Premise Microbial Testing

Basic IAQ Microbial Sampling Methods

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Sampling Guidelines

• Sampling alone is far from foolproof
• Visual inspection, detailed building walkthrough (include HVAC system)
  – Moisture meters
  – IR cameras
  – CO, CO₂
  – Temperature & RH
• Take plenty of notes to compare with lab report
• Photographic record
Non-culturable Techniques for Mold

- **Air sampling**
  - spore traps
- **Surface sampling**
  - Tape lift
  - Swab
  - Bulk
Spore Traps

- Air-O-Cell, Allergenco-D, Burkard, Cyclex, Micro-5, Mold Snap, Versa Trap…
  - Flow rate = 2-20 Lpm
  - Target volume = 30-200 L
  - Short term sampling up to 10 min
Sampling Pumps

Zefon DC Powered IAQ Sampling Pump

BiosDefender High flow

E-Lite Pump with rotameter
Wall Adaptors

- Make small hole in wall
- Insert adaptor and remove cap
- Attach spore trap and collect short sample
- Helps find hidden mold behind walls
Spore Trap Analysis

- Most widely used method for indoor mold sampling
- Analysis can be performed in several hours
- ASTM D7391

![Image of spore trap analysis with labeled species: Pithomyces, Alternaria, Spegazzinia]
Spore Count - Advantages

- Rapid Turnaround Time - 3 hours
- Shows potential for fungal allergens in the air
  - any spore can be potentially allergenic
- Useful for determining “hidden” mold behind sheetrock or duct chases
- Good for doing a preliminary assessment to determine if unseen mold is present
Disadvantages of Spore Counts

- Correct identification dependent upon the analyst training (differences between labs)
- Presumptive Identification at best
  Asp/Pen and others
- Identification to genus level only
- No information pathogenicity
- Viability unknown
Spore Count - Disadvantages

- Biased toward larger spores due to collection efficiency of the cassette
- Biased toward dry spores
- Grab sample – usually 10 minute maximum
- Sample may be easily overloaded
Surface Sampling

- Tape lift, swab, bulk
- Sampling is very easy
Direct Fungal Examination

- Fast and inexpensive test
- Information about active fungal growth
- This method is good for qualitative but not quantitative analysis
Tape Lift

- Preserves the integrity of the fungi
- For smooth and hard surfaces
Swab Sampling

- Collect suspected surface growth from a known area
- Better for:
  - difficult to reach area & moist to wet surfaces
Bulk Samples

- Preserves the integrity of the fungi, same as tape lift
Culturable Sampling Methods
Why Culture?

- **Advantage**
  - ability to detect & identify microbes to the species level

- **Disadvantage:**
  - 3-5 days for bacterial results
  - 7-10 days for fungal results
Media Considerations

- MEA for most fungi
- CMA or cellulose agar for water damage fungi
- TSA or blood agar for environmental screening
- MacConkey agar for Gram negatives
Importance of Fungal Media

Penicillium janthinellum
Culturable Samples

- Air
- Bulk
- Dust
- Swab
- Wipe
- Contact
Air Sampling

- All Glass Impinger (AGI)
- Andersen Impactors
- Biotest RCS
- SAS Sampler
- Settling plates
Andersen-type Impactors

- One, two, six stage impactor
- Flow rate – 28.3 Lpm
- Sampling optimum 2-5 min
A. carbonarius

A. oryzae

A. sydowii

Eurotium chevalieri

Stachybotrys chartarum

Yeast

A. fumigatus

Aureobasidium
All Glass Impinger (AGI)

- Flow rate - 12.5 Lpm
- Liquid volume - 20 mL
- Sampling up to 8 hr
- High collection efficiency
- Must be sterilized between uses

[Diagram of All Glass Impinger (AGI)]
Biotest RCS Sampler

- High flow air sampler
- Flow rate 40 - 100 Lpm
- Sampling time - 0.5 to 8 min

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SAS Sampler

- High flow air sampler (SAS 100, 180 and Duo 360)
- Adjustable flow rate 100-360 Lpm
- Sampling time up to 7h
- Accepts different sized agar plates
Settle/Settling Plates

- Simple gravity method
- Qualitative but not quantitative
- Accuracy is affected by many factors (particle size, air movement…)

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Bulk Sampling
Dust / Micro-vac Sampling
Swab Sampling
Wipe Sampling

• Same as swab
• Wet sponge with sterile water/buffer
• Wipe known area
Contact Samples (RODAC)

- Identification and viability of fungi or bacteria present

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Questions?

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