Environmental Testing in CIRS

A clinician's quick reference to what common assays measure, what they miss, and how to interpret them in context

WHY FUNGAL TESTING MAY NOT TELL THE WHOLE STORY

A 2025 peer-reviewed paper by Shoemaker et al. reports CIRS specific-causation signals involving Actinobacteria, bacterial endotoxins, beta-glucans and fungi within the authors' GENIE/CIRS research framework. **These percentages are framework-specific findings, not population prevalence estimates or regulatory exposure limits.** [1]

Actinobacteria	Bacterial endotoxins	Beta-glucans	Fungi
42%	**28%**	**6-10%**	**7%**

Clinical implication: ERMI and HERTSMI-2 are fungal DNA-based tools. They do not measure endotoxin or Actinobacteria. A reassuring fungal result therefore does not, by itself, exclude other environmental exposures or establish that a building is clinically irrelevant.

What fungal DNA testing can tell you

• **DNA, not viability.** MSQPCR quantifies fungal DNA. A positive result does not distinguish viable from nonviable fungal material. [2,3]

• **Fungal material extends beyond intact spores.** Indoor fungal particles can include spores, hyphae and submicron fragments. Research has demonstrated beta-glucan and antigenic material in small fungal fragments. [4,5]

• **Indices require context.** ERMI is a composite index. Individual species values can be informative, but no single line item should be treated as a stand-alone diagnosis of a building or a patient's illness. [2]

Why reports from the same building may differ

• **Sampling method and location matter.** Dust reservoir, collection location and technique can materially change the microbial profile and reduce comparability with the original ERMI reference approach. [2]

• **Carpet and settled dust preserve history.** A dust sample may reflect accumulated contamination rather than only what is currently airborne.

• **Laboratory testing does not replace a building assessment.** Moisture history, source identification, inspection findings and remediation quality remain essential. EPA describes ERMI as a research tool and does not recommend routine public use. [2,6]

Reading remediation history critically

• **Biocide use should prompt questions.** EPA does not recommend routine biocide use for mold cleanup and notes that dead mold may remain allergenic. Moisture correction and physical removal remain central. [3,7]

• **Fogging is not a substitute for physical cleaning.** CIRS-oriented IEP guidance distinguishes controlled misting used to aid particle removal from fogging used as a microbial-killing strategy. [8]

• **Post-remediation results need context.** Timing, sampling approach and residual settled dust can influence interpretation.

Framework-specific reference values

HERTSMI-2	**<11** lower re-entry risk; **11-15** borderline; **>15** higher risk within the Shoemaker CIRS framework. [9]
ERMI	Some Shoemaker-oriented post-remediation guidance uses **<2** as a target, with lower targets in selected highly sensitive patients. [10]

Important: These are framework-specific interpretation targets, not federal regulatory exposure limits or universally accepted health-based standards.

Three questions to ask when reviewing an environmental report

1. What was actually measured? Fungi, endotoxin, Actinobacteria, beta-glucans, or something else?	**2. How and where was it sampled?** Location, dust reservoir and collection method can change interpretation.	**3. Does it fit the building assessment?** Laboratory data should complement moisture history and qualified inspection.

Practical takeaway: Treat an environmental laboratory report as one component of the exposure assessment. Interpret the assay in light of what it actually measures, how the sample was collected, the building's moisture history, and the findings of a qualified indoor environmental professional.

References: [1] Shoemaker R, McMahon S, Heyman A, Dorninger E, Thacker A, Lark D. *Thirty years of published research on human health effects of exposure to the interior environment of water-damaged built environments.* Med Res Arch. 2025;13(8). doi:10.18103/mra.v13i8.6769. [2] U.S. EPA. Environmental Relative Moldiness Index (ERMI) and ERMI Fact Sheet. [3] U.S. EPA. Mold cleanup and biocide guidance. [4] Gorny RL, Reponen T, Willeke K, et al. Fungal fragments as indoor air biocontaminants. Appl Environ Microbiol. 2002;68(7):3522-3531. [5] Reponen T, Seo SC, Grimsley F, et al. Fungal fragments in moldy houses. Atmos Environ. 2007;41(37):8140-8149. doi:10.1016/j.atmosenv.2007.06.027. [6] U.S. EPA Office of Inspector General. Public May Be Making Indoor Mold Cleanup Decisions Based on EPA Tool Developed Only for Research Applications. 2013. [7] U.S. EPA. A Brief Guide to Mold, Moisture and Your Home. [8] Surviving Mold Indoor Environmental Professionals Panel. Consensus Statement on Remediation. 2020. [9] Surviving Mold. HERTSMI-2 Scoring System. [10] Weatherman G. A Condensed Remediation Plan for Small Microbial Particles; see also Shoemaker CIRS Step 1 guidance.

Prepared by Emil Haldey, PharmD | Shoemaker Proficiency Partner Diplomate | DetoxME.life

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