

# How to improve our possibilities to assess, predict and control mould risks?

Webinar

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Indoor Moulds How to improve our possibilities to assess, predict and control mould risks?

## Introduction

### Mould is a known problem, which will increase due to climate change

- No thresholds for indoor air
- Causes of mould are combinations of a.o. building features and behaviour
- Buildings subject to several transitions (energy, green building materials, climate change)
- Multidisciplinary approach required

### In this presentation:

1. How indoor mould is harmful to humans
2. Why health-based thresholds are lacking
3. TNO's (re)search for accurate and affordable assessment methods
4. Why modelling to predict and control mould risks is necessary



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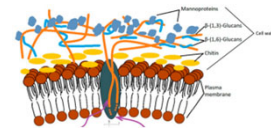
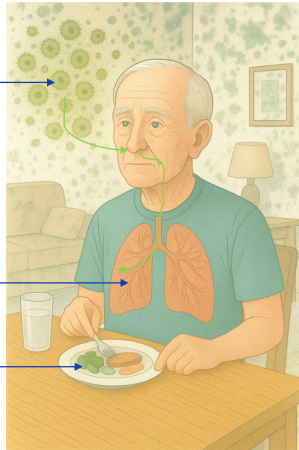
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# 1. How indoor mould is harmful to humans

Prolonged inhalation exposure to  **$\beta$ -glucans** may cause chronic diseases like asthma and allergy (all moulds)

Some moulds can cause **infections**; some infections are life threatening

Inhalation exposure to **mycotoxins** not very likely in normal situations (some moulds)



$\beta$ -glucans are part of cell walls of living and dead spores and degeneration fragments

# 2. Why health-based thresholds are lacking

## Standards for mould measurements are available, but...

- The sampling strategies aim to identify sources to prevent degeneration of the building structure; their aim is not to assess exposure to moulds;
- Some strategies only focus on visible moulds, while part of the moulds growing in buildings are invisible;
- Most measurements focus on living spores only and include a cultivation step;
- Currently no standardised measurement and analysis method to quantify occupant's exposure is available;
- Very small number of non-comparable exposure data → not possible to relate exposure to health effects → no threshold.

**CEN - EN 16868**  
Ambient air - Sampling and analysis of airborne pollen grains and fungal spores for networks related to allergy - Volumetric Hirst method

CEN/TC 137/WG 5 - MEASUREMENT OF BIOLOGICAL AGENTS (WORKPLACE)

## ISO 16000 series



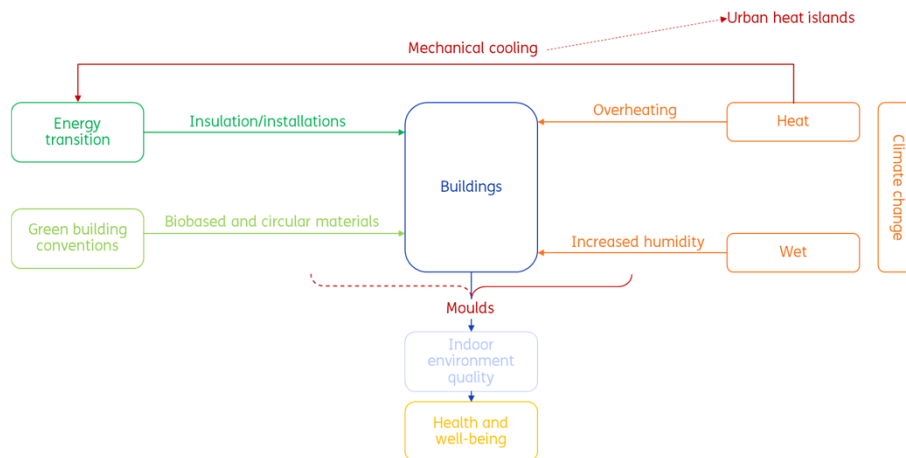
### 3. TNO's (re)search for accurate and affordable methods

Existing methods are either health relevant or affordable, nothing in between

Method	Sampling	Analysis (quantitative/qualitative)	DIY/Lab	Mould parts	Costs	Health relevance
Visual inspection (of walls, ceiling, etc.)	-	Qualitative	DIY	Visible mould	low	limited
DIY agar plates	Deposition of dust from air on agar plate	Qualitative: visual, counts	DIY	Living spores	low	limited
IAQ sensorbox	Passive air sampling (RH, Temp, VOC, PM)	Qualitative: algorithm to assign mould index	DIY	n.a.	low	?
Settled dust samples (EDC, plates, wipes, tapes, swaps, vacuum cleaner)	Deposition of dust from air; extraction needed	Quantitative: ELISA, beta-glucan assay (e.g. Fungitell, Glucatell)	Lab	Cell fragments, living and dead spores	high	high
	Deposition of dust from air; (extraction and) cultivation needed	Identification/quantification: MALDI-tof, qPCR, DNA barcoding	Lab	Living spores	high	high
Air samples	Active sampling with filter, impinger or impaction on agar plates; extraction and/or cultivation needed	Identification/quantification: ELISA, beta-glucan assay, MALDI-tof, qPCR, DNA-barcoding	Lab	Cell fragments, living and dead spores in air	high	high

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### 4. Why modelling to predict and control mould risks is necessary



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# Thank you

Looking for collaboration on measuring and modelling of health risks due to indoor mould growth?

Please contact us!  
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## Gezond binnenklimaat ten tijde van klimaatverandering

TNO innovation for life

Klimaatverandering leidt tot binnenklimaat van woningen aan - vooral door hitte en schimmel. Omdat mensen meer dan 80% van hun tijd binnen doorbrengen, is een gezond en klimaatbestendig woon- en werkomgeving essentieel. HITE, TNO's en schimmel-expertise het risico op gezondheidsrisico's, verminderde productiviteit en lagere levenskwaliteit - vooral bij kwetsbare groepen. TNO zoekt overvloedig, vocht en schimmel in woningen integreren aan. Met unieke expertise in hittebronnen, vocht, schimmelverrijking, geluidsoverlast, geluisscherming en effectieve interventies ontwikkelen we kennis en oplossingen voor gezonde, klimaatbestendige woningen.



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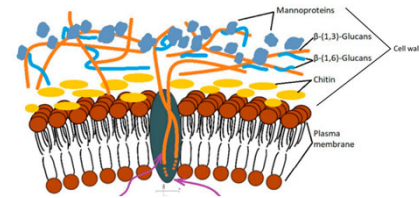
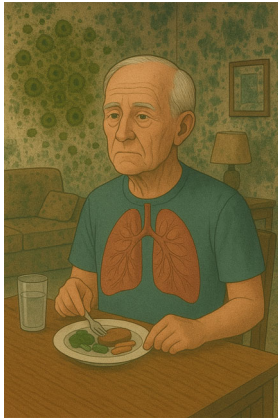
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# 1. How indoor mould is harmful to humans

## Prolonged exposure to $\beta$ -glucans may cause chronic diseases like asthma and allergy

- $\beta$ -glucans in cell walls of living and dead spores and mould degeneration fragments of all moulds



## Line 3: Buildings and their occupants

