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Role of NF- κ B signaling pathway in airway inflammation of rats induced by atmospheric PM_{2.5}

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ABSTRACT Objective: To define the effect of PM_{2.5} exposure on NF- κ B signaling pathway and airway inflammation, and to reveal the role of NF- κ B signaling pathway in airway inflammation induced by atmospheric PM_{2.5} in rats. Air pollution condition plays an important role in inflammatory response process. Previous studies had suggested that atmospheric PM_{2.5} was a common environmental problem, influencing almost 98% Southeast Asian populations. Therefore, to study the effect of atmospheric PM_{2.5} on airway inflammation and its mechanism is of great significance. **Methods:** Atmospheric PM_{2.5} from urban traffic trunk roads was collected and prepared into the dry powder. Twenty-four wistar rats (half male and half female) were divided into four groups. Rats in low concentration, middle concentration and high concentration groups were given PM_{2.5} saline suspension of respectively 1.5, 7.5, 37.5 mg/kg by intratracheal instillation, while rats in control group were given saline. HE stain was used to observe the inflammation reaction of the airway tissue. The levels of TNF- α and IL-1 β in rats' bronchoalveolar lavage fluid (BALF) and serum were measured with ELISA. The expression level of I κ B- α protein in the airway of rats was detected by western blot. SPSS 17.0 was used for statistical analysis. **Results:** The organ coefficient of trachea in the group receiving 1.5 mg/kg PM_{2.5} was significantly higher than that in control group. In group receiving 7.5 mg/kg PM_{2.5}, the lung tissue inflammation was obvious and the structure damage was mild, while in group of 37.5 mg/kg PM_{2.5}, the airway inflammation was mild and the structure damage was severe. In the serum of rats exposed to the 1.5 mg/kg PM_{2.5}, the level of inflammatory factor TNF- α was significantly lower than that in the control group. The level of TNF- α in BALF of rats exposed to PM_{2.5} was higher than the control group, and with the exposure dose increasing, the level has decreased. The expression of I κ B- α protein in lung tissue of rats exposed to the 1.5 mg/kg PM_{2.5} has increased than in control group. **Conclusion:** Atmospheric PM_{2.5} exposure can damage rats' airway, affect the level of serum inflammatory factor TNF- α , and the protein expression level of I κ B- α . With all considered, the NF- κ B signaling pathway may play a role in regulating airway inflammation induced by atmospheric PM_{2.5}.

Keywords: NF- κ B; PM_{2.5}; airway inflammation; I κ B- α

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