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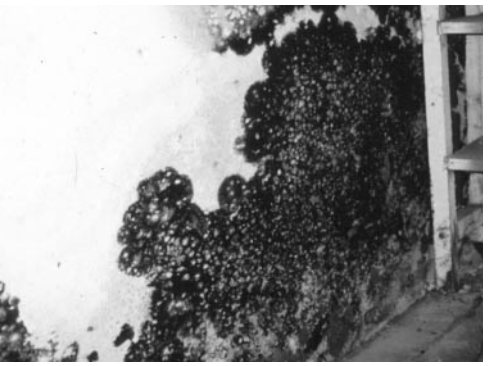
PINCHIN ENVIRONMENTAL NEWSLETTER #3

Ontario Ministry of Health Issues Report on Health Effects of Mould Contamination in Buildings and Guidelines for Mould in School Facilities



"Report of an Expert Panel on Fungal Contamination Indoors", Ontario Ministry of Health, July 1999

The Ontario Ministry of Health convened an expert medical panel on February 11-12, 1999, to review the evidence linking mould contamination in buildings and adverse health effects. This panel was the re-convening of a panel with a similar assignment that had met in 1997. The 1999 mandate was to review the new scientific evidence available since 1997, including papers presented at conferences, research work in progress, and other unpublished information known to the participants. The panel included physicians and scientists drawn from the University of Toronto, McMaster University, the Hospital for Sick Children in Toronto, the Ministries of Health and Labour, the Health Units of the Region of Peel and Brant County, and the Eastern New York Occupational and Environmental Health Center. The final draft of the panel report was reviewed by two distinguished external experts, and their comments were included in the final report. The panel's conclusions represent the most current, comprehensive scientific review of this issue.

The Expert Panel was posed a number of questions regarding the potential relationship between mould contamination in buildings and adverse health effects. Some of the more important conclusions are given below:

Q1A: "What are the health effects of exposure to moulds?"

The Expert Panel said that there is strong evidence to support the relationship between the exposure to mould in buildings and many health effects. However, some of the health effects do not apply to exposures generally experienced in residential settings or at low levels, where the exposure is by inhalation. Some effects have only been reported in occupational settings where exposures may be much higher. Considering exposure in all settings, the possible health effects listed by the Expert Panel were:

1) Allergic and other immune-mediated mechanisms (e.g. asthma, hay-fever, and hypersensitivity pneumonitis)

2) Infectious diseases (e.g. illnesses in immuno-compromised individuals from normally non-pathogenic organisms such as Aspergillus species.)

3) Potential (toxic effects) from mycotoxins and volatile products:

- Local and mucosal irritant effects (eye and throat irritation, skin rash)
- Systemic effects (changes in lymphocytes and neurobehavioral and cognitive effects)
- Pulmonary hemorrhage in infants

4) Potentially carcinogenic mechanisms. There is strong evidence of a carcinogenic effect in certain agricultural and industrial settings. However, there is no evidence that low-level exposure to fungi that would occur in residential and school facilities, has any relationship to cancer.

HIGHLIGHTS

- Expert panel confirms link between mould contamination and adverse health effects
- Guidlines given for inspection and surveillance of mould-prone school buildings

Q1B1: How convinced are you that the health effects as stated above are associated with mould or with environmental conditions (e.g. water damage or excess humidity) that might give rise to mould?

To quote the final report, "The Expert Panel agrees that there is evidence in the scientific literature which supports an association of several health effects, primarily symptoms, with unusual fungal growth in the indoor environment or with environmental conditions which are associated with fungal growth (e.g. humidity and conditions which promote fungal growth - "mould amplifiers")."

Q1B3: Within these circumstances, what constitutes a susceptible individual?

The determination of susceptibility can be specific to individual mould species and to the effects measured. Populations susceptible to one or more adverse health effects from mould and dampness may include:

1) Infants and children. Pulmonary hemorrhage / hemosiderosis associated with mould exposure and other home environment factors was reported only in infants. Respiratory symptoms such as cough associated with damp house were reported in children (as well as adults). Lymphocyte ratio changes were reported in children, although the clinical implications of this finding are uncertain.

2) Persons with specific diseases such as diabetes and immuno-suppression (e.g. organ transplant recipients, chemo-therapy patients, persons with AIDS) are more susceptible to infection with certain fungi such as Aspergillus species.

3) Atopic individuals. Some experts believe that allergic effects seen are simply due to IgE-mediated allergy. This would imply that only a minority of susceptible individuals exists. Atopy prevalence has been reported at about 15% of adults and 18% of teenagers. Others believe that the association is seen in non-allergic individuals, which implies that the general population may be at risk of allergic responses. Atopic children in particular are likely to be susceptible to the allergic effects of mould exposure. House dust mite-sensitized children may be more susceptible to airborne viable fungi or to mould allergens.

4) Pregnant women and the fetus. At the present time this concern is supported by animal studies only with ingested mycotoxins. Although adverse reproductive outcomes have been observed related to poisoning from ingested mycotoxin in (farm) animals, this experience does not allow extrapolation to pregnant women.

5) Institutionalized population such as the elderly and inmates of correctional facilities. This is a potential but unproven risk category except for the occurrence of AIDS and tuberculosis-related morbidity in inmates of correctional facilities.

Q4A Clarify and comment on the dose-response relationship between mould exposure and adverse human health outcomes. Identify / comment on what happens in terms of outcomes at low doses or levels of exposure?

The Panel concluded that at the present time there is no valid model for quantifying the dose-response relationship of "mould exposure" and other adverse health events.

Currently, there are insufficient data to establish threshold levels of exposure to most fungal components, in order to differentiate acceptable from unacceptable. This means that it is not possible to determine a level at which intervention should occur to permit avoidance of all health effects.

In relation to allergic sensitization, it has been shown with other aeroallergens that there is a dose-response relationship between exposure levels and the risk of sensitization. But, once sensitized, the individual will respond to extremely low levels of exposure.

For irritant and toxic effects, the higher the level of exposure, the higher the probability of response.

"Boards of Health Working with School Boards and the Community to Address Concerns about Indoor Air Quality (with special reference to indoor mould contamination)", Ontario Ministry of Health, 1999.

This guideline document was produced by a taskforce assembled in early 1999 by the Ontario Ministry of Health. The taskforce consisted of representatives of three Regional Health Units with significant experience with mould concerns in schools, and Ministry of Health staff. Although the primary concern of the document was the control of the risk of mould in school buildings, the report states that the same principles could be used to address other indoor air quality concerns in other types of buildings.

The guideline begins by discussing the respective roles of the school board and the health department in the management of this issue. School boards have the major responsibility in this area, and are explicitly responsible

under the Education Act for the health and safety of staff and students. The role of the health department is secondary, to provide assistance and support where needed. The role of the Public Health Department would be to provide information and advice to the school board, and others (local physicians, parents, staff), respond to complaints regarding specific facilities, and possibly review and monitor the long-term control programs instituted by the school board. Occasionally, the public health authority may have to issue directives or orders under the Health Promotion and Protection Act for the school board to act on mould in school buildings, as has already happened.

The document recommends development of a Risk Communication Strategy that will include members of the Public Health department, school boards, parents, teachers, and other affected groups.

The more important findings and recommendations of the guideline are discussed below.

Temporary school classrooms are particularly susceptible to mould growth.

Which School Facilities are of Special Concern Regarding Mould Contamination?

Several varieties of temporary school classrooms are used in Ontario, and for a variety of reasons, the construction and maintenance of these make them more mould-prone. The guideline recommends that all the following types of structures be managed for potential mould contamination:

- free-standing single portable classrooms
- port-a-packs which are groups of portables joined together with a common roof and main hallway
- relocatable classroom modules (RCMs), known in some school boards as kinderpaks or incrapaks

which are structures that resemble a permanent school addition, but are constructed using materials and with design details that differ from permanent school buildings.

Invasive Testing

The guideline states that invasive inspection (cutting into exterior wall cavities and accessing crawlspace, ceiling and attic spaces), is necessary to make a complete assessment of the extent of mould contamination in a structure. Health department staff with experience in inspection indicate that all areas of a portable classroom must be examined before the absence of mould contamination can be confirmed. The experience of the three Boards of Health was that the school boards in their regions found a very poor correlation between the results of visual (surface) inspection and subsequent invasive inspections. The guideline gives a sample invasive inspection procedure.

Sampling and Analysis

The report does not recommend testing of the mouldy material to determine the species present, unless there are medical, legal or community concern reasons why the species must be identified. All mould-suspect materials are to be treated the same.

Risk Assessment and Response

The document gives a decision matrix for recommended actions in the presence of symptoms, and/or visible mould growth, and/or evidence of water damage. A general summary of the action matrix follows:

• The document recommends mould abatement under all circumstances where mould growth is detected, regardless of the species present or the extent of mould growth.

• Where symptoms (consistent with mould exposure) are reported, the environment must be investigated. If visible mould growth is found, it must be abated. If visible mould growth is not found, but there are signs of water damage, the source of the moisture intrusion must be found and corrected and any damaged materials must be replaced. A closer examination of the surrounding area is necessary to determine if the moist conditions have resulted in mould contamination of hidden surfaces.

Mould growth under a carpet in a day care centre.

• Where symptoms are reported but there is no visible mould and no signs of water damage, there is still a need to investigate further. This may include the development of a symptom checklist, search for other indoor air quality stressors, preparation of a premises history (renovations, new finishes, spills, HVAC maintenance, etc.), and a thorough inspection for mould growth sites. "In some cases, air sampling and invasive procedures may be necessary to assist in making a confident risk determination."

• Where symptoms are not reported, there is no obvious mould growth, and no signs of moisture damage, these lower risk structures should still be examined after the units posing the immediate risk have been remediated.

Ongoing Inspection and Monitoring

Boards of Education are presumed to have a strategy for ongoing maintenance and monitoring that will correct structural deficiencies and prevent the conditions for mould and other air quality problems from occurring. Once the immediate abatement issues have been resolved, the public health departments may wish to review the maintenance plans in place at the school board.
A maintenance strategy would be expected to touch on several items, including:

• Instructions for preparing a site for placement of a portable structure.

• Protocol for conducting programmed visual inspections.

• Protocol for conducting programmed invasive inspections.

• Instructions for portable reinstatement.

• Cleanup information.

• Reporting requirements (details of inspection reports, distribution, etc.).

• Procedures for sampling and analysis (if necessary).

• Direction for portable demolition and disposal.

• Procedures for tracking portables that have been moved to other locations.

Mould-Related Situations Requiring Evacuation of a Classroom

Students must be removed from school portables under the following circumstances:

• Mould growth is found on interior surfaces.

• During invasive inspections or remediation activities.

• In the event of flooding or heavy leakage.

• If several students or teachers are experiencing physician-confirmed symptoms.

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