

## Effects of genistein on inflammatory responses in cigarette smoke-exposed rats

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**Introduction:** Cigarette smoking is a major cause for chronic obstructive pulmonary disease (COPD) with airway inflammation as a key feature<sup>1</sup>. High dietary intake of genistein has been reported to improve lung function and reduce the risk of developing COPD<sup>2</sup>. The aims of this study were to examine the potential of genistein in reducing pulmonary inflammation in rats exposed to cigarette smoke (CS).

**Methods:** Male Sprague Dawley rats were fed with phytoestrogen-free rodent diet throughout the whole study. At eight weeks old, they were administered with genistein (10 mg/kg) or the vehicle methylcellulose (0.5%) by oral gavage, and exposed to either sham air or CS (4%, smoke/air, v/v) 1 hour daily for 56 consecutive days. Bronchoalveolar lavage fluid (BALF) and lung tissues were collected one day after last exposure. Formalin-fixed paraffin-embedded lung section were stained with hematoxylin and eosin for histological examination. The amount of cytokine-induced neutrophil chemoattractant 1 (CINC-1), interleukin-6 (IL-6) and monocyte-chemotactic protein-1 (MCP-1) in BALF were measured by ELISA assay. The levels of malondialdehyde (MDA) and the activities of antioxidant enzymes, superoxide dismutase and catalase, in lung homogenates were measured by commercially available colorimetric assay kits. Data are presented as mean  $\pm$  SEM, with the value n indicating the number of rats used in the experiments. Statistical analysis was performed by one-way analysis of variance (ANOVA) followed by *post-hoc* Bonferroni's test.

**Results:** Alveolar enlargement was observed in the lungs of rats exposed to CS which was ameliorated in the presence of genistein. CS-exposure caused elevation of CINC-1, IL-6 and MCP-1 in BALF in comparison to sham air-exposed rats, which was attenuated in the presence of genistein. Moreover, genistein reduced CS-induced elevation of MDA level ( $1.76 \pm 0.13$  vs  $2.73 \pm 0.06$  nmol/mg protein, n=7) and normalized the activities of superoxide dismutase ( $0.63 \pm 0.07$  vs  $0.81 \pm 0.19$  U/mg protein, n=7) and catalase ( $974.69 \pm 104.94$  vs  $1282.49 \pm 202.97$  nmol/min/mg protein, n=7) in rat lung homogenates.

**Conclusion:** These findings demonstrated that treatment with genistein reduced CS-induced pulmonary inflammation and oxidative stress. Our data, therefore, suggest that genistein might be useful in preventing the development of COPD in people with smoking habit.

**References:** 1. Ha EV, Rogers DF. (2016). *Pharmacology* **97**: 84-100. 2. Hirayama FLA et al. (2010). *Mol Nutr Food Res* **54**: 909-917.