# Visually observed mold and moldy odor versus quantitatively measured microbial exposure in homes

The original paper contains 14 sections, with 9 passages identified by our machine learning algorithms as central to this paper.

## Paper Summary

SUMMARY PASSAGE 1

### Introduction

In contrast, early exposure to high level of fungal (1-3)-Î²-Dglucan and high endotoxin exposure in the presence of multiple dogs were associated with decreased risk of recurrent wheeze, allergen sensitization, and positive asthma predictive index Iossifova et al., 2007;2009). Only visual observation of mold and water damage and dust sampling were included in the Year 1 home evaluations. Air sampling was conducted in homes of a subgroup of children as part of a nested matched case-control study (atopic children and controls matched on birth date within one month) at child's average age of 1.7 years (Osborne et al., 2006).

SUMMARY PASSAGE 2

### Recruitment Of Homes

A balanced selection was then conducted for every 3-month subgroup based on the exposure criterion and the race of the child. For every home that contained some form of damage (visible mold, moldy odor, water damage or history of water damage), we randomly selected a home with no reported mold or water damage within the same age group. Altogether 220 recruitment letters were sent to families.

SUMMARY PASSAGE 3

# Home Visit And Sample Collection

The homes had previously been classified into three categories based on visual inspections in Year 1: Visible Damage Category 0 (no visible mold or moldy odor), Visible Damage Category 1 (low mold: reported history or observed water damage, observed moldy odor, or visible mold area â‰¤0.2 m 2 ), and Visible Damage Category 2 (high mold: visible mold area >0.2 m 2 ) (Cho et al., 2006b). Similar categorization was done based on the visual assessment in Year 7. In addition, a new two-level categorization (moldy odor yes/no) was developed based on the analysis of exposure data using the Principal Component analysis as described below.

SUMMARY PASSAGE 4

# Sample Analysis

Endotoxin concentrations in dust were expressed as endotoxin units per mg of dust (EU/ mg); similarly, (1-3)-Î²-D-glucan concentrations in dust were expressed as Âµg/g. Airborne endotoxin concentrations were expressed as EU/m 3 , whereas airborne (1-3)-Î²-D-glucan concentrations were expressed as ng/m 3 . The lower detection limit (LOD) for endotoxin was 0.053 EU/ml, which corresponded to detection limit of 0.002 EU/mg for dust samples and 0.046 EU/m 3 for air samples.

SUMMARY PASSAGE 5

# Statistical Analysis

Principal component analysis (PCA) and analysis of variance (ANOVA) were employed to combine the exposure information described by the levels of dust and air in home samples at Year 7 and the corresponding home mold category at Year 7. The ANOVA analyzed the values of first principal component (First PC) scores for three sets of exposure variables. The First PC score is a projection of the multidimensional coordinates of all exposure variables into one dimension, and explains the largest percent of the variability of the higher dimensional data set, than any other linear combination of exposure variables.

SUMMARY PASSAGE 6

# Results

It was found that all the microbial exposures were highest in homes that had moldy odor, but this difference was not significant when tested for the seven mold categories (Visible Damage Categories 0, 2 and five levels of Category 1 specified above). From the PCA analyses (Table 6), all of the three different combinations of exposure variables (both air and dust variables, dust only, air only) showed highest mean values for the two mold categories that included moldy odor. This finding indicates that homes that had moldy odor also had the highest concentrations of the measured microbial contaminants.

SUMMARY PASSAGE 7

# Discussion

This association is unclear in less severely damaged homes. Some studies have reported associations between visible mold damage and the concentration of airborne viable fungi and bacteria (Miller et al., 2000;Gent et al., 2002;HyvÃ¤rinen et al., 2006) and the concentrations of several microbial species in house dust determined by PCR (Lingnell et al., 2008). Borderline significant association have been reported between visible damage and the concentrations of (1-3)-Î²-D-glucan, endotoxin and 3-hydroxy fatty acids (chemical marker for gram-negative bacteria) in house dust (Douwes et al., 2006b;HyvÃ¤rinen et al. 2006;Bischof et al., 2002).

SUMMARY PASSAGE 8

# Conclusions

Future analysis will indicate which, if any, of the exposure values obtained with the different assessment methods are associated with the development of asthma or atopy. Dust borne endotoxin, dust borne (1-3)-Î²-D-glucan, ERMI, airborne endotoxin, airborne (1-3)-Î²-D-glucan, and airborne fungal spores in homes divided into three levels of visible mold damage: no mold (n=38), low mold (n=127) and high mold n=19). Histograms show geometric means, except arithmetic mean for ERMI, and error bars show 95% confidence intervals.

SUMMARY PASSAGE 9

# Dust Ermi

Dust Endotoxin (EU/mg) The First PC transforms sets of exposure variables into a single score. The First PC score is a one-dimensional summary of the variability in the set of exposure measurements, which is greater than any other transformation of exposure measurements. First PC scores were calculated for sets of exposure variables measured in each subject's home, Mean values of PC scores were obtained by ANOVA, where the dependent variables were First PC Scores, and mold levels were the categories of analysis.