

## Effect of microbiome from waste sorting industry in THP-1 cell homeostasis and inflammatory responses

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Organic dust and related microbial exposures are the main inducers of several respiratory symptoms and have been reported in diverse occupational settings. *In vitro* tests using relevant cell cultures can be useful for characterizing the toxicity of complex mixtures present in the air of occupational environments (Viegas et al. 2017).

In this study, cell viability was determined using the cell proliferation test WST-1 and inflammatory responses by ELISA assays measuring the production of proinflammatory cytokines TNF $\alpha$  and IL-1 $\beta$ . Human macrophages derived from THP-1 monocytic cells were exposed to extracts of 17 filters belonging to the filtration system from forklifts operating in one waste sorting industry located in the Lisbon region and one control filter. Additionally, bacterial and fungal diversity was assessed by RTL Genomics on an Illumina MiSeq with bacterial 16S 515F and 806R sequencing primers and fungal ITS1F and ITS2aR ribosomal DNA primers with 2x300bp chemistry.

All filter samples were positive for microbial contamination, for both bacterial (350-1329 operational taxonomic units [OTUs]) and fungal (157-650 OTUs) load. Three filter samples revealed only moderate cytotoxicity *in vitro*. On the average, the reduction in cell viability was between 0-20%, and 35% at the highest. All filter samples caused *in vitro* proinflammatory effects, regarding the elicited TNF $\alpha$  and IL-1 $\beta$  levels. The highest inflammatory responses were observed in filter samples 1, 4 and 5. A moderate negative correlation was found between bacterial load (OTUs) and inflammatory response for both TNF $\alpha$  ( $r=-0.61$ ;  $p=0.02$ ) and IL-1 $\beta$  ( $r=-0.46$ ;  $p=0.07$ ). No significant correlation was found between fungal load and inflammatory response *in vitro*.

In light of the results, we should consider that, besides microbiome, others pollutants such as dust, metabolites or particles are probably influencing the increased production of cytokines (Viegas et al. 2018). These findings corroborate, once more, the importance of considering exposure to complex mixtures in occupational settings. More studies are needed to drive robust conclusions on the effects of exposure to complex mixtures in occupational settings, in order to better estimate health risks for workers.

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### References

- Viegas, et al. (2017). *Toxics*. 5; 8: 1 – 16  
Viegas et al. (2018). *Annals of Work Exposures and Health*: 1–19

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**Main topic (tick the key topic of your presentation) :**

- Effects of biological agents on the health of workers exposed: infectiology and toxicology research, epidemiological studies, dose-response relationships, etc.
- Methods and strategies for the qualitative and quantitative assessment of biological risks: risk assessment methods, biometrology, methods and strategies for exposure measurement (bioaerosols, liquids, surfaces, real time), research resources (atmosphere generation, modelling), data interpretation, etc.
- Exposure to biological agents at the workstation: sectors and biological agents concerned, emission sources and exposure situations, characteristics of exposure (concentration, particle size distribution and biodiversity of bioaerosols, etc.), multi-exposure, biometrology, etc.
- Prevention measures: means available for reducing exposure, ventilation, innovative processes, personal protection, new technologies for bioaerosol removal and surface cleaning, etc.

**Preference (tick the preference for presentation):**

- Oral \*
- Poster presentation
- No preference

\* Authors selected to present oral communications will be asked to provide a short biography (5 lines) to allow the chair person of the session to introduce them.