

Sublingual Sufentanil Attenuates Perceived Pain, but not Blood Pressure Responses, During a Cold Pressor Test

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ABSTRACT

Sublingual sufentanil was developed to reduce pain following a traumatic injury in the field (e.g., battlefield). However, it is unknown whether an analgesic dose of sufentanil affects cardiovascular responses to a painful stimulus in humans. **PURPOSE:** We tested the hypothesis that sublingual sufentanil blunts pain perception and the accompanying cardiovascular responses during a cold pressor test (CPT). **METHODS:** Twenty-nine adults, 15 males and 14 females (age: 29 ± 5 years, body mass: 74 ± 8 kg, body mass index: 25 ± 2 kg/m²) participated in this double-blind, randomized, crossover, placebo-controlled trial. Following sublingual administration of sufentanil (30 μ g) or placebo, participants underwent a two-minute resting baseline period and then a two-minute CPT (hand in $0.07 \pm 0.10^\circ\text{C}$ ice-water), while heart rate (electrocardiography) and beat-to-beat blood pressure (photoplethysmography - Finometer) were measured continuously. Pain perception (100 mm visual analog scale) was compared between trials via a two-tailed Wilcoxon Signed-Rank test. Heart rate and blood pressure responses were compared using a mixed effects model (trial x time). Changes (Δ) in heart rate and blood pressure from baseline to the last 30 seconds of the CPT were compared using a two-tailed Wilcoxon Signed-Rank test and a two-tailed paired t-test, respectively. **RESULTS:** Sufentanil attenuated perceived pain (sufentanil: 35 [27 - 53] vs. placebo: 68 [38 - 82] mm, $p < 0.001$) during the CPT. The magnitude of the increase in heart rate to the CPT was influenced by the drug (trial: $p = 0.061$, time: $p < 0.001$, interaction: $p < 0.001$), with the Δ heart rate being greater for the placebo trial ($p = 0.002$). Both absolute mean blood pressure responses (trial: $p = 0.071$, time: $p < 0.001$, interaction: $p = 0.245$) and Δ mean blood pressure to the CPT (sufentanil: 15 ± 9 vs. placebo: 16 ± 8 , $p = 0.334$) were not different between trials. **CONCLUSION:** These data suggest that 30 μ g of sublingual sufentanil attenuates perceived pain, but not the accompanying blood pressure responses, during the CPT.