Cigarette Smoke Causes Decrease of mTOR via AMPK Activation in Swiss Mice Lung


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INTRODUCTION: Cigarette smoking is the major contributor of pulmonary diseases as COPD. In addition, smoking is associated to increased production of reactive oxygen species (ROS) and this is related with pathophysiological processes in COPD. The ROS increasing lead to AMP-activated protein kinase (AMPK) activation, as well as decrease of mammalian target of rapamycin (mTOR). The reduction in mTOR activity is associated to the increasing of inflammatory molecules and reduction of tissue repair capability in lung. The aim of this study was evaluate the effects of cigarette smoke on AMPK phosphorylation and mTOR/p70S6K pathway in lung mice.

MATERIALS AND METHODS: Male Swiss mice were exposed to 4 commercial cigarettes with filter (10mg tar, 0.8mg nicotine and 10mg carbon monoxide) per session, 3 sessions/day, daily for 7, 15, 30, 45, 60 days and control group (no exposure) (n=10). Twenty four hours after the cigarette smoking protocol, the animals were decapitated and the lung tissue were collected and analyzed by immunobloting for Sestrin2 protein levels and AMPK, mTOR and P70S6k phosphorylation. The group exposed for 45 days showed significant reduction in mTOR and p70S6k phosporylation when compared to other groups. Additionally, AMPK phosphorylation and Sestrin2 protein levels were increased in this group. The experiment was repeated only with three groups: control, 45 days and 45 days plus N-acetilcysteine (20 mg/kg/day).

RESULTS AND DISCUSSION: Lung animals exposed for 45 days to cigarette smoke exhibit increases protein levels of Sestrin2, increased AMPK phosphorylation and reduced mTOR phosphorylation. However, the NAC supplementation in this group reduced AMPK and increased mTOR phosphorylation. This was accompanied by lower inflammatory levels.

CONCLUSION: Our data suggest that ROS may to induce inflammatory process in lung through of AMPK activation and mTOR reduction antioxidants treatment could be a no pharmacological tool that can be used to improvement the smokers lung.

Key words: mTOR; Smoke cigarette; AMP-activated protein kinase

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