

EFFECTS OF PARTICULATE MATTER ON HUMAN DERMAL PAPILLA CELLS

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Introduction

Ambient particulate matter (PM) represents an environmental threat to which millions of humans worldwide are exposed. The adverse effects of PM on human health are currently a serious concern, and they have been shown to increase the risk of cancer, and pulmonary and cardiovascular diseases. The effects of ambient PM exposure on human skin in general, and on hair in particular, have not been studied. In this study, we investigated the effect of fine PM in human dermal papilla cells.

Materials and methods

In this study, we used two sources of pollutants, fine dust (PM₁₀-like) and diesel particulate extract purchased from Sigma-Aldrich Inc. Human follicle dermal papilla cells (HFDPCs) obtained from PromoCell were treated with various concentrations of fine dust (PM₁₀-like) and diesel particulate extract and subsequently incubated for 24 h. To investigate the expression of Wnt/ β -catenin signaling pathway and cell cycle genes, we performed western blotting.

Results

We found that the level of β -catenin through GSK-3 β signaling was decreased and by fine dust (PM₁₀-like) and diesel particulate extract in HFDPCs. Also, fine dust (PM₁₀-like) and diesel particulate extract inhibited the phosphorylation of Akt and ERK, which induce Wnt/ β -catenin signaling. Moreover, The level of cyclin D1, cyclin E and CDK2 was decreased by fine dust (PM₁₀-like) and diesel particulate extract in a dose-dependent manner.

Discussion

The results demonstrated that fine dust (PM10-like) and diesel particulate extract decreased Wnt/ β -catenin through the inactivation of Akt and ERK, induce cell-cycle arrest in HFDPs. therefore, the results suggest that particulate matter may causes hair loss.

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Hair Disorders