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Opioid Receptor Blockade Alters Heart Rate Variability When Combined with Exercise

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Opioid receptor blockade (Naltrexone; NTX) has been shown to alter cardiovascular (CV) reactivity in individuals who perform regular aerobic exercise. Certain opioid receptors blockers have been used to help individuals lose weight. Being that exercise is commonly prescribed as a therapy for weight loss understanding the acute interaction of exercise and NTX administration would be important.

PURPOSE: To study if opioid blockade alters the acute cardiovascular effects of acute exercise.

METHODS: Male 24 wk. C57-BL6 mice were divided into 4 groups: control (CON), exercise (EX), naltrexone (NTX), exercise with naltrexone (EX+NTX). Mice that underwent EX performed 50 mins of forced swimming following a week of familiarization. NTX or saline was given (i.p.; 4 mg/kg), 15 min prior to EX or 65 min prior to echocardiography (ECHO). Mice were anesthetized using isoflurane (4-5% for induction; 0.5-2.0% for maintenance of anesthesia). Fur was removed from the anesthetized animal with nair and echo gel was applied. Peak/peak (RR) interval was recorded during a 5 min period using the ECG platform of the ECHO (Visual Sonics Vevo 2100). HRV was analyzed in the time-domain. HRV was analyzed using the standard deviation of the inter beat intervals of normal sinus beats (SDNN). A 2x2 ANOVA was used to assess difference between groups with a $P < 0.05$ being used to detect significant differences. Data is represented by mean \pm SEM. **RESULTS:** Heart rate (BPM) was elevated following EX (CON=276 \pm 11.9 vs. EX = 360 \pm 22; $P < 0.05$). This effect was attenuated with the addition of NTX. SDNN was unchanged following EX (CON = 51 \pm 4.6 ms vs. EX = 71 \pm 6 ms) and NTX (52 ms \pm 5.1 ms). However, there was a significant interaction between EX and NTX ($p < 0.05$). HRV in the EX+NTX was different when compared to all three groups (17.9 ms \pm 1.5 ms; $p < 0.05$). **CONCLUSION:** The addition of NTX may alter mouse autonomic response to exercise by lowering both HRV and HR.