Repeatability of house dust samples in relation to quantitative PCR of microbes

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SUMMARY

The study was designed to determine the repeatability of house dust sampling and representativeness of a single sampling using quantitative PCR (qPCR) assays for several fungal species and groups. Dust samples were collected from dust bags of vacuum cleaners from five non-water damaged houses in four different seasons. Our results suggested that qPCR is a promising tool for microbial analyses from house dust samples in epidemiological studies.

INTRODUCTION

Associations between fungal species in our indoor environment and adverse health effects, such as respiratory symptoms, asthma and allergy are a major topic of interest. House dust sampling has been used to describe microbial populations in indoor environments. However, the repeatability of such sampling has not been thoroughly validated. In this study, the repeatability and representativeness of house dust sampling was tested using qPCR assays for several fungal species and groups.

RESULTS

Fungal concentrations varied between seasons depending on analysed species or assay groups. For example, the concentrations of *Cladosporium* species were at their highest in summer and autumn while for *Penicillium* and *Aspergillus* species differences were not so obvious (Figure 1). The repeatability of the parallel isolations of DNA was good (ICC > 60) for most of the analysed species and groups of fungi (Table 1).

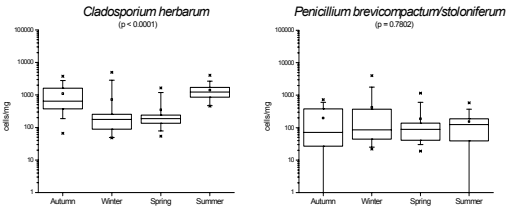

Figure 1. Percentiles and mean concentrations of *Cladosporium herbarum* and *Penicillium brevicompactum/stoloniferum* in different seasons, n = 5 * 5 (from each five repeated determinations were been made). The boxplots show the following: □, arithmetic mean; x, min and max; horizontal lines from the bottom, 1, 5, 25, 50, 75, 95 and 99 %.

MATERIALS AND METHODS

- ✓ Samples from five non-water damaged homes
  - dust from vacuum cleaner's dust bag
  - four different seasons
- ✓ DNA was isolated from five parallel subsamples from each dust samples
  - repeatability
- ✓ QPCR for 16 species or assay groups of fungi (Table 1)

Table 1. ICC values and frequencies (n=100) for analyzed fungal species and assay groups. Good repeatability in bold.

Assay groups / species	ICC*	Frequency (%)
Cladosporium herbarum	**84.5**	100
Penicillium chrysogenum	**83.1**	83
Eurotium amstelodami/chevalieri/herbariorum/rubrum/repens	**79.9**	100
Aspergillus niger/awamori/foetidus/phoenicis	**78.7**	69
Penicillium brevicompactum/stoloniferum	**72.5**	96
Aspergillus fumigatus/Neosartorya fischeri	**72.5**	53
Penicillium/Aspergillus/Paecilomyces variotii	**71.2**	100
Trichoderma viride/atroviride/koningii	**70.8**	88
Cladosporium cladosporioides	**66.8**	100
Wallemia sebi	**66.5**	98
Aureobasidium pullulans	**65.3**	100
Epicoccum nigrum	44.6	100
Aspergillus penicillioides	31.6	97
Cladosporium sphaerospermum	–	22
Stachybotrys chartarum	–	1
Aspergillus versicolor	–	–

* ICC (intraclass correlation coefficient) demonstrate similarity of the parallel samples, – not defined

CONCLUSION

Our results suggest that qPCR is a promising tool for the microbial analyses from house dust samples in epidemiological studies. However, seasonal variation must be taken into account.

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