A minimal stress modelfor the assessment of electroacupuncture analgesia in rats under halothane

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摘要

Abstract

The use of anesthetics in acupuncture analgesia is controversial. We evaluate a steady-state light anesthesia model to test whether minimal stress manipulation and reliable measurement of analgesia could be simultaneously achieved during electroacupuncture (EA) in animals. A series of experiments were performed. Firstly, EA compliance and tail-flick latencies (TFL) were compared in rats under 0.1%, 0.3%, 0.5%, 0.7%, or 1.1% halothane for 120min. Under 0.5% halothane, TFL were then measured in groups receiving EA at intensity of 3, 10 or 20 volt (V), 1 or 2mg/kg morphine, 20V EA plus naloxone, or control. Subsequently, the effect of EA on formalin-induced hyperalgesia was tested and c-fos expression in the spinal dorsal horn was analyzed. Rats exhibited profound irritable behaviors and highly variable TFL under 0.1% or 0.3% halothane, as well as a time-dependent increase of TFL under 0.7% or 1.1% halothane. TFL remained constant at 0.5% halothane, and needle insertion and electrical stimulation were well tolerated. Under 0.5% halothane, EA increased TFL and suppressed formalin-induced hyperalgesia in an intensity-dependent and naloxone-reversible manner. EA of 20V prolonged TFL by 74%, suppressed formalin-induced hyperalgesia by 32.6% and decreased c-fos expression by 29.7% at the superficial and deep dorsal horn with statistically significant difference. In conclusion, 0.5% halothane provides a steady-state anesthetic level which enables the humane application of EA stimulus with the least interference on analgesic assessment. This condition serves as a minimal stress EA model in animals devoid of stress-induced analgesia while maintaining physiological and biochemical response in the experiment.