

STUDY DORES: The effect of exposure to glucan spiked dust on bronchial responsiveness and eNO

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Introduction

B-1,3-D-Glucan (glucan), a fungal associated microbiological pattern, has been suggested as a causative agent inducing inflammatory responses in the people exposed to this component in the airways. We have earlier shown inflammatory effects of dust spiked with glucan in a human experimental design(1), and the present study was planned to investigate the dose response function of dust mixed with glucan.

Methods

This study was set out to study the possible dose response relations between dust spiked with glucan and health effects in a controlled experimental setting. The layout of the experiment is explained in detail elsewhere. In short 24 subjects were subjected to 4 exposure concentrations of dust in a randomised double blinded fashion. The exposures for the four exposure levels were 54 (52), 149 (59) 333 (104), and 646 (92) $\mu\text{g}/\text{m}^3$ (SD) respectively. The subjects were categorised as atopics (yes/no) based on a skin prick test. Bronchial responsiveness (BHR) to metacholine is a non-invasive marker of airway inflammation. In brief, the subjects inhale increasing concentrations of metacholine and the slope is calculated as log dose slope. Bronchial responsiveness was determined at 6 hour post exposure as the log dose slope $\text{BR} = {}^{10}\log [(\text{Initial FEV}_1 - \text{Last FEV}_1) / \text{Initial FEV}_1 * \text{Final dose}] + 1$.

Statistical analysis was done with a mixed model where the 'after exposure' value was related to the personal exposure.

Results

The lowest personal dust level observed was $3 \mu\text{g}/\text{m}^3$ and the highest observed level for any subject was $789 \mu\text{g}/\text{m}^3$.

The graphical analyses indicated an increase in response at higher exposure with a maximum at $350 \mu\text{g}/\text{m}^3$. The mixed model analysis revealed a borderline statistical significance for dust exposure ($p=0.08$), and an interesting contrast was that between no exposure and exposure $350 \mu\text{g}/\text{m}^3$, where statistical significance, $p=0.01$, was found. No interaction was found for the atopic group and the exposure. The analyses show a statistically significant effect of dust on exhaled NO with increased values of NO for higher values of dust.

Discussion and conclusion

This study showed a dose response like association of BHR and eNO with exposure to glucan spiked dust. This is a further elaboration of the primary study finding an increased inflammation after exposure to the spiked dust (1). The fact that two markers of inflammation increase with exposure makes the interpretation of a real effect more plausible.

1. Bønløkke J.H. et al. 2006. Scand. J. Work Environ. & Health 2006, 32(5): 374-82.