P026- CYTOTOXICITY OF PM10 FROM BRAKE WEAR AND TRUCK EXHAUST EMISSIONS TO LUNG CELLS

Marlene Soares 1, Daniela Figueiredo 1,2, Helena Oliveira 1, Célia Alves 2
1 Department of Biology and Centre for Environmental and Marine Studies, University of Aveiro, Aveiro, Portugal. marsalvadosoares@gmail.com
2 Department of Environment and Planning and Centre for Environmental and Marine Studies, University of Aveiro, Aveiro, Portugal

Particulate matter (PM) pollution is a global burden that affects the natural environment and living organisms. The main cause of this overwhelming pollution is traffic. PM is constituted by many compounds, including polycyclic aromatic hydrocarbons (PAHs), which have been linked to carcinogenic and mutagenic effects (Alegbeleye et al, 2017). Traffic related PM can be divided into two types: exhaust and non-exhaust PM (Thorpe & Harrison, 2008). Exhaust particles result from incomplete fuel combustion and lubricant volatilization during the combusting process in the engines (Amato et al., 2014). Non-exhaust PM emissions are created through wear processes of tires, brakes, and other vehicle parts, or by resuspension of already present road wear particles. In particular, brake wear particles are formed by friction between brake pads and disks (Thorpe & Harrison, 2008). The aim of this study was to evaluate the potential cytotoxic effects of PAHs bound to brake wear particles (PM10), and exhaust emissions from trucks to human lung adenocarcinoma cell line (A549). PM10 samples from both the tailpipe of trucks and brake wear were collected in laboratories equipped with bench dynamometers. PM10 from brake wear were obtained under test cycles with various braking severities: 1) two types of conventional brake pads (low steel 1 and 2), and 2) two types of non-asbestos organic brake pads (NAO 1 and 2) with non-ferrous metals (Alves et al., 2021). Exhaust samples from three diesel and GTL powered heavy duty vehicles (Euro V and VI) were collected under different driving cycles.

The effects of PM10-bound PAH extracts at 100, 150 and 400 ng/mL on A549 cells viability were evaluated by the MTT assay (Zerboni, A. et al. , 2019), while the effects cell cycle dynamics were evaluated by flow cytometry (Darzynkiewicz et al., 2001) , both after 24h exposure. PM10-bound PAHs from brake wear (150 and 400 ng/mL) presented statistically significant decrease in cell viability to A549 cells when exposed to the samples PT1, PEN12, PEN14 and PEN17. Samples from vehicle exhaust (100 ng/mL) caused no significant reduced viability. There is no statistically significant change in the cell cycle in any sample exposure. Some PM10 by their selves do not cause a statistically significant damage to the cells but combined between them may be seriously hazardous.

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