

NEMC



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 = 2-20Lpm
- Target volume = 30-200L
- Short term sampling up to 10 min



Air cassettes

Sampling Pumps



Zefon DC Powered IAQ Sampling Pump



BiosDefender High flow



E-Lite Pump with rotameter

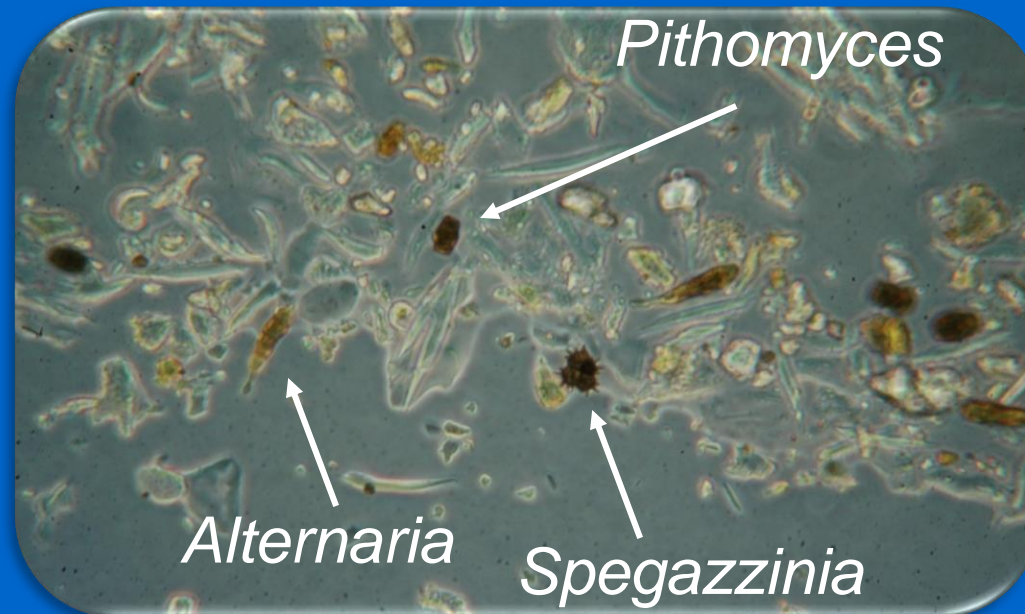
Wall Adaptors

- 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



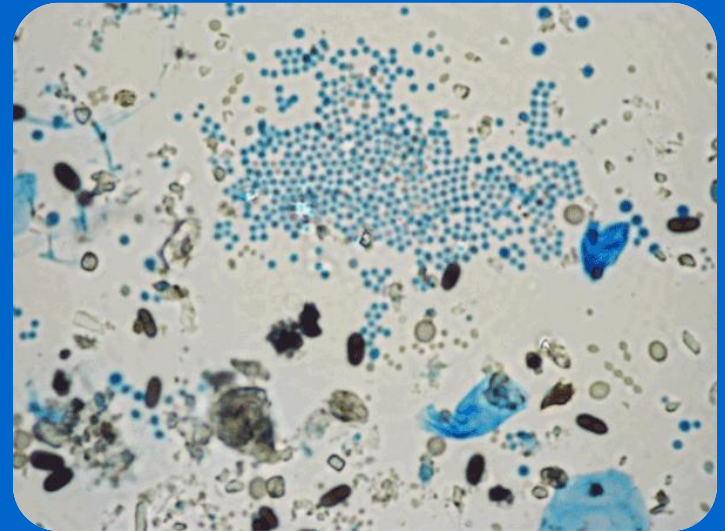
Spore Count - Advantages

- 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



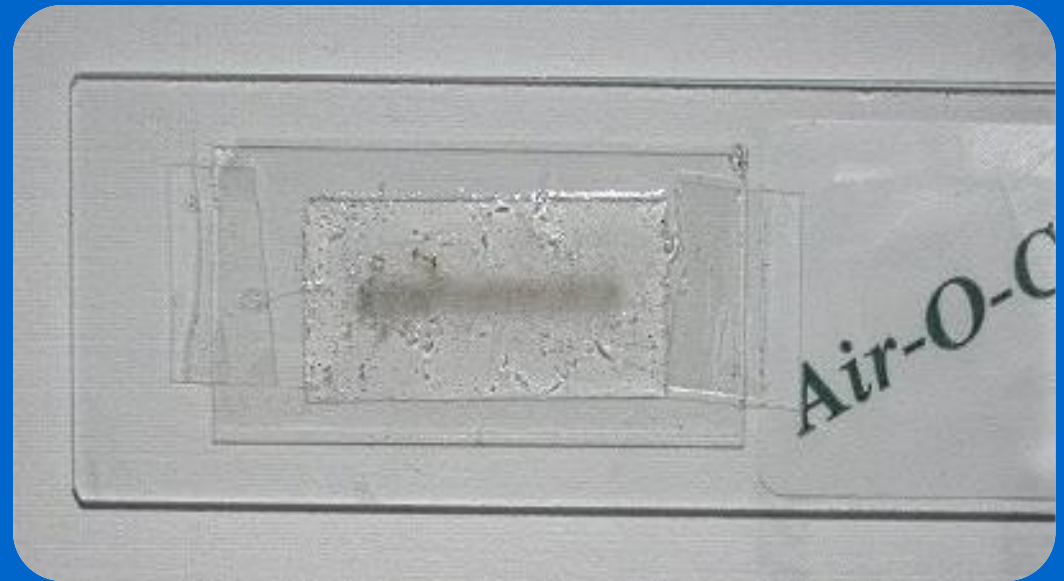
Disadvantages of Spore Counts

- 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

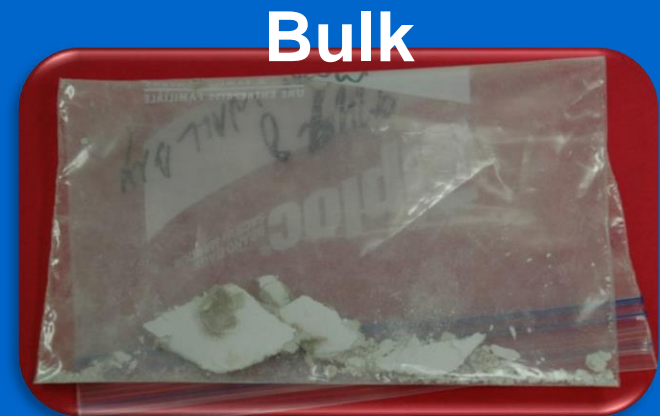


Surface Sampling

- Tape lift, swab, bulk
- Sampling is very easy



Swabs



Bulk



Tape lift

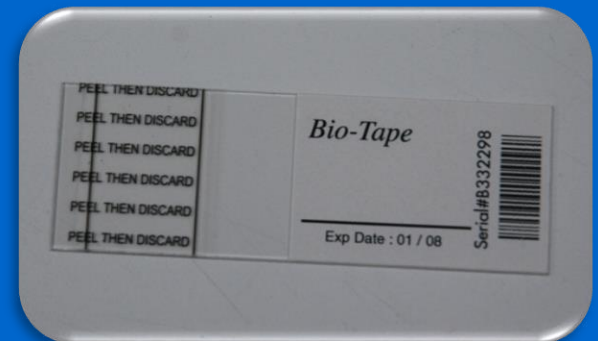
Direct Fungal Examination

- 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



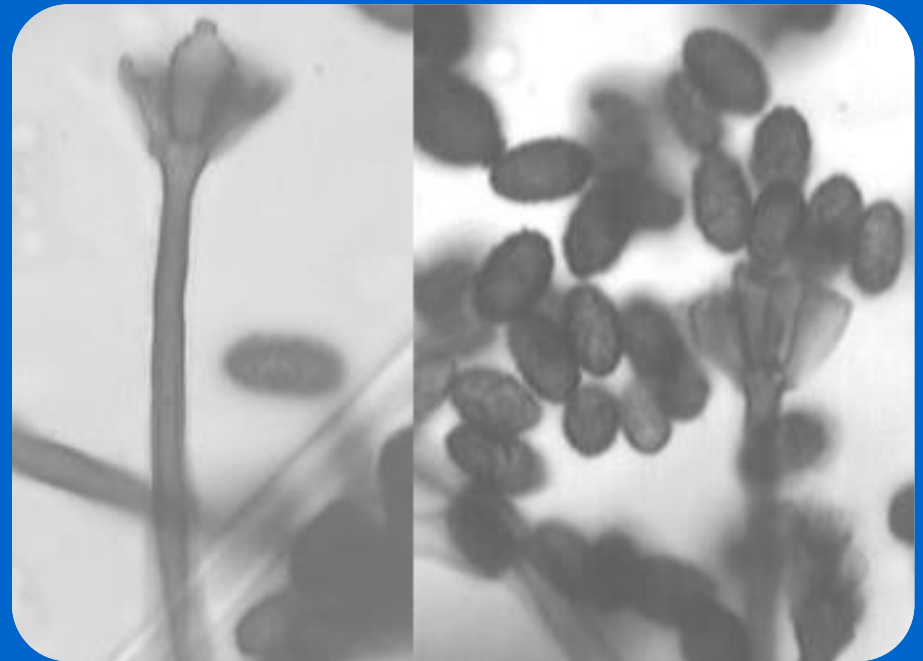
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Culturable Sampling Methods



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



Stachybotrys sp.

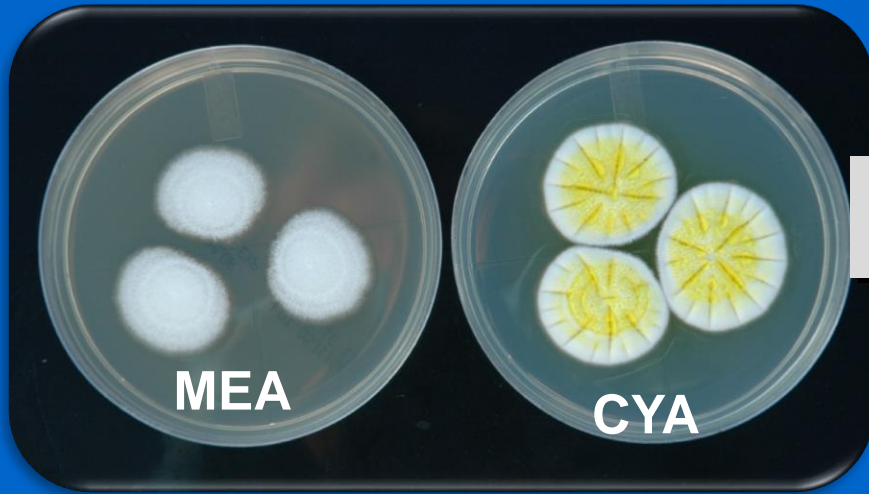
Media Considerations

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

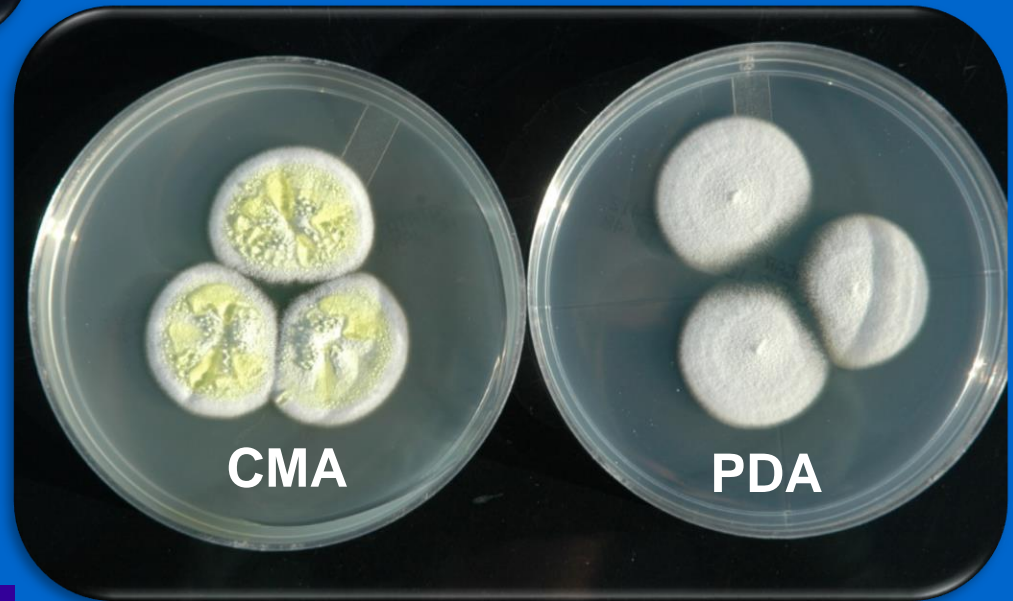


Penicillium chrysogenum

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



C. cladosporioides

P. sclerotiorum

P. melini

A. fumigatus

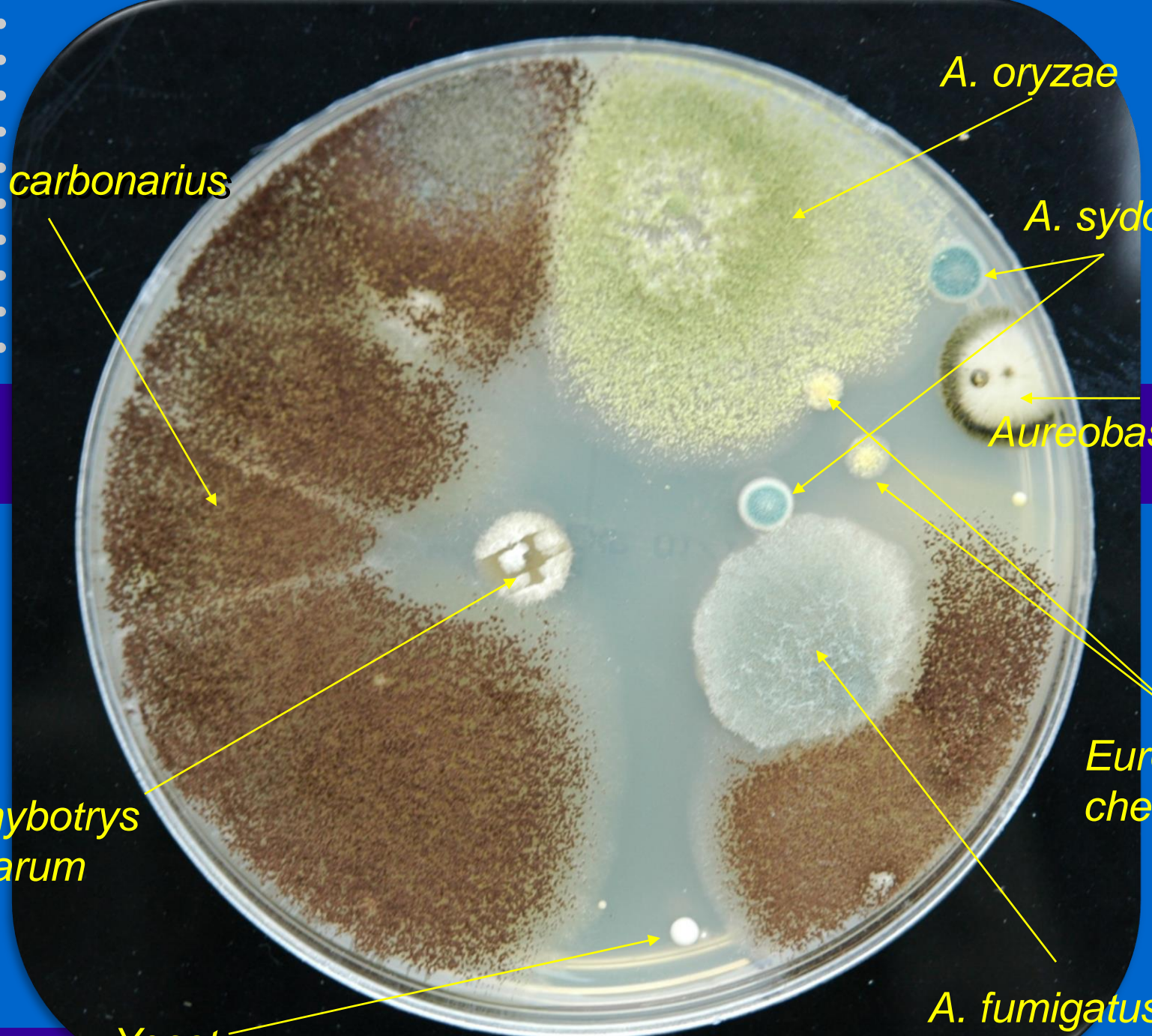
Sterile white

Geotrichum spp.

P. brevicompactum

Thysanophora





A. carbonarius

A. oryzae

A. sydowii

Aureobasidium

Eurotium chevalieri

Stachybotrys chartarum

A. fumigatus

Yeast



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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



Biotest RCS Sampler

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



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



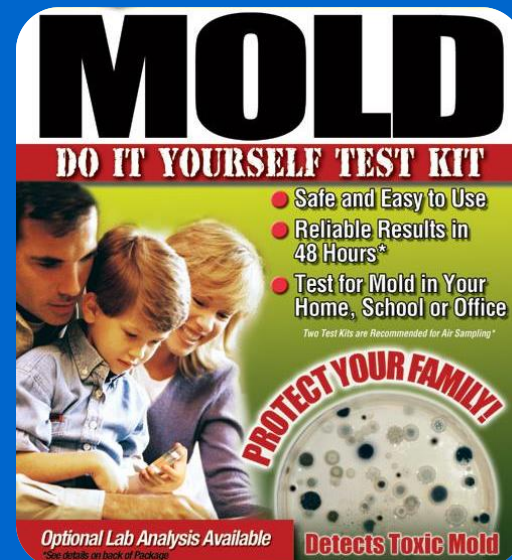
Super 100 Air Sampler

Duo Sas-Super 360



Settle/Settling Plates

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



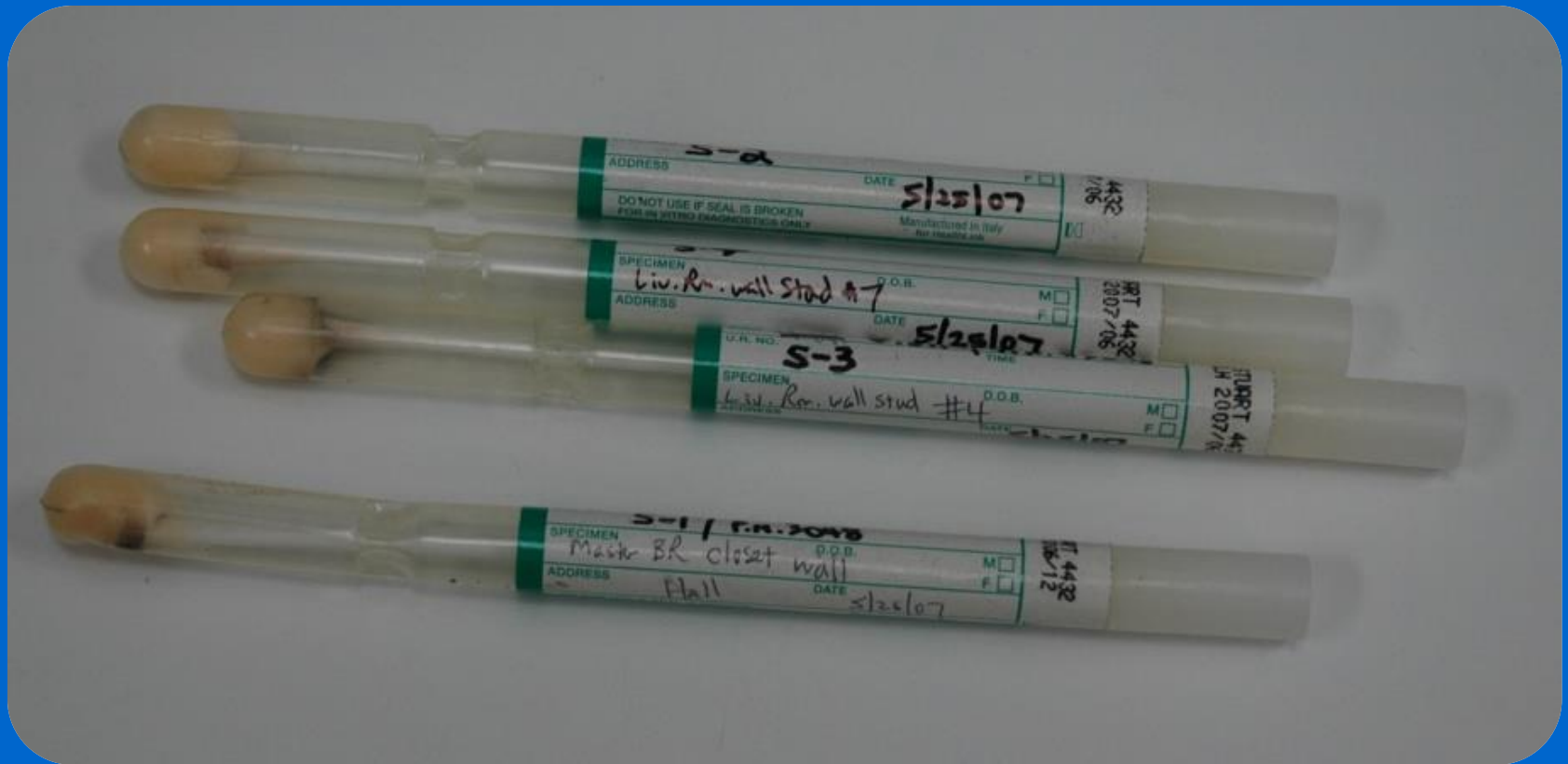
Bulk Sampling



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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