

Abstract

Potential oxidative and inflammatory effects induced by PM_{2.5} in Olfactory Ensheathing Cells (OECs) and SH-SY5Y cells.

Antonio Cristaldi^{1*}, Rosalia Pellitteri², Paola Dell'Albani², Valentina La Cognata², Eloise Pulvirenti¹, Gea Oliveri Conti¹, Margherita Ferrante¹.

¹ Department of Medical Sciences, Surgical and Advanced Technologies "G.F. Ingrassia", University of Catania, Italy.

² Institute for Biomedical Research and Innovation, National Research Council, Catania, Italy.

* Correspondence: antonio.cristaldi@unict.it

Abstract: PM_{2.5} in atmosphere can favor the onset of neurodegenerative diseases [1,2,3]. Our research evaluates oxidative and inflammatory processes in OECs and SH-SY5Y cells.

Cells were exposed *in vitro* to PM_{2.5} extracts to evaluate the viability, mitochondrial damage, cytoskeletal modifications and expression of caspase-3. ELISA tests were performed for the determination of SOD and cytokine levels (IL-2, 3, 6, 8, 17, TNF α).

Both cell lines showed reduced viability after exposure to PM_{2.5}, and some samples showed increased mitochondrial damage, alteration of vimentin functionality and presence of effector caspases. We detected an increase in the levels of some cytokines (IL-3 and IL-6) after 72 hours of exposure to PM_{2.5}.

Our results highlighted the possible effects of PM_{2.5} on cells. Furthermore, we detected molecules involved in oxidative and inflammatory processes associated with neurodegenerative processes. Consequently, the reduction of PM_{2.5} emissions is a fundamental objective for the environmental and public health.

Keywords: environmental pollution, PM_{2.5}, public health, neurodegenerative diseases.

References

1. Cristaldi, A., Fiore, M., Oliveri Conti, G., Pulvirenti, E., Favara, C., Grasso, A., Copat C., Ferrante, M., 2022. Possible association between PM_{2.5} and neurodegenerative diseases: A systematic review. *Environmental Research* 208 (2022)112581. <https://doi.org/10.1016/j.envres.2021.112581>
2. Wang, Y., Zhang, M., Li, Z., Yue, J., Xu, M., Zhang, Y., Yung, K.K.L., Li, R., 2019. Fine particulate matter induces mitochondrial dysfunction and oxidative stress in human SH-SY5Y cells. *Chemosphere* 218, 577–588. <https://doi.org/10.1016/j.chemosphere.2018.11.149>.
3. Kanninen K.M., Lampinen R., Rantanen L.M., Odendaal L., Jalava P., Chewa S., White A.R., 2020. Olfactory cell cultures to investigate health effects of air pollution exposure: Implications for neurodegeneration. *Neurochemistry International* 136 (2020) 104729. <https://doi.org/10.1016/j.neuint.2020.104729>



Copyright: © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).