Challenge 1004-3

April 2010

Stachybotrys species – Environmental sample

HISTORY

This sample was sent as a simulated environmental sample. Laboratories were expected to isolate and identify *Stachybotrys* species.

CMPT QA

The sample was verified by a reference laboratory. *Stachybotrys chartarum* was isolated as a pure culture after 2 days at 30°C on Phytone agar.

SURVEY RESULTS

This was the first *Stachybotrys* challenge sent by CMPT.

All laboratories processing the sample correctly identified the fungus as *Stachybotrys* species (Table 1). One laboratory reported *Stachybotrys chartarum*.

IDENTIFICATION

S. chartarum grows well on common mycological media such as malt extract, potato sucrose agar or V-8 agars.[1] Colonies are floccose, white at first, darkening with age.[2]

Microscopic morphology

In culture or on natural substrates the fungus sporulates profusely forming dark masses of conidia from characteristic phialides.

Conidiophores: erect, single, or branched, smooth or rough, bearing a group of phialides at the apex. The phialides, hyaline or pigmented, produce conidia successively into a slime droplet.

Conidia: black, one celled, ovoid to elliptical, smooth or rough, held together in a slimy mass[2].

Identifying *S. chartarum* is not difficult because of its unique conidiophore-phialide arrangement and ornamented conidia. However, it can present problems because of the great variation in the size and shape of the conidia, and especially the color and roughness.[3]

Table 1: Identification results *Stachybotrys* spp.

Reported	No of labs
Stachybotrys species	9
Stachybotrys chartarum	1
snnp	1
Total	11

snnp: specimen not normally processed

CLINICAL RELEVANCE

S. chartarum is a mold that is found in water-damaged homes. It grows on high cellulose and low nitrogen content gypsum board, fiberboard, and other substrates, including compostable pots.[4]

Stachybotrys produces mycotoxins that are potentially harmful to animals and humans.[5] It is the most commonly cited fungus in the literature, concerning “sick building syndrome” and in “toxic mould” cases.[6] While the contamination by *S. chartarum* is not controversial, the extent of the health consequences has been difficult to prove.

The presence of *S. chartarum* in buildings has been associated with asthma, hypersensitivity pneumonitis, and the constellation of respiratory and neurological symptoms associated with poorly ventilated buildings. [7,8,9,10]

Induction of allergenic responses to *S. chartarum* is an important consideration because a strong deleterious response in an individual could be evoked after exposure to even a low concentration of this mold in the indoor environment.

The allergenic capacity of *Stachybotrys* or any mold must be considered in the context of the myriad of immune mediated/related effects associated with fungal exposure, including innate inflammatory/irritant responses, adjuvant effects, and other antigen-specific hypersensitivity responses. [14]

“Toxic black mold”

The capacity of *Stachybotrys* to produce biologically potent mycotoxins and its previous association with animal mycotoxicoses has resulted in this fungus being colloquially referred to as "toxic black mold." [11,12,13]

TREATMENT

Relocation of occupants from contaminated buildings has resulted in a significant decrease in symptoms.[15]

REFERENCES

1. Miller JD, Rand TG, Jarvis BB. *Stachybotrys chartarum*: Cause of human disease or media darling? *Med Mycol*. 2003;41:271-291.
2. Kwon-Chung K.J., Bennet J.E. Common laboratory saprophytes (filamentous fungi). In: *Medical Mycology.* Malvern, Pennsylvania: Lea & Febiger; 1992:797.
3. Li DW, Yang CS. Taxonomic history and current status of *Stachybotrys chartarum* and related species. *Indoor Air*. 2005;15 Suppl 9:5-10.
4. Gravesen S, Nielsen PA, Iversen R, Nielsen KF. Microfungal contamination of damp buildings--examples of risk constructions and risk materials. *Environ Health Perspect*. 1999;107 Suppl 3:505-508.
5. Ashcroft C. Toxic mould syndrome--can the link be proved? *Nurs N Z*. 2009;15:22-23.
6. Nikulin M, Pasanen A, Berg S, Hintikka E. *Stachybotrys atra* growth and toxin production in some building materials and fodder under different relative humidities. *Appl Environ Microbiol*. 1994;60:3421-3424.
7. Kaplan NME, Palmer BF, Revankar SG. Clinical implications of mycotoxins and *Stachybotrys*. *Am J Med Sci*. 2003;325:262-274.
8. Cooley JD, Wong WC, Jumper CA, Straus DC. Correlation between the prevalence of certain fungi and sick building syndrome. *Occup Environ Med*. 1998;55:579-584.
9. Straus DC. Molds, mycotoxins, and sick building syndrome. *Toxicology and Industrial Health*. 2009;25:617-635.
10. Meggs WJ. Epidemics of mold poisoning past and present. *Toxicology and Industrial Health*. 2009;25:571-576.
11. Andersen B, Nielsen KF, Jarvis BB. Characterization of *Stachybotrys* from water-damaged buildings based on morphology, growth, and metabolite production. *Mycologia*. 2002;94:392-403.
12. Sudakin DL. *Stachybotrys chartarum*: Current knowledge of its role in disease. *MedGenMed*. 2000;2:E11.
13. Tantaoui-Elaraki A, Mekouar SL, el Hamidi M, Senhaji M. Toxigenic strains of *Stachybotrys atra* associated with poisonous straw in Morocco. *Vet Hum Toxicol*. 1994;36:93-96.
14. Pestka JJ, Yike I, Dearborn DG, Ward MDW, Harkema JR. *Stachybotrys chartarum*, trichothecene mycotoxins, and damp building-related illness: New insights into a public health enigma. *Toxicol Sci*. 2008;104:4-26.
15. Cooley JD, Wong WC, Jumper CA, Straus DC. Correlation between the prevalence of certain fungi and sick building syndrome. *Occup Environ Med*. 1998;55:579-584.