DISCUSSION

Do mycotoxins contaminate surfaces in homes or buildings (objects handled by occupants)?

CLOSURE

Fungi that grow on solid substrates typically do not release mycotoxins; therefore, it is very unlikely that surfaces in buildings will become contaminated with mycotoxins in the absence of obvious fungal growth.

DISCUSSION

(1) Are there any data to document low level exposures to mycotoxins and to detail long term effects of such? (2) Has diarrhea ever been reported to result from long term exposure to airborne mycotoxins or to spores of fungi known to produce mycotoxins?

CLOSURE

I know of no long term studies conducted on the effects of the inhalation of low levels of toxigenic fungi or their mycotoxic metabolites that are likely to be problems in buildings and homes. Most of these long term exposure studies have been conducted orally though there is concern that some workers may be exposed by a respiratory route - see W. G. Sorenson et al. *J Tox. Environ. Health* **1984**, *14*, 525-533.

DISCUSSION

In sick building syndrome cases where there is no evidence of increased rate of respiratory tract infections, would you consider that *Stachybotrys* toxins might be involved? i.e. does the immunosuppressive effect occur at doses at (or below) the dose causing acute toxic effects (headache, fatigue, etc.)

CLOSURE

Long term exposure to trichothecenes at subacute levels give immunotoxic effects in animals (see M. J. Taylor, V. F. Pang, and V. R. Beasley in Trichothecene Mycotoxicosis: Pathophysiologic Effects, Vol. II, V. R. Beasley, ed., CRC Press, Boca Raton, FL 1989, pp 1-38), but there are no data available for the specific toxins found in *Stachybotrys*. If there are no secondary bacterial infections and no complaints about burning sensations about the eyes and nose, I would say there is little reason to even suspect the involvement of *Stachybotrys*.

DISCUSSION

What effect does humidity have on *S. atra* population in the indoor environmental range of 10-70% RH? If it likes paper, would you expect problems in libraries and offices in particular? What about low level contamination over large surface areas?

CLOSURE

The relative humidity must be high (>70%) for *S atra* to flourish. In fact, *S atra* requires very damp conditions, i.e. the material needs to be soaking wet. Normally, when water damage in office or libraries occurs, the water is taken up and the place dried out. In such cases, *S atra* will not get started. When *S atra* does take hold, it

usually does so in out of the way places and in fairly localized areas rather than growing over large surface areas.

DISCUSSION

Are there *Penicillium* species which are notorious toxin producers? Which ones?

CLOSURE

Indeed there are. Betina (*Dev. Food Sci.* **1984**, *8*, p. 5) lists 29 such toxins from 18 species of *Penicillium*. However, of these species, *P. viridicatum* is probably the only one likely to be contaminating the air we breath in homes and buildings. Unfortunately, this species produces a variety of mycotoxins, although, to date, none have been identified from an indoor environment.

DISCUSSION

What culture media do you suggest for isolating *Stachybotrys*?

CLOSURE

Cellulose agar at pH 8 (see I. A. El-kady et al. *Mycopathologia* **1981**, *76*, 59).

DISCUSSION

Could mycotoxins be collected using traditional absorbents like Tenax, then analyzed via GC/MS? If not, why not, how volatile are these in general?

CLOSURE

Most mycotoxins are not volatile but are found inside the spores or mycelium of the fungi. Typically, the contaminated material is extracted (ethyl alcohol is a good all around solvent for such purposes) and the extract analyzed for the mycotoxins. GC/MS is often the best technique available, but standards must be available for comparison.

DISCUSSION

How do you decontaminate an area where large quantities of organisms have grown? i.e. *Penicillium*, etc.

CLOSURE

If the expense is not too high, it is often best to simply replace the contaminated items However, it this is not practical, the fungal growth should be scrapped off, and the area washed well with hypochlorite and detergent solutions. Those carrying out this work should wear respirators and protective clothing.

DISCUSSION

If you suspect that *Stachybotrys*/trichothecenes are contaminating a material such as sheetrock or wallpaper, how much material do you need for isolation of trichothecenes? Do you need kilogram, gram, mg or microgram amounts?

CLOSURE

Since the amount of toxin is related to the fungal mass, this will depend upon how heavily the material is contaminated In the case of heavily contaminated material, a gram or less of material should be sufficient. If the growth is poor, then much larger amounts may be required.

DISCUSSION

How many laboratories are capable of isolating and identifying mycotoxins that may be important in indoor environments? Are there commercial labs that can do this type of work?

CLOSURE

World wide, there are several dozen laboratories which can do these analyses for *specific* classes of toxins. Except in the case of aflatoxins and to a lesser extent the trichothecenes, there are no commercial laboratories which screen for mycotoxins.

DISCUSSION
Toxins released from many fungi such as *Aspergillus flavus* and *Stachybotrys* are extremely toxic; are there specific laboratory guidelines ensuring their safe analysis?

CLOSURE

There are such guidelines for *Aspergillus flavus* - see reference [8] - but not for *Stachybotrys*. In general, work in a hood and never allow this organism or its chemical products to come into contact with skin.