

Is it Worth the Wait?

**Onsite Microbial
Technology
Evolution, Evaluation
Revolution**

Presented by Lisa J Rogers

mycometer 

In the beginning.....

There were fungi and bacteria.

Little biological terrorists have evolved and outlasted most all organisms, building materials and seem to thrive on environmental disaster.

And yet we, complex higher thinking humans have not evolved our primary sampling and analytical strategies for these organisms

Overview

- Current Sampling Technology
- Ideal Technology Evolution
- Onsite Technology Evolution
- Choosing an Onsite Technology

Current Surface Sampling Techniques

- Sticky slide , swab, or tape lift,



Technology Limitations

- Limited surface area sampled
- Number of samples needed to characterize
- Overloading surface
- Extracting material from swabs
- Labor intensive analysis
- Analytical consistency between/within labs
- Interpretation of results

Current Air Sampling Technologies

- Impactors
 - Sticky slides/cassettes
 - Culture plates
- Filters
- Impingers



Technology Limitations

- Collection efficiency
- Media specificity \Rightarrow sampling limitations
- Short sampling duration “grab sample”
- Particle size selection
- Labor intensive analysis
- Analytical consistency between/within labs
- Data Interpretation

Environmental Limitations

- Ventilation
- Construction
- Size of Building
- Location of contamination
- Extent of contamination
- Ecology of contamination

What you put up with

- Samples are not representative of environment
- Many samples needed for statistical significance
- Data reliability
- Inconsistent data interpretation
- Costs

What do we want the Data to tell us?

- Diagnostics
 - Do atypical conditions exist?
 - Identify areas with amplification
 - Reliable, repeatable and legally defensible
- Documentation
 - PRV: Is it clean?
 - Have we missed something

Questions : is the complaint mold presence or symptoms

Ideal Technology Evolution

- Samples collected are more representative
- Analysis is more consistent
- Collection efficiency consistent
- Areas in buildings reliably differentiated between contaminated and clean areas
- Results are quickly obtained, even in the field

Onsite Technology Evolution

- Bioluminescence
- Lateral Flow Immunoassay
- Fluorescence

Bioluminescence

Test principle: Adenosine Triphosphate (ATP)

Tests For: viable microbial organisms including bacteria, fungi, skin cells, insects

Test time: 60 seconds

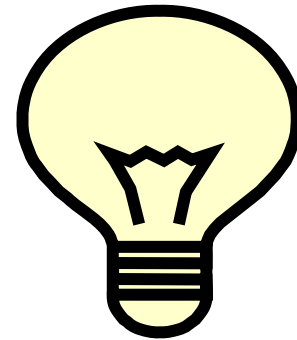
Sample Types: Surfaces

Manufacturer: BEM, Bio Trace



How does it work?

ATP + luciferin luciferase =



Same reaction as a firefly uses

Bioluminescence Advantages

- Easy to use
- Low analytical cost
- Limited interpretation criteria
- Shelf life 12 months
- No training required
- Variability < 10%

Bioluminescence Disadvantages

- Viable organisms only
- High potential for false positives/false negatives
- Cannot differentiate between fungi, bacteria or other responses
- Does not identify taxa
- Background interferences
- Surface samples only
- Sample overload potential

Bioluminescence Applications

Post remediation or post general cleaning

Lateral Flow Immunoassays

Test principle: Dye labeled antibodies

Tests For: specific organisms

Test time: 5-15 minutes

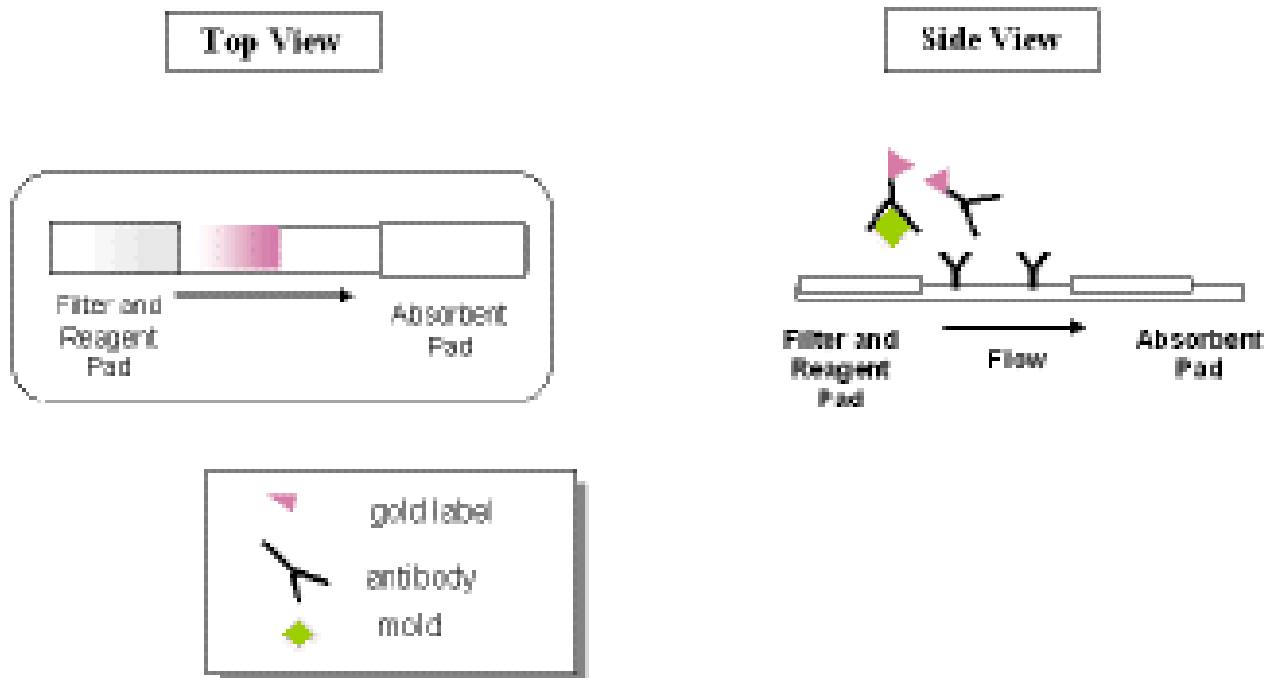
Sample Types: surfaces, air

Manufacturer: Alexeter, Envirologix



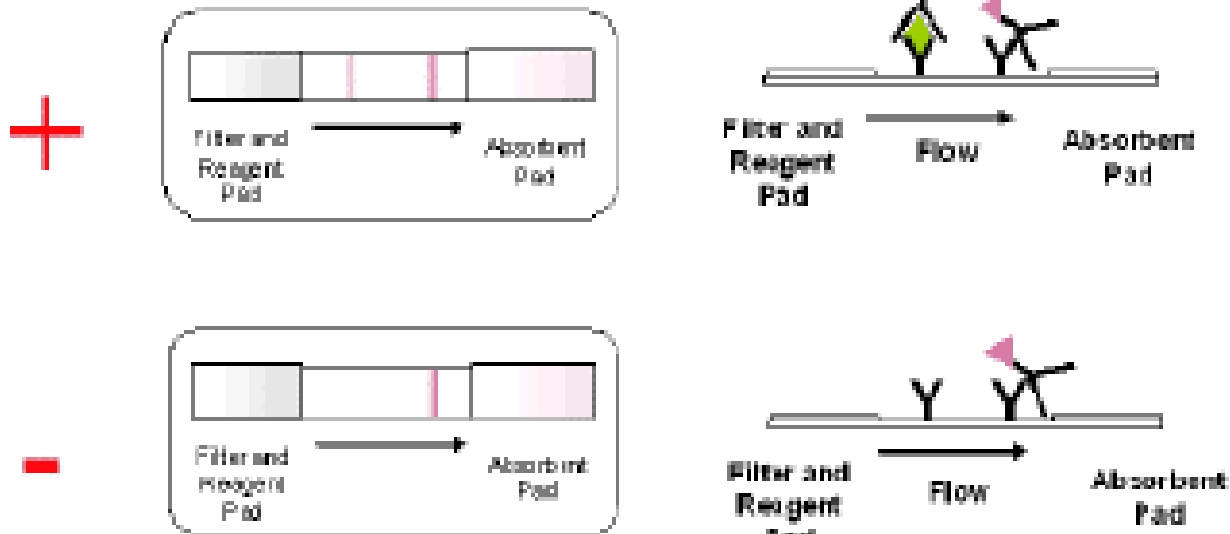
How does it work?

Inside the Test Strip with Sample Added



How does it work?

Positive vs. Negative Results



Immunoassay Advantages

- Organism specific
- Easy to use
- Detects viable and non-viable organisms
- Low sample cost
- No false positives
- Shelf life 6 months
- Variability <10 %

Immunoassay Disadvantages

- Only limited assays available
- Need different tests for each organism
- Does not quantify, only +/-
- Detection limit high: 10^5

Immunoassay Applications

Field screening when looking for specific organisms

Post remediation with caveats

Fluorescence

Test principle: Enzyme
Tests For: All fungi
Test time: 20-40 minutes



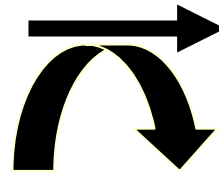
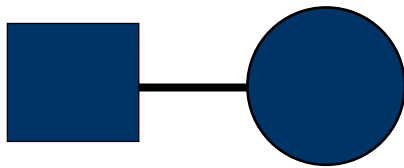
Sample Types: surface, air, bulk

Manufacturer : Mycometer

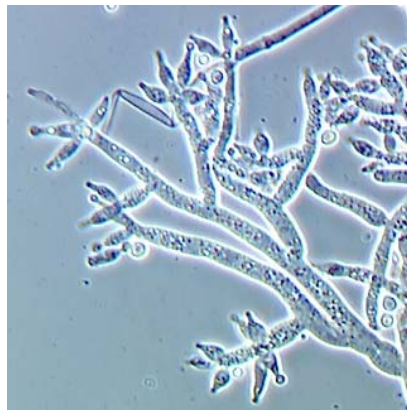
Developed at the University of Copenhagen

How does it work?

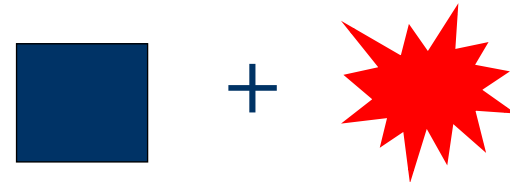
Enzyme substrate



Mold-enzyme



Fluorescent compound



Fluorescence Advantages

- Semi quantitative measure of fungal biomass
- Enzyme is common to all filamentous fungi
- Rare interference from other sources.
- Interpretation criteria easy to use follows IICRC
- Used in litigation
- Detects viable and non-viable organisms
- Large sample volumes – cannot overload test
- Shelf life 12months
- Variability <10 %

Interpreting Mycometer Data

Category	Mycometer Value (MM)	Interpretation
A	$MM \leq 25$	The level of mold is not above normal background level.
B	$25 < MM \leq 450$	The level of mold is above normal background level.
C	$MM > 450$	The level of mold is high above normal background level indicating mold growth.



What does a before and after remediation test look like?

Sample #	Sample Description	Before Cleaning	After Cleaning	Mycometer Value (FU)	A	B	C
1	Mortar with mold	X		279		X	
2	Mortar with mold	X		176		X	
3	Mortar with mold	X		1562			X
4	Mortar with mold	X		668			X
5	Mortar with mold		X	4	X		
6	Mortar with mold		X	3	X		
7	Mortar with mold		X	2	X		
8	Mortar with mold		X	6	X		
9	Mortar with mold		X	5	X		
10							



Fluorescence Disadvantages

- Certification training required to document proficiency
- Does not identify taxa
- Cost per analysis more than other onsite tests similar to lab cost

Applications

- Initial diagnostic assessment
- Delineation of contamination documentation
- Visual contamination confirmation
- Wood, grout & other building material contamination/remediation assessment

Applications

- Rapid remediation clearance testing
- Pre/Post HVAC cleaning documentation
- Fragile materials assessment
- Expedite disaster response damage assessment
- Healthcare ICRA documentation
- Routine maintenance cleaning confirmation

How to Choose an Onsite Technology

- What is your objective?
- What is the interpretation criteria & how it will be used?
- Is this a validated method, read the literature!
- Robust, repeatable protocols
- Has it been used in litigation?
- Collect Meaningful Data!

May I answer any questions you have?

Thank you for Listening!

If you want to know more about the
Mycometer-test send me an e-mail at
lr Rogers@mycometer.com

MycoMeter™ Test

41



Mycometer App

MycoMeter™ test
45

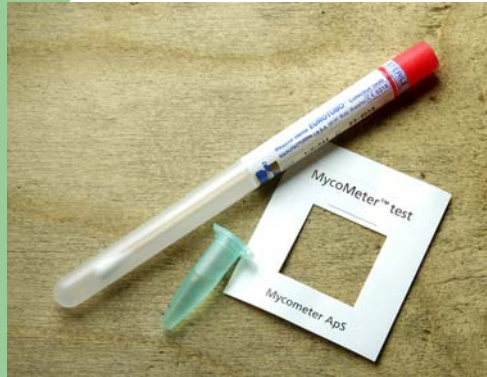




Field Proven, Lab Confirmed, Peer Reviewed

Mycometer® has been providing robust rapid microbiology for onsite evaluation for over 10 years. More than 80,000 samples in have been analyzed. Litigation tested in Florida and Texas

ASHRAE Innovation Award Recipient
Results scientifically validated
Published in peer reviewed publications



Surface, air or bulk material sampling

Easy 4 Step Procedure

1. Collect sample (surface, bulk, or air).
2. Extract sample for ~30 to 60 minutes.
3. Transfer reaction solution to a cuvette
4. Read sample cuvette in the Fluorometer.

