

## **James M Sonner, MD**

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## **SUMMARY OF EXPERTISE**

A Harvard-educated physician-scientist and Professor Emeritus at the University of California, San Francisco, with over 35 years of experience in chemistry, pharmacology, and clinical medicine. Board-certified in anesthesiology, with a career encompassing the care of approximately 50,000 patients and extensive NIH-funded research into drug mechanisms. Specialized in the pharmacology of the nervous system, expert analysis focuses on drug interactions, perioperative medication safety, and the identification of adverse drug reactions or toxic effects. A prolific researcher with nearly 100 peer-reviewed publications and a co-edited textbook, providing clear, scientifically rigorous, and impartial evaluations of complex pharmacological outcomes in clinical and legal contexts.

## **EDUCATION**

Harvard Medical School, Boston, MA  
Doctor of Medicine 1988

Harvard Graduate School of Arts and Sciences, Cambridge, MA  
Master's Degree, Biochemistry and Molecular Biology 1986

Harvey Mudd College, Claremont, CA  
Bachelor of Science, Chemistry 1981

University of Oxford  
Chemistry, one year as an undergraduate 1979-1980

## **EMPLOYMENT/PRINCIPAL POSITIONS HELD**

University of California, San Francisco (UCSF), 2016 – present  
Professor Emeritus, Anesthesiology and Perioperative Care

University of California, San Francisco (UCSF), 1992 – 2016  
Assistant, Associate, Professor, Anesthesiology and Perioperative Care

Knowledge Pharmaceuticals Inc, 2023 – 2026

CoFounder

Cedars-Sinai — Marina del Rey Hospital, Marina del Rey, CA, 2022 – 2026  
Anesthesiologist

Branequest Inc, 2016 – 2023  
Founder

Cedars Sinai Huntington Hospital, Pasadena, CA, 2016 – 2021  
Anesthesiologist

Huntington Medical Research Institute, Pasadena, CA 2016-2019  
Staff

Stanford University, 2006 – 2007  
Sabbatical, Biology and Chemical Engineering

University of California, San Francisco, CA  
Research Fellow 1995

University of California, San Francisco, CA  
Resident, Chief Resident (Anesthesiology) 1988-1992

Harvey Mudd College, Claremont, CA 1981-1982  
Laboratory Technician

University of Southern California, Los Angeles, CA 1981  
Laboratory Technician

## **PROFESSIONAL ACTIVITIES**

I worked at UCSF for 24 years following my residency. I was an attending anesthesiologist in the operating rooms at Moffitt-Long Hospital, Mt Zion Hospital, Mission Bay Hospital, Ambulatory Surgery Centers, and Orthopedic Institute there. My clinical activities involved the care of patients undergoing orthopedic, ophthalmologic, head and neck, oral/ maxillofacial, general surgical, plastic, gynecologic, obstetrical, urologic, transplant, spine, and occasionally vascular, intracranial, pediatric, and thoracic procedures.

My research at UCSF involved genetic approaches, electrophysiology, biophysical, and behavioral methods to investigate the mechanism of anesthetic action. This work led to new drugs. UCSF assigned me the patent rights to those drugs, which I signed over to Branequest. When I later discovered applications to cancer, I signed the patent rights over to Knowledge Pharmaceuticals Inc.

After leaving UCSF I worked first in the operating rooms at Huntington Memorial Hospital, Pasadena, CA which is affiliated with Cedars-Sinai Health System, and then in the operating rooms at Cedars-Sinai Marina del Rey Hospital.

## LICENSES, CERTIFICATION

1989 California State Medical Board License No. G 67923  
1993 American Board of Anesthesiology No 22472  
2009 American Board of Anesthesiology, Maintenance of Certification  
Present Drug Enforcement Administration certificate BS3085001  
2024 Advanced Cardiac Life Support 245409307768

## PEER REVIEWED JOURNAL PUBLICATIONS

1. **Sonner J**, Purves W. Natural occurrence of indole-3-acetylaspargate and indole-3-acetylglutamate in cucumber shoot tissue. *Plant Physiol* 1985; 77(3): 784-785
2. **Sonner J**, McPeck B. Precision and Generalizability. *Theoretical Surgery* 2 (4) p 162-164 (1988).
3. Fenerty J, **Sonner J**, Sakura S, Drasner K. Transient Radicular Pain Following Spinal Anesthesia: Review of the Literature and Report of a Case Involving 2% Lidocaine. *Int. J Obstet Anesth* 5 p. 32-35 (1996).
4. **Sonner J**, Katz J, Hynson J, Clark O. Nausea and Vomiting Following Thyroid and Parathyroid Surgery. *Journal of Clinical Anesthesia* 1997 Aug, 9 (5): 398-402.
5. Fang Z, **Sonner J**, Laster M, Ionescu P, Kandel L, Eger E, Halsey M. Anesthetic and Convulsant Properties of Aromatic Compounds and Cycloalkanes: Implications for Mechanisms of Narcosis. *Anesth Analg* 1996; 83: 1097-104.
6. Kandel L, Chortkoff B, **Sonner J**, Laster M, Eger E. Non-Anesthetics Can Suppress Learning. *Anesth Analg* 1996; 82: 321-6.
7. Fang Z, Laster M, Gong D, Ionescu P, Koblin DD, **Sonner J**, Eger, E, Halsey, M. Convulsant Activity of Nonanesthetic Gas Combinations. *Anesth Analg* 1997; 84:634-40.
8. Eger E, Koblin D, Bowland T, Balea M, Ionescu P, Laster M, Fang Z, Gong D, **Sonner J**, Weiskopf R. Nephrotoxicity of Sevoflurane vs. Desflurane Anesthesia in Volunteers. *Anesth Analg* 1997; 84:160-8.

9. Fang Z, Ionescu P, Chortkoff B, Kandel L, **Sonner J**, Laster M, Eger E. Anesthetic Potencies of n-Alkanols: Results of Additivity Studies Suggest a Mechanism of Action Similar to that for Conventional Inhaled Anesthetics. *Anesth Analg* 1997; 84: 1042-8.
10. Eger E, Bowland T, Ionescu P, Laster M, Fang Z, Gong D, **Sonner J**, Weiskopf R. Recovery and kinetic characteristics of desflurane and sevoflurane in volunteers after 8-h exposure include kinetics of degradation products. *Anesthesiology*, 1997 Sep, 87 (3): 517-26.
11. Fang Z, Laster MJ, Ionescu P, Koblin D, **Sonner J**, Eger E, Halsey M. Effects of inhaled nonimmobilizer, proconvulsant compounds on desflurane minimum alveolar anesthetic concentration in rats. *Anesth Analg* 1997; 85(5): 1149-53.
12. **Sonner J**, Li J, Eger E. Desflurane and Nitrous Oxide, But Not Nonimmobilizers, Affect Nociceptive Responses. *Anesth Analg* 1998; 86:629-34.
13. **Sonner J**, Li J, Eger E. Desflurane and the nonimmobilizer, 1,2,-Dichlorohexafluorocyclobutane (2N), suppress learning by a mechanism independent of the level of unconditioned stimulation. *Anesth Analg* 1998; 87:200-205.
14. **Sonner J**, Li J, Kandel L, Eger E. Ethanol concentrations approaching minimum alveolar anesthetic concentration are required to suppress learning in a fear-potentiated startle paradigm in rats. *Anesth Analg* 1998;87(6): 1398-403.
15. **Sonner J**, Li J, Eger E, Gong D, Laster M. Mouse Strain Modestly Influences MAC. *Anesth Analg* 1999;89:1030-4.
16. Eger E, Cantor R, Halsey M, Harris R, Kendig J, Koblin D, Pohorille A, **Sonner J**, Trudell J. Hypothesis: volatile anesthetics produce immobility by acting on two sites approximately five carbons apart. *Anesth Analg* 1999; 88:1395-1400.
17. Eger E, Koblin D, **Sonner J**, Fang Z, Gong D, Laster M, Ionescu P, Halsey M, Terrell R, Hudlicky T. Nonimmobilizers and transitional compounds may produce convulsions by two mechanisms. *Anesth Analg* 1999; 88:884-92.
18. Joo D, Xiong Z, MacDonald J, Jia Z, Roder J, **Sonner J**, Orser B. Blockade of glutamate receptors and barbiturate anesthesia: increased sensitivity to pentobarbital-induced anesthesia despite reduced inhibition of AMPA receptors in GluR2 null mutant mice. *Anesthesiology* 1999; 91(5): 1329-41.
19. Zhang Y, Wu S, Eger E, **Sonner J**. Neither GABA-A nor strychnine-sensitive glycine receptors are the sole mediators of MAC. *Anesth Analg* 2001; 92: 123-7.
20. Maurer A, **Sonner J**, Sessler D, Eger E. The nonimmobilizer 1,2,-dichlorohexafluorocyclobutane does not affect thermoregulation in rats. *Anesth Analg* 2000; 91: 1013-6.

21. **Sonner J**, Gong D, Eger E. A survey of the naturally occurring variability in MAC to three conventional inhaled anesthetics among inbred mouse strains. *Anesth Analg* 2000; 91: 720-6.
22. Zhang Y, Eger E, Dutton R, **Sonner J**. Inhaled anesthetics have hyperalgesic effects at 0.1 minimum alveolar anesthetic concentration. *Anesth Analg* 2000; 91:462-6.
23. Dutton R, Maurer A, **Sonner J**, Laster M, Fanselow M, Laster M, Eger E. The concentration of isoflurane required to suppress learning depends on the type of learning. *Anesthesiology* 2001; 94:514-9.
24. Eger E, Fisher D, Dilger J, **Sonner J**, Evers A, Franks N, Harris R, Kendig J, Lieb W, Yamakura T. Relevant concentrations of inhaled anesthetics for in vitro studies of anesthetic mechanisms. *Anesthesiology*. 2001 May; 94(5): 915-21.
25. Joo D, Gong D, **Sonner J**, Zhengping J, MacDonald J, Eger E, Orser B. Blockade of AMPA Receptors and Volatile Anesthesia. *Anesthesiology* 2001; 94:478-88.
26. Zhang Y, Stabernack C, **Sonner J**, Dutton R, Eger E. Both cerebral GABAA receptors and spinal GABAA receptors modulate the capacity of isoflurane to produce immobility. *Anesth Analg*. 2001;92(6):1585-9.
27. Dutton R, Maurer A, **Sonner J**, Fanselow M, Laster M, Eger E. Short-term memory resists the depressant effect of the nonimmobilizer 1-2-dichlorohexafluorocyclobutane (2N) more than long-term memory. *Anesth Analg*. 2002 Mar;94(3):631-9
28. Dutton R, Maurer A, **Sonner J**, Fanselow M, Laster M, Eger E. Isoflurane causes anterograde but not retrograde amnesia for Pavlovian fear conditioning. *Anesthesiology*. 2002 May;96(5):1223-9.
29. Zhang Y, Stabernack C, Dutton R, **Sonner J**, Trudell J, Mihic S, Yamakura T, Harris R, Gong D, Eger E. Luciferase as a model for the site of inhaled anesthetic action. *Anesth Analg*. 2001 Nov;93(5):1246-52.
30. Flood P, **Sonner J**, Gong D, Coates K. Heteromeric nicotinic inhibition by isoflurane does not mediate MAC or loss of righting reflex. *Anesthesiology*. 2002 Oct;97(4):902-5
31. **Sonner J**. Issues in the design and interpretation of minimum alveolar anesthetic concentration (MAC) studies. *Anesth Analg*. 2002 Sep;95(3):609-14,
32. Flood P, **Sonner J**, Gong D, Coates K. Isoflurane hyperalgesia is modulated by nicotinic inhibition. *Anesthesiology*. 2002 Jul;97(1):192-8.
33. Eger E, Zhang Y, Laster M, Flood P, Kendig J, **Sonner J**. Acetylcholine receptors do not mediate the immobilization produced by inhaled anesthetics. *Anesth Analg*. 2002 Jun;94(6):1500-4,

34. Wong S, **Sonner J**, Kendig J. Acetylcholine receptors do not mediate isoflurane's actions on spinal cord in vitro. *Anesth Analg*. 2002 Jun;94(6):1495-9,
35. **Sonner J**, Fisher D. Do sevoflurane and desflurane differ in upper airway reactivity. *Anesthesiology*. 2002 May;96(5):1274-5;
36. Zhang Y, Laster M, Hara K, Harris R, Eger E, Stabernack C, **Sonner J**. Glycine receptors mediate part of the immobility produced by inhaled anesthetics. *Anesth Analg*. 2003 Jan;96(1):97-101,
37. Stabernack C, **Sonner J**, Laster M, Zhang Y, Xing Y, Sharma M, Eger E. Spinal N-methyl-d-aspartate receptors may contribute to the immobilizing action of isoflurane. *Anesth Analg*. 2003 Jan;96(1):102-7
38. **Sonner J**, Zhang Y, Stabernack C, Abaigar W, Xing Y, Laster M. GABA(A) receptor blockade antagonizes the immobilizing action of propofol but not ketamine or isoflurane in a dose-related manner. *Anesth Analg*. 2003 Mar;96(3):706-12
39. Eger E, Xing Y, Pearce R, Shafer S, Laster M, Zhang Y, Fanselow M, **Sonner J**. Isoflurane antagonizes the capacity of flurothyl or 1,2-dichlorohexafluorocyclobutane to impair fear conditioning to context and tone. *Anesth Analg*. 2003 Apr;96(4):1010-8
40. Eger E, Xing Y, Laster M, **Sonner J**, Antognini J, Carstens E. Halothane and isoflurane have additive minimum alveolar concentration (MAC) effects in rats. *Anesth Analg*. 2003 May;96(5):1350-3
41. Eger E, Xing Y, Laster M, **Sonner J**. Alpha-2 adrenoreceptors probably do not mediate the immobility produced by inhaled anesthetics. *Anesth Analg*. 2003 Jun;96(6):1661-4
42. Dutton R, Zhang Y, Stabernack C, Laster M, **Sonner J**, Eger E. Temporal summation governs part of the minimum alveolar concentration of isoflurane anesthesia. *Anesthesiology*. 2003 Jun;98(6):1372-7
43. Zhang Y, Laster M, Eger E, Stabernack C, **Sonner J**. Blockade of 5-HT<sub>2A</sub> receptors may mediate or modulate part of the immobility produced by inhaled anesthetics. *Anesth Analg*. 2003 Aug;97(2):475-9
44. **Sonner J**, Antognini J, Dutton R, Flood P, Gray A, Harris R, Homanics G, Kendig J, Orser B, Raines D, Trudell J, Vissel B, Eger E. Inhaled anesthetics and immobility: mechanisms, mysteries, and minimum alveolar anesthetic concentration. *Anesth Analg*. 2003 Sep;97(3):718-40
45. Eger E, Laster M, Gregory G, Katoh T, **Sonner J**. Women appear to have the same minimum alveolar concentration as men: a retrospective study. *Anesthesiology*. 2003 Nov;99(5):1059-61.

46. Xing Y, **Sonner J**, Laster M, Abaigar W, Caraiscos V, Orser B, Eger E. Insulin decreases isoflurane minimum alveolar anesthetic concentration in rats independently of an effect on the spinal cord. *Anesth Analg*. 2004 Jun;98(6):1712-7
47. Xing Y, **Sonner J**, Eger E, Cascio M, Sessler D. Mice with a melanocortin 1 receptor mutation have a slightly greater minimum alveolar concentration than control mice. *Anesthesiology*. 2004 Aug;101(2):544-6
48. Zhang Y, **Sonner J**, Eger E, Stabernack C, Laster M, Raines D, Harris R. Gamma-aminobutyric acid A receptors do not mediate the immobility produced by isoflurane. *Anesth Analg*. 2004 Jul;99(1):85-90.
49. Paris A, Ohlendorf C, Marquardt M, Bein B, **Sonner J**, Scholz J, Tonner P. The effect of meperidine on thermoregulation in mice: involvement of alpha2-adrenoceptors. *Anesth Analg*. 2005 Jan;100(1):102-6.
50. Stabernack C, Zhang Y, **Sonner J**, Laster M, Eger E. Thiopental produces immobility primarily by supraspinal actions in rats. *Anesth Analg*. 2005 Jan;100(1):128-36.
51. **Sonner J**, Cascio M, Xing Y, Fanselow M, Kralic J, Morrow A, Korpi E, Hardy S, Sloat B, Eger E, Homanics G. Alpha 1 subunit-containing GABA type A receptors in forebrain contribute to the effect of inhaled anesthetics on conditioned fear. *Mol Pharmacol*. 2005 Jul;68(1):61-8
52. **Sonner J**, Xing Y, Zhang Y, Maurer A, Fanselow M, Dutton R, Eger E. Administration of epinephrine does not increase learning of fear to tone in rats anesthetized with isoflurane or desflurane. *Anesth Analg*. 2005 May;100(5):1333-7
53. Eger E, **Sonner J**. How likely is awareness during anesthesia? *Anesth Analg*. 2005 May;100(5):1544
54. Liao M, **Sonner J**, Husain S, Miller K, Jurd R, Rudolph U, Eger E. R (+) etomidate and the photoactivable R (+) azetomidate have comparable anesthetic activity in wild-type mice and comparably decreased activity in mice with a N265M point mutation in the gamma-aminobutyric acid receptor beta3 subunit. *Anesth Analg*. 2005 Jul;101(1):131-5
55. **Sonner J**, Vissel B, Royle G, Maurer A, Gong D, Baron N, Harrison N, Fanselow M, Eger E. The effect of three inhaled anesthetics in mice harboring mutations in the GluR6 (kainate) receptor gene. *Anesth Analg*. 2005 Jul;101(1):143-8
56. Liao M, **Sonner J**, Jurd R, Rudolph U, Borghese C, Harris R, Laster M, Eger E. Beta3-containing gamma-aminobutyric acid A receptors are not major targets for the amnesic and immobilizing actions of isoflurane. *Anesth Analg*. 2005 Aug;101(2):412-8
57. Eger E, Liao M, Laster M, Won A, Popovich J, Raines D, Solt K, Dutton R, Cobos F, **Sonner J**. Contrasting roles of the N-methyl-D-aspartate receptor in the production of immobilization by conventional and aromatic anesthetics. *Anesth Analg*. 2006 May;102(5):1397-406.

58. Dutton R, Laster M, Xing Y, **Sonner J**, Raines D, Solt K, Eger E. Do N-methyl-D-aspartate receptors mediate the capacity of inhaled anesthetics to suppress the temporal summation that contributes to minimum alveolar concentration. *Anesth Analg*. 2006 May;102(5):1412-8.
59. Won A, Oh I, Liao M, **Sonner J**, Harris R, Laster M, Brosnan R, Trudell J, Eger E. The minimum alveolar anesthetic concentration of 2-, 3-, and 4-alcohols and ketones in rats: relevance to anesthetic mechanisms. *Anesth Analg*. 2006 May;102(5):1419-26.
60. Liao M, Laster M, Eger E, Tang M, **Sonner J**. Naloxone does not increase the minimum alveolar anesthetic concentration of sevoflurane in mice. *Anesth Analg*. 2006 May;102(5):1452-5.
61. Eger E, **Sonner J**. Anaesthesia defined (gentlemen, this is no humbug). *Best Pract Res Clin Anaesthesiol*. 2006 Mar;20(1):23-9.
62. Won A, Oh I, Laster M, Popovich J, Eger E, **Sonner J**. Chirality in anesthesia I: minimum alveolar concentration of secondary alcohol enantiomers. *Anesth Analg*. 2006 Jul;103(1):81-4.
63. Brosnan R, Gong D, Cotten J, Keshavaprasad B, Yost C, Eger E, **Sonner J**. Chirality in anesthesia II: stereoselective modulation of ion channel function by secondary alcohol enantiomers. *Anesth Analg*. 2006 Jul;103(1):86-91.
64. Won A, Oh I, Brosnan R, Eger E, **Sonner J**. Hypothermia decreases ethanol MAC in rats. *J Anesth*. 2006;20(3):247-50.
65. Tanifuji Y, Zhang Y, Liao M, Eger E, Laster M, **Sonner J**. Do dopamine receptors mediate part of MAC? *Anesth Analg*. 2006 Nov;103(5):1177-81.
66. **Sonner J**, Werner D, Elsen F, Xing Y, Liao M, Harris R, Harrison N, Fanselow M, Eger E, Homanics G. Effect of isoflurane and other potent inhaled anesthetics on minimum alveolar concentration, learning, and the righting reflex in mice engineered to express alpha1 gamma-aminobutyric acid type A receptors unresponsive to isoflurane. *Anesthesiology*. 2007 Jan;106(1):107-13.
67. Benkwitz C, Liao M, Laster M, **Sonner J**, Eger E, Pearce R. Determination of the EC50 amnesic concentration of etomidate and its diffusion profile in brain tissue: implications for in vitro studies. *Anesthesiology*. 2007 Jan;106(1):114-23.
68. Zhang Y, Laster M, Eger E, Sharma M, **Sonner J**. Blockade of acetylcholine receptors does not change the dose of etomidate required to produce immobility in rats. *Anesth Analg*. 2007 Apr;104(4):850-2.
69. Cascio M, Xing Y, Gong D, Popovich J, Eger E, Sen S, Peltz G, PhD, **Sonner J** Mouse chromosome 7 harbors a quantitative trait locus for isoflurane minimum alveolar concentration. *Anesth Analg*. 2007 Aug;105(2):381-5.

70. Brosnan R, Yang L, Milutinovic P, Zhao J, Laster M, Eger E, **Sonner J** Ammonia has anesthetic properties. *Anesth Analg*. 2007 Jun;104(6):1430-3.
71. Yang L, Zhao J, Milutinovic P, Brosnan R, Eger E, **Sonner J**. Anesthetic properties of the ketone bodies beta hydroxybutyric acid and acetone *Anesth Analg*. 2007 Sep;105(3):673-9.
72. Yang L, Milutinovic P, Brosnan R, Eger E, **Sonner J**. The plasticizer di(2-ethylhexyl) phthalate modulates gamma-aminobutyric acid type A and glycine receptor function. *Anesth Analg*. 2007 Aug;105(2):393-6.
73. Milutinovic P, Yang L, Cantor R, Eger E, **Sonner J**. Anesthetic-like modulation of a gamma-aminobutyric acid type A, strychnine-sensitive glycine, and N-methyl-D-aspartate receptors by coreleased neurotransmitters. *Anesth Analg*. 2007 Aug;105(2):386-92.
74. Ethnicity affects MAC. **Sonner J**. Ethnicity can affect anesthetic requirement. *Anesthesiology*. 2007 Jul;107(1):4-5.
75. Zhang Y, Laster M, Eger E, Sharma M, **Sonner J**. Lidocaine, MK-801, and MAC. *Anesth Analg*. 2007 May;104(5):1098-102
76. Brosnan R, Eger E, Laster M, **Sonner J**. Anesthetic properties of carbon dioxide in the rat. *Anesth Analg*. 2007 Jul;105(1):103-6.
77. Laster M, Zhang Y, Eger E, Shnayderman D, **Sonner J**. Alterations in spinal, not cerebral, cerebrospinal fluid Na<sup>+</sup> concentrations affect the isoflurane minimum alveolar concentration in rats. *Anesth Analg*. 2007 Sep;105(3):661-5.
78. Yang L, **Sonner J**. The anesthetic-like effects of diverse compounds on wild-type and mutant gamma-aminobutyric acid type A and glycine receptors. *Anesth Analg*. 2008 Mar;106(3):838-45
79. Zhao J, Zhang Y, Eger E, **Sonner J**. Intrathecal glycine significantly decreases the minimum alveolar concentration of isoflurane in rats. *Chin Med Sci J*. 2008 Mar;23(1):16-8.
80. Yost C, Oh I, Eger E, **Sonner J**. Knockout of the gene encoding the K(2P) channel KCNK7 does not alter volatile anesthetic sensitivity. *Behav Brain Res*. 2008 May 20.
81. **Sonner J**. A hypothesis on the origin and evolution of the response to inhaled anesthetics. Sept 2008 *Anesth Analg* 107(3) 849-54
82. Yang L, **Sonner J**. Anesthetic-like modulation of receptor function by surfactants: a test of the interfacial theory of anesthesia. *Anesth Analg*. 2008. 107(3) 868-74
83. Eger E, Tang M, Liao M, Laster M, Solt K, Flood P, Jenkins A, Raines D, Hendricks J, Shafer S, Yasumasa T, **Sonner J**. Inhaled anesthetics do not combine to produce synergistic effects regarding minimum alveolar anesthetic concentration in rats. *Anesth Analg* 2008 107(2) 479-85

84. Hendricks J, Eger E, **Sonner J**, Shafer L. Is synergy the rule? A review of anesthetic interactions producing hypnosis and immobility. *Anesth Analg*. 2008. 207(2) 494-506
85. Shafer S, Hendrickx J, Flood P, **Sonner J**, Eger E. Additivity versus synergy: a theoretical analysis of implications for anesthetic mechanisms. *Anesth Analg* 2008. 107(2) 507-24
86. Eger E, Raines D, Shafer S, Hemmings H, **Sonner J**. Is a new paradigm needed to explain how inhaled anesthetics produce immobility? *Anesth Analg*. 2008. 107(3) 832-48
87. Milutinovic P, Zhao J, **Sonner J**. Tolerance to Isoflurane does not occur in developing *Xenopus laevis* tadpoles. *Anesth Analg* 2009 108(1) 176-80
88. Weng Y, Hsu T, Zhao J, Nishimura S, Fuller G, **Sonner J**. Isovaleric, methylmalonic, and propionic acid decrease anesthetic EC<sub>50</sub> in tadpoles, modulate glycine receptor function, and interact with the lipid 1,2-dipalmitoyl-*sn*-glycero-3-phosphocholine. *Anesth Analg* 2009. 108(5) 1538-45
89. Rau V, Iyer S, Oh I, Chandra D, Harrison N, Eger E, Fanselow M, Homanics G, **Sonner J**. Gamma-aminobutyric acid type A receptor alpha 4 subunit knockout mice are resistant to the amnestic effect of isoflurane. *Anesth Analg* 2009. 109 (6) 1816-22.
90. Weng Y, Yang L, Corringer PJ, **Sonner J**. Anesthetic sensitivity of the *Gloeobacter violaceus* proton-gated ion channel. *Anesth Analg*. 2010. 110(1) 59-63.
91. Speca D, Chihara D, Ashique A, Bowers M, Pierce-Shimomura J, Lee J, Rabbee N, Speed T, Gularte R, Chitwood J, Medrano J, Liao M, **Sonner J**, Eger E, Peterson A, McIntire S. Conserved role of unc-79 in ethanol responses in lightweight mutant mice. *PLoS Genet*. 2010. 12;6(8). pii:e1001057
92. Werner D, Swihart A, Rau V, Jia F, Borghese C, McCracken M, Iyer S, Fanselow M, Oh I, **Sonner J**, Eger E, Harrison N, Harris R, Homanics G. Inhaled anesthetic responses of recombinant receptors and knockin mice harboring  $\alpha 2(S270H/L277A)$  GABA(A) receptor subunits that are resistant to isoflurane. *J Pharmacol Exp Ther* 2011. 336 (1) 134-44
93. Rau V, Oh I, Liao M, Bodarky C, Fanselow M, Homanics G, **Sonner J**, Eger E. Gamma-aminobutyric acid type A receptor  $\beta 3$  subunit forebrain-specific knockout mice are resistant to the amnestic effect of isoflurane. *Anesth Analg*. 2011 Sep; 113(3):500-4. PMID: 21813630
94. Nury H, Van Renterghem C, Weng Y, Tran A, Baaden M, Dufresne V, Changeux J, **Sonner J**, Delarue M, Corringer P. X-ray structures of general anaesthetics bound to a pentameric ligand-gated ion channel. *Nature*. 2011. 469(7330): 428-31
95. Duret G, Renterghem C, Weng Y, Prevost M, Moraga-Cid G., Huon C., **Sonner J**, Corringer P. Functional prokaryotic-eukaryotic chimera from the pentameric ligand-gated ion channel

family. Proc Natl Acad Sci U S A. 2011 Jul 19;108(29):12143-8. doi: 10.1073/pnas.1104494108. Epub 2011 Jul 5. PMID: 21730130

96. Hsu T, Leiske L, Rosenfeld L, **Sonner J**, Fuller GG. 3-hydroxybutyric Acid interacts with lipid monolayers at concentrations that impair consciousness. Langmuir. 2013 Feb 12; 29(6):1948-55. PMID: 23339286

97. **Sonner J**, Cantor R. Molecular mechanisms of drug action: an emerging view. Annu Rev Biophys. 2013 May 6; 42:143-67. PMID: 23451895

## BOOK CHAPTERS

1. **Sonner J**, Katz J. Candidiasis. In: Essence of Anesthetic Practice, Eds. M Roizen and L Fleisher. W. B. Saunders Company, Philadelphia, PA. 1997

2. **Sonner J**, Katz J. Pemphigus. In: Essence of Anesthetic Practice, Eds. M. Roizen and L. Fleisher. W. B. Saunders Company, Philadelphia, PA. 1997.

3. **Sonner J**. What Novel Inhaled Compounds Tell Us About the Meyer-Overton Theory. 2ND International Workshop on Anesthetic Mechanisms, Takamatsu, Japan. Proceedings of the 2ND International Workshop on Anesthetic Mechanisms. December 1999.

4. **Sonner J**, Katz J. Candidiasis. In: Essence of Anesthetic Practice, Eds. M. Roizen and L. Fleisher. W. B. Saunders Company, Philadelphia, PA. 2002.

5. **Sonner J**, Katz J. Pemphigus. In: Essence of Anesthetic Practice, Eds. M. Roizen and L. Fleisher. W. B. Saunders Company, Philadelphia, PA. 2002.

6. **Sonner J**. GABAA Receptors Contribute Minimally to Isoflurane MAC. Urban B, editor. Molecular and Basic Mechanisms of Anesthesia: Pabst Science Publishers, 2003.

7. **Sonner J** Population Variability in MAC: What Is It and What Does It Mean? Urban B, editor. Molecular and Basic Mechanisms of Anesthesia: Pabst Science Publishers, 2003.

8. **Sonner J**. Blistering Skin Diseases. In: The Manual of Anesthetic Practice, Edited by Manuel Pardo and James Sonner. Pocket Medicine publisher, 2003.

9. **Sonner J**. Wrist Blocks. In: The Manual of Anesthetic Practice, Edited by Manuel Pardo and James Sonner. Pocket Medicine publisher, 2003.

10. **Sonner J**, Pardo M, Wiener-Kronish J. Diabetes Mellitus. In: The Manual of Anesthetic Practice, Edited by Manuel Pardo and James Sonner. Pocket Medicine publisher, 2003.

11. Pardo M, **Sonner J**, Gupta D, Swangard D. Carotid Endarterectomy. In: The Manual of Anesthetic Practice, Edited by Manuel Pardo and James Sonner. Pocket Medicine publisher, 2003.

12. McKay R, **Sonner J**, McKay W. Inhalational Anesthetics. In: Basics of Anesthesia. RK Stoelting and RD Miller, editors. New York, Churchill-Livingstone, 2006

## BOOK

I was one of two editors of a printed and electronic "Manual of Anesthetic Practice" produced by UCSF faculty and residents, copyrighted 2004. This 1108 page publication provides concise information to practitioners about anesthetic evaluation and management of patients in the operating room.

## ABSTRACTS

1. Fang Z, **Sonner J**, Laster M, Ionescu P, Kandel L, Eger E, Halsey M. Anesthetic and Convulsant Properties of Aromatic Compounds. Western Anesthesia Research Conference. April 1995.

2. Koblin K, Eger E, Bowland T, Balea M, Ionescu P, Laster M, Fang Z, Weiskopf R, Gong D, **Sonner J**. Toxicity After Sevoflurane Anesthesia in Volunteers. ASA Annual Meeting 1996.

3. **Sonner J**, Katz J, Hynson J, Clark O. Nausea and Vomiting Following Thyroid and Parathyroid Surgery. ASA Annual Meeting 1996.

4. **Sonner J**, Li J, Eger E. Effect of Subanesthetic doses of Ethanol on Learning. Association of University Anesthesiologists Meeting. May 1998.

5. **Sonner J**, Li J, Eger E. Mice lacking the  $\gamma$  isoform of protein kinase c have decreased sensitivity to the immobilizing effects of volatile anesthetics. ASA Annual Meeting 1998.

6. Zhang Y, Wu S, **Sonner J**, Eger E. The increased MAC produced by picrotoxin application to the rat spinal cord has a ceiling: more than GABA-A enhancement mediates MAC. ASA Annual meeting, 1999.

7. **Sonner J**. What Novel Inhaled Compounds Tell Us About the Meyer-Overton Theory. 2nd International Workshop on Anesthetic Mechanisms, Takamatsu, Japan. Proceedings of the 2nd International Workshop on Anesthetic Mechanisms. December 1999.

8. Zhang, Y, **Sonner J**. The Contribution of Spinal GABA<sub>A</sub> and Glycine Receptors to Anesthetic Induced Immobility. 2nd International Workshop on Anesthetic Mechanisms, Takamatsu, Japan. Proceedings of the 2nd International Workshop on Anesthetic Mechanisms). December 1999.

9. **Sonner J**, Maurer A, Sessler D, Eger E. Thermoregulatory effects of the nonimmobilizer 1,2-dichlorohexafluorocyclobutane. ASA annual meeting in San Francisco, October 2000.
10. Zhang Y, **Sonner J**, Eger E. Hyperalgesia and inhaled agents. ASA annual meeting San Francisco, October 2000.
11. Zhang Y, Stabernack C, **Sonner J**, Eger E. Luciferin as a model system for anesthetic action. ASA Annual Meeting, San Francisco, CA. October 2000.
12. Stabernack C, Zhang Y, **Sonner J**, Eger E. The Effect of Intrathecal Thiopental on Isoflurane MAC in Rats. IARS Annual Meeting, Orlando, Florida, March 2001.
13. **Sonner J**, Vissel B, Sailer A, Heinemann S, Eger E. GluR6 Receptors and Isoflurane Anesthesia. 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
14. **Sonner J**, Zhang Y, Stabernack C, Eger E. GABAA Receptors Contribute Minimally to MAC. 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
15. **Sonner J**, Gong D, Harris R, Barron N, Harrison N, Eger E. MAC of Isoflurane and ethanol in  $\alpha 1(S267Q)$  glycine transgenic mice. 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
16. **Sonner J**. Population Variability in MAC: What is it and what does it mean? 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
17. Flood P, **Sonner J**. Behavioral results of isoflurane inhibition of neuronal nicotinic acetylcholine receptors. 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
18. Joo D, **Sonner J**, MacDonald J, Eger E, Orser B. Enhanced anesthetics sensitivity in GluR2 (-/-) mice is independent of actions on AMPA receptors. 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany, June 2001.
19. Zhang Y, Stabernack C, **Sonner J**, Dutton R, Eger E. Both Cerebral and Spinal GABA<sub>A</sub> Receptors Modulate the Capacity of Isoflurane To Produce Immobility. 2001 ASA Meeting Abstracts.
20. Flood P, **Sonner J**, Gong D, Coates K. Isoflurane Hyperalgesia Is Mediated by Nicotinic Inhibition. 2001 ASA Meeting Abstracts.
21. Stabernack C, Zhang Y, **Sonner J**, Eger E. NMDA Receptors May Contribute to the Immobilizing Action of Isoflurane. 2001 ASA Meeting Abstracts.

22. Flood P, **Sonner J**, Gong D, Coates K, Maurer A. Nicotinic Inhibition Does Not Mediate Immobility or Hypnosis Caused by Isoflurane but May Mediate Amnesia. 2001 ASA Meeting Abstracts .
23. Zhang Y, **Sonner J**, Eger E, Stabernack C, Laster M. .GABAA Receptors Do Not Mediate the Immobility Produced by Inhaled Anesthetics. 2001 ASA Meeting Abstracts.
24. Zhang Y, **Sonner J**, Staberback C. GABAA Receptors Probably Mediate the Capacity of Propofol and Etomidate, but Not Ketamine, To Produce Immobility in Response to Noxious Stimuli. 2001 ASA Meeting Abstracts.
25. Xing Y, Laster M, **Sonner J**, Eger E. Isoflurane MACawake for rats. Presentation at the International Anesthesia Research Society 76th Clinical and Scientific Congress, San Diego, CA 2002.
26. Xing Y, Eger E, Zhang Y, Laster M, **Sonner J**, Flood P. Acetylcholine receptors influence amnesia from inhaled anesthetics. Presentation at the International Anesthesia Research Society 76th Clinical and Scientific Congress, San Diego, CA 2002.
27. **Sonner J**, Xing Y, Zhang Y, Maurer A, Fanselow M, Dutton R, Eger E. Does Epinephrine Enhance Learning Under Anesthesia? Abstracts of the Seventh International Conference on Basic and systemic Mechanisms of Anesthesia in Nara, Japan, February, 2005.
28. **Sonner J**, Cascio M, Xing Y, Fanselow M, Kralic J, Morrow A, Korpi E, Hardy S, Sloat B, Eger E, Homanics G. What Knockout Mice Tell Us About the Role of GABAA Receptors to the Amnestic Effect of Isoflurane. Abstracts of the Seventh International Conference on Basic and systemic Mechanisms of Anesthesia in Nara, Japan, February, 2005.
29. Zhao J, Zhang Y, **Sonner J**, Eger E. The effect of intrathecal glycine on isoflurane MAC in rats. ASA Annual Meeting, Oct 15 2006, Chicago IL.
30. **Sonner J**, Fuller G, Hsu T, Milutinovic P, Nishimura S, Weng Y, Yang L, Zhao J. Modulation of glycine receptor function by interfacially active compounds. Ligand -gated ion channels meeting, 18th *Neuropharmacology* Conference in association with International Union of Basic and Clinical Pharmacology, and a satellite to the 2008 Society for Neuroscience meeting.
31. **Sonner J**, Weng Y, Kalasabail P, Huynh S, Sen S. Genome-wide analysis of halothane sensitivity in the model eukaryote, *S. Cerevisiae*. MAC 2010 Basic and systemic mechanisms of anesthetic action meeting, University of Toronto, 2010.
32. MacIver M, **Sonner J**. Mental impairment associated with organ failure diseases. Stanford Anesthesia - UCSF Anesthesia Research Retreat, Hyatt Regency San Francisco Airport, Burlingame, CA, August 18, 2012.
33. Rodgers F, Oh I, Liao M, Rau V, Jurd R, Rudolph U, Eger E, **Sonner J**, Pearce R. Etomidate blocks LTP and impairs learning but does not enhance tonic inhibition in the hippocampus of the

β3-15N265M mice. Society for Neuroscience Annual Meeting, Washington DC, November 2014.

## **RESEARCH AND CREATIVE ACTIVITIES**

### **AWARDS**

I was the principal investigator on an NIH R01 grant; project leader on NIH Program Project Grant; and coinvestigator on other NIH grants, which funded the research described in the publications above. I had a National Science Foundation Graduate Fellowship while in graduate school from 1982-24.

### **INVITED PRESENTATIONS**

#### **INTERNATIONAL**

1999 "What Novel Inhaled Compounds Tell Us About the Meyer-Overton Theory." Second International Workshop on Anesthetic Mechanisms Dec 1999, Takamatsu, Japan.

2001 "Population Variability in MAC: What is it and What does it Mean?", 6th International Conference on Molecular and Basic Mechanisms of Anesthesia, Bonn, Germany June 2001.

2005 "Do  $\alpha 1$  GABA<sub>A</sub> Receptors Influence The Capacity of Isoflurane to Produce Amnesia or Immobility?" The Seventh International Conference on Basic and Systemic Mechanisms of Anesthesia, Nara, Japan February 2005.

2008 "What do we know after 20 years of studying the mechanisms of inhaled anesthetics?" Invited Lecture delivered remotely, International Society of Anesthetic Pharmacology Satellite Meeting, Chongking, China, March 2008.

2011 "What do inhaled anesthetics tell us about how the nervous system works?" Invited Lecture, Institut Pasteur, Paris, France, June 2011.

2016 "Can we design better and safer anesthetics?" I organized a conference and was chair on this topic at the International Anesthesia Research Society meeting in April, 2016.

2020 "Reverse Engineering the Ketogenic Diet." Epilepsy Pipeline Conference August 2020.

#### **NATIONAL**

2001 "Update on Anesthetic Mechanisms", American Society of Anesthesiologists, Review Course, New Orleans, LA October 2001.

2003 "Should We Give Membrane Mechanisms of Inhaled Anesthetic Action a Second Look?" International Society for Anesthetic Pharmacology, San Francisco, CA October 2003.

2005 "Evolution of the Anesthetic State--A Hypothesis" International Society for Anesthetic Pharmacology, Atlanta, GA October 21, 2005.

2018 "Genetic studies in anesthesia: Behold the Awesome Power of Yeast Genetics." American Society of Anesthesiologists meeting, San Francisco, CA 2018.

## **REGIONAL AND OTHER INVITED PRESENTATIONS**

2001 "Anesthetic Mechanisms." Lecture to Neurogesix, Inc, San Carlos, CA.

2003 "How Inhaled Anesthetics Work." MiniMedical School, UCSF.

2006 "Evolution of the Anesthetic State--A Hypothesis." University of Medicine and Dentistry of New Jersey, Anesthesia Department.

2006 "Evolution of the Anesthetic State--A Hypothesis." Waggoner Center for Alcohol and Addiction Research, University of Texas, Austin.

2007 "Approaches to Inhaled Anesthetic Mechanisms: Is It Time For A Paradigm Shift?" University of Washington, Seattle, Department of Anesthesia.

2007 "Approaches to Inhaled Anesthetic Mechanisms: Is It Time For A Paradigm Shift?" Stanford University, Department of Anesthesia.

2008 "New Concepts On How and Why Inhaled Anesthetics Work." UCLA Anesthesia Department.

2016 Biosensors for Real Time Measurement of Arterial Blood Gases, Caltech.

2016 15<sup>th</sup> International Conference on Complex Diseases, Caltech.

2018 Huntington Medical Research Institute, December 2018, Mechanism of Action of Antiepileptic Drugs.

## **SERVICE**

## **SERVICE TO PROFESSIONAL PUBLICATIONS 1998-2014**

- 1998 Ad hoc reviewer, Cellular and Molecular Life Sciences
- 1998 Ad hoc reviewer, Proceedings of the National Academy of Sciences
- 1998 Ad hoc reviewer, Chemical Research in Toxicology
- 1998 Ad hoc reviewer, Materials Chemistry and Physics
- 1998 Ad hoc reviewer, Chemical Biology
- 2010 Ad hoc reviewer, J Phys Chem B
- 2013 Ad hoc reviewer, Journal of Neuroscience
- 2013 Ad hoc reviewer, BBA – Biomembranes
- 2014 Ad hoc reviewer, Journal of General Physiology
- Various Ad hoc reviewer, Anesthesia & Analgesia
- Various Ad hoc reviewer, Journal of Clinical Anesthesia
- Various Ad hoc reviewer, European Journal of Pharmacology
- Various Ad hoc reviewer, Acta Anaesthesiologica Scandinavica
- Various Ad hoc reviewer, Anesthesiology

## **GOVERNMENT SERVICE**

- 2009 – 2011 NIH, Internet Assisted Reviewer

## **SERVICE TO PROFESSIONAL ORGANIZATIONS**

- 1992 – 1994 American Society of Anesthesiologists Committee on Scientific Exhibits  
Committee Member
- 1992 – 1993 American Society of Anesthesiologists Committee on Patient Safety and  
Risk Management, Committee Member
- 1993 – 1993 American Society of Anesthesiologists Liaison to the Geriatric Anesthesia  
Committee, Liaison to the committee
- 1993 – 1996 International Association of Plumbing and Mechanics Officials Committee on  
Medical Gases, Committee Member

1995 – 1996 Northern California Anesthesia Society, Vice President

2006 - present International Society of Anesthetic Pharmacology, Board member, Treasurer (2010-2011), Secretary (2011-2012), Vice President (2012-2013), President Elect (2013-2014), President (2014-2015), Annual Meeting co-chair (2011, 2012)

## **UNIVERSITY SERVICE (UCSF)**

1992-1995 Course Director, Dental Interns' Anesthesia Rotation

1992 Laboratory Transition Committee, Mt Zion Hospital

1992-1995 Anesthesia Equipment Coordinator, Mt Zion  
2003-2010

1993-1995 Mt Zion Anesthesia Service Quality Assurance Committee

1993-1996 Medical Director, Surgery Admissions and Procedure Center, UCSF/Mt Zion Hospital

1993, 1996 Infusion Pump Selection Committee

1993-1996 Surgery Admissions and Procedure Center Collaborative Practice Committee

1993-1998 Mt Zion Hospital Surgery Committee

1993-2005 Anesthesia Department Equipment Committee

1994-2000 Medical Director, Pavilion Ambulatory Surgery Center, Mt Zion Hospital

1994-2000 Blood Utilization and Transfusion Committee

1995 UCSF/Mt Zion Operating Room Patient Education Committee

1998-1999 Anesthesia Department Promotion Committee  
2003-2004  
2013-2014

2008-2011 Anesthesia Department Compensation Committee

2010-2012 Associate Director, Regional Anesthesia, Mt Zion Hospital

Various Anesthesia Department Animal Care and Use Committee

Various PACU Collaborative Practice Committee

Various UCSF/Mt Zion Operating Room Committee for Take Your Child to Work Day

Various Examiner, Mock Oral Board Examination for Anesthesia Residents

Various Nursing Inservice