Platform Abstracts

Untargeted metabolomics to assess in vitro toxicity of two fractions of fine particulate matter (PM2.5-0.25 and PM0.25) at environmental levels on A549 lung carcinoma cells.

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Particulate matter smaller than 2.5 μm (PM2.5; also referred as "fine") is considered as one of the most dangerous components of air pollution. According with last estimations, around 7 million people die annually in the world as a consequence of inhalation of PM2.5. Due to its harmful potential, toxicity of PM2.5 on lung cells has been widely studied, and nowadays it is possible to investigate this subject on different levels. However, most of the publications on this topic are focused on studying PM2.5 effects on human alveolar cells for short periods of time after applying doses far higher than environmental levels. To bridge this knowledge gap, we have collected two fractions of fine PM (PM2.5-0.25 and PM0.25) in the surroundings of a petrochemical complex. Subsequently, human alveolar epithelial cells (A549) were subjected to several assays to determine the toxicity of these two PM fractions. The first one was a dose-response test to evaluate the cytotoxicity after 72 h of exposure. The second one was an untargeted metabolomics approach to determine changes in cell's intracellular metabolic profile after exposure to two different PM doses (environmental dose and IC5) for 72 h. For the latter objective, an ultrahigh performance liquid chromatography-high resolution tandem mass spectrometry (UHPLC-QTOF-MS) was used to acquire the polar and non-polar fraction of the metabolome. Preliminary results show a higher cytotoxicity of the finest fraction. Thus, cell mortality at low doses (0.5-0.1 μg PM/mL) ranged from 23-42% for PM0.25, while it was between 12-27% in the case of PM2.5.Furthermore, several differences in the lipidomic profile between the control cells and those exposed to PM were noticed. The methodology carried out in this study will help to improve the knowledge of sub-lethal effects after exposition to environmental levels of fine PM, which can be useful not only for scientific purposes, but also for regulators and policy makers.