

**” Mold building syndrome ”:
Symptoms caused by enviromental
moulds; any treatment for patients ?**

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**Symtoms caused by enviromental
moulds; any treatment for patients ?**

- **Definitions of ”mould building syndrome”**
- **Some patient cases**
- **Clinical symptoms**
- **Treatment**
- **Prevention**
- **Summary**

Definitions of "mold building syndrome"

- Terms used in medical literature from similar problems
 - Mold allergy ; Organic dust toxic syndrome ; Toxic volatile organic compounds ; "Sick building syndrome" ; Indoor air pollution ; Allergic bronchopulmonary aspergillosis
- Definition used in this lecture
 - "Mold building syndrome" covers any clinical symptoms in patients exposed to persistent dampness and microbial growth on interior surfaces and in building structures and which symptoms are aggravated in buildings with moisture damages and which symptoms are probably caused by molds and other microbes in moisture buildings by immunological, toxic and other mechanisms

- **SOME "MOLD BUILDING SYNDROME" PATIENT CASES TO ILLUSTRATE THE WIDE CLINICAL SPECTRUM OF THIS SYNDROME**
- **1) A TYPICAL CASE**
- **2) AN ALLERGIC ALVEOLITIS CASE**
- **3) AN OPTICUS NEURITIS CASE**

A female teacher with "mold building syndrome" (1)

- A female teacher, born 1966, who has been earlier very healthy
- She has been working in a school in Helsinki from 1999, in which school there has been severe moisture damages, visible molds in building structures and heavy growth of various fungi and bacteria from moisture damages and where many teachers and pupils have experienced irritating respiratory tract symptoms
- In addition from 2005 she has been living in an apartment where there has been moisture damages, too

A female teacher with mold building syndrome (2)

- From 2006 onwards she has had several respiratory tract infections like sinusitis and bronchitis
- During 2010 she had severe arthralgia and back pain and she was out of work several months without relief
- In summer 2010 she could not live any more in her apartment because her symptoms became worse when she was in the apartment but the symptoms were relieved when she was out of the apartment

A female teacher with mold building syndrome (summary) (3)

- She has respiratory symptoms and arthralgia in many public buildings but almost symptomless in nature
- Her laboratory tests are normal except mild eosinophilia but corticosteroid therapy is not helping much
- She is now looking for a "healthy" apartment and a school where she could work
- She is depressed because many physicians do not believe her symptoms and her economical situation is poor
- She is fulfilling the clinical criteria for "mold building syndrome" diagnosis which is , however, not an "official" diagnosis and she is receiving no economical support from the society

Mold building syndrome case (TLJ 1) (allergic alveolitis)

- A female, born in 1951
- She worked from 1970s in an office building in Helsinki, in which building severe moisture damages were found in 1990s and where several workers reported respiratory tract symptoms from 1990 onwards
- The building was renovated in 2000 but symptoms among many workers continued
- The female patient started to have dyspnoea and mild fever around 2000 and the symptoms were clearly linked to her presence in the office building but were absent when the patient was away from the building more than two days

TUJ (2)

- From 2000 the patients had many sinusitis and bronchitis; 2001 the asthma diagnosis was done
- In 2002 she was studied in Finnish Institute of Occupational Health and the diagnosis was allergic alveolitis based on the pulmonary infiltrates in HRCT, strong lymphocytosis in BAL, decreased diffusion capacity ad 76 %, and reversible bronchial obstruction
- She started corticosteroid treatment and was out of work on pension

TUJ (3)

- Her condition was followed in Helsinki University Central Hospital in 2003-2011
- She had severe shortness of breath, cough and fever when visiting many "moisture buildings" and gardens during summertime but almost symptomless at home
- She could walk only a couple of hundred meters during summer time outside home
- Corticosteroids and antibiotics helped a little but she developed secondary diabetes due to corticosteroids

TUJ (4)

- **In 2007 her diffusion capacity was dropped to 49 % from normal and CRP value was 23 and blood sugar was 22 and she started metformin treatment and continuous doxycycline plus low dose corticosteroid treatment and she avoided "mold places"**
- **Her condition was rather stable but poor during 2007-2008 and 2009 there were new pulmonary infiltrates and lung biopsy was done, where clear allergic alveolitis was observed, no bacteria or fungi were isolated from the lung tissue**

TUJ (5)

- **Some immunogenetic studies were done; she was HLA B35+, HLA DR1*1+, HLADR1*15+, Complement 4B one allele was lacking, immunoglobulin levels were normal**
- **2009 she was started experimental treatment with IV-immunoglobulins and the response was very good**
- **She could walk outside the home many kilometers but still experienced shortness of breath in severe moisture buildings**
- **Her diffusion capacity increased to almost normal, her pulmonary infiltrates disappeared, serum inflammation parameters turned to normal**

TLJ (6)

An allergic alveolitis case- summary

- **PAD verification for allergic alveolitis and her symptoms were worsening in moisture buildings and also in gardens during summer time**
- **The experimental treatment with IV - immunoglobulins gave a good clinical , laboratory and radiologic response and the remission has lasted now almost two years**
- **Allergic alveolitis cases due to molds have been published, but no controlled trial with IV - Ig treatment has so far been published in this disease**

Patient case JPK (1) (Opticus neuritis)

- **A man, born 1953**
- **He has had hypertension and asthma for over ten years beginning from 1990s**
- **1990s he had many sinusitis, which were suspected to be caused by molds in his working place**
- **1996 he changed his working place and his sinusitis problems and respiratory infections were stopped altogether and also asthma and hypertension were milder**

JPK (2)

- In May 2004 he was helping his wife by gathering various things for a couple of hours at school (his wife´s working place), where there has lately been a severe dampness damage and visible mold
- A couple of weeks afterwards his vision became worse
- In June 2004 he was studied in Helsinki University Central Hospital, in Eye and Neurological clinics

JPK (3)

- The diagnosis was bilateral opticus neuritis
- His vision was only 0,2 l.a.
- Inflammation parameters like CRP and ESR were normal, but there were 4 leucocytes in cerebrospinal fluid and his antinuclear antibodies in serum were high, 1280
- NMR from head was normal
- He was given high doses of corticosteroids, which helped a little

JPK (4)

- In winter 2005 he was almost blind, vision only 0,1 or under
- Infectious disease physician was consulted whether opticus neuritis could be due to mold allergy
- The consultation answer: possibly there was a connection between the heavy exposure to molds and the onset of opticus neuritis in a patient who had had earlier sinusitis problem probably due to molds

JPK (5)

- An experimental IV-immunoglobulin therapy was started in July 2005, when his vision was 0,1
- There was a remarkable treatment response; his vision was 0,7 (dx) and 0,3 (sin) in August, 2005
- His vision was 0,8 in both eyes in November, 2005 and he returned to work
- IV-immunoglobulin therapy was stopped in December, 2005, but his vision has been 0,8 (l.a) since then and he has avoided molds as well as possible

JPK (6) Opticus neuritis (summary)

- **Many infections and vaccines may trigger opticus neuritis, but no opticus neuritis case has been published so far to be due to mold allergy**
- **IV-immunoglobulin therapy has been used in various autoimmune and neurological diseases including opticus neuritis with variable success**
- **No reports have been published so far from the use of IV-immunoglobulin therapy in mold allergy patients**

The clinical symptoms of "mold building syndrome" (1)

- **The clinical symptoms are very variable**
- **As a rule the clinical picture starts with irritation symptoms in eyes and respiratory tract like redness and itching in eyes and sneezing and cough which are bad when the person is in the building where there is indoor air problems or dampness damages, but the symptoms disappear when the person is out of the "mold building"**

The clinical symptoms of "mold building syndrome" (2)

- Later on the amount of respiratory tract infections (like sinusitis and bronchitis) is increasing and skin manifestations, fatigue, arthralgia, gastrointestinal symptoms, head ache and various neurologic symptoms are also rather common
- Some patients may develop asthma and very rare patients may have allergic alveolitis
- Also rheumatic diseases and vasculitis cases have been published

The clinical symptoms of "mold building syndrome" (3)

- Clinical hints which favor the diagnosis of mold building syndrome
- 1) The symptoms are clearly associated with the presence of the person in " sick buildings ", where there are or has been clear dampness damages, visible mold in structures or heavy growth of various molds in the structures, but his or her symptoms diminish clearly when the person is away from " the mold buildings"

The clinical symptoms of "mold building syndrome" (4)

- 2) Typical symptoms or findings (but not always present in every patient)
 - High blood pressure and tachycardia attacks when exposed to molds
 - Disseminated herpes infections in head region without heavy immunosuppression
 - Dizziness and various unspecific neurological symptoms like head ache, pain or diminished sensoral findings all over the body
 - **A very sensitive ability to smell molds**

The diagnosis of "mold building syndrome"

- Always a clinical diagnosis
- No specific diagnostic laboratory tests available
- The key elements in diagnosis:
 - The clear association of symptoms with "mold buildings"
 - The clinical picture may vary but as a rule irritative symptoms in eyes and respiratory tract predominate in the beginning
 - Later on increased amounts of respiratory tract infections and arthralgia, skin manifestations are common, but asthma, various autoimmune manifestations and neurological symptoms vary from patient to patient

The treatment of "mold building syndrome"

- **The avoidance of molds is the most important form of therapy**
- **Antihistamines may offer little help**
- **Corticosteroids help in some cases but not as well as e.g. in classic asthma**
- **Antibiotics help in secondary infections**
- **Antifungal agents especially sporaconazole has been used especially in allergic bronchopulmonary aspergillosis with some success**
- **IV-immunoglobulin therapy may help in some severe cases but no controlled studies are available**

The prevention of "mold building syndrome"

- **The quality of construction work should be improved**
- **The renovation of the building with moisture damages does not help necessarily those patients who are very allergic to molds (spores left ?), but may help to prevent new victims of this syndrome**
- **There are probably genetic susceptibilities in persons who develop this syndrome more easily than others but we do not know these genes**

”Mold building syndrome” (Summary)

- **”Mold building syndrome” is a clinical diagnosis but we urgently need better laboratory tests to confirm this diagnosis**
- **The avoidance of molds is the best treatment for this syndrome**
- **Better quality in building may diminish this syndrome in the future**

Further readings from ”mold building syndrome”

- **1) WHO guidelines for indoor air quality: dampness and mold; WHO 2009**
- **2) Putus T: Home ja terveys, kosteusvauriohomeiden ja hiivojen terveyshaitat (in Finnish); Suomen ympäristö- ja terveysalan kustannus oy, 2010**
- **3) Strauss: molds, mycotoxins and sick building syndrome. Toxicology and industrial health 2009; 25: 617**