



Risks to Health from Moulds and Other Fungi

Background

Recent events surrounding the highly publicised leaky buildings issue have highlighted a potential health issue for workers and others who may be involved in repair of buildings. These problems can arise when leaks allow the growth of mould and fungi — whatever the cause of the leak. Overseas experience has shown that there are health risks associated with the moulds and other fungi, which can grow in a damp building. Under the Health and Safety in Employment Act 1992 (HSE Act) ‘all practicable steps’ must be taken to manage hazards in the workplace. This bulletin provides some basic information about the problem.

What are Moulds?

Moulds, along with mushrooms and yeasts, are fungi. Fungi are simple, microscopic organisms, present virtually everywhere, indoors and outdoors. In order to grow they need a food source (any organic material such as leaves, wood, paper, or dirt), moisture and a place to grow. When they reproduce they release countless tiny, lightweight spores, which travel through the air, and can be inhaled. If indoor mould contamination is extensive, high airborne spore levels may exist. Exposure can also occur via contaminated foods, or by touching infected materials.

Adverse Health Effects

Everyone is exposed to some mould spores on a daily basis without noticeable harm. Mould spores usually cause health problems when they are inhaled in large numbers. This may occur with very active mould growth within indoor working and living environments.

Moulds can produce adverse health effects such as inflammation, allergy, or infection. Allergic reactions may be the most common, and of these, a ‘hay fever’ or allergic rhinitis and sinusitis is most often described. In some people an allergic reaction to fungal spores may take the form of asthma, or occasionally a condition known as hypersensitivity pneumonitis or extrinsic allergic alveolitis.

Symptoms that exposed persons report include:

- Respiratory problems, such as wheezing and shortness of breath;
- Nasal and sinus congestion;
- Eye irritation (burning, watery, or reddened eyes);
- Dry, hacking cough;
- Nose or throat irritation; and
- Skin rashes or irritation.

Although uncommon, infection from moulds can result in a fever. Other reported symptoms

include headaches, memory problems, mood swings, nosebleeds, and body aches and pains; but their cause is not well understood.

People with pre-existing asthma are at greater risk, as even a relatively small number of spores may trigger an asthma attack. Similarly, those with clearly weakened immune systems (such as people on chemotherapy or with HIV infection) will be more susceptible to infection. Increased susceptibility may also apply to the elderly and infants. Anybody suffering from the general symptoms described and who has been exposed to mouldy conditions should see their GP for a medical assessment.

Certain types of moulds, such as *Stachybotrys chartarum* (SC), may produce compounds that have other toxic properties. These are called mycotoxins. This is a greenish black mould that grows on material with a high cellulose content, such as fibreboard, the paper covering of gypsum wallboard, wallpaper, dust and wood, when these become chronically water damaged. It requires very wet conditions for days or weeks in order to grow. Excessive indoor humidity resulting in water vapour condensation on walls from plumbing leaks, spills from showering or bathing, water leaking through foundations or roofs will promote its growth.

However, finding *Stachybotrys* within a building does not necessarily mean that occupants have been exposed to either allergens or toxins. While SC is growing, a wet slime layer covers its spores, preventing them from becoming airborne. Significant exposure to individuals could occur when the mould dies and dries up. Air currents or physical handling can cause the spores to become airborne.

There are no readily available commercial laboratory tests that can detect mycotoxins in a building where moulds are present. The first reported human health effects from SC were seen in agricultural workers who handled mouldy straw or hay. These high-level exposures were associated with coughing, a runny nose, burning sensations in the mouth or nose, nose bleeds, headache, fatigue and skin irritation (rashes and itching) at the site of mouldy hay contact. Much less is known about health effects of SC when it

occurs in indoor environments. Most people who experience health effects associated with mouldy buildings fully recover following removal and clean up of the mould contamination.

At present there is no environmental test to determine whether *Stachybotrys* growth found in buildings is producing toxins, nor any blood or urine test that can establish if an individual has been exposed to *Stachybotrys chartarum* spores or its toxins. Identification and evaluation of such toxins has been confined to specialised international research laboratories.

Identification and Assessment of Mould Contamination

Mould growth on surfaces can often be seen in the form of discoloration; frequently green, grey, brown, or black but also white and other colours; or cottony or speckled patterns on walls, ceilings or furniture. There may be warping of floors, or an earthy, musty odour. Evidence of past or ongoing water damage should trigger a thorough inspection of areas such as underneath water-damaged surfaces or behind walls, floors or ceilings.

Significant sources of indoor moisture include:

- Flooding;
- Leaky roofs or walls;
- Sprinkler spray hitting the house;
- Plumbing leaks;
- Overflow from sinks or sewers;
- Damp basement or crawl space;
- Steam from shower or cooking;
- Humidifiers; and
- Wet clothes drying indoors or clothes dryers exhausting indoors.

Reliable air sampling for mould can be expensive and requires expertise and equipment that is not widely available. Occasionally, public health agencies may provide this service, particularly where clear health problems exist. Owners of individual private homes will generally need to locate and pay an analytical consulting company to carry out such sampling. Any such results may not be very helpful.

Furthermore, there are few available standards for judging what is an acceptable quantity of mould. In all locations, there is some level of airborne mould outdoors. If sampling is carried out in a home, an outdoor air sample must be collected at the same time as the indoor samples, to provide a baseline comparison. Because individual susceptibility varies so greatly, sampling is, at best, a general guide. For all these reasons, OSH advises against this process. If mould is present in a form that is likely to cause health effects, it will be very visible and clean-up action and remediation of the problems causing the mould, especially if commenced as soon as possible, should result in relief.

Control of Hazards – Clean-Up Procedures

Remove Mouldy Materials

Spores are more easily released when mouldy materials dry out; therefore it is necessary to remove mouldy items and clean mouldy surfaces as soon as possible.

When removing or cleaning mouldy materials, it is important to use respiratory protection to protect yourself from inhaling airborne spores. Spore counts may be 10 to 1000 times higher than background levels when mould-contaminated materials are disturbed. A respirator with particulate filter(s) (P1 minimum) is required for spores, however, with prolonged substantial use of cleaning agents, a combined particulate and vapour respirator is preferable. If in doubt, consult a safety equipment supply company. Protective clothing that is easily cleaned or discarded, and rubber or other suitable gloves should be worn during the following procedures:

- Discard porous materials from which it will be difficult to remove mould completely, e.g. paper, rags, wallboard, wood products, ceiling tiles, carpet, drapes, and upholstered furniture. Contaminated carpet is often difficult to thoroughly clean, especially when the backing and/or padding can become mouldy. Solid materials (such as glass, plastic, and metal) can generally be kept after they are thoroughly cleaned.

- Bag and discard mouldy items. Enclose adequately and dispose with household rubbish.
- Dry affected areas for 2 or 3 days.

Clean and Dry the Mouldy Areas

- Use a non-ammonia soap or detergent, or a commercial cleaner in hot water, and scrub the entire affected area.
- Use a stiff brush or cleaning pad on cement-block walls or other uneven surfaces.
- Rinse cleaned items with water and dry thoroughly. A wet/dry vacuum cleaner is helpful for removing water and for cleaning items.

Disinfection of Contaminated Materials

Disinfectants should be applied to materials after they have been thoroughly cleaned with soap or detergent, to ensure that most micro-organisms have been killed. They may not always be necessary, particularly for non-porous materials.

- After thoroughly cleaning and rinsing the contaminated materials, a solution of 10% household bleach (e.g. 1½ cups of household bleach to four litres of water) can be used.
- Keep the disinfectant on the treated material for the prescribed time before rinsing or drying; typically, 10 minutes is recommended for a bleach solution.
- When disinfecting a large structure, make sure that the entire surface is wetted.

Bleach fumes can irritate the eyes, nose, and throat, and damage clothing and shoes. Minimise exposure when using disinfectants by ensuring good ventilation of the area, and air it well afterwards. Wear gloves, mask and eye protection.

Precautions

If you are concerned about the effects on your health, work for short time periods with rests in fresh air. Try cleaning a test area first. Generally speaking, small areas or light mould growths will not cause significant problems. However, gross contamination or heavy growths may be more of a problem for certain individuals. Never use a gasoline or LPG-fuelled engine indoors as this

could produce dangerous levels of carbon monoxide. Never mix bleach with ammonia; toxic fumes may be produced. Ozone air cleaners ARE NOT recommended. Ozone is a known lung irritant and is not effective in controlling airborne moulds and other microbial contamination. It may damage materials in the home, such as causing rubber items to become brittle. Ensuring dry conditions will be the best way of preventing mould from growing.

Prevention of Moulds

Inspect your building regularly for the indications and sources of indoor moisture and mould. If a leak or flooding occurs, it is essential to act quickly:

- Stop the source of leak or flooding.
- Remove excess water with mops or wet vacuum.
- Whenever possible, move wet items to a dry and well ventilated area, or outside to expedite drying. Move rugs and pull up areas of wet carpet as soon as possible.
- Open closet and cabinet doors and move furniture away from walls to increase circulation.

- Run portable fans to increase air circulation. DO NOT use fans if mould may have already started to grow,
- Run dehumidifiers to lower humidity.
- DO NOT turn up the heat or use heaters in confined areas, as higher temperatures increase the rate of mould growth.
- If water has soaked inside the walls, it may be necessary to open wall cavities, remove baseboards, and/or pry open wall panelling.

Adapted from California Department of Health Services *IAQ Info Sheet*, July 2001.

Further reading is available on the US EPA website: <http://www.epa.gov/iaq/pubs/moldresources.html>

Copies of this bulletin are available on the OSH website www.osh.dol.govt.nz. If you have any concerns about your mould and your work conditions and wish to discuss this, please contact your nearest OSH office. If the mould is not in a workplace, please contact the local Medical Officer of Health or Public Health Unit.