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论著

七氟烷和异氟烷急性暴露对SD幼大鼠学习记忆及海马脑源性神经营养因子表达的影响

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摘要 目的 探讨挥发性麻醉药七氟烷和异氟烷急性暴露对SD大鼠幼年期学习记忆及海马脑源性神经营养因子(BDNF)表达的影响及其机制。方法 7日龄大鼠提前0.5 h ip给予荷包牡丹碱8 mg·kg^{-1}或蝇蕈醇1 mg·kg^{-1}，然后暴露于含3.6%七氟烷或2.3%异氟烷的空氧混合气中，连续6 h。出生后第21天时行Morris水迷宫实验记录潜伏期；取海马，免疫组化及Western印迹法检测γ氨基丁酸-A(GABA-A)受体α1亚基和BDNF表达，逆转录-PCR方法检测mRNA表达。结果 氟烷组的连续5 d总潜伏期均显著延长(P<0.05)；与七氟烷和异氟烷组比，提前给予荷包牡丹碱或蝇蕈醇对潜伏期无显著改善作用。免疫组化、Western印迹法和逆转录-PCR结果显示，与正常对照组相比，七氟烷、异氟烷和提前给予荷包牡丹碱或蝇蕈醇组幼鼠海马GABA-A受体α1亚基蛋白与mRNA表达无明显差异；七氟烷和异氟烷组BDNF的蛋白和mRNA表达量显著降低，分别降低了13%，25%和23%，21%(P<0.05)。与七氟烷和异氟烷组相比，提前给予荷包牡丹碱或蝇蕈醇组BDNF的蛋白和mRNA表达量无显著差异。结论 七氟烷和异氟烷急性暴露能够影响SD大鼠幼年期学习记忆功能，可能与BDNF的表达改变有关，GABA-A受体不参与神经发育毒性的介导。

关键词 七氟烷 异氟烷 学习障碍 受体，GABA-A 脑源性神经营养因子

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Effect of acute exposure to sevoflurane and isoflurane on learning, memory and brain derived neurotrophic factor expression in hippocampus of juvenile SD rats

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Abstract

OBJECTIVE To investigate the effect and mechanism of acute neonatal exposure to sevoflurane and isoflurane on memory and learning of juvenile SD rats. **METHODS** Rats of postnatal day (PND) 7 were subjected to acute exposure to 3.6% sevoflurane or 2.3% isoflurane with mixture gas of air-oxygen for 6 h. Bicuculline 8 mg·kg^{-1} or muscimol 1 mg·kg^{-1} was ip administered 0.5 h pre-exposure. Morris water maze test was carried out for the rars that survived on PND 21 before hippocampus of rats was collected for determination of GABA-A receptor α1 and brain derived neurotrophic factor (BDNF) by immunothistochemistry assay, Western blotting and RT-PCR. **RESULTS** GABA-A receptor α1 subunit protein and mRNA expression of pup hippocampus showed no significant difference between the groups. Compared with normal control group, BDNF protein and mRNA levels significantly decreased by 13% and 25% in sevoflurane and isoflurane groups and by 23% and 21% in isoflurane group, respectively(P<0.05). Compared with sevoflurane and isoflurane groups, there were no significant differences in BDNF protein and mRNA expression in bicuculline and muscimol groups. **CONCLUSION** Sevoflurane and isoflurane can significantly inhibit memory and learning in juvenile SD rats, which can be induced through BDNF rather than modulated by GABA-A receptor α1.

Key words sevoflurane isoflurane learning disorder receptors GABA-A brain derived neurotrophic factor

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