WHAT YOU NEED TO KNOW ABOUT

MOLD

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Molds are ...

Fungi

Fungi include:

- Molds / Mildew
- Mushrooms
- Yeasts

Many are beneficial
Fungi give us ...
Some fungi are beautiful . . .

BUT

DEADLY!
Some cause serious infections:

- **Candida**
- **Cryptococcus**
- **Histoplasma**
- **Blastomyces**
Fungi are important decomposers - the ultimate recyclers

- Enrich soil with compost
- Process landfill materials
- Prevent forest fires by eliminating fuel
Mold spores are everywhere, particularly outdoors.
MOLD SPORES ARE ALLERGENS

Many people are allergic to mold.
WE EXPERIENCE DAILY EXPOSURE TO MANY KINDS OF AIRBORNE ALLERGENS
POLLEN
DUST MITES
ALLERGENS INTERACT WITH IMMUNE CELLS TO PRODUCE SYMPTOMS

- RHINITIS
- HEADACHE
- NAUSEA
- URTICARIA (HIVES)
ACUTE EXPOSURE TO ALLERGENS CAN PRECIPITATE AN ASTHMA ATTACK IN SENSITIZED INDIVIDUALS
Chronic exposure may cause . . .

HYPERSENSITIVITY PNEUMONITIS (HP)

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

CHRONIC LUNG DISEASE IN PREDISPOSED INDIVIDUALS
HYPERSENSITIVITY PNEUMONITIS
AKA \textit{EXTRINSIC ALLERGIC ALVEOLITIS}

OFTEN AN OCCUPATIONAL HEALTH ISSUE

CAUSED BY CHRONIC EXPOSURE TO SPORES AND/OR ORGANIC DUST

ASSOCIATED WITH A WIDE VARIETY OF MATERIALS

OFTEN NAMED AFTER THE OCCUPATION AFFECTED
MUSHROOM GROWER’S LUNG
(COMPOST; THERMOPHILIC ACTINOMYCETES)

BAKER’S LUNG
(ORGANIC DUST)
FARMER’S LUNG
(ORGANIC DUST; SPORES)

SPICE WORKER’S LUNG
(ORGANIC DUST)
COFFEE GROWER’S LUNG

(ORGANIC DUST; SPORES)

MACHINIST’S LUNG

(CONTAMINATED METALWORKING FLUIDS)
SERIOUS FUNGAL INFECTIONS ARE RARE IN IMMUNOCOMPETENT INDIVIDUALS
SYSTEMIC FUNGAL INFECTIONS

- LIFE THREATENING
- RELATIVELY RARE
- NOT USUALLY ASSOCIATED WITH INDOOR ENVIRONMENTS

CRYPTOCOCCUS
HISTOPLASMA
BLASTOMYCES
ASPERGILUS IS AN OPPORTUNISTIC PATHOGEN
ASPERGILLUS MYCETOMA

PREDISPOSING CONDITIONS

- CANCER / CHEMO
- HIV / AIDS
- LEUKEMIA
- IMMUNOSUPPRESSANTS

BRAIN – (LEFT)

LUNG – (BELOW)
MOST FUNGAL INFECTIONS ARE SUPERFICIAL, AFFECTING:

- HAIR
- NAILS
- SKIN

NOT ASSOCIATED WITH INDOOR AIR
MOST (ALL?) FUNGI PRODUCE MYCOTOXINS

THEREFORE, “TOXIC MOLD” IS A MEANINGLESS TERM!
Mycotoxins...

• ARE SECONDARY METABOLITES
• ARE PRODUCED BY MOST FUNGAL GENERA
• ARE NOT PRODUCED BY ALL ISOLATES
• ARE SOURCES OF IMPORTANT ANTIBIOTICS
MYCOTOXINS...  

• ARE TOXIC TO HUMANS AND ANIMALS  
• ARE TOXIC IN VERY SMALL AMOUNTS  
• MAY HAVE HORMONAL EFFECTS  
• ARE TOXIC BY PRIMARILY BY INGESTION
EFFECTS OF INHALATION OF MYCOTOXINS BY HUMAN BEINGS ARE NOT WELL CHARACTERIZED

STILL UNCERTAIN WHETHER HUMANS ARE EXPOSED TO SIGNIFICANT AMOUNTS OF MYCOTOXIN MERELY BY INHALING SPORES
SO WHAT ABOUT...?

STACHYBOTRYS

STACHYBOTRYS CHARTARUM
STACHYBOTrys CHARTARUM

- Known to be toxic to animals when ingested with feed
- Sticky; does not shed spores readily
- Requires wet (not merely humid) conditions
- Grows on cellulose
- Produces trichothecenes
- Probably allergenic
- Toxic potential of inhaling spores poorly understood
TRICHOTHECENE MYCOTOXINS

- MORE THAN 300 KNOWN
- PRODUCED BY SEVERAL FUNGAL SPECIES
- A FEW ADVERSELY AFFECT HUMANS AND ANIMALS
- VERY POTENT

EXAMPLE: SATRATOXIN PRODUCED BY STACHYBOTrys CHARTARUM
WHAT YOU HEARD . . .

MOLD KILLS BABIES IN CLEVELAND!
“The reviews led CDC to conclude that a possible association between acute pulmonary hemorrhage / hemosiderosis in infants and exposure to molds, specifically *Stachybotrys chartarum*, commonly referred to by its synonym *Stachybotrys atra*, was not proven."
THERE'S MOLD IN MY HOUSE.

NOW WHAT?
DON'T DO THIS!

IT MAY BE NECESSARY TO REMOVE DRY WALL, CARPET, AND OTHER CONTAMINATED MATERIALS, BUT TOTAL DEMOLITION IS RARELY, IF EVER, APPROPRIATE.
A MOLD PROBLEM IS ALWAYS A WATER PROBLEM

STOP THE WATER!
YOU MUST . . .

CLEAN IT UP AND DRY IT OUT!

• LOOK FOR SOURCE OF MOISTURE OR WATER INCURSION

• CORRECT THE PROBLEM

• DRY OR REMOVE ALL WET MATERIALS

• CLEAN OR REMOVE AND REPLACE ALL MOLDED MATERIAL
CLEAN AND DISINFECT
• GLASS
• METAL
• SEALED WOOD
• MOST PLASTIC
• NON-POROUS SURFACES

REMOVE AND REPLACE
• CARPET
• UPHOLSTERY AND OTHER FABRIC
• DRYWALL MATERIAL
• UNSEALED WOOD
• POROUS MATERIALS
CAN I DO IT MYSELF?

IT DEPENDS

REMEDIATION . . .
NOT A BIG DEAL

 HOW MUCH AND WHERE?

BIG DEAL

REALLY BIG DEAL!
WORST CASE . . .

HOWEVER, MANY OF THESE STRUCTURES WERE GUTTED AND REHABILITATED.

HURRICANE KATRINA
WHEN TO CALL A PROFESSIONAL

- THE JOB IS TOO BIG OR COMPLEX
- THERE IS A RISK OF SCATTERING SPORES
- YOU ARE ALLERGIC TO MOLD
- YOU LACK TOOLS OR EXPERTISE
- THERE ARE LEGAL OR LIABILITY ISSUES
WHOM DO YOU CALL?

- A STATE LICENSED MOLD INVESTIGATOR
- A CERTIFIED INDUSTRIAL HYGIENEST
- CERTIFICATION BY AMERICAN COUNCIL FOR ACCREDITED CERTIFICATION
• EXAMINE CREDENTIALS; ALL CERTIFICATIONS ARE NOT EQUALLY CREDIBLE

• LOOK FOR CONFLICT OF INTEREST IN FIRMS PERFORMING BOTH INSPECTIONS AND REMEDIATION WORK

• BE WARY OF EXTENSIVE SAMPLING PROTOCOLS; SAMPLING IS EXPENSIVE; OFTEN UNNECESSARY

• BEWARE OF "TREATMENTS"; THEY DON’T WORK

BEWARE . . . MANY INDIVIDUALS WORKING IN THIS FIELD ARE LESS THAN QUALIFIED
• BEWARE OF RECOMMENDATIONS FOR EXTENSIVE DEMOLITION; MAY NOT BE NECESSARY

• BE SUSPICIOUS OF SCARE TACTICS REGARDING HEALTH EFFECTS

• THE TERM “TOXIC MOLD” IS MEANINGLESS

• SAMPLES MUST BE ANALYZED BY EMLAP CERTIFIED LAB; RESULTS INTERPRETED BY QUALIFIED INDIVIDUAL

SAFETY... ASK ABOUT PERSONAL PROTECTIVE EQUIPMENT AND NEGATIVE AIR CONTAINMENT
• Waste of money
• Collection method not is valid
• Yields no useful information
DOES MY WORKPLACE HAVE SICK BUILDING SYNDROME?

THE BUILDING IS NOT SICK, BUT THE OCCUPANTS MAY BE
SBS SYMPTOMS ARE NON-SPECIFIC

- HEADACHE
- EYE, NOSE, THROAT IRRITATION
- DRY COUGH
- DRY OR ITCHY SKIN
- DIZZINESS
- NAUSEA
- DIFFICULTY CONCENTRATING
- FATIGUE
- SENSITIVITY TO ODORS
THERE IS NO TEST FOR SBS!

ISSUES ARE VERY COMPLEX AND OFTEN RELATED TO INDOOR AIR QUALITY

VARIOUS PHYSICAL, PSYCHOLOGICAL, AND ENVIRONMENTAL FACTORS MAY WORK TOGETHER SYNERGISTICALLY
PHYSICAL CAUSES

PARTICULATE ALLERGENS
VOLATILE ORGANIC COMPOUNDS (VOC)

PSYCHOLOGICAL FACTORS

JOB SATISFACTION
STRESS

BUILDING ENVIRONMENT
TEMPERATURE
VENTILATION
COMMON IRRITANTS IN INDOOR AIR

POLLEN

HOUSE DUST

PHOTOCOPIER TONER

FRAGRANCE
VOLATILE ORGANIC COMPOUNDS (VOC) IN INDOOR AIR

GENERATED BY NEW OR NEWLY APPLIED . . .

- PAINTS, VARNISHES
- CARPET, UPHOLSTRY
- FURNITURE

ALSO:
AIR FRESHENERS
CANDLES
PERSONAL FRAGRANCE
TOBACCO SMOKE

THE HUMAN SENSE OF SMELL IS MORE SENSITIVE THAN ANY INSTRUMENT FOR DETECTING VOC

THE NOSE KNOWS!
MANY KINDS OF MOLD SPORES IN BOTH INDOOR AIR AND OUTDOOR AIR

THE KINDS OF SPORES AND RELATIVE AMOUNTS SHOULD BE SIMILAR, INDOORS AND OUTDOORS
IDENTIFICATION OF FUNGI REQUIRES THE EXPERTISE OF A QUALIFIED MYCOLOGIST

USUALLY, IT IS FEASIBLE TO IDENTIFY ISOLATES ONLY TO THE GENUS LEVEL
Figure 1. Indoor air resembles outdoor air with respect to kinds and relative numbers of fungi isolated. Total fungal load is less indoors due to air filtration.
Figure 2. Significantly more Penicillium/Aspergillus in indoor air, suggesting a proliferative source of fungi indoors.
NO MAGIC NUMBER FOR DIFFERENTIATING BETWEEN “SAFE” AND “UNSAFE” LEVELS OF FUNGI

MUST EXAMINE AND INTERPRET DATA

MUST COMPARE WITH OUTDOOR AIR
Rx FOR SICK BUILDING

- CHECK FOR WATER INCURSION
- REMOVE ALL WET OR DAMP MATERIALS
- REMOVE MOLDED MATERIALS
- CONTROL HUMIDITY
- INSPECT VENTILATION SYSTEM
- INCREASE FRESH AIR
- CONTROL VOC
ELIMINATE SOURCES OF VOLATILE ORGANIC COMPOUNDS FROM THE WORKPLACE

- SMOKE
- PERFUME
- CANDLES
- AIR FRESHENERS
REMEMBER TO...

BREATHE
Inhale, Exhale, Relax