

# In Vitro Evaluation of Cytotoxicity Induced by Particulate Matter in Human Lung Epithelial Cells (A549)

---

**Hygerta Berisha<sup>a</sup>**

Rona Mustafa<sup>b</sup>, Artiola Gashi<sup>a</sup>, Armond Daci<sup>a\*</sup>

<sup>a</sup>Department of Pharmacy, Faculty of Medicine, University of Prishtina, 10000 Prishtina, Kosovo

<sup>b</sup>Department of General Medicine, Faculty of Medicine, University of Prishtina, 10000 Prishtina, Kosovo

hygerta.berisha@student.uni-pr.edu

---

**Background:** Particulate matter (PM), especially PM<sub>2.5</sub>, is a contributor to respiratory diseases, as it can infiltrate the lungs and trigger inflammation.<sup>1,2</sup> A549 cells, a model for human alveolar epithelial cells, are susceptible to PM-induced damage, which can result in impaired lung function. Investigating the cellular responses of A549 cells to PM exposure is essential for understanding the full scope of air pollution's detrimental effects on lung health.<sup>3,4</sup>

**Aims:** This study aims to evaluate the cytotoxic impact of PM<sub>2.5</sub> on A549 lung epithelial cells sourced from two urban areas in Kosovo: Prishtina and Obiliq. We aimed to assess the dose- and time-dependent effects of PM<sub>2.5</sub> on cell viability and to provide insights into how PM exposure compromises lung health.

**Methods:** A549 cells were cultured and exposed to varying concentrations of PM<sub>2.5</sub> (25, 50, 70, and 100 µg/ml) for 24 hours. MTT assays were used to determine cell viability and metabolic activity after exposure, reflecting the cytotoxic effects of PM<sub>2.5</sub> on the cells.

**Results:** A dose-dependent decline in cell viability was observed in A549 cells, with higher concentrations of PM<sub>2.5</sub> leading to a more pronounced reduction in cellular metabolic activity and increased cytotoxicity after 24 hours of exposure.

**Conclusions:** This study highlights the dose-dependent toxic effects of PM<sub>2.5</sub> on human alveolar epithelial cells, underscoring the damaging impact of air pollution on respiratory health. These findings contribute to a growing understanding of the potential risks posed by PM<sub>2.5</sub> exposure, particularly in relation to the development of respiratory diseases.

## References

1. Manisalidis, I., Stavropoulou, E., Stavropoulos, A. & Bezirtzoglou, E. Environmental and Health Impacts of Air Pollution: A Review. *Frontiers in Public Health* vol. 8 Preprint at <https://doi.org/10.3389/fpubh.2020.00014> (2020).
2. Arias-Pérez, R. D. *et al.* Inflammatory effects of particulate matter air pollution. doi:10.1007/s11356-020-10574-w/Published.
3. Kim, W. *et al.* A study of cytotoxicity and genotoxicity of particulate matter (PM<sub>2.5</sub>) in human lung epithelial cells (A549). *Mol Cell Toxicol* 14, 163–172 (2018).
4. Yan, Z. *et al.* The Cytotoxic Effects of Fine Particulate Matter (PM<sub>2.5</sub>) from Different Sources at the Air–Liquid Interface Exposure on A549 Cells. *Toxics* 12, (2024).