

**Effect of the moderate and high intensity chronic exercise on plasma tumor necrosis factor alpha and Langerhans islets histology in healthy rats**

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**ABSTRACT**

Tumor necrosis factor alpha (TNF- $\alpha$ ), a pro-inflammatory cytokine, negatively affects  $\beta$ -cell physiology and morphology, as occurs during type 1 diabetes mellitus and metabolic syndrome. Physical exercise is a good tool to reduce the pro-inflammatory state. **PURPOSE:** The present study investigated the effects of moderate and high-intensity chronic exercise on plasma TNF- $\alpha$  levels in a basal state; it further analyzed whether these cytokine changes are associated with changes in the pancreatic Langerhans islets morphology under healthy state. **METHODS:** Two month-old healthy male Wistar rats were divided into three groups: control (C) (n = 7), moderate intensity training (MIT) (n = 7), and high intensity training (HIT) (n = 5). The training protocol consisted of 24 exercise sessions, which involved running in a treadmill. The training intensity was 60% of the maximal oxygen consumption (VO<sub>2</sub>max) for MIT and 80% VO<sub>2</sub>max for HIT. Forty-eight hours after the last training session, plasma samples were obtained from the three groups to determine TNF- $\alpha$  and insulin levels with ELISA method. The duodenal pancreas was dissected to analyze the Langerhans islets. The correlation analysis among the nuclei/total islet area was carried out. **RESULTS:** The HIT group showed lower TNF- $\alpha$  plasma levels compared with the C group. Systemic insulin levels were not significantly modified in basal state by the chronic exercise intensity. In addition all the experimental groups showed a positive nuclei/islet area correlation. **CONCLUSION:** Under healthy conditions, the high intensity training reduces the plasma TNF- $\alpha$  level, but this effect is not associated with functionality or morphology changes of the pancreatic Langerhans islets. This study emphasizes the importance of one threshold in the exercise training to reduce the plasmatic TNF- $\alpha$  levels in a healthy state model.