

Mold: Basic Issues

by

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Some Basics About Fungi

- Fungi are everywhere
 - Job: Break down matter to organic building blocks
 - Fungi include yeasts, molds, mildews, large mushrooms, puffballs and bracket fungi
 - **Don't Discriminate**: They come in all colors: green, orange, white and brown AND black
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Health Effects of Molds

- Allergic Reactions
 - Hay fever, allergic rhinitis, hypersensitivity pneumonitis, asthma
 - Infections
 - Colds, TB, Flu, legionella, etc.
 - Irritation and Toxic Reactions
 - Mycotoxins, endotoxins, MVOC's
 - Stachybotris
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Allergic Rhinitis

- Most common response to mold
 - Prevalence rate of 10% - 20% of population.
 - Sympt. - Runny and congested nose, inflamed throat and eyes, sneezing, etc.
 - Caused by IgE mediated inflammation and histamine release.
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Hypersensitivity Pneumonitis

- Caused by repeated or continuous exposure to antigenic substances.
 - Flu symptoms - chills, fever, malaise, cough, difficulty breathing.
 - Granulomatous lesions within the lung.
 - Easily misdiagnosed.
 - Sarcoidosis
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Irritant Effects

- Affect mucous membrane of eyes, nose, throat and mouth
 - Caused by organic chemicals produced by mold and released into indoor air
 - Alcohols, aldehydes and acidic molecules
 - Associated with “pungency”; initiates avoidance reactions
 - Breath holding; discomfort; itching, burning skin
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Irritant Effects: Odors

- Adverse reactions to odors
 - Perception is highly variable
 - Headache, nasal stuffiness, nausea or vomiting
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Infections

- Uncommon except in immune compromised individuals
 - Very common in hospitals
 - *Aspergillus fumigatus* associated with infections ("Aspergilloses")
 - Can affect skin, eyes, lung, etc.
 - Other fungi cause infections, but don't generally grow indoors
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Stachybotrys chartarum

The "Deadly Black Mold"

- Toxigenic fungi implicated in pulmonary hemosiderosis.
 - Produces trichothecene mycotoxins
 - Cluster of 10 cases of PH in Cleveland.
 - Associated with major water damage, increased fungal levels.
 - Major concern was *S. chartarum*.
 - Published in MMWR and journals.
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Stachybotrys (cont)

- Special Panel Review
 - Sample results were not correct.
 - Sampling was not blind.
 - Water damage in control and test homes gave equal *S. chartarum* presence.
 - PH not found in other flood areas with *S. chartarum*.
 - Not sufficient evidence to support an association.
 - Need inhaled dose of 3.5×10^9 spores to equal animal toxic dose, too high to be found indoors
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Health Effects of Mold

- There are no air or concentration standards for mold
- This is due to Difference Principle:

“Different molds effect different people differently”

Organizations on Mold & Health

- CDC: Supports only allergy, irritation & Infection
 - ACOEM: allergy, irritation & infection
 - Numerous other Medical groups, support only allergy, irritation & infection
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National Academy of Science Damp Indoor Spaces and Health

May 25, 2004

- Sponsored by CDC, thru Institute of Medicine
 - Largest Study To date of Mold & Health Effects
 - Data Support correlation of Mold Exp &:
 - Symptoms in asthmatics allergic to mold
 - Symptoms of coughing, wheezing, Upper Respiratory Tract Illness in healthy adults
 - HP in genetically susceptible adults
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NAS-IOM Study on Mold

- Data shows **Possible** correlation of mold &:
 - New onset of asthma, shortness of breath & LRI in healthy children
 - Animal & cell culture studies show toxic effects, but not extrapolated to humans
 - Data **DID NOT** support mold exp &:
 - Symptoms of fatigue, neuropsychiatric disorders or many other symptoms
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Causes of Mold Problems

- Reservoir
 - Moisture, food, warmth
 - Selection factors
 - Method of dissemination
 - Ventilation system
 - Air currents
 - Susceptible individuals
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Moisture and Mold Problems

- Moisture, Moisture, Moisture.
 - Moisture Infiltration.
 - Groundwater
 - Sprinkler Systems
 - Roof Leaks
 - Internal Moisture.
 - Humidity
 - Evaporative Coolers
 - Condensate Pans
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WIDE PANEL DESIGN
LONG DIMENSION

Duro
EXPOSURE 1
3/4" x 48" x 96"
N.E.R. 1
SIZED FOR JOIST
SPACING
16" O.C.
MADE IN THE U.S.A.
ALL

Duro





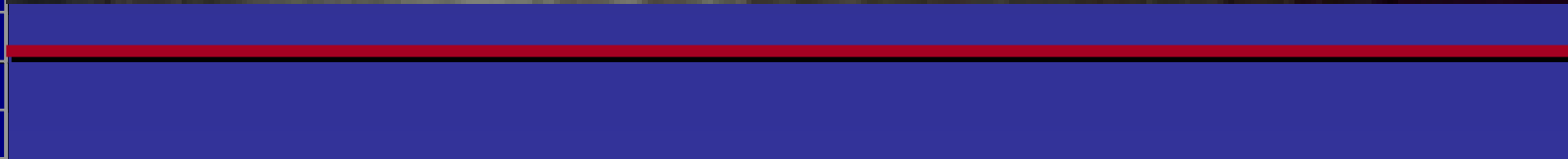












Mold Sampling Methods

- Non-viable Samples
 - Tape samples
 - Bulk Samples
 - Viable Samples
 - Bulk Samples
 - Cascade Impactors
 - Polymerase Chain Reaction
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Is Sampling Necessary?

- Is visible mold present?
 - Has there been water intrusion into the building?
 - Has hypersensitivity pneumonitis been diagnosed in the building?
 - What are the specific aims for a sampling program?
 - How much money do you have?
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Why not to conduct bioaerosol sampling.

- To determine the presence or absence of a bioaerosol.
 - To determine if an area is safe.
 - To determine the cause of frequent colds, flu, rashes, etc..
 - To show that mold from the carpet, etc. is entering the air.
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What do the Results Mean????

- Factors to look at:
 - Numbers present
 - Species present
 - Comparison to control areas
 - Comparison to outside levels
 - Are there any standards?
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Case #1

Air Sampling Results

Location	Total Fungi	Penicil. Sp.	Clado. Sp.
Outside	495	18	272
B-147	36	12	18
A-102	77	41	12
B-122	89	24	30
C-113	2915	2037	7
D-107	259	41	42

Case #2

Airborne Sampling Results

Location	Tot. Fungi	Penicil. Sp.	Aspergil. Sp.
Outside	813	80	0
Old Barn	1095	100	500
Slaughter House	85,760	85,760	0

Case #3

Airborne Sampling Results

Location	Tot. Fungi	Aspergil. Sp.	Cladosp. Sp.
Outside	251	3	150
A127	356	238	53
A113	131	78	36
A117	148	0	106
A106	18	12	6

Blank Results

- 148 *Aspergillus sp.*
 - 36 *Penicillium sp.*
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Is Remediation Necessary?

- Is there a potential for exposure?
 - What is the potential for health effects?
 - What risks will remediation present?
 - Employees and residents.
 - Remediation workers.
 - Is Remediation likely to be successful?
 - Cost - Benefit of remediation.
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When Should Remediation be Conducted?

- Only after the initial cause has been corrected!!!!
 - If visible biological contamination has been found.
 - If chronic moisture control problems have occurred.
 - If the facility has been found to be producing a bioaerosol.
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Goals of remediation

- To remove bioaerosol sources within the building.
 - To protect occupants during remediation process.
 - To protect remediation workers.
 - To prevent the spread of biological material to previously uncontaminated areas.
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Health Concerns During Remediation

- Dust exposure for sensitive individuals.
 - Allergic response from sensitized individuals.
 - Asthma
 - Atopic
 - Hypersensitivity Pneumonitis
 - Organic Dust Toxic Syndrome (ODTS)
 - Fever, flu-like symptoms, respiratory affects.
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Guidelines for Remediation

- New York City, Dept. of Health Guidelines.
 - ACGIH Bioaerosols: Assessment and Control
 - EPA Mold Remediation in Schools and Commercial Buildings
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Items to be Considered

- Hard easily cleanable surfaces
 - Semi-porous surfaces
 - Porous surfaces
 - Structural surfaces
 - Furniture, papers, etc.
 - Cooling towers, humidification systems, and HVAC systems.
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Easily Cleanable Surfaces

- Examples - metals, glass, plastic, etc.
 - Mitigation
 - Not frequently involved.
 - Can be cleaned with a detergent or disinfectant/detergent.
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Semi-Porous Surfaces

- Examples - Wood studs, paneling, furniture, etc.
 - Reusability depends upon:
 - Structural integrity
 - necessity
 - Ease of cleaning
 - Clean by removing fungi and refinishing.
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Porous Surfaces

- Examples - carpeting, fabric, pads, dry wall, furniture.
 - If contaminated with actual mold growth, removal may be necessary.
 - Even if mold growth did not occur, spores and odors may be present.
 - Washing and HEPA vacuuming may help remove contamination.
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Porous Surfaces (Cont)

- Dry Wall
 - Remove water damaged material.
 - Remove mold-contaminated material.
 - Furniture
 - Water damaged - remove
 - Non-damaged - Clean and disinfect if possible.
 - Papers and Books
 - Discard water damaged items.
 - Freeze drying or cleaning may be possible.
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HVAC Systems

- Air Handler Decontamination
 - Duct Decontamination
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Air Handler Decontamination

- Primary problem areas:
 - Drip pan
 - Fiberglass lining
 - Filters
 - Heat exchangers
 - **DO NOT** decontaminate while in use and occupied!!!!!!
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Drip Pans

- Must be designed to drain.
 - Anti-siphon
 - Anti-vacuum
 - Clean
 - Clean drain pans when necessary.
 - Can disinfect and clean when not in service.
 - Do not use continuous disinfectant.
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Duct Systems

- Lined and Unlined Ducts
 - Condition of lining
 - Cleanliness of lining
 - System moisture
 - Duct Cleaning (To Clean or Not to Clean)
 - Reheat systems may be clogged
 - Chemicals should not be used
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WHEN GERMS ATTACK!



Dust, mold and microscopic germs maybe attacking you from the air ducts!

Indoor air pollution is often worse than the air outside. Your home's air ducts contain dirt, dust mites, mold, dead animals and microscopic germs. These pollutants can make your family sick with colds and allergies! Dirty air ducts can affect your family's health and make your furnace run inefficiently. Call now and ask for a FREE estimate! Monster Vac can improve your Indoor Air Quality. Take advantage of our superior power and get Monster Vac'd today!

MONSTER VAC WE'VE GOT THE POWER

Boulder
303 499 4148

Ft. Collins/Greeley
970 490 6001
Colorado Springs
719 522 1555

Metro Denver
303 277 0140

Vail Valley
970 477 4750
Aspen/Glenwood
970 945 4584



MonsterVac.com

Filters

- Replacement schedule
 - Effect on filtration.
 - Effect on flow.
 - Poor maintenance
 - Missing filters
 - Inappropriate size
 - Filter type
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New York Guidelines

- Guidelines are for both areas and the HVAC System.
 - Level 1: Small Isolated Areas
 - Level 2: Mid-Sized Isolated Areas
 - Level 3: Large Isolated Areas
 - Level 4: Extensive Contamination
 - Level 5: Remediation of HVAC Systems
 - Less than 10 sq.ft.
 - Greater than 10 sq.ft.
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ACGIH Recommendations

- Minimal Contamination
 - Source Containment
 - Dust Prevention
 - N95 and gloves
 - Moderate Contamination
 - Local Containment
 - Eye and body protection
 - Extensive Contamination
 - Full Containment
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EPA Mold Remediation in Schools and Commercial Buildings

- Areas Less than 10 sq.Ft.
 - N-95 Respirator, gloves and goggles
 - No Containment
 - 10 sq. ft. to 100 sq.ft.
 - Limited or full protection
 - Limited containment
 - > than 100 sq.ft.
 - Full personal protection
 - Full containment
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Remediation Effectiveness

- Primary criterion = can people reoccupy the space.
 - Remediation samples:
 - Surface Samples
 - Air Samples
 - Absence of mold or water damaged material.
 - If cause has not been remediated, the problem will be back.
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References

- Bioaerosols: Assessment and Control
 - American Conf. Of Govt. Industrial Hygienists
 - Mold Remediation in Schools and Commercial Buildings
 - U.S. EPA
 - Field Guide for the Determination of Biological Contaminants in Environmental Samples
 - AIHA
 - Guidelines on Assessment and Remediation of Fungi in Indoor Environments
 - New York City Dept. of Health
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Web Sites

- Centers for Disease Control (CDC) Mold Information
 - www.cdc.gov/nceh/airpollution/mold
 - EPA – “A Brief Guide to MOLD, MOISTURE & YOUR HOME”
 - www.epa.gov/iaq/molds/moldguide.html
 - EPA "Mold Remediation in Schools and Commercial Buildings"
 - www.epa.gov/iaq/molds/references.html
 - New York City Guidelines for Mold Remediation
 - <http://www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html>
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 - American Industrial Hygiene Association (AIHA) Guide to Selecting a Mold Professional: [www.cal-ieq.org/guide aiha 9901.htm](http://www.cal-ieq.org/guide_aiha_9901.htm)
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