Molecular Effects of Exposure to Cigarette Smoke on adipose tissue of lean Swiss Mice

Wisniewski, E; Morsch, ALBC; Luciano, TF; Marques, SO; Souza, DR; Pieri, BLS; Lira, FS; Pinho, RA; De Souza, CT.

Laboratório de Fisiologia e Bioquímica do Exercício – LAFIBE, Universidade do Extremo Sul Catarinense, Santa Catarina, Brazil.

INTRODUCTION: Smoking is associated with weight loss; this is due to the action of smoke on the CNS. However, our group thinks that the cigarette smoke may have a direct effect on lipolysis in adipose tissue, since cigarette smoke increases the production of reactive oxygen species (ROS) and, this is considered by activating a pivotal lipolytic enzyme, AMP-activated protein kinase (AMPK). Thus, this study aims to investigate the molecular changes in adipose tissue of mice exposed to cigarette smoke. MATERIAL AND METHODS: Male Swiss mice were exposed daily to 4 commercial cigarettes for 7, 15, 30, 45, 60 days and control group (n=10). 24 hours after the cigarette smoking protocol, the animals were decapitated and adiposity index analyzed (%/b.w.). Adipose tissues, epididymal pad were used for Western blot analyses. The group exposed for 30 days showed significant reduction of the adiposity index when compared to other groups. In addition, AMPK, ATGL and HSL phosphorylation and CGI-58 protein levels increased, and perilipin protein levels diminish. Thus, 30 days exposure period was used in future experiments. Next, so, the experiment was repeated only with three groups: no smoking, 30 days and 30 N-acetilcysteine (20 mg/kg/day). RESULTS AND DISCUSSION: Mice exposed to cigarette smoking showed a reduced of 61% in adiposity index when compared with control group. However, the 30 days plus NAC group increased adiposity index for 47% when compared with 30 days group. Animals exposed to smoke for 30 days showed higher levels of pAMPK, ATGL, HSL phosphorylation, CGI-58 and perilipin protein levels when compared to the control group. Thus, supplementation with NAC reversed this situation. The results suggest that exposure to cigarette smoke increases the ROS leading to increased lipolysis. CONCLUSION: Take together, our results showed that cigarette smoke may have direct effects on adipose tissue and it appears to be associated with increased oxidative stress.

Key words: AMP-activated protein kinase, cigarette smoke, lipolysis.

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