

Mass spectrometry methods for determining mycotoxins in dust and building materials from water-damaged indoor environments in southern Sweden and New Orleans, USA

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Introduction

Exposure to molds through inhalation is suspected to cause adverse health effects *e. g.* allergy, asthma, and symptoms of intoxication. Here we report highly specific and sensitive mass spectrometry (MS) methods for demonstrating a range of mycotoxins in mold-affected building materials and in dust settled above floor level in Swedish water-damaged indoor environments. In addition, we also demonstrate mycotoxins in bulk dust collected in New Orleans, USA, after hurricanes Katrina and Rita.

Materials and Methods

Samples were extracted with methanol, processed, and analyzed by triple-quad MS in combination with high pressure liquid chromatography for demonstrating sterigmatocystin (STRG), aflatoxin B₁, gliotoxin (GLT), satratoxin G (SATG), and satratoxin H (SATH), and in combination with gas chromatography for demonstrating hydrolysis products of macrocyclic trichothecenes, *i.e.* verrucarol (VER), and trichodermin, *i.e.* trichodermol (1).

Results

In Sweden, a majority (65%) of the building materials (n=101) were positive for at least one mycotoxin; 22% for STRG (produced by *Aspergillus spp.*), 2% for GLT (produced by some *Aspergillus spp.* and *Penicillium spp.*), 5% for SATG, 4% for SATH, 32% for VER, and 52% for TRID (typically produced by *Stachybotrys chartarum*). In addition, 2 out of 18 studied settled dust samples were positive for VER. Out of seven samples from New Orleans 3 were positive for VER, and one of the three was also positive for STRG.

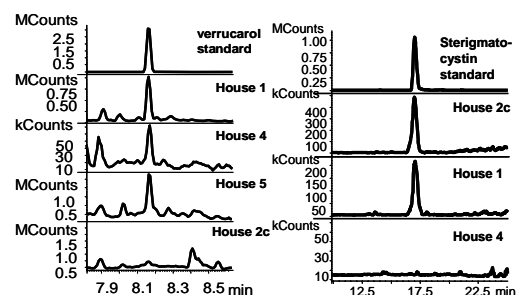


Figure 1. GC-MSMS chromatograms of VER-HFB₂ (left) and HPLC-MSMS chromatograms of STRG (right) in collected dust samples from New Orleans. Chromatograms representing positive controls (upper) and mycotoxin-negative dust samples (lower) are included for comparison.

Conclusion

The results indicate that molds contaminating building materials regularly produce mycotoxins, and that mold spores and/or particles from such materials can become airborne, and thus inhalable, since mycotoxins were also found in dust settled above floor level. This is also the first report on the detection of mycotoxins in dust samples collected in water-damaged New Orleans homes.

- (1) Bloom E., Bal K., Nyman E., Must A., and Larsson L. 2007. Mass spectrometry-based strategy for direct detection and quantification of some mycotoxins produced by *Stachybotrys* and *Aspergillus spp.* in indoor environments. *Appl Environ Microbiol.* 73:4211-7.

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