

# Stanford

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## Joan Kendig

Professor of Biology in the Department of Anesthesia, Emeritus  
Anesthesiology, Perioperative and Pain Medicine

### Bio

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#### ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Anesthesiology, Perioperative and Pain Medicine

### Research & Scholarship

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#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

My laboratory tries to find out how pharmacologic agents used in the practice of anesthesia (general anesthetic and analgesic agents) lead to therapeutically desirable endpoints including unconsciousness, immobility and absence of pain. The old idea that general anesthetics are uniformly non-specific "membrane stabilizers" has given way to the realization that these agents exert specific actions on particular ion channels and intracellular signalling systems. Currently we are identifying anesthetic effects on ligand-gated and second messenger-operated ion channels in mammalian neurons, using both receptor-specific evoked potentials from isolated superfused spinal cord and whole cell patch clamp of neurons *in situ* in spinal cord slices. The goal of the research program is to construct a manageable set of actions which alone or in combination are both necessary and sufficient to bring about an anesthetic state. Most recently we have focused attention on mechanisms of spinal sensitization that contribute to chronic pain following injury and also to the development of tolerance to anesthetic and analgesic agents. We have described and partially characterized long term potentiation (LTP) in isolated spinal cord. We have also discovered long-lasting increases in spinal cord excitability following exposure to opioids such as morphine and to ethanol; these changes may be related to mechanisms of tolerance, dependence, and withdrawal.

### Publications

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#### PUBLICATIONS

- **Hyperresponsiveness on washout of volatile anesthetics from isolated spinal cord compared to withdrawal from ethanol** *ANESTHESIA AND ANALGESIA*  
Wong, S. M., Sweitzer, S. M., Peters, M. C., Kendig, J. J.  
2005; 100 (2): 413-418
- **Protein kinase C gamma mediates ethanol withdrawal hyper-responsiveness of NMDA receptor currents in spinal cord motor neurons** *BRITISH JOURNAL OF PHARMACOLOGY*  
Li, H. F., Mochly-Rosen, D., Kendig, J. J.  
2005; 144 (3): 301-307
- **Acute and chronic ethanol exacerbates formalin pain in neonatal rats** *NEUROSCIENCE LETTERS*  
Shumilla, J. A., Sweitzer, S. M., Kendig, J. J.  
2004; 367 (1): 29-33
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Shumilla, J. A., Sweitzer, S. M., Kendig, J. J.  
2004; 366 (3): 332-335
- **Mechanical allodynia and thermal hyperalgesia upon acute opioid withdrawal in the neonatal rat** *PAIN*  
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- **Exaggerated nociceptive responses on morphine withdrawal: roles of protein kinase C epsilon, and gamma PAIN**  
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2004; 110 (1-2): 281-289
- **Inhibition of spinal protein kinase C-epsilon or -gamma isozymes does not affect halothane minimum alveolar anesthetic concentration in rats ANESTHESIA AND ANALGESIA**  
Shumilla, J. A., Sweitzer, S. M., Eger, E. I., Laster, M. J., Kendig, J. J.  
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- **Ethanol withdrawal hyper-responsiveness mediated by NMDA receptors in spinal cord motor neurons BRITISH JOURNAL OF PHARMACOLOGY**  
Li, H. F., Kendig, J. J.  
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- **Enflurane decreases glutamate neurotransmission to spinal cord motor neurons by both pre- and postsynaptic actions ANESTHESIA AND ANALGESIA**  
Cheng, G., Kendig, J. J.  
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- **Ethanol tachyphylaxis in spinal cord motoneurons: role of metabotropic glutamate receptors BRITISH JOURNAL OF PHARMACOLOGY**  
Li, H. F., Wang, M. Y., Knape, J., Kendig, J. J.  
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- **Pre- and postsynaptic volatile anaesthetic actions on glycinergic transmission to spinal cord motor neurons BRITISH JOURNAL OF PHARMACOLOGY**  
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2002; 136 (5): 673-684
- **In vitro networks: subcortical mechanisms of anaesthetic action BRITISH JOURNAL OF ANAESTHESIA**  
Kendig, J. J.  
2002; 89 (1): 91-101
- **Acetylcholine receptors do not mediate isoflurane's actions on spinal cord in vitro ANESTHESIA AND ANALGESIA**  
Wong, S. M., Sonner, J. M., Kendig, J. J.  
2002; 94 (6): 1495-1499
- **Enflurane actions on spinal cords from mice that lack the beta(3) subunit of the GABA(A) receptor Annual Meeting of the Association-of-University-Anesthesiologists**  
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- **Enflurane directly depresses glutamate AMPA and NMDA currents in mouse spinal cord motor neurons independent of actions on GABA(A) or glycine receptors ANESTHESIOLOGY**  
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1998; 54 (4): 433-443

● **Glutamate receptor-mediated hyperexcitability after ethanol exposure in isolated neonatal rat spinal cord** *JOURNAL OF PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS*

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● **Ethanol as a general anesthetic: Actions in spinal cord** *EUROPEAN JOURNAL OF PHARMACOLOGY*

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● **Propofol potentiates the depressant effect of alfentanil in isolated neonatal rat spinal cord and blocks naloxone-precipitated hyperresponsiveness** *NEUROSCIENCE LETTERS*

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● **Synergistic interactions between midazolam and alfentanil in isolated neonatal rat spinal cord** *BRITISH JOURNAL OF ANAESTHESIA*

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