TACSM Abstract

Systemic Inflammation Persists in Rats with Heart Failure after a Short-Term Endurance Training Protocol

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ABSTRACT

Exercise has been shown to produce an anti-inflammatory response and an increased exercise tolerance in heart failure (HF) patients. In rats, monocrotaline (MCT) leads to pulmonary arterial hypertension-induced HF (PAH-HF), resulting in exercise intolerance and chronic inflammation. However, little is known about the effects of endurance training in rats with PAH-HF induced by monocrotaline. **PURPOSE:** To investigate the effects of an endurance training protocol on systemic inflammatory markers and exercise tolerance in rats with HF. **METHODS:** 30 male Wistar rats (~250g) were randomly divided into 4 groups: control untrained (CU); control trained (CT), PAH-HF untrained (HFU), and PAH-HF trained (HFT). PAH-HF was induced by a single dose of MCT (60 mg/kg). Control groups received an equivalent volume of saline solution. Trained groups were subjected to a 4-week endurance training program, which consisted of running on a treadmill 5 days/wk at 60% of maximal endurance capacity. Exercise tolerance was evaluated by time to fatigue using a maximal endurance test. Immune activation was assessed *in vitro* in tibial bone marrow-derived macrophages (BMDM). Inflammatory cytokines, interleukin(IL)-1β and IL-6, were detected using a multiplex assay. Statistical analysis: Two-way ANOVA and Tukey's post-hoc test. Data expressed as mean ± SD with significance level set at 0.05. **RESULTS:** CT group had higher exercise tolerance across all groups (CU: 17 ± 3.4, CT: 23.5 ± 2.9, HFU: 10.7 ± 2.9, HFT: 10.8 ± 3.7 min; $p < 0.05$). The CU group showed a higher time to fatigue than the HFU and HFT ($p < 0.05$) and both HF groups had the same total time regardless of training status. Plasma IL-6 concentrations were significantly higher in both HF groups (CU: 257.2 ± 15.1, CT: 242 ± 12.9, HFU: 310.5 ± 55, HFT: 351.2 ± 56.7 pg/ml; $p < 0.05$) compared to their counterparts, regardless of training status. BMDMs showed a significant increase in IL-1β release after inflammatory stimulation for both HF groups compared to the controls (CU: 4386 ± 2126, CT: 3713 ± 1451, HFU: 54531 ± 43791, HFT: 85010 ± 32149 pg/ml; $p < 0.05$). However, no differences were found between HF groups ($p > 0.05$). **CONCLUSION:** The short-term, moderate-intensity endurance training protocol used was not sufficient to mitigate systemic inflammation or exercise intolerance in rats with PAH-HF induced by MCT.