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

Bio

ACADEMIC APPOINTMENTS
• Emeritus Faculty, Acad Council, Anesthesiology, Perioperative and Pain Medicine

Research & Scholarship

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

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.
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• **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.
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• **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

• **Acute and chronic ethanol does not affect incisional pain in neonatal rats** *NEUROSCIENCE LETTERS*
  Shumilla, J. A., Sweitzer, S. M., Kendig, J. J.
  2004; 366 (3): 322-335

• **Mechanical allodynia and thermal hyperalgesia upon acute opioid withdrawal in the neonatal rat** *PAIN*
  Sweitzer, S. M., Allen, C. P., Zissen, M. H., Kendig, J. J.
  2004; 110 (1-2): 269-280
Exaggerated nociceptive responses on morphine withdrawal: roles of protein kinase C epsilon, and gamma

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Inhibition of spinal protein kinase C-epsilon or -gamma isozymes does not affect halothane minimum alveolar anesthetic concentration in rats

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

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Enflurane decreases glutamate neurotransmission to spinal cord motor neurons by both pre- and postsynaptic actions

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Ethanol tachyphylaxis in spinal cord motorneurons: role of metabotropic glutamate receptors

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

Cheng, G., Kendig, J. J.
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In vitro networks: subcortical mechanisms of anaesthetic action

Kendig, J. J.
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Acetylcholine receptors do not mediate isoflurane’s actions on spinal cord in vitro

Wong, S. M., Sonner, J. M., Kendig, J. J.
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Enflurane actions on spinal cords from mice that lack the beta(3) subunit of the GABA(A) receptor

Wong, S. M., Cheng, G., Homanics, G. E., Kendig, J. J.
LIPPINCOTT WILLIAMS & WILKINS. 2001: 154–64

Enflurane directly depresses glutamate AMPA and NMDA currents in mouse spinal cord motor neurons independent of actions on GABA(A) or glycine receptors

Cheng, G., Kendig, J. J.
2000; 93 (4): 1075-1084

Patch clamp studies of motor neurons in spinal cord slices: a tool for high-resolution analysis of drug actions

Wang, M. Y., Kendig, J. J.
2000; 21 (6): 507-515

Ethanol directly depresses AMPA and NMDA glutamate currents in spinal cord motor neurons independent of actions on GABA(A) or glycine receptors

Wang, M. Y., Rampil, I. J., Kendig, J. J.
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Differential sensitivities of TTX-resistant and TTX-sensitive sodium channels to anesthetic concentrations of ethanol in rat sensory neurons

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• ANESTHETIC ACTIONS IN THE HIPPOCAMPAL-FORMATION. **Annals of the New York Academy of Sciences**
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• THE ALPHA-2-ADRENOCEPTOR AGONIST DEXMEDETOMIDINE INCREASES THE APPARENT POTENCY OF THE VOLATILE ANESTHETIC ISOFURANCE IN RATS INVIVO AND IN HIPPOCAMPAL SLICE INVITRO. **Brain Research**
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• GENERAL ANESTHETIC MODIFICATION OF SYNAPTIC FACILITATION AND LONG-TERM POTENTIATION IN HIPPOCAMPUS. **British Journal of Anaesthesia**
MacIver, M. B., Tauck, D. L., Kendig, J. J.
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Grossman, Y., Kendig, J. J.
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