Fungal burden in filtering respiratory protective devices used in the waste sorting industry

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One of the solutions for reducing the workers’ exposure to the effects of organic dust is the use of Filtering Respiratory Protective Devices (FRPD). During FFR use, water vapour and sweat are released increasing humidity of the material providing favourable conditions for fungal growth. The aim of this study is to characterize the fungal burden (fungi and mycotoxins) retained in FRPD used by workers from one waste sorting from Portugal.

Fifty-four FFRs (Protection FFP3) were collected after normal use (one work shift) from waste sorting workers. The exhalation valve and 2 cm² from the interior layer of the each FFR were extracted and seeded on two media: 2% malt extract agar (MEA) supplemented with 0.05 g/L chloramphenicol and dichloran-glycerol agar (DG18), following incubation at 27 °C for 5–7 days. All FFRs samples will be screened for mycotoxins presence.

The fungal contamination in the interior layer of the mask ranged from 0 to 25 CFU.cm⁻² in MEA, and from 0 to 26.4 CFU.cm⁻² in DG18. Six different fungal species were found in the interior layer in both MEA and DG18. The most common fungal genera found in MEA were Lichtheima (57.41%), Penicillium (27.10%) and Aspergillus (14.35%; including sections Fumigati, Nigri, Flavi, Candidi and Circumdati). In DG18, the most common genera were Penicillium (85.37%), Aspergillus (14.29%; comprising sections Fumigati, Circumdati, Candidi, Flavi, Nigri and Aspergilli) and Mucor sp. (0.15%). In the exhalation valve, the fungal contamination ranged from 0 to 0.45 CFU.cm⁻² in MEA, and from 0 to 0.8 CFU.cm⁻² in DG18. In MEA, only two genera were found: Penicillium (60.53%) and Aspergillus (39.47%; including sections Fumigati and Nigri). But in DG18, seven different genera were found, of which the most found were Penicillium (68%), Aspergillus (25.33%; covering sections Fumigati, Candidi, Nigri, Restricti and Aspergilli) and Mucor (2.67%).

Our results point out for the need of intervention regarding the FFR replacement frequency due to quantitative and qualitative results (species with toxigenic potential).

Acknowledgments
The authors are grateful to FCT – Fundação para Ciência e Tecnologia for funding the project EXPOSe – Establishing protocols to assess occupa-tional exposure to microbiota in clinical settings (02/SAICT/2016 – Project nº 23222) and to Instituto Politécnico de Lisboa, Lisbon, Portugal for funding the Project “Waste Workers’ Exposure to Bioburden through Filtering Respiratory Protective Devices” (IPL/2018/WasteFRPD_ESTeSL).

The project is co-financed by the Polish National Agency for Academic Exchange (PPN/BIL/2018/1/00231)