

大气颗粒物对A549 和HUVEC 的DNA 损伤机制

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Genotoxicity of Size-Fractionated Ambient Particulate Matter in A549 and HUVEC Cell Lines

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摘要 采集北京市海淀区大气颗粒物粗颗粒($PM_{10-2.5}$)、细颗粒($PM_{2.5-0.1}$)和超细颗粒($PM_{0.1}$),分析颗粒物对人肺上皮细胞(human lung epithelial cell, A549)和人脐静脉内皮细胞(human umbilical vein endothelial cell, HUVEC)的基因毒性及促进活性氧自由基(reactive oxygen species, ROS)生成的机制。彗星实验发现: $PM_{10-2.5}$ 、 $PM_{2.5-0.1}$ 和 $PM_{0.1}$ 对2种细胞均有显著的基因毒性,并呈剂量-效应关系;细和超细颗粒造成的DNA损伤显著高于粗颗粒;HUVEC细胞的DNA损伤程度大于A549细胞; $PM_{2.5-0.1}$ 和 $PM_{0.1}$ 可诱导2种细胞内ROS水平显著升高,而 $PM_{10-2.5}$ 不能。因此细胞内DNA损伤可能与ROS生成有一定联系。

关键词: 大气颗粒物 人肺上皮细胞(A549) 人脐静脉血管内皮细胞(HUVEC) DNA损伤 活性氧自由基

Abstract: Ambient particulate matter has become one of the most harmful pollutants in the air. The genotoxic effects and generation mechanism of reactive oxygen species (ROS) were studied in A549 and HUVEC cells treated with three sizes of ambient particles, $PM_{10-2.5}$, $PM_{2.5-0.1}$ and $PM_{0.1}$. The results from comet assay show that $PM_{10-2.5}$, $PM_{2.5-0.1}$ and $PM_{0.1}$ caused significant DNA damages in both A549 and HUVEC cells in a dose-dependent manner. In both types of cells, the DNA damage caused by $PM_{2.5-0.1}$ and $PM_{0.1}$ are significantly higher than that caused by $PM_{10-2.5}$, and PMs cause higher DNA damage in HUVEC cells than that in A549 cells. $PM_{2.5-0.1}$ and $PM_{0.1}$ can significantly increase the intracellular ROS level, but $PM_{10-2.5}$ cannot. DNA damage in cells induced by particles may be related to the generation of ROS, which deserves further investigations.

Keywords: ambient particulate matter, human umbilical vein endothelial cell (HUVEC), human lung epithelial cell (A549), DNA damage, ROS generation

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