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Modification of local anesthetic-induced antinociception by fentanyl in rats

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Abstract:
In clinical practice, using the lowest doses of drugs for anesthesia or analgesia is the main goal. Opioid combinations with local anesthetics can be preferable for achieving adequate anesthesia or analgesia. The primary purpose of this study was to examine possible thermal antinociceptive effects of the opioid –fentanyl and the amide local anesthetics levobupivacaine and lidocaine when locally administered alone or in combination.
The paw withdrawal latencies to noxious thermal stimuli in rats were measured to assess the antinociceptive actions of drugs after subcutaneous intraplantar injection into the hind paw.
All drugs examined in this study produced dose- and time-dependent increases in the paw withdrawal latencies. Fentanyl is approximately 125 and 500 times more potent than levobupivacaine and lidocaine, respectively. At the same dose, the antinociceptive potency of levobupivacaine was 3.6-fold higher than that of lidocaine. Co-injection of the lowest doses of levobupivacaine and lidocaine dramatically increased the paw withdrawal latency. However, in the presence of fentanyl, the effects of levobupivacaine and lidocaine were different. Although co-injection of levobupivacaine with fentanyl both enhanced and prolonged antinociceptive action, the lidocaine-fentanyl combination did not significantly change the paw withdrawal latency.
These results suggest that intraplantar co-administration of fentanyl with levobupivacaine, but not lidocaine, may provide more effective antinociception without increasing the dose requirements.

Key words:
fentanyl, levobupivacaine, lidocaine, intraplantar, antinociception, rat