Reactive oxygen stress generating capacity and inflammatory potential of settled dust samples from moisture damaged and reference schools

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AIMS

Exposure to moisture damaged indoor environment is associated with adverse respiratory health effects, but responsible factors remain unidentified. In order to elucidate the mechanism behind these effects, Reactive Oxidative Stress (ROS)-generating capacity of settled dust samples (n=25) collected from moisture damaged and reference schools in Spain, The Netherlands and Finland was evaluated. In addition, the results were compared with immunotoxicological endpoints analysed with an in vitro model.

METHODS

The settled dust samples were collected to cardboard boxes for 8 weeks from reference (n=11) and moisture damaged (n=14) schools from Spain, The Netherlands and Finland. Sample was vacuumed from the cardboard box onto MCE-filter, suspended to diluting buffer and stored in a freezer. Samples of each school were pooled, filtered, aliquotted and frozen again before further analysis.

RESULTS

The average TD50 values showed that samples from The Netherlands had higher ROS capacity (= lower TD50 values) compared to samples from The Spain and Finland (Fig. 1). The results were in line with the findings of an in vitro model showing higher production of inflammatory mediators and toxicity of the Dutch samples, although the difference between TD50 values of samples from moisture damaged and reference environments was not statistically significant (Fig.2). However, the results of the mouse macrophage model indicated that in two out of three countries, the immunotoxic potency of samples was higher in moisture damaged environments (Fig. 3).

CONCLUSIONS

The results indicate that the ROS generating capacity, along with immunotoxicological activity of settled dust differs between geographical locations. The inflammatory potential of dust tends to be higher in moisture damaged buildings, but geographical differences and high variance confounds the differentiation between moisture damaged and reference environments.

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