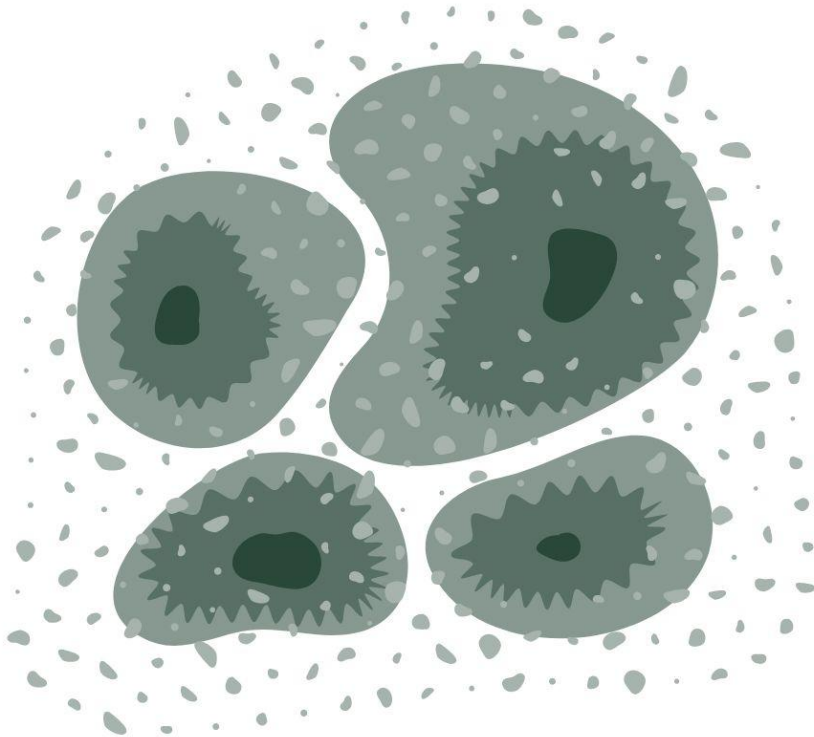




MCAS and Mould

Deborah Bircham

Live Well With Chronic Illness

How does Mould Trigger MCAS?

Moulds can produce allergens, spores, volatile compounds and, in some circumstances, mycotoxins. All of these can trigger an immune response.

Mycotoxins are toxic chemical compounds that become airborne and are inhaled.

Mycotoxins bind directly to receptors on mast cell surfaces, triggering degranulation and mediator release.

The strongest evidence is for asthma, allergy and respiratory effects; the direct evidence linking mould exposure to MCAS is still emerging, but the biological pathways are clearly demonstrated.

The research is complex, with limited human clinical studies. Most research is animal or lab-based, because exposure to mould is unethical.



Research – Mould and Health

A 2009 research study published in *Toxicology and Industrial Health* found that mould may affect the nervous system and lead to neurologic and neuropsychiatric symptoms.

<https://pubmed.ncbi.nlm.nih.gov/19854819/>

A 2011 study published in *Environmental Health Perspectives* found that mould may play a role in allergies and respiratory conditions <https://pmc.ncbi.nlm.nih.gov/articles/PMC3114807/>

A 2013 study published in *Toxins (Basel)* has found that mould exposure from water-damage buildings may be an underlying issue in patients with chronic fatigue syndrome and mitochondrial dysfunction. <https://pmc.ncbi.nlm.nih.gov/articles/PMC3705282/>



Research – Mould and Mast Cells

For MCAS specifically, the direct clinical evidence is not yet clear, but the mechanism is understood.

We know that mould exposure can dysregulate immune function.

A 2021 review Mold, Mycotoxins and a Dysregulated Immune System (Kraft, Buchenauer & Polte, Int. Journal of Molecular Sciences) found mycotoxins disrupt immune regulation via TLR4/NF- κ B signalling, locking mast cells in sustained hyperactivation rather than episodic flares.

They found that mycotoxins may be particularly relevant in people with pre-existing immune dysregulation, including allergic, inflammatory and autoimmune conditions.



<https://pmc.ncbi.nlm.nih.gov/articles/PMC8619365/>

Research - Mould and Mast Cells



There is also experimental evidence that fungi and mould can trigger mast cells to release inflammatory cytokines.

2018 study by Kritas et al. reported that fungi can activate mast cells to release pro-inflammatory cytokines.

'MCs activated by fungi provoke an increases of PGD2 levels and lead to hypersensitivity diseases which present signs such as irritation of the respiratory tract and eyes, recurrent sinusitis, bronchitis, cough and neurological manifestations including fatigue, nausea, headaches and brain fog.'

<https://pubmed.ncbi.nlm.nih.gov/30043558/>



Research Mould and MCAS



2019 study Cheryl F Harding et al

When mice were exposed in the lab to repeated mould exposure, it was shown to activate their innate immune response, causing the release of inflammatory chemicals and causing neurological impact.

'Innate-immune activation may explain how both toxic mold and nontoxic mold ...elements caused cognitive and emotional dysfunction.'

https://pmc.ncbi.nlm.nih.gov/articles/PMC7231651/?utm_source=chatgpt.com



Chronic Mould Exposure



Mould in a home causes continuous exposure to the trigger

This creates cumulative, chronic activation rather than occasional flares.

Symptoms worsen gradually the longer the exposure goes on

A key indicator that mould is an issue - symptoms improve when away from home (or work) for extended periods and worsen on return.

Often people report they feel better in the warmer, dryer months, and worse in autumn and winter.



Dr Tania Dempsey



Dr Tania Dempsey (US mast cell specialist): when her most unwell MCAS patients aren't improving, mould is number one or two on her trigger list in virtually every case.

Has written an article 'What's the connection between mold-illness and mast cell activation?'

Mould exposure *'can lead to ongoing inflammation and a faulty immune response with ongoing mast cell activation and overproduction of histamine and/or other chemicals'*

<https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2016.00672/full>

<https://drtaniadempsey.com/whats-the-connection-between-mold-illness-and-mast-cell-activation/>



Th1/Th2

A potential model for understanding this is through the balance between two broad patterns of immune response:

- Th1 responses** help defend against infections by activating immune cells such as macrophages and supporting cell-mediated immunity.

- Th2 responses** are more closely associated with allergic inflammation, IgE production, eosinophils and mast cell activation.

Although the immune system is far more complex than a simple "Th1 vs Th2" model, it provides a useful framework for understanding how different immune pathways can become dominant.

Drs Gail Clayton and Margaret Christensen view mould illness through the lens of Th1/Th2 imbalance



Th1 Th2



Current evidence indicates that:

Fungal allergens (such as *Alternaria*, *Aspergillus*, *Cladosporium* and *Penicillium*) can promote Th2 immune responses, particularly in allergic asthma and rhinitis.

These responses involve immune signalling molecules (including IL-25, IL-33 and TSLP) that activate Th2 cells, eosinophils and mast cells.

Some mycotoxins have also been shown in laboratory and animal studies to suppress certain aspects of cell-mediated immunity associated with Th1 immune response.

Overall, this has led to the hypothesis that mould exposure may encourage a more allergy-prone immune environment and could amplify mast cell activation in susceptible people.



Other Effects of Mycotoxins on Health



- Neuroinflammation: mycotoxins can cross the blood–brain barrier, and promote neuroinflammation, which could lead to brain fog, anxiety, depression and cognitive decline.
<https://pubmed.ncbi.nlm.nih.gov/39814257/>
- Some mycotoxins have endocrine-disrupting properties. Experimental studies show that certain mycotoxins can interact with oestrogen, testosterone and thyroid hormones by binding to hormone receptors or altering hormone signalling.
<https://www.sciencedirect.com/science/article/pii/S0304389425037598>



Other Effects of Mycotoxins on Health



- Studies into food-borne mycotoxins suggest they can alter the gut microbiome, impair intestinal barrier function and disrupt mucosal immune responses.
- This may explain reduced tolerance to foods in susceptible individuals. In people with MCAS, this may provide one explanation for worsening gastrointestinal symptoms and increasing food sensitivities, although direct human evidence is not available yet.

<https://ift.onlinelibrary.wiley.com/doi/abs/10.1111/1541-4337.13242>

- Experimental studies show that ochratoxin A can impair mitochondrial function and reduce cellular energy production. This may contribute to fatigue and reduced energy availability in exposed individuals.

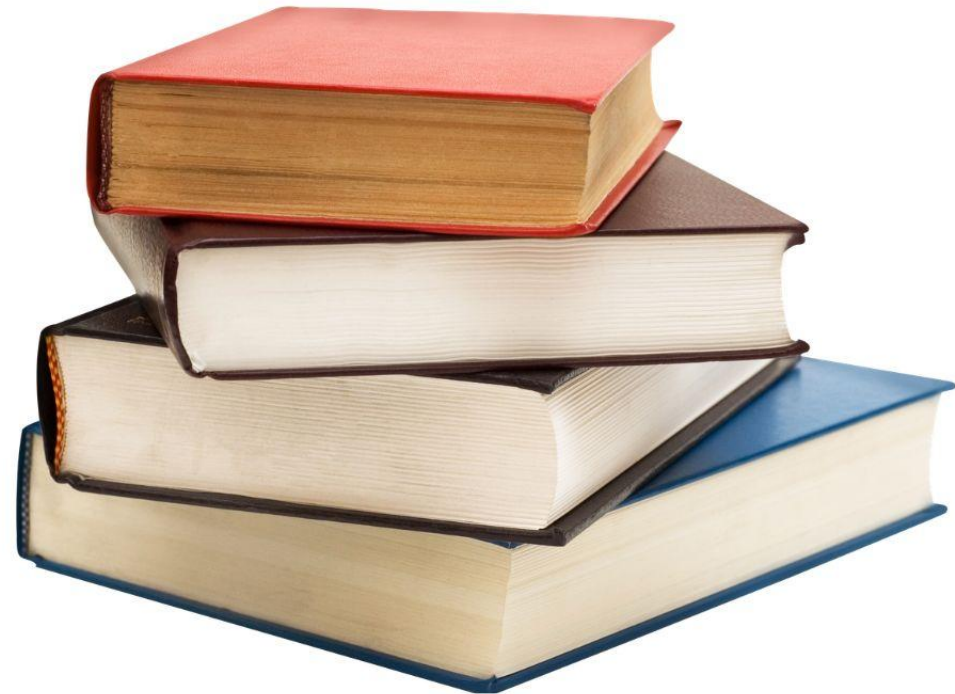
<https://pubmed.ncbi.nlm.nih.gov/23907020/>



Research Gaps



- Peer-reviewed research specifically on mould and MCAS is limited. MCAS itself was only formally identified in the early 2010s
- No large-scale randomised controlled trials exist on mould exposure and MCAS
- No standardised biomarkers for diagnosing mould-triggered MCAS specifically
- Most clinical understanding comes from functional and integrative medicine practitioners, not mainstream immunology journals
- Patient-reported outcomes and clinical observation significantly outpace published evidence
- The research hasn't caught up with the experience of patients and doctors working in this field.



Selected Key References



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The End

Thank you for Listening

Any Questions?



Spare slides

Symptoms of Mould



- Neurological: brain fog, cognitive impairment, anxiety, depression, insomnia, headaches, light and noise sensitivity
- Respiratory: chronic sinusitis, cough, shortness of breath, asthma-like symptoms
- Gastrointestinal: bloating, nausea, diarrhoea, constipation, rapid-onset food intolerances
- Skin: hives, flushing, rashes, itching
- Cardiovascular: tachycardia, palpitations, blood pressure changes
- Systemic: profound fatigue, widespread pain, temperature dysregulation, severe smell/chemical sensitivity



Types of Mould



Which moulds are most harmful

- *Stachybotrys chartarum* ('black mould') - trichothecene mycotoxins, among the most potent immunotoxic compounds
- *Aspergillus* species - aflatoxins and ochratoxin A
- *Penicillium* species - ochratoxin A (nephrotoxic and immunosuppressive)
- *Chaetomium* and *Fusarium* - frequently found in water-damaged buildings

Important note from Dr Neil Nathan: mould is not harmful outdoors, it's natural there. Inside a home, it becomes a pathogen.

Not all mould species are toxic, but those found in water-damaged buildings often are

