

# CURRICULUM VITAE

(December 2022)

## I. Personal Information

Name: Martin S. Angst, MD  
Current position: Professor of Anesthesiology, Perioperative and Pain Medicine  
Affiliation: Stanford University School of Medicine

## II. Education History

### Colleges and Universities Attended

1987 MD, University of Berne, Switzerland

### Residency and Fellowship Training

1988 – 1990 Residency, Internal Medicine, Burgdorf Hospital, Burgdorf, Switzerland  
1990 – 1994 Residency, Anesthesia and Intensive Care Medicine, University Hospital of Berne, Berne, Switzerland  
1994 – 1996 Postdoctoral Fellowship, Clinical Pharmacology, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

### Board Certification

1993 Swiss Board, Swiss Society of Anesthesiologists  
1993 European Board, European Academy of Anesthesiology

## III. Employment

### Academic Appointments

2011 – present Professor of Anesthesiology, Perioperative and Pain Medicine  
Stanford University School of Medicine, Stanford, CA  
2006 – 2010 Associate Professor of Anesthesiology, Perioperative and Pain Medicine  
Stanford University School of Medicine, Stanford, CA  
1998 – 2006 Assistant Professor of Anesthesiology, Perioperative and Pain Medicine  
Stanford University School of Medicine, Stanford, CA  
1996 – 1998 Clinical Instructor of Anesthesiology, Perioperative and Pain Medicine  
Stanford University School of Medicine, Stanford, CA

### Other Appointments

2022 – present Vice Chair for Strategy and Initiatives, Department of Anesthesiology, Perioperative and Pain Medicine  
2019 – 2022 Director of Cardiovascular and Thoracic Anesthesia, Department of Anesthesiology, Perioperative and Pain Medicine

#### IV. Honors and Awards

1994 – 1995	Swiss Society of Anesthesiologists, Research Fellowship Award
1994 – 1995	Ciba-Geigy-Jubilaeumsstiftung, Research Fellowship Award
1994 – 1995	Janggen-Poehn Stiftung, Research Fellowship Award
1996	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
1997	Analgesia and Headache Section, American Society of Clinical Pharmacology and Therapeutics: Best Abstract.
2001	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2002	Monthly Resident Teaching Award, Department of Anesthesiology, Perioperative and Pain Medicine
2007	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2008	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2008	Elected Member of National Panel for Establishing Opioid Research Guidelines
2009	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2010	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2011	Stanford Society of Physician Scholars (SSPS) Collaborative Research Award (Mentor), Stanford University School of Medicine
2012	Society of Obstetric Anesthesia and Perinatology: Best Abstract (Mentor)
2013	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2013	International Anesthesia Research Society: Kosaka Award for Best Abstract in Patient-oriented Research (Mentor)
2013	International Anesthesia Research Society: Best Abstract of Critical Care, Trauma and Resuscitation Category (Mentor)
2015	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2015	Society of Reproductive Investigations on Immunology and Women's Health: Best New Investigator Poster Award (Mentor)
2017	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2018	American Society of Regional Anesthesia: Best of Meeting Abstract Award (Mentor)
2018	Team Science Leadership Workshop Nomination, Stanford Medicine's Office of Faculty Development and Diversity, Stanford University School of Medicine
	International Anesthesia Research Society: Finalist Kosaka Award (Mentor)
2018	Research Award, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine (Mentor)
2019	Society of Cardiovascular Anesthesiologists: Best of Meeting Award (Mentor)
2019	American Society of Regional Anesthesia: Best of Meeting Award (Mentor)

#### V. Bibliography

**Peer-reviewed original research (113 total, 8 submitted, annotated starting 2018)**

1. Saxenhofer H, **Angst MS**, Weidmann P, Shaw SG, Ferrier C. Corticosteroid-induced Stimulation of Atrial Natriuretic Peptide in Man. *Acta Endocrinologica* 118:179-86, 1988
2. Raymond K, Bevan DR, Bikhazi G, Shanks CA, Fragen RJ, Dyck JB, **Angst MS**, Matteo R. Dose-ranging Study in Younger Adult and Elderly Patients of ORG 9487, a new Rapid Onset, Short Duration Muscle Relaxant. *Anesth Analg* 84:1011-8, 1997
3. **Angst MS**, Mackey SC, Zupfer GH, Tataru CD, Brock-Utne JG. A New Double-Lumen IV Infusion Set Reduces Pain on Injection of Propofol. *J Clin Anesth* 9:462-6, 1997
4. **Angst MS**, Azarnoff DL, Goldblum R, Gfroerer T, Ho B, Linton EA, Glynn BP, Shafer SL. Pharmacokinetics, Cortisol Release and Hemodynamics after Intravenous and Subcutaneous Injection of Human Corticotropin-Releasing Factor in Man. *Clin Pharmacol Ther* 64:499-510, 1988
5. **Angst MS**, Brose WG, Dyck JB. The Relationship between the Visual Analog Pain Intensity and Pain Relief Scale Changes during Analgesic Drug Studies in Chronic Pain Patients. *Anesthesiology* 91:34-41, 1999
6. Fisher DM, Kahwaji R, Bevan D, Bikhazi G, Fragen RJ, **Angst MS**, Ornstein E, Matteo RS. Factors Affecting the Pharmacokinetic Characteristics of Rapacuronium. *Anesthesiology* 90:993-1000, 1999
7. **Angst MS**, Ramaswamy B, Riley ET, Stanski DR. Lumbar Epidural Morphine in Humans and Supraspinal Analgesia to Experimental Heat Pain. *Anesthesiology* 92:312-24, 2000
8. Lotsch J, Tegeder I, **Angst MS**, Geisslinger G. Antinociceptive Effects of Morphine-6-Glucuronide in Homozygous mdr1a P-Glycoprotein Knockout and in Wildtype Mice in the Hotplate Test. *Life Sci* 66:2393-2403, 2000
9. Brodsky JB, Mallott K, **Angst MS**, Fitzmaurice BG, Kee SP, Logan L. The Relationship between Tracheal and Bronchial Width: Recommendations for Selection of Left Double Lumen Tubes. *J Cardiothorac Vasc Anesth* 15:216-7, 2001
10. Raj PP, Chado HN, **Angst MS**, Heavner J, Dotson R, Brandstater ME, Johnson B, Parris W, Finch P, Shahani B, Dhand U, Mekhail N, Daoud E, Hendler N, Somerville J, Wallace M, Panchal S, Glusman S, Jay GW, Palliyath S, Longton W, Irving G. Painless Electrodiagnostic Current Perception Threshold and Pain Tolerance Threshold Values in CRPS Subjects and Healthy Controls: A Multi-Center Study. *Pain Practice* 1:53-60, 2001
11. Li X, **Angst MS**, Clark JD. A Murine Model of Opioid-induced Hyperalgesia. *Brain Res Mol Brain Res* 86:56-62, 2001
12. **Angst MS**, Drover DR, Lotsch J, Ramaswamy B, Naidu S, Stanski DR. The Pharmacodynamics of Orally Administered Sustained Release Hydromorphone in Humans. *Anesthesiology* 94:63-73, 2001
13. Li X, **Angst MS**, Clark JD. Opioid-induced Hyperalgesia and Incisional Pain. *Anesth Analg* 93:204-9, 2001
14. Drover DR, **Angst MS**, Valle M, Ramaswamy B, Naidu S, Stanski DR, Verotta D. Input Characteristics and Bioavailability after Administration of Immediate and a New Sustained Release Formulation of Hydromorphone in Healthy Volunteers. *Anesthesiology* 97:827-36, 2002
15. **Angst MS**, Koppert W, Pahl I, Clark JD, Schmelz M. Short-term Infusion of the  $\mu$ -Opioid Agonist Remifentanil in Humans Causes Hyperalgesia during Withdrawal. *Pain* 106:49-57, 2003
16. Koppert W, **Angst MS**, Alsheimer M, Sittle R, Albrecht S, Schuettler S, Schmelz M. Naloxone Provokes Similar Pain Facilitation as Observed after Short-term Infusion of Remifentanil in Humans. *Pain* 106:91-9, 2003
17. Ginosar Y, Columb M, Cohen S, Mirikatani E, Tingle MS, Ratner EF, **Angst MS**, Riley ET. The Site of Action of Epidural Fentanyl Infusions in the Presence of Local Anesthetics: An MLAC Infusion Study in Nulliparous Labor. *Anesth Analg* 97:1439-45, 2003
18. Ginosar Y, Riley ET, **Angst MS**. Infusion versus Bolus Administration of Epidural Fentanyl in Humans: Difference in the Predominant Site of Action. *Anesth Analg* 97:1428-38, 2003
19. Smith DL, **Angst MS**, DeBattista C, Brock-Utne J. Anesthesia for ECT: Effects on Seizure Duration of Remifentanil/Low-dose Methohexital versus Methohexital Alone. *Acta Scand Anesth* 47:1064-6, 2003
20. Lotsch J and **Angst MS**. The  $\mu$ -Opioid Agonist Remifentanil Attenuates Hyperalgesia Evoked by Blunt and Punctuated Stimuli with Differential Potency: A Pharmacological Evaluation of the Freeze Lesion in Humans. *Pain* 102:151-61, 2003

21. **Angst MS**, Ramaswamy B, Davis F, Maze M. Comparative Analgesic and Mental Effects of Increasing Plasma Concentrations of Dexmedetomidine and Alfentanil in Humans. *Anesthesiology* 101:744-52, 2004
22. Koppert W, Filitz J, Troster A, Ihmsen H, **Angst MS**, Flor H, Schuttler J, Schmelz M. The Activation of Naloxone Sensitive and Insensitive Inhibitory Systems in a Human Pain Model. *J Pain* 6:757-64, 2005
23. Todd MM, Hindman BJ, Clarke WR, Torner JC; Intraoperative Hypothermia for Aneurysm Surgery Trial (**IHAST**) **Investigators**. Mild Intraoperative Hypothermia during Surgery for Intracranial Aneurysm. *N Engl J Med* 352:135-45, 2005
24. Clark JD, Qiao Y, Li X, Xie X, **Angst MS**, Yeomans DC. Blockade of the Complement C5a Receptor Reduces Incisional Allodynia, Edema, and Cytokine Expression. *Anesthesiology* 104:1274-82, 2006
25. Chu LF, Clark JD, **Angst MS**. Development of Tolerance and Hyperalgesia in Chronic Back Pain Patients after one Month of Oral Morphine. *J Pain* 7:43-48, 2006
26. Carvalho B, **Angst MS**, Fuller A, Lin E, Anbu D, Mathusamy AD, Riley ET. Experimental Heat Pain Delineates Pregnancy-induced Analgesia in Humans. *Anesth Analg* 103:1283-7, 2006
27. Clark JD, Liang D, Qiao Y, Li X, Shi X, **Angst MS**, Yeomans DC. Morphine Reduces Local Cytokine Expression and Neutrophil Infiltration after Incision. *Mol Pain Mol* 3:28, 2007
28. **Angst MS**, Clark JD, Carvalho B, Tingle M, Schmelz M, Yeomans DC. Cytokine Profile in Human Skin in Response to Experimental Inflammation, Noxious Stimulation and Administration of a COX-inhibitor: A Microdialysis Study. *Pain* 139:15-27, 2008
29. Liang D, Shi X, Li X, Qiao Y, Yeomans DC, **Angst MS**, Clark JD. Chronic Morphine Administration Enhances Nociceptive Sensitivity and Cytokine Production after Incision. *Mol Pain Mol* 4:7, 2008
30. Carvalho B, Clark JD, **Angst MS**. Local and Systemic Release of Cytokines, Nerve Growth Factor, Prostaglandin E2 and Substance P in Incisional Wounds and Serum Following Cesarean Delivery. *J Pain* 9:650-7, 2008
31. Scuderi GJ, Cuellar JM, Gabrovsky V, Yeomans DC, Carragee EJ, **Angst MS**. Epidural Interferon Gamma-immunoreactivity: A Biomarker for Lumbar Nerve Root Irritation. *Spine* 34:2311-7, 2009
32. **Angst MS**, Chu LF, Tingle M, Shafer SL, Clark JD, Drover DR. No Evidence of Acute Tolerance to Analgesic, Respiratory Depressant and Sedative Opioid Effects in Human Volunteers. *Pain* 142:17-26, 2009
33. Todd MM, Hindman BJ, Clarke WR, Torner JC, Weeks JB, Bayman EO, Shi Q, Spofford CM; **IHAST Investigators**. Perioperative Fever and Outcome in Surgical Patients with Aneurysmal Subarachnoid Hemorrhage. *Neurosurgery* 64:897-908, 2009
34. Pasternak JJ, McGregor DG, Lanier WL, Schroeder DR, Rusy DA, Hindman B, Clarke W, Torner J, Todd MM; **IHAST Investigators**. 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* 110:563-73, 2009
35. Hindman BJ, Bayman EO, Pfisterer WK, Torner JC, Todd MM; **IHAST Investigators**. 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* 112:86-101, 2010
36. Carvalho B, Aleshi P, Horstman D, **Angst MS**. Effect of a Preemptive Femoral Nerve Block on Cytokine Release and Hyperalgesia in Experimentally Inflamed Skin of Human Volunteers. *Reg Anesth Pain Med* 35:514-9, 2010
37. Hu Y, Liang D, Li X, Liu H, Zhang X, Zheng M, Dill D, Shi X, Qiao Y, Yeomans D, Carvalho B, **Angst MS**, Clark JD, Peltz G. The Role of IL-1 in Wound Biology Part I: Murine in Silico and in Vitro Experimental Analysis. *Anesth Analg* 111:1525-33, 2010
38. Hu Y, Liang D, Li X, Liu H, Zhang X, Zheng M, Dill D, Shi X, Qiao Y, Yeomans D, Carvalho B, **Angst MS**, Clark JD, Peltz G. The Role of IL-1 in Wound Biology Part II: In vivo and Human Translational Studies. *Anesth Analg* 111:1434-42, 2010
39. Carvalho B, Clark JD, Yeomans DC, M, Qiao Y, **Angst MS**. Continuous Subcutaneous Instillation of Bupivacaine Compared to Saline Reduces Interleukin 10 and Increases Substance P in Surgical Wounds after Cesarean Delivery. *Anesth Analg* 111:1452-9, 2010

40. **Angst MS**, Phillips NG, Drover DR, Tingle M, Galinkin JL, Christians U, Swan GE, Lazzeroni LC, Clark DJ. Opioid Pharmacogenomics Using a Twin Study Paradigm: Methods and Procedures for Determining Familial Aggregation and Heritability. *Twin Res Hum Genet* 13:412-25, 2010
41. Nekhendzy V, Lemmens HJ, Tingle M, Nekhendzy M, **Angst MS**. The Analgesic and Antihyperalgesic Effects of Transcranial Electrostimulation with Combined Direct and Alternating Current in Healthy Volunteers. *Anesth Analg* 111:1301-7, 2010
42. Chapman CR, Lipschitz DL, **Angst MS**, Chou R, Denisco RC, Donaldson GW, Fine PG, Foley KM, Gallagher RM, Gilson AM, Inturrisi CE, Haddox JD, Susan SD, Jick SS, Lipman AG, Loser JD, Noble M, Porter L, Rowbotham MC, Schoelles KM, Turk DC, Volinn E, Von Korff MR, Webster LR, Weisner CM. Opioid Pharmacotherapy for Chronic Non-cancer Pain: Research Guideline. *J Pain* 11:807-29, 2010
43. Scuderi GJ, Woolf N, Dent K, Golish SR, Bowser R, Cuellar JM, Cuellar VG, Yeomans DC, Carragee EJ, **Angst MS**, Hanna LS. Identification of a Complex between Fibronectin and Aggrecan G3 Domain in Synovial Fluid of Patients with Painful Meniscal Pathology. *Clin Biochem* 43:808-14, 2010
44. Cuellar JM, Golish SR, Reuter MW, Gabrovsky V, **Angst MS**, Carragee EJ, Yeomans DC, Scuderi GJ. Cytokine Evaluation in Individuals with Low Back Pain Utilizing Discographic Lavage. *Spine J* 10:212-8, 2010
45. Oertel BG, Felden L, Tran PV, Bradshaw MH, **Angst MS**, Schmidt H, Greer JJ, Geisslinger G, Varney MA, Lotsch J. Selective Antagonism of Opioid-induced Respiratory Depression by Ampakines in Humans Without Loss of Opioid Analgesia. *Clin Pharmacol Ther* 87:204-11, 2010
46. Nguyen HP, Zaroff JG, Bayman EO, Gelb AW, Todd MM, Hindman BJ; **IHAST-MIDS and IHAST Investigators**. 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* 113:327-42, 2010
47. Chu LF, Dairmont J, Zamora AK, Young CA, Angst MS. The Endogenous Opioid System is Not Involved in Modulation of Opioid-Induced Hyperalgesia. *J Pain* 12:108-115, 2011
48. Boyer K, **Angst MS**, Asay J, Giori NJ, Andriacchi TP Sensitivity of Gait Parameters to the Effects of Anti-inflammatory and Opioid Treatments in Knee Osteoarthritis Patients. *J Orthop Res* 30:1118-24, 2011
49. Tzabasis AZ, Klukinov M, Crottaz-Herbette S, Nemenov MI, **Angst MS**, Yeomans DC. Selective Nociceptor Activation in Volunteers by Infrared Diode Laser. *Mol Pain* 7:18, 2011
50. Oertel BG, Vermehren J, Zimmermann M, Huynh TT, Ferreiros N, Doehring A, Schmitz-Rixen T, Geisslinger G, Harder S, **Angst MS**, Lötsch J. Re-evaluation of Safety and Necessity of Arterial Blood Sampling for Remifentanyl Pharmacokinetic-pharmacodynamic Assessments. *Clin Pharmacokinet* 5:629-38, 2012
51. Chu LF, D'Arcy N, Brady C, Zamora A, Young C, Kim J, **Angst MS**, Clark JD. Analgesic Tolerance but no Opioid-induced Hyperalgesia: A Double-blinded, Randomized, Placebo-controlled Trial of Sustained-release Morphine for the Treatment of Chronic Non-radicular Low Back Pain. *Pain* 153:1583-92, 2012
52. **Angst MS**, Phillips NG, Drover DR, Tingle M, Swan GE, Lazzeroni LC, Clark DJ. Aversive and Reinforcing Opioid Effects: A pharmacogenomic Twin Study. *Anesthesiology* 117:22-37, 2012
53. Ruau D, Dudley JT, Chen R, Phillips NG, Swan GE, Lazzeroni LC, Clark JD, Butte AJ, **Angst MS**. Integrative Approach to Pain Genetics Identifies Pain Sensitivity Loci Across Diseases. *PLoS Computational Biology* 8:6, 2012
54. **Angst MS**, Phillips NG, Drover DR, Tingle M, Swan GE, Lazzeroni LC, Clark DJ. Pain Sensitivity and Opioid Analgesia: A pharmacogenomic Twin Study. *Pain* 153:1397-1409, 2012
55. Chu LF, Cun T, Ngai LK, Kim J, Zamora AK, Young CA, **Angst MS**, Clark JD. Modulation of Remifentanyl-induced Post-infusion Hyperalgesia by the beta-adrenergic Antagonist Propranolol in Humans. *Pain* 153:974-81, 2012
56. Ruau D, Liu LY, Clark JD, **Angst MS**, Butte AJ. Sex Differences in Reported Pain across 12,000 Patients Captured in Electronic Medical Records. *J Pain* 13:228-34, 2012
57. Ginosar Y, Riley ET, **Angst MS**. Analgesic and Sympatholytic Effects of Low-dose Intrathecal Clonidine Compared with Bupivacaine: A Dose-response Study in Female Volunteers. *Br J Anaesth* 111:256-63, 2013

58. Pepper A, Li W, Kingery WS, **Angst MS**, Curtin CM, Clark JD. Complex Regional Pain Syndrome-Like Changes in Patients after Surgery and Immobilization. *J Pain*14:516-24, 2013
59. Carvalho B, Clark DJ, **Angst MS**. 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. *J Pain* 14:48-56, 2013
60. Bayman EO, Chaloner KM, Hindman BJ, Todd MM; **IHAST Investigators**. Bayesian Methods to Determine Performance Differences and to Quantify Variability Among Centers in Multi-center Trials: the IHAST Trial. *BMC Med Res Methodol* 13:5, 2013
61. Gaudilliere B, Fragiadaki GK, Bruggner RV, Nicolau M, Rachel F, Tingle M, Silva J, Ganio EA, Yeh CG, Maloney WJ, Huddleston JI, Goodman SB, Davis MM, Bendall SC, Fantl WJ, **Angst MS\***, Nolan GP. Clinical recovery from surgery correlates with single-cell immune signatures. *Sci Transl Med* 6:255ra131, 2014 (\*co-senior authors)
62. Fragiadakis GK, Brice Gaudillière, Ganio EA, Aghaeepour N, Tingle M, Nolan GP, **Angst MS**. Patient-specific Immune States before Surgery are Strong Correlates of Surgical Recovery. *Anesthesiology* 123:1241-55, 2015
63. Gaudilliere B, Ganio EA, Tingle, Lancero H M, Fragiadakis GK, Baca QJ, Nolan GP, **Angst MS**. Implementing mass cytometry at the bedside to study the immunological basis of human diseases: Distinctive immune features in patients with a history of term and preterm birth. *Cytometry A* 87:817-29, 2015
64. Fragiadakis GK, Baca QJ, Gherardini PF, Ganio EA, Gaudilliere DK, Tingle T, Lancero HL, McNeil L, Okada RL, Spitzer MH, Wynn VD, Wong RJ, Shaw GM, Darmstadt GL, Sylvester KG, Carvalho B, Lewis DB, Stevenson DK, Nolan GP, Aghaeepour N, **Angst MS**, Gaudilliere B. Mapping the Interface of Fetomaternal Immunity at Term Pregnancy. *J Immunol* 197:4482-4492, 2016
65. Edwards RR, Dworkin RH, Turk DC, **Angst MS**, Dionne R, Freeman R, Hansson P, Haroutounian S, Arendt-Nielsen L, Attal N, Baron R, Brell J, Bujanover S, Burke LB, Carr D, Chappell AS, Cowan P, Etropolski M, Fillingim RB, Gewandter JS, Katz NP, Kopecky E, Lin AH, Markman JD, Nomikos G, Porter L, Rappaport BA, Rice A, Scavone J, Scholz J, Simon LS, Smith SM, Tobias J, Tockarschewsky T, Veasley C, Versavel M, Wasan A, Wen W, Yarnitsky D. Patient Phenotyping in Analgesic Clinical Trials: IMMPACT Recommendations. *Pain* 157:1851-71, 2016
66. Tzabazis A, Jacobs D, Mechanic J, Miller J, Pascual C, ManFrey N, Klukinov M, Cuellar J, Frey II W, Carson D, **Angst MS**, Yeomans DC. Oxytocin Receptor: Expression in the Trigeminal Nociceptive System and Potential Role in the Treatment of Headache Disorders. *Cephalgia* 36:943-50, 2016
67. Wise PH, Shaw GM, Druzin ML, Darmstadt GL, Quaintance C, Makinen E, Relman DA, Quake SR, Butte AJ, **Angst MS**, Muglia LJ, Macones G, Driscoll D, Ober C, Simpson JL, Katz M, Howse J, Stevenson SK. Risky Business: Meeting the Structural Needs of Convergent Science. *J Pediatr* 191:255-58, 2017
68. Aghaeepour N, Ganio EA, Mcilwain D, Tsai AS, Tingle M, Van Gassen S, Gaudilliere DK, Baca Q, McNeil L, Okada R, Furman D, Wong RJ, Winn VD, Druzin ML, El- Sayed Y, Quaintance C Gibbs R, Darmstadt GL, Shaw GM, Stevenson DK, Tibshirani R, Nolan GP, Lewis DB, **Angst MS**, Gaudilliere B. An Immune Clock of Human Pregnancy. *Sci Immunol* 15:1-11, 2017
69. Aghaeepour N, Tingle M, Ganio E, Lancero HL, McNeil L, Okada RL, Kin C, Shelton A, **Angst MS\***, Gaudilliere B\* (\*co-senior authors). Deep Immune Profiling of an Arginine-Enriched Nutritional Intervention in Patients Undergoing Surgery. *J Immunol* 199:2171-2180, 2017
70. Tzabazis A, Kori S, Mechanic J, Miller J, Pascual C, Manering N, Carson D, Klukinov M, Spierings ELH, Jacobs D, Cuellar J, Frey II W, Hanson L, **Angst MS**, Yeomans D. Oxytocin and Migraine Headache. *Headache* 57:64-75, 2017
71. Castellano JM, Mosher KI, Abbey RJ, Berdnik D, Shen JC, Zhou B, Xie XS, Tingle M, **Angst MS**, Wyss-Coray T. Human Umbilical Cord Plasma Proteins Revitalize Hippocampal Function in Aged Mice. *Nature* 544:488-92, 2017
72. Blazkova J, Gupta S, Liu Y, Gaudilliere B, Ganio E, Bolen CR, Saar-Dover R, Fragiadakis GK, **Angst MS**, Aghaeepour N, Stevenson D, Chaussable D, Altman M, Kaplan MJ, Davis MM, Furman D. Multicenter

- Systems Analysis of Human Blood Reveals Immature Neutrophils in Males and During Pregnancy. *J Immunol* 198:2479-2488, 2017
73. Aghaeepour N, Simonds EF, Knapp DJ, Bruggner RV, Sachs K, Culos A, Gherardini PF, Samusik N, Bendall SC, Fragiadakis GK, Gaudilliere B, **Angst MS\***, Eaves CJ, Weiss WA, Fantl WJ, Nolan GP. GateFinder: Projection-based Gating Strategy Optimization for Flow and Mass Cytometry. *Bioinformatics* 34:4131-4133, 2018  
\*contributed to data interpretation and manuscript writing
74. Berger M, Schenning KJ, Brown CH 4th, Deiner SG, Whittington RA, Eckenhoff RG, **Angst MS\***, Avramescu S, Bekker A, Brzezinski M, Crosby G, Culley, DJ, Eckenhoff M, Eriksson LI, Evered L, Ibinson J, Kline RP, Kofke A, Ma D, Mathew JP, Maze M, Orser BA, Price CC, Scott DA, Silbert B, Su D, Terrando N, Wang DS, Wei H, Xie Z, Zuo Z; Perioperative Neurotoxicity Working Group. Best Practices for Postoperative Brain Health: Recommendations from the Fifth International Perioperative Neurotoxicity Working Group. *Anesth Analg* 127:1406-1413, 2018  
\*contributed to consensus building and manuscript writing
75. Aghaeepour N, Lehallier B, Ganio EA, Baca Q, Wong RJ, Quaintance C, Winn VD, El-Sayed YY, Blumenfeld Y, Druzin ML, Gibbs RS, Shaw GM, Stevenson DK, Tibshirani R, Gaudilliere B, **Angst MS**. A Proteomic Clock of Pregnancy. *Am J Obstet Gynecol* 218:347, 2018
76. Gaudilliere DK, Culos A, Djebali K, Tsai AS, Ganio EA, Choi WM, Maghaireh A, Choisy B, Ando K, Baca Q, Bertrand B, Einhaus JF, Hedou JJ, Fallahzadeh R, Ghaemi MS, Han X, Okada R, Stanley N, Tanada A, Tingle M, Alpagot T, Helms JA, **Angst MS\***, Aghaeepour N, Gaudilliere B. Systemic Immunological Consequences of Chronic Periodontitis. *J Dent Res* 98:985-993, 2019  
\*contributed to study conceptualization, data interpretation and manuscript writing
77. Han X, Ghaemi MS, Ando K, Peterson L, Ganio E, Tsai A, Gaudilliere D, Einhaus J, Stanley N, Culos A, Tanada A, Tsai E, Wong R, Winn VD, Druzin ML, Blumenfeld Y, Quaintance C, Gibbs R, Lewis D, Carvalho B, Shaw GM, Stevenson DK, **Angst MS\***, Aghaeepour N, Gaudilliere B. Differential Dynamics of the Maternal Immune System in Healthy Pregnancy and Preeclampsia. *Front Immunol* 10:1305, 2019  
\*co-senior author
78. Tsai A, Berry K, Beneyto MM, Gaudilliere D, Quach L, Ganio E, Lansberg M, **Angst MS\***, Drag L, Gaudilliere B, Buckwalter MS, Aghaeepour N. Deep Profiling of the Systemic Immune Response to Stroke over the Course of One Year in Humans. *Brain* 142:978-991, 2019  
\*contributed to study conceptualization, data interpretation and manuscript writing
79. Ghaemi MS, Callahan B, Contrepolis K, DiGiulio DB, Lee BA, Lehallier B, Ngo T, Mcilwain D, Rosenberg-Hasson Y, Wong RJ, Culos A, Tanada A, Tsai A, Gaudilliere D, Ganio E, Han X, Ando K, McNeil L, Okada R, Tingle M, Maric I, Wyss-Coray T, D Winn VD, Druzin ML, Gibbs R, Darmstadt GL, B Lewis DB, Nia VP, Agard B, Maecker H, Nolan G, Tibshirani R, Snyder MP, Relman D, Quake SR, Shaw G, Stevenson D, **Angst MS\***, Gaudilliere B, Nima Aghaeepour N. Multiomics Modeling of the Immunome, Transcriptome, Microbiome, Proteome, and Metabolome Adaptations during Human Pregnancy. *Bioinformatics* 35:95-103, 2019  
\*co-senior author
80. Jehan F, Sazawal S, Baqui AH, Nisar MI, Dhingra U, Khanam R, Ilyas M, Dutta A, Mitra DK, Mehmood U, Deb S, Mahmud A, Hotwani A, Ali SA, Rahman S, Nizar A, Ame SM, Moin MI, Muhammad S, Chauhan A, Begum N, Khan W, Das S, Ahmed S, Hasan T, Khalid J, Rizvi S, Juma MH, Chowdhury NH, Kabir F, Aftab F, Quaiyum A, Manu A, Yoshida S, Bahl R, Rahman A, Pervin J, Winston W, Musonda P, Stringer JS, Litch JA, Ghaem MS, Mira N, Moufarrej MN, Contrepolis K, Chen S, Stelzer IA, Stanley N, Chang AL, GB, RJ, Candace Liu C, Quaintance CC, Culos A, Espinosa C, Xenochristou M, Becker M, Fallahzadeh R, Ganio E, Tsai AS, Gaudilliere D, Tsai ES, Han X, Ando K, Tingle M, Maric I, Wise PH, Winn VD, Druzin ML, Gibbs RS, Darmstadt GL, Murray JC, Shaw GM, Stevenson DK, Snyder MP, Quake SR, **Angst MS\***, Gaudilliere B, Aghaeepour N. Multiomics Characterization of Preterm Birth in Low- and Middle-Income Countries. *JAMA Netw Open* 3:e2029655, 2020  
\*contributed to study conceptualization, data interpretation and manuscript writing

81. Culos A, Tsai AS, Stanley N, Becker M, Ghaemi MS, McIlwain DR, Fallahzadeh R, Tanada A, Nassar H, Ganio E, Peterson L, Han X, Stelzer I, Kazuo A, , Gaudilliere D, Phongpreecha T, Maric I, Chang AL, Shaw GM, Stevenson DK, Bendall S, Davis KL, Fantle W, Nolan GP, Tibshirani R, **Angst MS\***, Gaudilliere B, Aghaeepour. Integration of Mechanistic Immunological Knowledge into a Machine Learning Pipeline Improves Prediction. *Nat Mach Intell* 2:619-628, 2020  
\*co-senior author
82. Drag LL, Mlynash M, Nassar H, Osborn E, **Angst MS\***, Agheepour n, Buckwalter M, Lansberg MG. A Longitudinal Study of the Post-stroke Immune Response and Cognitive Functioning: The StrokeCog Study Protocol. *BMC Neurology* 20:313-319, 2020  
\*contributed to conceptualization and manuscript writing
83. Tawfik VL, Huck NA, Baca QJ, Ganio E, Elena S, Haight ES, Culos A, Ghaemi S, **Angst MS\***, Clark JD, Aghaeepour N, Brice Gaudilliere B. Systematic Immunophenotyping Reveals Sex-Specific Responses After Painful Injury in Mice. *Frontiers in Immunology* 11:1652, 2020  
\*contributed to manuscript writing
84. Stanley N, Stelzer I, Fallahzadeh R, Ganio E, Tsai A, Ghaemi S, Culos A, Han X, Rumer K, Peterson L, Becker M, Phongpreecha J, Nassar H, Chang A, Maric I, Gaudilliere D, Tsai E, Ando K, Leipold M, Obermoser G, Cross D, Pollard A, Maecker H, Shaw G, David Stevenson S, **Angst MS\***, Gaudilliere B, Aghaeepour N. VoPo Leverages Cellular Heterogeneity for Predictive Modeling of Single-Cell Data. *Nature Communications* 11:3738, 2020  
\*co-senior author
85. Ganio E, Stanley N, Lindberg-Larsen V, Einhaus J, Tsai A, Culos A, Rumer K, Stelzer I, Gaudilliere D, Tsai E, Fallahzadeh R, Kehlet H, Aghaeepour N, **Angst MS\***, Gaudilliere B. Preferential inhibition of adaptive immune system dynamics by glucocorticoids in patients after acute surgical trauma. *Nature Communications* 11:3737, 2020  
\*co-senior author
86. Hao S, Zhao H, You J, Chen L, Huang Y, Zheng L, Tian L, Maric I, Liu X, Li T, Bianco YK, Winn VD, Aghaeepour N, Gaudilliere B, **Angst MS\***, Zhou X, Li Y, Mo L, Wong RJ, Shaw GM, Stevenson DK, Cohen HJ, McElhinney DB, Sylvester KG, Ling XB. Changes in pregnancy-related serum biomarkers early in gestation are associated with later development of preeclampsia. *PLoS One* 15:e0230000, 2020  
\*contributed to manuscript writing
87. Van Gassen S, Gaudilliere B, **Angst MS\***, Yvan Saeys Y, Aghaeepour N. CytoNorm: A Normalization Tool for Cytometry Data. *Cytometry A*, 97:268-278, 2020  
\*contributed to conceptualization and manuscript writing
88. Fallahzadeh R, Verdonk F, Ganio E, Culos A, Stanley N, Marić I, Chang AL, Becker M, Phongpreecha T, Xenochristou M, Bidoki NH, De Francesco D, Espinosa C, Tsai E, Gao X, Tsai A, McNeil L, Sultan P, Tingle M, Gaudilliere B, **Angst MS\***, Nima Aghaeepour N. Objective Activity Parameters Track Patient-Specific Physical Recovery Trajectories After Surgery and Link with Individual Preoperative Immune States. *Annals of Surgery* 10.1097, 2021  
\*co-senior author
89. Peterson LP, Hedou J, Ganio EA, Stelzer IA, Feyaerts D, Harbert E, Adusumelli Y, Ando K, Tsai ES, Tsai AS, Han X, Ringle M, Houghteling P, Reiss J, Stevenson DK, Lewis DB, Winn V, **Angst MS\***, Aghaeepour N, Brice Gaudilliere B. Single-cell Analysis of the Neonatal Immune System Across the Gestational Age Continuum. *Frontiers Immunology* 12:714090, 2021  
\*contributed to conceptualization and manuscript writing
90. Feinstein I, Wilson EN, Swarovski MS, Andreasson KI, **Angst MS\***, Greicius MD. Cardiac Surgery and Hip Surgery Cause Acute and Sustained Increases in Plasma P-Tau181. *JAMA Neurology* 78:1407-1409, 2021  
\*co-senior author
91. Ando K, Hédou JJ, Feyaerts D, Han X, Ganio E, Tsai ES, Peterson LS, Verdonk F, Tsai AS, Marić I, Wong RJ, **Angst MS\***, Aghaeepour N, Stevenson D, Blumenfeld YJ, Sultan P, Carvalho B, Stelzer IA, Gaudillière B. A peripheral immune signature of labor induction. *Frontiers Immunology* 12:725989, 2021



- \*contributed to conceptualization and manuscript writing
92. Rishel CA, **Angst MS\***, Sun EC. Association between Preoperative Opioid Weaning and Subsequent Long-term Opioid Use: A Retrospective Analysis. *Anesthesiology* 135:1015-1027, 2021
- \*contributed to conceptualization, data analysis, and manuscript writing
93. Spatz JM, Fulford MH, Tsai A, Gaudilliere D, Ganio E, **Angst MS\***, Aghaeepour N, Gaudilliere B. Human immune system adaptations to simulated microgravity revealed by single-cell mass cytometry. *Science Report* 11:11872, 2021
- \*contributed to conceptualization and manuscript writing
94. Stelzer IA, Ghaemi MS, Han X, Ando K, Hedou J, Feyaerts D, Peterson L, Tsai ES, Ganio EA, Gaudilliere DK, Tsai AS, Traber GM, Ellenberger M, Stanley N, Becker MG, Culos A, Fallahzadeh R, Wong RJ, Quaintance CC, Quake SR, Darmstadt G, Relman DA, Druzin M, Winn V, Gibbs RS, Ling B, Sylvester K, Carvalho B, Snyder MP, Shaw GM, Stevenson DK, Contrepolis K, **Angst MS\***, Aghaeepour N, Gaudilliere B. Integrated Metabolomic, Proteomic, and Immunological Trajectories Predict Labor Onset. *Sci Trans Med* 13: eabd9898, 2021
- \*co-senior author
95. Beliveau CM, McMahan VM, Arenander J, **Angst MS\***, Kushel M, Torres A, Santos G-M, Coffin PO. Stimulant use for self-management of pain among safety-net patients with chronic non-cancer pain. *Substance Abuse* 1-8, 2021
- \*contributed to conceptualization, data analysis, and manuscript writing
96. Espinosa C, Becker M, Marić I, Wong RJ, Shaw GM, Gaudilliere B, Aghaeepour N, Stevenson DK, Prematurity Research Center at Stanford incl. **Angst MS\***. Data-Driven Modeling of Pregnancy-Related Complications. *Trends Mol Med* 27:762-776, 2021
- \*contributed to manuscript writing
97. Baca QJ, Marti M, Poblete B, Gaudilliere B, Aghaeepour N, **Angst MS**. Predicting Acute Pain after Surgery: A Multivariate Analysis. *Ann Surg* 273:289-298, 2021
98. Feyaerts D, Hédou J, Gillard J, Chen H, Tsai ES, Peterson LS, Ando K, Manohar M, Do E, Dhondalay G, Fitzpatrick J, Artandi M, Chang I, Snow TT, Chinthrajah S, Warren C, Wittman R, Meyerowitz J, Ganio EA, Stelzer IA, Han X, Verdonk F, Gaudilliere DK, Tsai AA, Rumer KK, Jiang S, Ferrer S, Kelly DJ, Furman D, Aghaeepour A, **Angst MS\***, Boyd S, BA, Garry P, Nolan K, Gaudilliere B, McIlwain DR. Integrated plasma proteomics and single-cell immune signaling network signatures demarcate mild, moderate, and severe COVID-19. *Cell Report Medicine*, 3:1, 2022
- \*contributed to manuscript writing
99. Simons LE, Moayedi M, Coghil RC, Stinson JN, **Angst MS\***, Nima Aghaeepour N, Gaudilliere B, King CD, Lopez MS, Hoeppli M, Biggs E, Ganio E, Williams SE, Goldschneider K, Campbell F, Ruskin D, Krane E, Goulianu G, Walker SM, Rush G, Heirich M. Signature for Pain Recovery IN Teens (SPRINT): Protocol for a Multi-site Prospective Signature Study in Chronic Musculoskeletal Pain. *BMJ Open* 12:e061548, 2022
- \*contributed to conceptualization, data analysis and manuscript writing
100. Ghaemi MS, Tarca AL, Romero RR, Stanley N, Fallahzadeh R, Tanada A, Culos A, Kazuo A, Xiaoyua H, Blumenfeld YJ, Druzin ML, El-Sayed YY, Gibbs RS, Winn VD, Ling XB, Wong R, Shaw GM, Stevenson DK, Gaudilliere B, Aghaeepour N, **Angst MS**. Proteomic Signatures Predict Preeclampsia in Individual Cohorts but Not Across Cohorts – Implications for Clinical Studies. *J Matern Fetal Neonatal Med* 35:5621-5628, 2022
101. Rumer KK, Hedou J, Tsai A, Einhaus J, Verdonk F, Stanley N, Choisy B, Ganio E, Bonham A, Jacobsen D, Warrington B, Gao X, Tingle M, McAllister TN, Fallahzadeh R, Feyaerts D, Stelzer I, Gaudilliere D, Ando K, Shelton A, Morris A, Kebebew E, Aghaeepour N, Kin C, **Angst MS\***, Gaudilliere B. Integrated Single-cell and Plasma Proteomic Modeling to Predict Surgical Site Complications: A Prospective Cohort Study. *Ann Surg* 275:582-590, 2022
- \*co-senior author
102. De Francesco D, Blumenfeld Y, Marić I, Chang AL, Fallahzadeh R, Phongpreecha T, Butwick AJ, Xenochristou M, Phibbs CS, Bidoki NH, Martin Becker M, Culos A, Espinosa C, Liu Q, Gaudilliere B,

**Angst MS\***, Stevenson DK, Shaw GM, Aghaeepour N. A Data-driven Health Index for Neonatal Morbidities. *iScience* 25:104143, 2022

\*contributed to conceptualization and manuscript writing

103. Sultan P, Jensen S, Taylor J, El-Sayed Y, Carmicheal S, Cella D, **Angst MS\***, Gaudilliere B, Lyell D, Carvalho B. Proposed Domains for Postpartum Recovery: A Concept Elicitation Study. *BJOG* 129:9-20, 2022

\*contributed to conceptualization and manuscript writing

104. Fallahzadeh R, Bidoki NH, Stelzer IA, Becker M, Marić I, Chang AL, Culos A, Phongpreecha T, Xenochristou M, De Francesco D, Espinosa C, Berson E, Verdonk F, **Angst MS\***, Gaudilliere B, Aghaeepour N. In-Silico Generation of High-Dimensional Immune Response Data in Patients using a Deep Neural Network. *Cytometry A* doi: 10.1002/cyto.a.24709, 2022

\*contributed to conceptualization and manuscript writing

105. Becker M, Jonathan M, Phogat NK, Quaintance Cc, Laborde A, King L, Gotlib IH, Gaudilliere B, **Angst MS\***, Shaw GM, Stevenson DK, Aghaeepour N, Dhabhar FS. Deleterious and Protective Psychosocial and Stress-Related Factors Predict Risk of Spontaneous Preterm Birth. *Am J Perinatol* 40:74-88, 2023

\*contributed to conceptualization and manuscript writing

### Peer-reviewed publications (submitted)

1. Sindhern SB, Chin AR, Aghaeepour N, Prince L, Maecker H, Shaw G, Stevenson D, Nadeau KC, Snyder M, Khatri P, Boyd S, Winn V, **Angst MS**, Chinthrajah RS. Unravelling Mechanisms for the Development of Allergic Disease. Submitted to *International Journal of Molecular Medicine*
2. Stanley N, Xenochristou M, Nassar H, Stelzer IA, Liu C, Ghaemi S, Maric I, Phongpreecha T, Becker M, Fallahzadeh R, Espinosa C, Culos A, Bidoki N, De Francesco D, Chang AL, Liu Q, Shaw G, Stevenson D, **Angst MS**, Gaudilliere B, Aghaeepour N. Comparative Benchmarking of Dimension Reduction Methods for Joint Analysis of Multiomics Measurements. Submitted to *Nature Biotechnology*
3. Marić I, Contrepolis K, Moufarrej MN, Stelzer IA, Feyaerts D, Han X, Tang A, Stanley N, Wong RJ, Traber GM, Ellenberger M, Chang AL, Fallahzadeh R, Nassar H, Becker M, Xenochristou M, Espinosa C, De Francesco D, Ghaemi MS, Costello EK, Culos, Ling XB, Sylvester KG, Darmstadt GL, Winn VD, Shaw GM, Relman DA, Quake SR, **Angst MS**, Snyder MP, Stevenson DK, Gaudilliere B, Aghaeepour N. Early Prediction and Longitudinal Modeling of Preeclampsia from Multiomics. Submitted to *Pattern*
4. Becker M, Feyaerts D, Stelzer IA, Berson E, Chang AL, Clarke GS, Culos A, De Francesco D, Espinosa C, Kim Y, Maric I, Mataraso S, Payrovnaziri SN, Phongpreecha T, Ravindra NG, Stanley N, Shome S, Tan Y, Thuraiappah M, Xue L, Shaw G, Stevenson D, **Angst MS**, Gaudilliere B, Aghaeepour N. CoDi: A Software Package for Profiling Functional Disruption in Biological Systems. Submitted to *Bioinformatics*
5. Becker M, Dai J, Chang AL, Fayaerts D, Stelzer IA, Zhang M, Mayo JA, Quaintance CC, Laborde A, King LS, Gotlib IH, **Angst MS**, Shaw GM, Stevenson DK, Gaudilliere B, Aghaeepour N. Revealing the Impact of Lifestyle Stressors on the Risk of Adverse Pregnancy Outcomes with Multitask Machine Learning. Submitted to *Frontiers in Pediatrics*
6. De Francesco D, Reiss JD, Roger J, Tang AS, Chang AL, Becker M, Phongpreecha T, Espinosa C, Morin S, Berson E, Thuraiappah M, Le BL, Ravindra NG, Payrovnaziri N, Mataraso S, Kim Y, Xue L, Rosenstein M, Oskotsky T, Marić I, Gaudilliere B, Carvalho B, Bateman B, **Angst MS**, Prince LS, Blumenfeld YJ, Benitz WE, Fuerch JH, Shaw GM, Sylvester KS, Stevenson DK, Sirota M, Aghaeepour N. AI-Driven Longitudinal Characterization of Neonatal Health and Morbidity. Submitted to *Sci Transl Med*
7. Becker M, Nassar, Espinosa C, Stelze IA, Berson E, Bidoki NH, Chang AL, De Francesco D, Fallahzadeh R, Feyaerts D, Liu Q, Maric I, Samson J, Mataraso SJ, Phongpreecha T, Ravindra NG, Stanley N, Thuraiappah M, Shaw G, Stevenson D, **Angst MS**, Gaudilliere B, Nima Aghaeepour N. Large scale correlation network construction for unraveling the coordination of complex biological systems. Submitted to *Nature Computational Science*
8. Espinosa C, Ali SM, Khan W, Khanam R, Pervin J, Price JT, Rahman S, Hasan T, Ahmed S, Raqib R, Rahman M, Aktar S, Nisar MI, Khalid J, Dhingra U, Dutta A, Deb S, Stringer JSA, Wong RJ, Gary M.

Shaw GM, Stevenson DK, Darmstadt GL, Gaudilliere B, Baqui AH, Jehan F, Rahman A, Sazawal S, Vwalika B, Aghaeepour N, **Angst MS**. Comparative Predictive Power of Plasma versus Serum Proteomic Signatures for Predicting Fetomaternal Health Outcomes. Submitted to *AJOG MFM*

**Peer-reviewed publications (other – 27 total)**

1. **Angst MS**. Dose-response Function of Epidural Fentanyl versus Sufentanil, *Anesth Analg* 86:918-919, 1998 (letter)
2. **Angst MS**, Bühler M, Lötsch J. Insidious Intoxication after Morphine Treatment in Renal Failure: Delayed Onset of Morphine-6-Glucuronide Action. *Anesthesiology* 92:1473-6, 2000 (case report)
3. Claire RE, Drover DD, Haddow GR, Esquivel CO, **Angst MS**. Orthotopic Liver Transplantation for Carcinoid Syndrome: Anesthetic Management. *Can J Anaesth* 40:334-7, 2000 (case report)
4. Carroll I, **Angst MS**, Clark JD. Management of Perioperative Pain in Patients on Chronic Opioid Therapy. *Reg Anesth Pain Med* 29:276-91, 2004 (review)
5. Maze M and **Angst MS**. Defining the Role of Dexmedetomidine for ICU Sedation. *Anesthesiology* 101:1059-61, 2004 (editorial)
6. **Angst MS** and Drover DR. The Pharmacology of Drugs Formulated with DepoFoam™: A Sustained Release Drug Delivery System for Parenteral Administration Using Multivesicular Liposome Technology. *Clin Pharmacokinet* 45:1153-76, 2006 (review)
7. **Angst MS** and Clark JD. Opioid Induced Hyperalgesia: A Qualitative Systematic Review. *Anesthesiology* 104:570-87, 2006 (review)
8. Davis MP, Shaioval LA, **Angst MS**. When Opioids Cause Pain. *J Clin Oncol*, 28:4497-8, 2007 (case report)
9. **Angst MS** and Clark JD. Comment on Koltzenburg et al.: Differential Sensitivity of Three Experimental Pain Models in Detecting the Analgesic Effects of Transdermal Fentanyl and Buprenorphine. *Pain* 128:292-4, 2007 (letter)
10. Chu LF, **Angst MS**, Clark JD. Opioid-induced Hyperalgesia in Humans: Molecular Mechanisms and Clinical Considerations. *Clin J Pain* 24:479-96, 2008 (review)
11. **Angst MS**, Tingle M, Schmelz M, Carvalho B, Yeomans DC. Human in-vivo bioassay for the tissue-specific measurement of nociceptive and inflammatory mediators. *J Vis Exp* 2008 (video article)
12. **Angst MS**, Tingle M, Phillips NG, Carvalho B. Determining Heat and Mechanical Pain Thresholds in Inflamed Skin of Human Subjects. *J Vis Exp* 2009 (video article)
13. **Angst MS**, Clark JD. Ketamine for Managing Perioperative Pain in Patients on Chronic Opioid Therapy: A Unique Indication? *Anesthesiology* 113:514-5, 2010 (editorial)
14. **Angst MS**. Evaluating the Analgesic Efficacy of Intrathecal Cyclooxygenase Inhibitors in Humans: Don't Throw in the Towel! *Anesthesiology* 112:1082-3, 2010 (editorial)
15. Carvalho B, Clark DJ, Yeomans D, **Angst MS**. Collecting and Measuring Wound Exudate Biochemical Mediators in Surgical Wounds. *J Vis Exp* 2012 (video article)
16. **Angst MS** and Clark JD. In Respons. *Anesthesiology* 2013 118:230-1, 2013 (letter)
17. **Angst MS**. Editorial Comment: Challenges in the Perioperative Management of the Patient Receiving Extended-Release Naltrexone. *A&A Case Report* 11:145, 2014 (editorial)
18. **Angst MS**. Intraoperative Use of Remifentanyl for TIVA: Postoperative Pain, Acute Tolerance, and Opioid-Induced Hyperalgesia. *J Cardiothorac Vasc Anesth* 29:S16-22, 2015 (review)
19. **Angst MS**, Fragiadakis GK, Gaudilliere B, Aghaeepour N, Nolan, GP. In Response. *Anesthesiology* 124:1414-1415, 2016 (letter)
20. Gaudilliere B, **Angst MS**, Hotchkiss R. Deep Immune Profiling in Trauma and Sepsis: flow is the way to go! *Critical Care Medicine* 45:1577-1578, 2017 (editorial)
21. Berger M, **Angst MS**, Culley DJ, Price CE, Scott DA, Whittington RA, Eckenhoff RG; Perioperative Neurotoxicity Working Group. In Response. *Anesth Analg* 129:e112-e113, 2019 (letter)

22. Stevenson D, Wong R, Aghaeepour N, **Angst MS**, Darmstadt G, DiGiulio D, Druzin M, Gaudilliere B, Gibbs R, Gould J, Katz M, Li J, Moufarrej M, Quaintance C, Quake S, Relman D, Shaw G, Snyder M, Wang X, Wise P. Understanding health disparities. *J Perinatol* 39:354-358, 2019 (commentary)
23. Davis KD, PhD, Aghaeepour N, Ahn AH, **Angst MS**, Borsook D, Brenton A, Burczynski ME, Crean C, Edwards R, Gaudilliere B, Hergenroeder GW, Iadarola MJ, Iyengar S, Jiang Y, Kong JT, Mackey S, Saab C, Sang CN, Scholz J, Segerdahl M, Tracey I, Veasley C, Wang J, Wager TD, Wasan AD, Pelleymounter MA. Discovery and Validation of Biomarkers to Develop Non-Addictive Therapeutics for Pain: Challenges and Opportunities. *Nat Rev Neurol* 16:381-400, 2020 (review)
24. Peterson LS, Stelzer IA, Tsai AS, Ghaemi MS, Han X, Kazuo Ando K, Winn VD, Martinez NR, Contrepolis K, Moufarrej MN, Relman DA, Snyder MS, Shaw GM, Stevenson DK, Wong RJ, Arck P, **Angst MS**, Aghaeepour N, Gaudilliere B. Multiomic Immune Clockworks of Pregnancy. *Semin Immunopathol* 42:397-412, 2020 (review)
25. Verdonk F, Einhaus J, Tsai AS, Hedou J, Choisy B, Gaudilliere D, Kin C, Aghaeepour N, **Angst MS**, Gaudilliere B. Measuring the human immune response to surgery: multi-omics for the prediction of post-operative outcomes. *Current Opinion in Critical Care* 27:717-725, 2021 (review)
26. Stevenson DK, Aghaeepour A, Maric I, **Angst MS**, Gaudilliere B, Ling XB, Moufarrej MN, Quake SR, Relman DA, Snyder MP, Sylvester KG, Shaw GM, Wong RJ. Understanding how biologic and social determinants affect disparities in preterm birth and outcomes of preterm infants in the NICU. *Semin Perinatol* 45:151408, 2021 (commentary)
27. Stevenson DK, Gotlib IH, Buthmann JL, Maric I, Aghaeepour N, Gaudilliere B, **Angst MS**, Darmstadt GL, Druzin ML, Wong RJ, Shaw GM, Michael Katz M. Stress and Its Consequences – Biological Strain. *Am J Perinatol* doi: 10.1055/a-1798-1602, 2022 (commentary)

### Book chapters (13 total)

1. Norten JA and **Angst MS**: Pancreatic Surgery, Anesthesiologist's Manual of Surgical Procedures Sixth Edition. In Jaffe RA ed. New York: Wolters Kluwer, 2020. pp687-706.
2. Norten JA and **Angst MS**: Peritoneal Surgery, Anesthesiologist's Manual of Surgical Procedures Sixth Edition. In Jaffe RA ed. New York: Wolters Kluwer, 2020. pp707-728.
3. Berte N, Albaniel M, Shluzas LA, Beigi B, **Angst MS**, Pickham D: Design Thinking Pain Management: Tools to Improve Human-centered Communication between Patients and Providers, Design Thinking Research. In Meinel C and Leifer L eds. New York: Springer, 2019. pp179-197.
4. Rigelhaupt PM and **Angst MS**: Nociceptive Physiology, Pharmacology and Physiology for Anesthesia Second Edition. In Hemmings HC and Egan YD eds. Philadelphia: Elsevier, 2019. pp311-331.
5. Norten JA and **Angst MS**: Pancreatic Surgery, Anesthesiologist's Manual of Surgical Procedures Fifth Edition. In Jaffe RA ed. New York: Wolters Kluwer, 2014. pp623-628.
6. Norten JA and **Angst MS**: Peritoneal Surgery, Anesthesiologist's Manual of Surgical Procedures Fifth Edition. In Jaffe RA ed. New York: Wolters Kluwer, 2014. pp639-658.
7. Ottestad E and **Angst MS**: Nociceptive Physiology, Pharmacology and Physiology for Anesthesia. In Hemmings HC and Egan YD eds. Philadelphia: Elsevier, 2013. pp235-252.
8. **Angst MS**, Chu LF, Clark JD: Overview on Clinical Features of Opioid-induced Hyperalgesia, Opioid-induced Hyperalgesia. In Mao J ed. London: Informa Healthcare, 2009. pp21-37.
9. Norten JA and **Angst MS**: Pancreatic Surgery, Anesthesiologist's Manual of Surgical Procedures Forth Edition. In Jaffe RA and Samuels SL eds. New York: Wolters Kluwer/ Lippincott Williams & Wilkins, 2009. pp609-624.
10. Norten JA and **Angst MS**: Peritoneal Surgery, Anesthesiologist's Manual of Surgical Procedures Forth Edition. In Jaffe RA and Samuels SL eds. New York: Wolters Kluwer/ Lippincott Williams & Wilkins, 2009. pp625-644.
11. Chu LF, Clark JD, **Angst MS**: Molecular Basis and Clinical Implications of Opioid Tolerance and Opioid- Induced Hyperalgesia, Acute Pain Management. In Sinatra R, deLeon-Casasola OA, Ginsberg B, Viscusi ER eds. Cambridge: Cambridge University Press, 2009. pp114-143

12. Norton JA and **Angst MS**: Pancreatic Surgery, Anesthesiologist's Manual of Surgical Procedures Third Edition. In Jaffe RA and Samuels SL eds. New York: Wolters Kluwer/ Lippincott Williams & Wilkins, 2004.
13. Norton JA and **Angst MS**: Peritoneal Surgery, Anesthesiologist's Manual of Surgical Procedures Third Edition. In Jaffe RA and Samuels SL eds. New York: Wolters Kluwer/ Lippincott Williams & Wilkins, 2004.

### Abstracts (33 last 5 years, 97 total)

1. Verdonk F, Hedou J, Marić I, Bellan G, Einhaus J, Gaudilliere D, Bonham A, **Angst MS**, Gaudilliere B. An Immune Signature of Surgical Site Infections (SSI), a Retrospective Study with a Novel Machine Learning Pipeline for Biomarker Identification. IARS 2023.
2. Verdonk F, Hedou J, Marić I, Bellan G, Einhaus J, Gaudilliere D, Ladant FX, Stelzer I, Feyaerts D, Tsai A, Bonham A, **Angst MS**, Aghaeepour N, Stevenson DK, Tibshirani R, Gaudilliere B. STABL Enables Reliable and Selective Biomarker Discovery in Predictive Modeling of High-dimensional Omics Data. IARS 2023.
3. Tsai AS, Hedou J, Einhaus J, Rumer K, Verdonk F, Stanley N, Choisy B, Ganio E, Bonham A, Jacobsen D, Warrington B, Gao X, Tingle M, McAllister TN, Fallahzadeh R, Feyaerts D, Stelzer I, Gaudilliere D, Ando K, Shelton A, Morris A, Kebebew E, Aghaeepour N, Kin C, **Angst MS**, Gaudilliere B. Integrated single-cell and plasma proteomic modeling to predict surgical site complications, a prospective cohort study. IARS 2022.
4. Verdonk F, Tsai AS, Hedou J, Heifets B, Gaudilliere D, Bellan G, Feyaerts F, Stelzer I, Ganio E, Sato M, Bonham A, Ando A, Aghaeepour N, **Angst MS**, Gaudilliere B. An immune signature of postoperative cognitive dysfunction (POCD). IARS 2022.
5. Choisy B, Hedou GH, Verdonk F, Gaudilliere D, Tsai AS, Shankar K, Sato M, Einhaus J, Ganio E, Bonham A, Warrington B, Ahmad S, Tingle M, Ando K, Bruckman S, S. **Angst MS**, Kin C, Gaudilliere B. Multimodal, coached telehealth prehabilitation has high compliance and improves exercise and cognitive capacity prior to surgery: a pilot study. IARS 2022.
6. Multiomics Longitudinal Modeling of Preeclamptic Pregnancies Marić I, Contrepolis K, Moufarrej M, Stelzer, Feyaerts D, Han H, Tang A, Wong RJ, Darmstadt GL, Winn VD, Shaw GM, Relman DA, Quake SR, **Angst MS**, Snyder MP, Stevenson DK, Brice Gaudilliere G, Aghaeepour N. SRI 2022.
7. Chang AL, Reiss JD, Culos A, Becker M, Mayo JA, Marić I, Fallahzadeh R, Bidoki NH, De Francesco D, Phongpreecha T, Espinosa CA, Xenochristou M, Zhang M, Stanley N, Lee HC, Gaudilliere B, **Angst MS**, Stevenson DK, Shaw GM, Sylvester KG, Aghaeepour N. Quantitative assessment of neonatal health using dried blood spot metabolite profiles and deep learning. SRI and PAS 2022.
8. Feyaerts D, Stelzer IA, Maric I, Hedou J, Diop M, Ganio EA, Han X, Ando K, Aghaeepour N, Hlatky MA, **Angst MS**, Winn VD, Stevenson DK, Romero R, Gaudilliere B, Gomez-Lopez N. Cross-tissue Assessment of Local and Peripheral Immune Determinants of Preeclampsia. PAS 2022.
9. Becker M, Nassar H, Espinosa CA, Stelzer IA, Feyaerts D, Berson E, Bidoki N, Chang AL, De Francesco D, Fallahzadeh R, Maric I, Mataraso SJ, Phongpreecha T, Ravindra NG, Stanley N, Thuraiappah M, Shaw G, Stevenson DK, **Angst MS**, Gaudilliere B, Aghaeepour N. Next-generation Network Construction Algorithm Reveals Changes in Coordination between Multiomics Biological Pathways during Pregnancy. PAS 2022.
10. Espinosa CA, Chang AL, Phongpreecha T, Moufarrej MN, Contrepolis K, Wong RJ, Quaintance CC, Becker M, Berson E, Bidoki N, De Francesco D, Liu Q, Mataraso S, Ravindra N, Thuraiappah M, Stelzer I, Maric I, Wise PH, Winn VD, Druzin ML, Gibbs RS, Darmstadt GL, Murray JC, Gaudilliere B, Snyder MP, **Angst MS**, Shaw GM, Stevenson DK, Aghaeepour N. Multiomics modeling of preterm birth in low- and middle-income countries. SRI 2022.
11. Protocol for a multisite prospective biomarker study in adolescent chronic musculoskeletal pain. Simons L, Coghill R, Moayed M, Stinson J, King C, Lopez-Sola M, **Angst MS**, Gaudilliere B, Aghaeepour N. NIH 2021 HEAL meeting.

12. Marić I, Contrepois K, Moufarrej M, Stelzer I, Feyaerts D, Han X, Tang A, Stanley N, Wong RJ, Winn VD, Shaw GM, Relman DA, Quake SR, **Angst MS**, Snyder MP, Stevenson DK, Gaudilliere B, Aghaeepour N. Multiomics Data Analysis Predicts Risk of Preeclampsia. Pediatric Academic Societies 2021 Virtual Meeting.
13. Kristen Rumer K, Ganio E, Stanley N, Tsai E, Kin S, Shelton A, Morris A, **Angst MS**, Aghaeepour N, Gaudilliere B. Deep immune profiling of patients with inflammatory bowel disease reveal disordered immune cell frequencies before and in response to major abdominal surgery. Scientific Forum 2020
14. Tsai ES, Rumer K, Wong KD, Warrington B, Shelton E, Ganio E, Ando K, Tsai AS, Kebebew E, Shelton A, Morris A, Kirilcuk N, Gurland B, Folk-Tolbert M, Shankar K, Kin C, **Angst MS**, Aghaeepour N, Brice G. Immune profiling to predict recovery outcomes after surgery. Shock 2019.
15. Rishel C, **Angst MS**, Sun E. Association between the Trajectory of Preoperative Opioid Use and Postoperative Opioid Use, Adverse Events, and Economic Outcomes: A Retrospective Analysis. IARS 2019.
16. Stelzer I, Becker M, Han X, Ganio E, Tsai E, Peterson L, Shaw G, Stevenson DK, **Angst MS**, Aghaeepour N, Gaudillière. Fetal sex influences maternal immune system dynamics over the course of pregnancy. ISIR 2019.
17. Ghaemi M, Becker M, Culos A, Fallahzadeh R, Hamad GB, Hedou J, Phongpreecha T, Stanley N, Tanada A, Ando K, Baca Q, Ganio E, Gaudilliere D, Han X, Peterson L, Rumer K, Stelzer I, Tsai A, Tsai E, Wong R, Shaw G, Stevenson D, Snyder M, Relman D, Quake S, **Angst MS**, Gaudilliere B, Aghaeepour N. Machine Learning for Integration of Mass Cytometry with the Transcriptome, Microbiome, Proteome, and Metabolome for Prediction of Clinical Outcomes. CYTO 2019.
18. Stanley N, Han X, Fallahzadeh R, Ganio E, Becker M, Culos A, Hamad GB, Hedou J, Phongpreecha T, Tanada A, Ando K, Baca Q, Gaudilliere D, Peterson, Rumer K, Stelzer I, Tsai A, Tsai E, **Angst MS**, Gaudilliere B, Aghaeepour N. Multi-view Machine Learning Increases Predictive Power in Clinical Flow and Mass Cytometry Datasets. CYTO 2019
19. Ganio E, Stanley N, Einhaus J, Tsai A, Culos A, Rumer K, Fallahzadeh R, Lindberg-Larsen V, Kehlet H, **Angst MS**, Aghaeepour N, Gaudillière B. Deep Immune Profile of Preoperative Glucocorticoid Administration in Patients Undergoing Surgery. AUA/IARS 2019, Shock 2019, CYTO 2019.
20. Rishel C, **Angst MS**, Sun E. Association between Preoperative Opioid Weaning and Subsequent Long-term Opioid Use: A Retrospective Analysis. AUA/IARS 2019.
21. Baca QJ, McNeil L, Okada R, Tingle M, Aghaeepour A, Gaudilliere B, **Angst MS**. Lidocaine Infusion during Hip Arthroplasty Modulates the Surgical Immune Response and Decreases Postoperative Pain. ASRA 2019.
22. Feinstein I, Yutsis M, Fischbein MP, Oakes DA, **Angst MS**. Investigating Cognitive Decline after Cardiac Surgery: A Magnetic Resonance Spectroscopy Approach. SCA 2019.
23. Han, X., Ghaemi, M. S., Ando, K., Peterson, L., Ganio, E. A., Tsai, A. S., Gaudilliere, D., Einhaus, J., Tsai, E. S., Stanley, N. M., Culos, A., Taneda, A. H., Fallahzadeh, R., Wong, R. J., Winn, V. D., Stevenson, D. K., **Angst, MS.**, Aghaeepour, N., Gaudilliere, B. Differential Dynamics of the Maternal Immune System in Healthy Pregnancy and Preeclampsia. SRI 2019, CYTO 2019.
24. Ando, K., Han, X., Ghaemi, S., Tsai, A., Ganio, E., Gaudilliere, D., Culos, T., Shaw, G., Wong, R., Stevenson, D., Carvalho, B., Tingle, M., **Angst, MS.**, Aghaeepour, N., Gaudilliere, B. Mass Cytometry and Proteomic Based Prediction of the Onset of Labor. SOAP 2018.
25. Tsai AS, Beneyto MM, Berry K, Ganio EA, Baca QD, Gaudillière D, Han X, Ando K, **Angst MS**, Lansberg MG, Buckwalter MS, Gaudillière B, Aghaeepour N. Systemic Immune Profile of Stroke Recovery. Cyto 2018, Shock 2019.
26. Gaudillière D, Djebali K, Culos T, Tsai AS, Ganio EA, Choi W, Ahmad A, Okada R, Tingle M, **Angst MS**, Aghaeepour N, Gaudillière B. Identifying a Peripheral Immune Signature of Chronic Periodontitis Using Mass Cytometry. CYTO 2018.
27. Han X, Ando K, Ghaemi S, Tsai AS, Ganio EA, Gaudillière D, Culos T, Tanada A, Shaw G, Stevenson D, Carvalho B, Tingle M, **Angst MS**, Aghaeepour N, Gaudillière B. Assessment of Maternal Peripheral Immune System by Mass Cytometry to Predict the Onset of Labor. CYTO 2018.

28. Spatz J, Tsai AS, Gaudillière D, Ganio EA, **Angst MS**, Hughes-Fulford M, Aghaeepour N, Gaudillière B. Immunosuppression in Space: System-level, single-cell human adaptations to microgravity. CYTO 2018.
29. Ganio EA, Choisy B, Gaudillière D, Tsai AS, Han X, Ando K, Tingle M, McNeil L, **Angst MS**, Aghaeepour N, Gaudillière B. Systematic examination of whole blood sample handling procedure for analysis of immune cell function. CYTO 2018.
30. Rishel C, **Angst MS**, Sun E. Association between preoperative opioid weaning and postoperative outcomes among chronic opioid users: a retrospective analysis. WARD 2018.
31. Aghaeepour N, Ganio E, McIlwain D, Tsai A, Tingle M, Van Gassen S, Gaudilliere D, Baca Q, McNeil L, Okada R, Ghaemi MS, Furman D, Wong R, Wing V, Druzin M, El-Sayed Y, Quaintance C, Gibbs R, Darmstadt G, Shaw G, Stevenson D, Tibshirani R, Nolan G, Lewis D, **Angst MS**, Gaudilliere B. An Immune Clock of Human Pregnancy. RECOMB 2018.
32. Ghaemi, S., **Angst, MS.**, Gaudilliere, B., Aghaeepour, N. Multiomics Analysis of the Immunome, Transcriptome, Microbiome, Proteome, and Metabolome in Term Pregnancy. SRI 2018.
33. Predictors of postoperative pain in 1,008 spine surgery patients. Baca QJ, Marti F, Gaudilliere B, Aghaeepour N, **Angst MS**. ASRA 2018.

## VI. Grant Funding

### Current:

4/2022 – 3/2024	Funder: ADRC Stanford and NIH, P30AG066515 Title: Comprehensive Biomarker Analysis of Perioperative Neurocognitive Disorder and its Relationship to Latent Alzheimer’s Disease Pathology Role: Mentor
1/2022 – 12/2023	Funder: March of Dimes Title: Immune Mechanisms and Proteomic Signatures Predicting and Determining Preterm Birth Role: Co-investigator (project leader)
10/2021 – 6/2023	Funder: Bill and Melinda Gates Foundation Title: Discovery Hubs and Network-Adjuvants Role: Co-investigator
9/2020 – 6/2025	Funder: NIH, R35GM138353 Title: Machine Learning for Integrative Modeling of the Immune System in Clinical Settings Role: Co-investigator
9/2020 – 8/2025	Funder: NIH, R21/33AG065744 Title: Building a Platform for Precision Anesthesia for the Geriatric Surgical Patient Role: Co-investigator
7/2020 – 6/2024	Funder: NIH, R01NS117340 Title: B Lymphocyte-Mediated Autoimmunity in Pain after Trauma Role: Site PI
9/2019 – 7/2024	Funder: NIH, R61NS114926 Title: Signatures of Pain Recovery in Teens (SPRINT) Role: Co-investigator
9/2018 – 6/2023	Funder: NIH, R01AG058417-0251 Title: Dietary Modulation of Neuro-inflammation in Age-Related Memory Disorders Role: Site PI
9/2018 – 6/2023	Funder: NIH, R01AG058417

Title: Dietary Modulation of Neuro-inflammation in Age-Related Memory Disorder  
Role: Site PI

**Completed:**

- 2020 – 2021  
Funder: FIDL Award Department of Anesthesiology Stanford University  
Title: Oxidative Stress and Surgical Outcomes  
Role: Co-investigator
- 2020 – 2021  
Funder: RISE Stanford COVID-19 Crisis Response Program  
Title: Using Micro-geographic Variability to Address Modifiable Factors Associated with COVID-19 Transmissibility, Hospitalization, and Death  
Role: Co-investigator
- 2019 – 2022  
Funder: Alkahest Inc.  
Title: A Randomized, Placebo-controlled Pilot Study to Evaluate the Effect of GRF6019 on Intracellular Signaling Cascades in Blood Leukocytes and Post-surgery Recovery of Participants Undergoing Primary Hip or Knee Arthroplasty  
Role: Principal Investigator
- 2019 – 2021  
Funder: SCA/IARS Mid-Career Research Grant  
Title: Enhanced Recovery after Cardiac Surgery with Erector Spinae Plane Catheters: A Prospective, Randomized, Placebo Controlled Trial  
Role: Co-investigator
- 2019 – 2020  
Funder: ITI Center for Systems Immunology and the Bill and Melinda Gates Foundation  
Title: Machine Learning for Integrated Multiomics Analysis of Preeclampsia  
Role: Co-investigator
- 2019 – 2020  
Funder: ITI Center for Systems Immunology and the Bill and Melinda Gates Foundation  
Title: Identifying a Predictive Immune Signatures of Preeclampsia  
Role: Co-investigator
- 2019 – 2020  
Funder: Stanford Maternal and Child Health Research Institute  
Title: Maternal Life Stress, Prenatal Inflammation, and the Developmental Origins of Child Temperament  
Role: Co-investigator
- 2018 – 2022  
Funder: NIH, R01HL139844  
Title: Preeclampsia to Cardiovascular Disease - Life Course Analysis of Biomarkers and Risks  
Role: Co-investigator
- 2018 – 2020  
Funder: NIH, R21DE027728  
Title: Identifying a Systemic Immune Signature of Periodontal Disease with Mass Cytometry  
Role: Co-investigator
- 2018 – 2020  
Funder: American Heart Association  
Title: A Systems-based Mass Cytometry Approach to Study the Post-cardiac Arrest Immune Response  
Role: Co-investigator
- 2018 – 2020  
Funder: Bill and Melinda Gates Foundation  
Maternal and Fetal Markers for New Biology and Maternal/Fetal/Newborn Birth Risk  
Role: Co-investigator (project leader)
- 2017 – 2018  
Funder: SPARK Translational Research Program Stanford University



Title: Cocoa Flavanols for Modulating the Immune Response to Surgery and Accelerate Recovery  
 Role: Principal Investigator  
 2017 – 2018 Funder: Lukas Center Grant, Stanford University  
 Title: Cognitive Decline after Cardiac Surgery: A Multimodal Magnetic Resonance Spectroscopy Approach  
 Role: Co-investigator  
 2017 Funder: Premature Research Center Stanford University School of Medicine  
 Title: A Proteomic Signature of Preeclampsia  
 Role: Principal Investigator  
 2016 – 2019 Funder: NIH, T32GM089626  
 Title: The Effects of Lidocaine on Pain Trajectories and Immune Responses after Hip Arthroplasty  
 Role: Primary Mentor  
 2016 – 2017 Funder: HPI Hasso Plattner Institute  
 Title: Human Technology Teamwork: Enabling Clinicians to Focus on Complex Design Thinking Tasks through Advances in IT Systems Engineering: Tools to Improve Human-centered Communication between Patients and Providers  
 Role: Co-investigator  
 2016 – 2017 Funder: Robert Butler Columbia Aging Center  
 Title: Plasticity in Recovery from Surgery - The Effects of Exercise Prehabilitation on Cognitive and Functional Recovery after Shoulder Replacement Surgery in Older Adults  
 Role: Co-investigator  
 2016 Funder: SomaLogic Inc.  
 Title: Aptamer Technology to Infer Gestational Age in the Plasma Proteome  
 Role: Principal Investigator  
 2014 – 2018 Funder: Stanford Neuroscience Institute  
 Title: The Stroke Collaborative Action Network: Redefining Stroke Recovery  
 Role: Co-investigator  
 2014 – 2018 Funder: NIH, K23GM111657  
 Title: Role of Myeloid-derived Suppressor Cells in the Immune Response to Surgery  
 Role: Mentor  
 2014 – 2016 Funder: Bill and Melinda Gates Foundation  
 Title: Use of Molecular Features in Peripheral Blood to Understand Relationships between Microbiome and Host in the Setting of Preterm Birth  
 Role: Co-investigator  
 2013 – 2017 Funder: NIH, K23HD07097201  
 Title: Postpartum Hemorrhage and Anemia: Epidemiologic and Cost-Effectiveness Analyses  
 Role: Mentor  
 2013 – 2016 Funder: Stanford University School of Medicine, BioX Graduate Fellowship  
 Title: Systems-analysis of the Human Immune Response to Surgery  
 Role: Mentor  
 2013 – 2015 Funder: March of Dimes  
 Title: Characterizing Immune Signatures in Preterm Labor with Single Cell Mass Cytometry  
 Role: Co-investigator (project leader)  
 2013 – 2014 Funder: NIH, T32GM089626  
 Title: Systems Analysis of the Human Immune Response to Surgical Trauma

2012 – 2017  
Role: Mentor  
Department of Anesthesia, Stanford University School of Medicine  
Title: Mass cytometry - A Systems-based Approach for Studying Immune Health in Surgery and Anesthesia

2008 – 2012  
Role: Principal Investigator  
Funder: NIH, R01DA023063  
Title: Opioid Efficacy - A Twin-study

2008 – 2011  
Role: Principal Investigator  
Funder: DARPA, W911NF0710462  
Title: Feedback Regulated Drug Delivery System Based on Polymer Hydrogels and Vesicles

2009 – 2010  
Role: Consortium Principal Investigator  
Funder: NIH, R43DA027259  
Title: Intranasal Nociceptin for the Treatment of Migraine and Head Pain

2008 – 2010  
Role: Consultant  
Funder: Stanford Institute for Immunity, Transplantation and Infection  
Title: A Systems Biology Approach for Discovery of Biomarkers for Inflammatory Pain

2008 – 2010  
Role: Principal Investigator  
Funder: NIH, 1R43DA026228  
Title: Naso-cerebral Administration of Peptides for Temporo-mandibular Joint Pain

2008  
Role: Consultant  
Funder: Scientific Imagenetics Inc.  
Title: Analgesic and Anti-inflammatory Effects of Electromagnetic Therapy in Humans

2007 – 2008  
Role: Principal Investigator  
Funder: DARPA, W911NF0710462  
Title: Feedback Regulated Drug Delivery System Based on Polymer Hydrogels and Vesicles

2006 – 2008  
Role: Consortium Principal Investigator  
Funder: NIH, K12  
Title: Chronic Persistent Pain Following Cesarean Delivery: The Role of Wound Cytokines

2007  
Role: Mentor  
Funder: I-Flow Corporation  
Title: Continuous Administration of Bupivacaine and Ketamine to Surgical Wounds via the Follow-on Pain Buster System: Analgesic, Anti-hyperalgesia and Anti-inflammatory Effects

2007  
Role: Principal Investigator  
Funder: Department of Anesthesia, Stanford University School of Medicine  
Title: Pilot-Study - Heritability of Opioid Analgesia

2006  
Role: Principal Investigator  
Funder: Organon Pharmaceuticals Inc.  
Title: A Multi-center, Randomized, Phase III Trial Assessing the PK/PD of Org 25969 in Subjects of Various Ages

2005 – 2007  
Role: Co-investigator  
Funder: Department of Anesthesia, Stanford University School of Medicine  
Title: Effects of Trans-cranial Electro-stimulation on Pain Perception, Cognition and Mood in Human Volunteers

2005 – 2006  
Role: Mentor  
Funder: Department of Anesthesia, Stanford University School of Medicine

Title: Effect of Nicotine on Inflammatory and Nociceptive Biomarkers in a Sunburn Model of Hyperalgesia in Healthy Volunteers  
 Role: Principal Investigator  
 2005 Funder: Organon Pharmaceuticals Inc.  
 Title: A Multi-center, Randomized, Assessor-blinded, Phase II, Parallel Dose-finding Trial to Assess the Efficacy and Safety of Org 25969  
 Role: Co-investigator  
 2004 – 2009 Funder: NIH, K23  
 Title: Opiate-induced Tolerance and Hyperalgesia in Pain Patients  
 Role: Mentor  
 2004 – 2005 Funder: Department of Anesthesia, Stanford University School of Medicine  
 Title: Human Biomarkers of Inflammation and Nociception: Validation of an In-vivo Model  
 Role: Principal Investigator  
 2003 – 2004 Funder: Foundation for Anesthesia Education and Research  
 Title: Opiate-induced Tolerance and Hyperalgesia in Pain Patients  
 Role: Mentor  
 2002 – 2004 Funder: Foundation for Anesthesia Education and Research  
 Title: Differential Rate for the Development of Acute Tolerance to Opioid-induced Analgesia, Respiratory Depression and Sedation  
 Role: Principal Investigator  
 2001 – 2002 Funder: Physiometrix Inc.  
 Title: Data Collection Study for PSA 4000 with Hypnos Software Upgrade  
 Role: Co-investigator  
 2001 – 2002 Funder: Department of Anesthesia, Stanford University School of Medicine  
 Title: Gender and Rate Differences in Acute Tolerance and Withdrawal to the Analgesic, Sedative, and Respiratory Depressant Effects of Opioids  
 Role: Principal Investigator  
 2000 – 2001 Funder: Department of Anesthesia, Stanford University School of Medicine  
 Title: Experimental Model of Acute Opioid Tolerance and Withdrawal in Man  
 Role: Principal Investigator  
 2000 – 2001 Funder: Cellergy Pharmaceuticals Inc.  
 Title: Pharmacokinetics of Anogestic in Patients with Anal Fissure  
 Role: Co-investigator  
 1997 – 2001 Funder: Knoll Pharmaceutical Company  
 Title: Pharmacokinetics and Pharmacodynamics of Slow Release Hydromorphone in Humans  
 Role: Principal Investigator  
 1996 – 1997 Funder: Abbott Inc.  
 Title: Analgesic Action of Dexmedetomidine in Humans  
 Role: Principal Investigator  
 1996 Funder: Neurobiological Technologies Inc.  
 Title: Pharmacokinetics of Corticotropin-Releasing Factor in Man  
 Role: Principal Investigator  
 1995 – 1996 Funder: Organon Inc.  
 Title: ORG-9487 - A New Rapid Onset Muscle Relaxant  
 Role: Co-investigator

## VII. Patents

1. US 8,258,096: Therapy procedure for drug delivery for trigeminal pain (2012)

2. US 8,252,745: Methods for treatment of headaches by administration of oxytocin (2012)
3. US 8,202,838: Methods for the treatment of headaches by administration of oxytocin (2012)
4. US 8,198,240: Methods for the treatment of headaches by administration of oxytocin (2012)
5. US 8,551,949: Methods for the treatment of pain (2013)
6. US 8,501,691: Methods for the treatment of headaches by administration of oxytocin (2013)
7. US14/562,401: Methods and compositions for treating aging-associated conditions (2015)
8. US 9,238,053: Methods for the treatment of pain (2016)
9. US62/767,957: Compositions and methods of prognosis and classification for preeclampsia (2018)
10. US63/066,701: Composition and methods of predicting time to onset of labor (2020)
11. US63/162,912: Systems and methods to generate a surgical risk score and uses thereof (2021)

## **IX. Editorial Services**

### **Editorial positions**

2007 – 2010	Associate Editor, Anesthesia & Analgesia
2010 – 2012	Editor, Anesthesia & Analgesia
2010 – 2019	Associate Editor, European Journal of Pain
2012 – 2014	Section Editor Pain and Analgesic Mechanisms, Anesthesia & Analgesia

## **X. Services as Grant Reviewer**

2001 – 2006	Research Grants Council of Hong Kong, China
2006	NIH, NAIDA: Ad hoc Reviewer
2009	NIH, NINDS: ZRG1 SBIB-V Challenge Grant Panel
2011	NIH, Somatosensory and Chemosensory Systems Study Section
2017	NIH, Special emphasis panel NCCIH - Phased Innovation Award for Mechanistic Studies to Optimize Mind Body Interventions in NCCIH High Priority Research Topics
2019	NIH, Special Emphasis Panel ZRG1 IFCN-L HEAL Initiative
2021	NIH, NINDS: Neurological Sciences and Disorders A Study Section

## **XI. Administrative Services**

2022 – present	Co-chair Data Governance Committee, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2022 – present	Search Committee Chair: Anesthesia Division Chief of Critical Care Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2022 – present	Data Science Initiative Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2022 – present	Executive Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2022 – present	Operations Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2021 – present	MCL Search Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2020 – 2021	Multi-Organ Transplantation Quality Project Member, Stanford University School of Medicine
2019 – 2022	CVH Operations Leadership Group Member, Stanford Cardiovascular Health Service Line

2019 – present	Governance Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2019 – present	Finance Committee Member, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2018 – 2021	Search Committee Member: UML Faculty Search, Department of Surgery, Stanford University School of Medicine
2017 – 2018	Search Committee Chair: Division Chief Cardiovascular and Thoracic Anesthesia, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2016 – 2020	Stanford Biobank Working Group Member, Representative for the Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2016	Member High Value Care Team for Spine Surgery, Stanford Medicine
2015 – 2021	Appointment and Promotion Committee, Stanford University School of Medicine
2015	Search Committee Member: Head Bio-banking and Population-based Genetic Research, Department of Medicine, Stanford University School of Medicine
2014	Search Committee Chair: Clinician Scientist in Pain Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2014	Search Committee Member: Senior Scientist, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2013	Search Committee Member: Clinician Scientist in Clinical Pharmacology, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2012	Search Committee Member: Clinician Scientist, Critical Care Division, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2011	Search Committee Member: Chief of Multi-Specialty Division, Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
2011	Search Committee Member: Research Faculty, Stanford Neuroscience Institute, Stanford University School of Medicine
2009 – 2012	Member of Stanford Hospital Committee for Establishing ICU CNS Pharmacotherapy Guidelines, Stanford Medicine
2000 – 2006	Admissions Panel Medical School, Stanford University School of Medicine

## **XII. Services to Professional Organizations**

1995 – 2014	Member International Association for the Study of Pain
1995 – 2014	Member American Pain Society
1995 – present	Member California Society of Anesthesiologists
1995 – present	Member American Society of Anesthesiologists
1996 – present	Member International Anesthesia Research Society
1997 – 2000	Member American Society for Clinical Pharmacology and Therapeutics
2009 – present	Member Association of University Anesthesiologists (elected)
2015 – 2022	Member Shock Society
2015 – 2022	Member American Association of Immunologists

## **XIII. Invited Presentations (since 2011)**

**Grand Rounds (total 16):**

1. 2011 “Opioid Pharmacogenomics in a Twin-Study Paradigm”, Laboratory of the Biology of Addictive Diseases, Rockefeller University, New York, NY
2. 2014 “Immunity in the Context of Surgery and Anesthesia. Department of Anesthesiology, Pain and Perioperative Medicine, Stanford, CA
3. 2014 “Clinical Recovery from Surgery Strongly Correlates with Single-Cell Immune Signatures, CCR UCSF, San Francisco, CA
4. 2015 “Immune Signatures of Clinical Recovery from Surgical Trauma: Mass Cytometry to Comprehensively Surveil the Entire Immune System with Single-cell Resolution at the Bedside”, Rigshospitalet, Copenhagen University, Denmark
5. 2015 “Single-cell Analysis of the Peripheral Immune System in Patients with a History of Term and Preterm labor”, Department of Pediatrics, Stanford, CA
6. 2016 “Immune Correlates of Delayed Surgical Recovery”, Department of Anesthesia, Washington University, St. Louis, MO
7. 2017 “Immune Correlates of Surgical Recovery, Grand Round DeGroote Institute, McMaster University, Hamilton, Canada
8. 2022 “Biological Determinants of Postoperative Recovery”, Grand Round, Stony Brook Medicine, Stony Brook, NY
9. 2022 “Anesthetic Management of Aneurysms and Vascular Malformations”, Grand Round, Stony Brook Medicine, Stony Brook, NY

**National/Regional Meetings (total 23):**

1. 2013 “TIVA - Implications on Pain Management”, Mylan Roundtable, Trenton, NJ
2. 2013 “The Role of Pharmacologic Challenge in Patient Phenotyping for Phase 2 and 3 Trials”, IMMPACT, Washington DC
3. 2015 “Implementing Mass Cytometry at the Bedside: Single-cell Immune Signatures of Clinical Recovery from Surgical Trauma. Stroke Collaborative Action Network, Stanford, CA
4. 2015 “Single-Cell Immune Signatures Predict Clinical Recovery after Surgery. UCSF/Stanford Anesthesia Research Retreat, Millbrae, CA
5. 2017 “A Proteomic Clock of Pregnancy”, Stanford Prematurity Research Center, Stanford, CA
6. 2018 “Emerging Tools and Approaches in Biomarker Discovery and Development”, Panel Chair NIH Workshop, Washington DC
7. 2018 “Multiomic and Computational Approaches to Biomarker Discovery: Mass Cytometry and Data Integration”, NIH Workshop, Washington DC
8. 2018 “A Proteomic Signature of Preeclampsia”, Stanford Prematurity Research Center, Stanford, CA
9. 2018 “Deep Multiomic Profiling in Clinical Studies”, UCSF/Stanford Research Retreat, Millbrae, CA
10. 2018 “Cocoa Flavanols for Modulating the Surgical Immune Response and Accelerating Clinical Recovery” SPARK, Stanford, CA
11. 2019 “Cocoa Flavanols for Modulating the Surgical Immune Response and Accelerating Clinical Recovery - Final Results”, SPARK, Stanford, CA

**International Meetings (total 21):**

1. 2011 “All about Opioids: Opioid-induced Hyperalgesia”, American Academy of Pain Medicine, Washington DC
2. 2012 “Opioid-induced Hyperalgesia: Clinical Presentation and Implication”, World Institute of Pain, Miami, FL
3. 2015 “The Resolution of Pain after Surgery and Trauma - New Concepts Bring New Opportunities: Immunologic Aspects of Recovery from Surgery”, American Society of Anesthesiology, New Orleans, LA

4. 2016 “Cellular and Proteomic Signatures of Term/preterm Birth”, March of Dimes, Montreal, Canada
5. 2016 “New Thoughts on Predicting and Preventing Chronic Pain after Surgery: An Immune Biomarker for Slow Recovery and How to Modify Risk in Slow Recovery”, International Anesthesia Research Society, San Francisco, CA
6. 2019 “Persistent Postsurgical Pain - Pathophysiology and Preventive Strategies: Perioperative Inflammation and Immune Response”, American Society of Anesthesiology, Orlando, FL
7. 2019 “Intraoperative Opioids: Postoperative Consequences, Opioid-free Anesthesia, and Nociception-Index Guided Anesthesia”, International Anesthesia Research Society, Montreal, Canada
8. 2019 “Shifting Gears – Biological Hall Marks of Surgical Recovery”, Shock Society, San Diego, CA
9. 2019 “Immune Signatures for Risk Profiling of Surgical Patients”, Intensive Care Symposium, Schwyz, Switzerland
10. 2019 “Signals to Begin Labor – Inflammation and PTL, March of Dimes, Washington DC
11. 2021 “Symposium on Immune Health in Surgery and Critical Care – Challenges and Novel Opportunities (organizer and moderator)”, International Anesthesia Research Society, Online (due to COVID-19)

#### **XIV. Trainees**

##### **Junior Faculty:**

2003 – 2004	Larry F. Chu, MD, FAER Award, NIH K23 Award
2006 – 2008	Brendan Carvalho, MD, BIRCWH Scholar, NIH K12 Award
2013 – 2017	Alexander Butwick, MD, NIH K-23 Award
2013 – 2019	Quentin Barca, MD, PhD, FARM fellow, NIH T32 Award
2014 – 2018	Brice Gaudilliere, MD, PhD, FARM fellow, NIH T-32 Award, NIH K-23 Award
2015 – present	Igor Feinstein, MD, PhD, FARM fellow, ADRC/NIA Award
2019 – 2020	Karen Hirsch, MD, AHA Award
2019 – 2021	Jessica Brodt, MD, SCA/IARS Award

##### **Postdoctoral Fellows:**

1997 – 1998	Bhamini Rhamaswamy, MD
1999 – 2001	Yehuda Ginosar, MD
2009 – 2012	David Ruau, PhD
2005 – 2007	Jason M. Cuellar, PhD, Medical Student, Stanford Scholar Fellowship Award
2017 – 2019	Chris Rishel, MD, FARM Fellow, NIH T32 Award

##### **Graduate Student:**

2012 – 2016	Gabi Fragiadakis, BioX Graduate Fellow Award
-------------	--

##### **Medical Student:**

2009	Victor Wang, FAER Medical Student Fellow Award
2010	Jeremy Harris, Medical Scholar Fellowship Award
2011	Ryan Schuber, SSPS Scholar Award