HOW DOES A BUILDING BIOLOGIST HELP IMPROVE HEALTH AND WELLBEING?

A Building Biologist is trained health professional able to evaluate and control health hazards in the built environment. This involves assessing the home for allergens, chemicals, toxicants, electromagnetic fields and biotoxins unique to a water-damaged building.

A Building Biologist provides strategies to address, reduce or eliminate toxic exposures and / or design a safe, healthy, biologically-friendly building, with a lower environmental footprint, safe for people and the planet.

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WORKSHOPS

Survival of the Smartest
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Healthy Building Know-How

BUILDING BIOLOGY

AND WATER-DAMAGED BUILDINGS

WHAT IS BUILDING BIOLOGY

Building Biology is a science and an art of creating and or constructing healthy, environmentally friendly homes and workplaces.

THINGS YOU DON'T WANT IN YOUR HOME OR WORKPLACE

Poisonous chemicals in household and personal care products – absorbed by the body.

Air pollutants and volatile organic compounds (VOCs) – breathed in.

Electromagnetic Fields (EMF and Electromagnetic Radiation (EMR) – toxic energy you can't see, feel, touch, taste or hear unless you have testing equipment.

Mould and biological toxins found in water-damaged buildings.

WHAT IS A WATER-DAMAGED BUILDING?

A water-damaged building (WDB) is a damp building which has been exposed to bulk water for more than 48 hours from an external or internal flooding event or excess water or moisture build-up which has affected building materials and the building envelope (EPA 2012, NYSDH 2010).

Excess moisture may result from: rain events; through leaks or wicking also known as capillary action from the ground due to outdoor sources; from internal sources such as leaks from broken pipes; or from building materials retaining moisture during construction or condensation within the building envelope because of poor ventilation or poor thermal performance of the building structure.

Internal moisture may also be due to condensation caused by human activity such as showering, cooking, washing and drying clothes without sufficient ventilation or control of moisture accumulation (Lstiburek 2002, WHO 2009, Bornehag et al 2001, Dewsbury, Law 2017).

WHAT IS MOULD?

Mould is the term used for a group of filamentous fungi which grows on wet building materials however it also grows on food and wet or moist materials or furniture found in a WDB (AIHA 2013, Bijlsma 2018a). All fungi originate outdoors where it is normally found in soil, on dead or decaying matter and will grow on just about anything that provides a food source and enough moisture to survive. The amount of moisture available will determine the type of fungi or mould and the water activity (a_w) or water availability to enable it to flourish.

While some fungi like very wet conditions others will grow with very little moisture. There is one common element among all fungi species; fungi or mould will not grow if water activity (a_w) is below .6 a_w -.8 a_w (Wikipedia, WHO 2009). Indoors this means controlling moisture levels is the key to keeping the indoor environment healthy. According to WHO (2009) the minimum water activity or wetness required for fungi to grow on building materials varies from less than 0.8 to 0.98 a_w (Grant et al 1989).

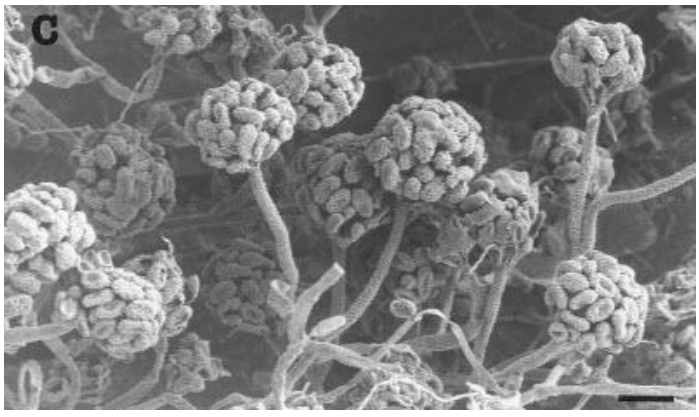
ADVERSE HEALTH EFFECTS FROM A WATER-DAMGED BUILDING

If microbial growth is allowed to continue it creates a complex mixture of biotoxins resulting in a "biochemical stew" of harmful gram-negative and gram-positive bacteria and fungi related moulds such as Alternaria, Aspergillus versicolor, Chaetomium, Cladosporium, Fusarium, Stachybotrys chartarum (toxic black mould), Penicillium and Trichoderma (Rudert & Portnoy 2017, Thomas). These endotoxins and inflammagens along with by-products produced by bacteria and fungi make up this biochemical stew inhaled by occupants in a WDB.

Shoemaker classified CIRS or WDB illness as biotoxin illness affecting 24% of the population. Genetically susceptible people have a Human Leukocyte Antigen (HLS) gene type that do not make antibodies to deal with the biotoxins. This means the biotoxins cause continuing unregulated production of cytokines causing high levels of inflammation which leads to damage of multiple systems in the body including the gastrointestinal system, the central nervous system and cross the blood brain barrier causing neurological damage.

Biotoxins are not one particular toxin but a combination of endotoxins entering the body via inhalation, food, water or tick/bug bite (Shoemaker 2011, Thomas). Shoemaker and Maizel (2010) indicate over 90% of patients present with fatigue and multi-system and multi-symptom illness. According to Dr Shoemaker (2010) the adverse health effects caused by these biotoxins include impaired nerve cell function, chronic pain, sleep disturbance, gastrointestinal problems, flu-like symptoms; muscle aches, unstable temperature, difficulty concentrating and patients have difficulty recovering from illness.

In addition to biotoxin related illness condensation, high humidity and moist building materials promote the growth and survival of dust mites and insect pests and increase the likelihood of damp building materials emitting volatile organic compounds (VOC) including formaldehyde and potentially hazardous chemicals and pesticides used in their manufacture (WHO 2009). Exposure to fungal toxins, and allergens cause multiple respiratory health effects including but not limited to asthma, asthma development, cough, wheeze, allergies, flu-like symptoms; nasal congestion, runny nose, sinusitis, and allergic rhinitis; hay fever (Fisk, Lei-Gomez, Mendell 2007, WHO 2009).



Microscopic view of Stachybotrys Source: Andersson et al (1997)

The diagram below produced by Sandeep Gupta (2017) was designed from Dr Shoemaker's Biotoxin Pathway (2011) to simplify the complex issues surrounding CIRS.

Many CIRS symptoms can be misdiagnosed because of the multi-system and multi-symptom effects on the body. Dr Richie Shoemaker produced a cluster table (Table 1) of symptoms however Gupta suggests there may be additional symptoms not on the chart (2017).

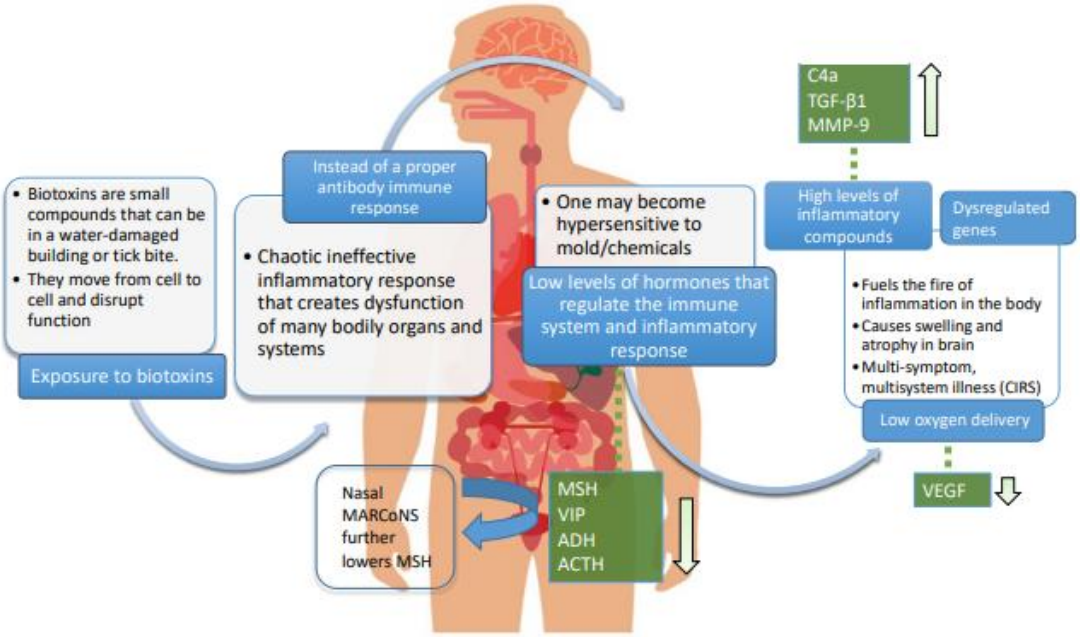


Table 1.

CIRS Symptom Clusters		
Fatigue		Red Eyes
Weakness	Unusual skin sensitivity	Blurred Vision
Decreased assimilation of knowledge	Tingling	Sweats (night)
Aches		Mood Swings
Headache		Ice-pick Pain
Light Sensitivity		
Memory Impairment	Shortness of breath	Abdominal Pain
Decreased Word Finding	Sinus congestion	Diarrhea
		Numbness
Difficulty Concentrating	Cough	Tearing
	Excessive thirst	Disorientation
	Confusion	Metallic Taste
Joint Pain	Appetite Swings	Static Shocks
AM Stiffness	Difficulty regulating body temperature	Vertigo
Cramps	Increased urination	

Cluster table © R.Shoemaker

Mould isn't just dangerous to humans is gradually destroys the things it grows on. It can affect your home and your furnishings causing costly long-term damage (EPA IAQ 2012).

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