

# In vitro human alveolar macrophage ImmuPHAGE responses to particulate matter exposure

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Air pollution represents a recognised threat to human health and among its components particulate matter PM is considered as one of the most important pollutants 1. PM are microscopic particles of solid or liquid matter suspended in the air, these particles are small enough to invade and penetrate even the smallest airways in the lung potentially causing oxidative and inflammation in the respiratory system 2–4. Alveolar macrophages are first line of defence against inhaled particulates/substances in the respiratory airways and determine both short- and long-term lung responses. As these particles are delegated to deposit in the alveolar region it is crucial to understand their interaction with alveolar macrophage and investigate their potential to generate adverse, toxicological, or immunological responses.

The aim of this study is to investigate in vitro respiratory toxicity of PM 2.5 collected from two different cities of Kosova : Prishtina and Obiliq. Moreover, this work aims to compare the responses of alveolar macrophages exposed to different PM concentrations and link the dose/time effect relationship.

ImmuPHAGE™ (human alveolar macrophages) were provided by ImmuONE Ltd (Stevenage, UK). The model was exposed to cultured medium containing four different concentrations of PM2.5 (25, 50,10 Ug/ml). After 24 h incubation, cellular responses were assessed including cell viability, membrane permeability and phagocytic activity. All samples demonstrated concentration dependent reduction in mitochondrial activity and significant decrease on phagocytic activity was observed after just 24 h incubation. This study explored the toxic effects of particulate matters on macrophage health and their functionality aiming to contribute on understanding the impact of air pollution on human health.

Key Words: Particulate matters, alveolar macrophage, safety assessment, in vitro

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## References

1. World Health Organization. Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease. World Health Organization; 2016. <https://iris.who.int/handle/10665/250141>
2. Yang J, Huo T, Zhang X, et al. Oxidative stress and cell cycle arrest induced by short-term exposure to dustfall PM 2.5 in A549 cells. Environmental Science and Pollution Research. 2018;25:22408-22419.
3. Lewtas J. Air pollution combustion emissions: characterization of causative agents and mechanisms associated with cancer, reproductive, and cardiovascular effects. Mutation Research/Reviews in Mutation Research. 2007;636(1-3):95-133.
4. Feng S, Gao D, Liao F, Zhou F, Wang X. The health effects of ambient PM2. 5 and potential mechanisms. Ecotoxicology and environmental safety. 2016;128:67-74.