lippincott, Williams & Wilkins.2014; 5
- **Analgesic and sympatholytic effects of low-dose intrathecal clonidine compared with bupivacaine: a doseresponse study in female volunteers** *BRITISH JOURNAL OF ANAESTHESIA*
Ginosar, Y., Riley, E. T., Angst, M. S.
2013; 111 (2): 256-?
 - **Changes resembling complex regional pain syndrome following surgery and immobilization.** *journal of pain*
Pepper, A., Li, W., Kingery, W. S., Angst, M. S., Curtin, C. M., Clark, J. D.
2013; 14 (5): 516-524
 - **Bayesian methods to determine performance differences and to quantify variability among centers in multi-center trials: the IHAST trial** *BMC MEDICAL RESEARCH METHODOLOGY*
Bayman, E. O., Chaloner, K. M., Hindman, B. J., Todd, M. M.
2013; 13
 - **In reply.** *Anesthesiology*
Angst, M. S., Clark, J. D.
2013; 118 (1): 230-231
 - **Nociceptive Physiology** *Pharmacology and Physiology for Anesthesia*
Ottestad, E., Angst, M. S.
edited by Hemmings, H. C., Egan, T. D.
Elsevier.2013; 1: 235–252
 - **Postoperative Subcutaneous Instillation of Low-Dose Ketorolac But Not Hydromorphone Reduces Wound Exudate Concentrations of Interleukin-6 and Interleukin-10 and Improves Analgesia Following Cesarean Delivery** *JOURNAL OF PAIN*
Carvalho, B., Lemmens, H. J., Ting, V., Angst, M. S.
2013; 14 (1): 48-56
 - **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 tolerance without demonstrable opioid-induced hyperalgesia: a double-blinded, randomized, placebo-controlled trial of sustained-release morphine for treatment of chronic nonradicular low-back pain** *PAIN*
Chu, L. F., D'Arcy, N., Brady, C., Zamora, A. K., Young, C. A., Kim, J. E., Clemenson, A. M., Angst, M. S., Clark, J. D.
2012; 153 (8): 1583-1592
 - **Pain sensitivity and opioid analgesia: A pharmacogenomic twin study** *PAIN*
Angst, M. S., Phillips, N. G., Drover, D. R., Tingle, M., Ray, A., Swan, G. E., Lazzeroni, L. C., Clark, J. D.
2012; 153 (7): 1397-1409
 - **Aversive and Reinforcing Opioid Effects A Pharmacogenomic Twin Study** *ANESTHESIOLOGY*
Angst, M. S., Lazzeroni, L. C., Phillips, N. G., Drover, D. R., Tingle, M., Ray, A., Swan, G. E., Clark, J. D.
2012; 117 (1): 22-37
 - **Sensitivity of gait parameters to the effects of anti-inflammatory and opioid treatments in knee osteoarthritis patients** *JOURNAL OF ORTHOPAEDIC RESEARCH*
Boyer, K. A., Angst, M. S., Asay, J., Giori, N. J., Andriacchi, T. P.
2012; 30 (7): 1118-1124
 - **Integrative Approach to Pain Genetics Identifies Pain Sensitivity Loci across Diseases** *PLOS COMPUTATIONAL BIOLOGY*
Ruau, D., Dudley, J. T., Chen, R., Phillips, N. G., Swan, G. E., Lazzeroni, L. C., Clark, J. D., Butte, A. J., Angst, M. S.
2012; 8 (6)
 - **Modulation of remifentanyl-induced postinfusion hyperalgesia by the beta-blocker propranolol in humans** *PAIN*
Chu, L. F., Cun, T., Ngai, L. K., Kim, J. E., Zamora, A. K., Young, C. A., Angst, M. S., Clark, D. J.

2012; 153 (5): 974-981

- **Sex Differences in Reported Pain Across 11,000 Patients Captured in Electronic Medical Records** *JOURNAL OF PAIN*
Ruau, D., Liu, L. Y., Clark, J. D., Angst, M. S., Butte, A. J.
2012; 13 (3): 228-234
- **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
- **Necessity and Risks of Arterial Blood Sampling in Healthy Volunteer Studies** *CLINICAL PHARMACOKINETICS*
Oertel, B. G., Vermehren, J., Zimmermann, M., Huynh, T. T., Doehring, A., Ferreiros, N., Senzel, S., Schmitz-Rixen, T., Erbe, M., Geisslinger, G., Harder, S., Angst, M. S., Loetsch, et al
2012; 51 (10): 629-638
- **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
- **The Endogenous Opioid System Is Not Involved in Modulation of Opioid-Induced Hyperalgesia** *JOURNAL OF PAIN*
Chu, L. F., Dairmont, J., Zamora, A. K., Young, C. A., Angst, M. S.
2011; 12 (1): 108-115
- **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
- **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
- **Effect of a Preemptive Femoral Nerve Block on Cytokine Release and Hyperalgesia in Experimentally Inflamed Skin of Human Volunteers** *REGIONAL ANESTHESIA AND PAIN MEDICINE*
Carvalho, B., Aleshi, P., Horstman, D. J., Angst, M. S.
2010; 35 (6): 514-519
- **The Analgesic and Antihyperalgesic Effects of Transcranial Electrostimulation with Combined Direct and Alternating Current in Healthy Volunteers** *ANESTHESIA AND ANALGESIA*
Nekhendzy, V., Lemmens, H. J., Tingle, M., Nekhendzy, M., Angst, M. S.
2010; 111 (5): 1301-1307
- **Opioid Pharmacogenomics Using a Twin Study Paradigm: Methods and Procedures for Determining Familial Aggregation and Heritability** *TWIN RESEARCH AND HUMAN GENETICS*
Angst, M. S., Phillips, N. G., Drover, D. R., Tingle, M., Galinkin, J. L., Christians, U., Swan, G. E., Lazzeroni, L. C., Clark, J. D.
2010; 13 (5): 412-425
- **Opioid Pharmacotherapy for Chronic Non-Cancer Pain in the United States: A Research Guideline for Developing an Evidence-Base** *JOURNAL OF PAIN*
Chapman, C. R., Lipschitz, D. L., Angst, M. S., Chou, R., Denisco, R. C., Donaldson, G. W., Fine, P. G., Foley, K. M., Gallagher, R. M., Gilson, A. M., Haddock, J. D., Horn, S. D., Inturrisi, et al
2010; 11 (9): 807-829
- **Ketamine for Managing Perioperative Pain in Opioid-dependent Patients with Chronic Pain A Unique Indication?** *ANESTHESIOLOGY*
Angst, M. S., Clark, J. D.
2010; 113 (3): 514-515
- **Perioperative Hypothermia (33 degrees C) Does Not Increase the Occurrence of Cardiovascular Events in Patients Undergoing Cerebral Aneurysm Surgery Findings from the Intraoperative Hypothermia for Aneurysm Surgery Trial** *ANESTHESIOLOGY*

- Nguyen, H. P., Zaroff, J. G., Bayman, E. O., Gelb, A. W., Todd, M. M., Hindman, B. J.
2010; 113 (2): 327-342
- **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
 - **Intrathecal Cyclooxygenase Inhibitors in Humans Don't Throw in the Towel!** *ANESTHESIOLOGY*
Angst, M. S.
2010; 112 (5): 1082-1083
 - **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
 - **Selective Antagonism of Opioid-Induced Ventilatory Depression by an Ampakine Molecule in Humans Without Loss of Opioid Analgesia** *CLINICAL PHARMACOLOGY & THERAPEUTICS*
Oertel, B. G., Felden, L., Tran, P. V., Bradshaw, M. H., Angst, M. S., Schmidt, H., JOHNSON, S., Greer, J. J., Geisslinger, G., Varney, M. A., Loetsch, J.
2010; 87 (2): 204-211
 - **No Association between Intraoperative Hypothermia or Supplemental Protective Drug and Neurologic Outcomes in Patients Undergoing Temporary Clipping during Cerebral Aneurysm Surgery Findings from the Intraoperative Hypothermia for Aneurysm Surgery Trial** *ANESTHESIOLOGY*
Hindman, B. J., Bayman, E. O., Pfisterer, W. K., Torner, J. C., Todd, M. M.
2010; 112 (1): 86-101
 - **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
 - **PERIOPERATIVE FEVER AND OUTCOME IN SURGICAL PATIENTS WITH ANEURYSMAL SUBARACHNOID HEMORRHAGE** *NEUROSURGERY*
Todd, M. M., Hindman, B. J., Clarke, W. R., Torner, J. C., Weeks, J. B., Bayman, E. O., Shi, Q., Spofford, C. M.
2009; 64 (5): 897-908
 - **No evidence for the development of acute tolerance to analgesic, respiratory depressant and sedative opioid effects in humans** *PAIN*
Angst, M. S., Chu, L. F., Tingle, M. S., Shafer, S. L., Clark, J. D., Drover, D. R.
2009; 142 (1-2): 17-26
 - **Effect of Nitrous Oxide Use on Long-term Neurologic and Neuropsychological Outcome in Patients Who Received Temporary Proximal Artery Occlusion during Cerebral Aneurysm Clipping Surgery** *ANESTHESIOLOGY*
Pasternak, J. J., McGregor, D. G., Lanier, W. L., Schroeder, D. R., Rusy, D. A., Hindman, B., Clarke, W., Torner, J., Todd, M. M.
2009; 110 (3): 563-573
 - **Determining heat and mechanical pain threshold in inflamed skin of human subjects.** *Journal of visualized experiments : JoVE*
Angst, M. S., Tingle, M., Phillips, N. G., Carvalho, B.
2009
 - **Molecular Basis and Clinical Implications of Opioid Tolerance and Opioid- Induced Hyperalgesia** *Acute Pain Management*
Chu, L. F., Clark, J., Angst, M. S.
edited by Sinatra, R. S., deLeon-Casasola, O. A., Ginsberg, B., Viscusi, E. R.
Cambridge University Press.2009: 114-143
 - **Peritoneal Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Oberhelmen, H. A., Angst, M. S.
edited by Jaffe, R. A., Samuels, S.
Lippincott Williams & Wilkins.2009; 4: 625-644
 - **Pancreatic Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Samuels, S.

Lippincott Williams & Wilkins.2009; 4: 609–624

- **Overview on Clinical Features of Opioid-induced Hyperalgesia** *Opioid- induced Hyperalgesia*
Angst, M. S., Chu, L. F., Clark, J.
edited by Mao, J.
Informa Healthcare.2009: 21–37
- **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.
2008; 139 (1): 15-27
- **Opioid-induced pain - In reply** *JOURNAL OF CLINICAL ONCOLOGY*
Davis, M. P., Angst, M.
2008; 26 (20): 3465
- **Opioid-induced hyperalgesia in humans - Molecular mechanisms and clinical considerations** *CLINICAL JOURNAL OF PAIN*
Chu, L. F., Angst, M. S., Clark, D.
2008; 24 (6): 479-496
- **Local and systemic release of cytokines, nerve growth factor, prostaglandin E2, and substance P in incisional wounds and serum following cesarean delivery** *JOURNAL OF PAIN*
Carvalho, B., Clark, D. J., Angst, M. S.
2008; 9 (7): 650-657
- **Opioid-induced hyperalgesia may be more frequent than previously thought - Reply** *JOURNAL OF CLINICAL ONCOLOGY*
Davis, M. P., Angst, M.
2008; 26 (9): 1565
- **Chronic morphine administration enhances nociceptive sensitivity and local cytokine production after incision** *MOLECULAR PAIN*
Liang, D., Shi, X., Qiao, Y., Angst, M. S., Yeomans, D. C., Clark, J. D.
2008; 4
- **Human in-vivo bioassay for the tissue-specific measurement of nociceptive and inflammatory mediators.** *Journal of visualized experiments : JoVE*
Angst, M. S., Tingle, M., Schmelz, M., Carvalho, B., Yeomans, D. C.
2008
- **Morphine reduces local cytokine expression and neutrophil infiltration after incision** *MOLECULAR PAIN*
Clark, J. D., Shi, X., Li, X., Qiao, Y., Liang, D., Angst, M. S., Yeomans, D. C.
2007; 3
- **When Opioids cause pain** *JOURNAL OF CLINICAL ONCOLOGY*
Davis, M. P., Shaiova, L. A., Angst, M. S.
2007; 25 (28): 4497-4498
- **Comment on Koltzenburg et al.: Differential sensitivity of three experimental pain models in detecting the analgesic effects of transdermal fentanyl and buprenorphine.** *Pain 2006;126 : 165-74 PAIN*
Angst, M. S., Clark, J. D.
2007; 128 (3): 292-294
- **Experimental heat pain for detecting pregnancy-induced analgesia in humans** *ANESTHESIA AND ANALGESIA*
Carvalho, B., Angst, M. S., Fuller, A. J., Lin, E., Mathusamy, A. D., Riley, E. T.
2006; 103 (5): 1283-1287
- **Blockade of the complement C5a receptor reduces incisional allodynia, edema, and cytokine expression** *ANESTHESIOLOGY*
Clark, J. D., Qiao, Y., Li, X., Shi, X., Angst, M. S., Yeomans, D. C.
2006; 104 (6): 1274-1282
- **Opioid-induced hyperalgesia - A qualitative systematic review** *ANESTHESIOLOGY*
Angst, M. S., Clark, J. D.
2006; 104 (3): 570-587

- **Pharmacology of drugs formulated with DepoFoaM (TM) - A sustained release drug delivery system for parenteral administration using multivesicular liposome technology** *CLINICAL PHARMACOKINETICS*
Angst, M. S., Drover, D. R.
2006; 45 (12): 1153-1176
- **Opioid tolerance and hyperalgesia in chronic pain patients after one month of oral morphine therapy: A preliminary prospective study** *JOURNAL OF PAIN*
Chu, L. F., Clark, D. J., Angst, M. S.
2006; 7 (1): 43-48
- **Activation of naloxone-sensitive and -insensitive inhibitory systems in a human pain model** *JOURNAL OF PAIN*
Koppert, W., Filitz, J., Troster, A., Ihmsen, H., Angst, M., Flor, H., Schuttler, J., Schmelz, M.
2005; 6 (11): 757-764
- **Mild intraoperative hypothermia during surgery for intracranial aneurysm** *NEW ENGLAND JOURNAL OF MEDICINE*
Todd, M. M., Hindman, B. J., Clarke, W. R., Torner, J. C., Todd, M., Hindman, B., Clarke, W., Chaloner, K., Torner, J., Davis, P., Howard, M., Tranel, D., Anderson, et al
2005; 352 (2): 135-145
- **Dexmedetomidine and opioid interactions: Defining the role of dexmedetomidine for intensive care unit sedation** *ANESTHESIOLOGY*
Maze, M., Angst, M. S.
2004; 101 (5): 1059-1061
- **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
- **Comparative analgesic and mental effects of increasing plasma concentrations of dexmedetomidine and alfentanil in humans** *ANESTHESIOLOGY*
Angst, M. S., Ramaswamy, B., Davies, M. F., Maze, M.
2004; 101 (3): 744-752
- **Pancreatic Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Angst, M. S.
edited by Jaffe, R. A., Samuels, S.
Lippincott Williams & Wilkins.2004; 3
- **Peritoneal Surgery** *Anesthesiologist's Manual of Surgical Procedures*
Norton, J. A., Oberhelmen, H. A., Angst, M. S.
edited by Jaffe, R. A., Samuels, S.
2004; 3
- **The site of action of epidural fentanyl in humans: The difference between infusion and bolus administration** *Annual Meeting of the Society-of-Obstetric-Anesthesiology-and-Perinatology*
Ginosar, Y., Riley, E. T., Angst, M. S.
LIPPINCOTT WILLIAMS & WILKINS.2003: 1428-38
- **The site of action of epidural fentanyl infusions in the presence of local anesthetics: A minimum local analgesic concentration infusion study in nulliparous labor** *Annual Meeting of the Society-of-Obstetric-Anesthesiology-and-Perinatology*
Ginosar, Y., Columb, M. O., Cohen, S. E., Mirikatani, E., Tingle, M. S., Ratner, E. F., Angst, M. S., Riley, E. T.
LIPPINCOTT WILLIAMS & WILKINS.2003: 1439-45
- **Short-term infusion of the mu-opioid agonist remifentanyl in humans causes hyperalgesia during withdrawal** *PAIN*
Angst, M. S., Koppert, W., Pahl, I., Clark, D. J., Schmelz, M.
2003; 106 (1-2): 49-57
- **Naloxone provokes similar pain facilitation as observed after short-term infusion of remifentanyl in humans** *PAIN*
Koppert, W., Angst, M., Alsheimer, M., Sittl, R., Albrecht, S., Schuttler, J., Martin, S.
2003; 106 (1-2): 91-99
- **Seizure duration with remifentanyl/methohexital vs. methohexital alone in middle-aged patients undergoing electroconvulsive therapy** *ACTA ANAESTHESIOLOGICA SCANDINAVICA*

- Smith, D. L., Angst, M. S., Brock-Utne, J. G., Debattista, C.
2003; 47 (9): 1064-1066
- **The mu-opioid agonist remifentanyl attenuates hyperalgesia evoked by blunt and punctuated stimuli with different potency: a pharmacological evaluation of the freeze lesion in humans** *International CPT Congress*
Lotsch, J., Angst, M. S.
ELSEVIER SCIENCE BV.2003: 151-61
 - **Input characteristics and bioavailability after administration of immediate and a new extended-release formulation of hydromorphone in healthy volunteers** *Annual Meeting of the American-Society-of-Anesthesiologists*
Drover, D. R., Angst, M. S., Valle, M., Ramaswamy, B., Naidu, S., Stanski, D. R., Verotta, D.
LIPPINCOTT WILLIAMS & WILKINS.2002: 827-36
 - **Opioid-induced hyperalgesia and incisional pain** *ANESTHESIA AND ANALGESIA*
Li, X. Q., Angst, M. S., Clark, J. D.
2001; 93 (1): 204-209
 - **The relationship between tracheal width and left bronchial width: Implications for left-sided double-lumen tube selection** *JOURNAL OF CARDIOTHORACIC AND VASCULAR ANESTHESIA*
Brodsky, J. B., Malott, K., Angst, M., Fitzmaurice, B. G., Kee, S. P., Logan, L.
2001; 15 (2): 216-217
 - **A murine model of opioid-induced hyperalgesia** *MOLECULAR BRAIN RESEARCH*
Li, X. Q., Angst, M. S., Clark, J. D.
2001; 86 (1-2): 56-62
 - **Pharmacodynamics of orally administered sustained-release hydromorphone in humans** *ANESTHESIOLOGY*
Angst, M. S., Drover, D. R., Lotsch, J., Ramaswamy, B., Naidu, S., Wada, D. R., Stanski, D. R.
2001; 94 (1): 63-73
 - **Painless Electrodiagnostic Current Perception Threshold and Pain Tolerance Threshold Values in CRPS Subjects and Healthy Controls: A Multi-Center Study** *Pain Practice*
Raj PP, Chado HN, Angst MS, et al.
2001; 1: 53-60
 - **Antinociceptive effects of morphine-6-glucuronide in homozygous MDR1a P-glycoprotein knockout and in wildtype mice in the hotplate test** *LIFE SCIENCES*
Lotsch, J., Tegeder, I., Angst, M. S., Geisslinger, G.
2000; 66 (24): 2393-2403
 - **Insidious intoxication after morphine treatment in renal failure: Delayed onset of morphine-6-glucuronide action** *ANESTHESIOLOGY*
Angst, M. S., Buhner, M., Lotsch, J.
2000; 92 (5): 1473-1476
 - **Orthotopic liver transplantation for carcinoid tumour metastatic to the liver: anesthetic management** *CANADIAN JOURNAL OF ANAESTHESIA-JOURNAL CANADIEN D ANESTHESIE*
Claire, R. E., Drover, D. D., Haddow, G. R., Esquivel, C. O., Angst, M. S.
2000; 47 (4): 334-337
 - **Lumbar epidural morphine in humans and supraspinal analgesia to experimental heat pain** *ANESTHESIOLOGY*
Angst, M. S., Ramaswamy, B., Riley, E. T., Stanski, D. R.
2000; 92 (2): 312-324
 - **The relationship between the visual analog pain intensity and pain relief scale changes during analgesic drug studies in chronic pain patients** *ANESTHESIOLOGY*
Angst, M. S., Brose, W. G., Dyck, J. B.
1999; 91 (1): 34-41
 - **Factors affecting the pharmacokinetic characteristics of rapacuronium** *ANESTHESIOLOGY*
Fisher, D. M., Kahwaji, R., Bevan, D., Bikhazi, G., Fragen, R. J., Angst, M. S., Ornstein, E., Matteo, R. S.
1999; 90 (4): 993-1000

- **Pharmacokinetics, cortisol release, and hemodynamics after intravenous and subcutaneous injection of human corticotropin-releasing factor in humans** *CLINICAL PHARMACOLOGY & THERAPEUTICS*
Angst, M. S., Dyck, J. B., Azarnoff, D. L., Goldblum, R., Ho, B., Gfroerer, T., Linton, E. A., Glynn, B. P., Shafer, S. L.
1998; 64 (5): 499-510
- **Dose-response function of epidural fentanyl versus sufentanil** *ANESTHESIA AND ANALGESIA*
Angst, M. S.
1998; 86 (4): 918-919
- **Dose-ranging study in younger adult and elderly patients of ORG 9487, a new, rapid-onset, short-duration muscle relaxant** *ANESTHESIA AND ANALGESIA*
Kahwaji, R., Bevan, D. R., Bikhazi, G., Shanks, C. A., Fragen, R. J., Dyck, J. B., Angst, M. S., Matteo, R.
1997; 84 (5): 1011-1018
- **A New Double-Lumen IV Infusion Set Reduces Pain on Injection of Propofol.** *J Clin Anesth*
Angst MS, Chris Tataru, Sean Mackey, Gary Zupfer, John B. Dyck, John G. Brock-Utne.
1997
- **CORTICOSTEROID-INDUCED STIMULATION OF ATRIAL NATRIURETIC PEPTIDE IN MAN** *ACTA ENDOCRINOLOGICA*
SAXENHOFER, H., Angst, M., Weidmann, P., Shaw, S. G., Ferrier, C.
1988; 118 (2): 179-186