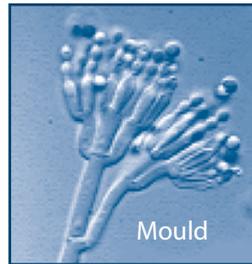


## Microbials and Indoor Air Quality

Microbials are small living organisms invisible to the naked eye that can multiply in large numbers. They are naturally present in our environment in a wide range of species and numbers. We are exposed to them in our daily activities. Microbials are present on our skin and hair, in the soil and in the air we breathe. They have been used for centuries to manufacture common food products such as yogurt, cheese, beer and wine. Microbials are also used to manufacture medicine and cosmetics.



Seemingly harmless, microbials can become a health problem in indoor air environments when certain species are present or when their numbers are too high. There are three types of microbials that can affect indoor air quality: mould, bacteria and viruses.

### Symptoms of Exposure

Symptoms vary greatly among individuals. They range from fever, coughing, nausea and irritation of the nose and throat to sinusitis, asthma and allergies. Immuno-compromised individuals and seniors may be at higher risk.

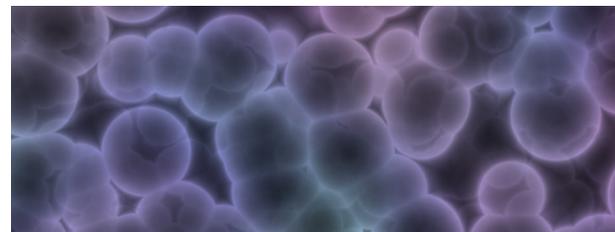
### Growth Requirements

The key to reducing microbial growth is controlling the conditions in which they thrive.

**Mould** requires an organic material such as cellulose (paper-containing materials) or dust with high water content for nutrients and support. The material must be wet or humid for growth to occur. A moderate to high relative humidity (greater than 70%) is also sufficient for some species.

**Bacteria** thrive in organic material such as decaying organic matter or bird droppings. They are highly dependent on the presence of water and grow in suspension while feeding on organic material. Bacteria form a slimy film on the surface of containers when left standing.

- Most types of mould are present in both outdoor and indoor environments.
- Indoor air generally has a higher level of bacteria than outdoor air. Most of these bacteria are harmless and are shed from skin and respiratory tracts.
- An increase in the number or the predominance of one species indoors may cause a health problem.
- Water (or water vapour) is a key element required by most microbials to multiply.
- Moulds usually grow in large, easily observable colonies.
- Bacteria are impossible to see with the naked eye.
- Moulds and bacteria may produce toxins known as mycotoxins or endotoxins. They have been linked to sick building syndrome.
- Viruses are less of a concern when dealing with indoor microbials. They are mostly responsible for the common cold, the flu and diseases such as chicken pox and measles. Viral transmission depends on proximity or contact with an infected individual or object. Viruses do not multiply outside a host and, in most cases, do not survive long once airborne.



### EXAMPLES OF BACTERIA EXPOSURES

Philadelphia, 1976:  
Legionnaire's disease was caused by a bacteria that was carried by pigeons into a hotel heating, ventilation and air conditioning (HVAC) system.

BBC Headquarters, 1988:  
Legionnaire's disease killed 10 people.



### SIGNS OF MICROBIAL GROWTH

MOULD	BACTERIA
<ul style="list-style-type: none"> <li>■ Mouldy smell</li> <li>■ Signs of recent or past water infiltration</li> <li>■ Green or black dusty growth on building materials</li> </ul>	<ul style="list-style-type: none"> <li>■ Presence of still, cloudy water</li> <li>■ Slimy feel on the surface of items containing standing water</li> <li>■ Presence of pigeons near the HVAC system or on the building</li> </ul>

**Microbial Sampling:** Microbials can often be detected visually. However, in some instances, WorkSafeNB may undertake sampling to confirm their presence.

### Control

Simple measures can be applied to control microbial growth in your work environment and at home.

- Avoid water infiltration and condensation.
- Avoid water accumulation.
- Keep relative humidity below 70%.
- Avoid dust accumulation in HVAC systems and inside buildings.
- Ensure good drainage from water drip pans.
- Prevent pigeons from nesting and resting on the building.
- Provide adequate filtration in HVAC (50-70% dust efficiency).
- Provide filtered respirators for employees working with microbial contaminated materials.

### Exposure Standards

There are currently no exposure standards for microbials in North America due to limitations set by sampling techniques, microbials diversity and individual sensitivities.

However, guidelines have been published by Health Canada in the booklet *Indoor Air Quality in Office Buildings: A Technical Guide*. These guidelines are based on results from hundreds of air samples taken over several years.

## Cleanup Procedures for Contaminated Materials

### Moulds



Most moulds release billions of spores when they are disturbed. Employees involved in the cleanup of mould should wear National Institute for Occupational Safety and Health-approved respirators with recommended filters, such as HEPA or N95, and proper coveralls. Depending on the size

of the contaminated surface, the area should be well ventilated and sealed from the rest of the building. Contaminated air from the removal area should not be allowed to recirculate in the rest of the building.

Mould infiltrates the porous materials they grow on. Cleaning the surface will not remove all the mould.

Any contaminated porous material (drywall, insulation, wood, etc.) should be discarded. Completely removing all microbials from such material is almost impossible. Furthermore, if some contaminated materials are left behind, chances are the microbials will grow back.

Non-porous materials, such as metals, glass and concrete, can be cleaned and disinfected. Household bleach diluted one to 10 parts makes a good disinfectant solution (wear gloves). Pure bleach is not recommended, as it is too corrosive.

The greatest level of exposure to microbials is likely to happen when contaminated materials are disturbed. The health effects of such exposure can be so severe that medical attention may be required.

### Bacteria

Contaminated water should be drained and all contaminated surfaces should be disinfected. Further water infiltration or accumulation should be prevented. If organic matter is present, it should be removed and provision should be made to prevent further contamination of the area.