MOSAIC DIAGNOSTICS

MDX SCIENCE SNAPSHOT:
Mycotoxin Testing in Urine vs. Serum

When it comes to detecting mycotoxin exposure, not all testing methods are created equal. Urine LC-MS/MS testing is the most accurate and scientifically validated method for assessing internal mycotoxin burden, as it directly measures the toxins actively excreted by the body. In contrast, serum ELISA antibody tests detect only immune sensitization, indirect evidence that cannot confirm current or ongoing exposure, and they lack validation for exposure assessment. LC-MS/MS aligns with internationally recognized best practices in human biomonitoring, making it the clear standard for clinical mycotoxin testing.

Mycotoxin Exposure

Mycotoxin exposure - whether through ingestion of contaminated staple foods, inhalation of mold spores, or dermal contact - is a global public health concern, with clinical awareness of its impact continuing to grow, particularly within functional and environmental medicine.

Patients with complex, chronic symptoms often note histories of regular intake of foods prone to mycotoxin presence and/or environmental exposure from water-damaged buildings or mold. **Clinically, mycotoxin exposure has been associated with carcinogenic, nephrotoxic, hepatotoxic, immunomodulatory, and neurotoxic effects.**

The utility of mycotoxin testing depends on both the analytical method and its biological relevance. This snapshot contrasts **urine LC-MS/MS testing with serum ELISA antibody** assays, outlining their respective strengths, limitations, and implications for clinical practice.

Urine LC-MS/MS Testing for Mycotoxins

Overview

Liquid chromatography–tandem mass spectrometry (LC-MS/MS) directly detects and quantifies mycotoxins in urine. Unlike antibody-based tests, LC-MS/MS measures the actual chemical compounds present, providing a snapshot of **current or recent internal exposure. This method is the preferred standard for dietary exposure assessment in population biomonitoring and is used by the following public health organizations/ associations**

CDC · efsa · World Health Organization · HBM4EU science and policy for a healthy future

Scientific Strengths:

- **Direct measurement –** quantifies mycotoxins, not immune response markers
- **High sensitivity and specificity –** detects low-level current or recent exposure in pg/mL–ng/mL range
- **Higher multiplex capability –** simultaneous detection of multiple mycotoxins common in staple foods and indoor exposures
- **Alignment with public health programs –** used in NHANES, EFSA surveillance, and international biomonitoring initiatives
- **Creatinine correction –** adjusts for urine dilution, improving comparability in spot samples
- Useful for **confirming exposure**, tracking dietary or environmental interventions, and supporting targeted mitigation strategies

Limitations:

- Not FDA-cleared for diagnosis; interpretation should be integrated with patient history, dietary patterns, and environmental risk factors

Serum ELISA Antibody Testing for Mycotoxins

Overview

Serum ELISA assays measure IgG or IgE antibodies directed against mycotoxins, confirming that the immune system has been sensitized to these compounds at some point. However, these tests cannot distinguish between current and past exposure - particularly for IgG - or provide a quantitative measure of direct internal toxin burden. In the context of mycotoxins, IgE responses are poorly characterized in clinical research, and their association with specific human health outcomes remains uncertain.

Scientific Limitations:

- **Confirms sensitization only –** does not establish timing of exposure or internal toxin levels
- Cross-reactivity – ELISA antibody test can cross react with structurally similar but unrelated compounds, leading to false positive results
- **Immune suppression factor –** chronic exposure to mycotoxins may blunt antibody production, increasing false-negative risk
- **Lack of clinical validation –** no FDA clearance or peer-reviewed evidence linking antibody titers to specific health outcomes
- **No authoritative endorsement –** absent from CDC, EFSA, WHO, AAAAI, and EAACI recommendations for mycotoxin exposure assessment

Given these limitations, serum IgG/IgE testing is not considered a reliable method for determining current exposure, guiding detoxification protocols, or monitoring treatment response in clinical practice.

Conclusion: Urine LC- MS/ MS is the Preferred Method for Assessing Mycotoxin Exposure.

As the preferred method, LC-MS/MS directly and sensitively measures toxins excreted from the body, providing a scientifically validated reflection of internal burden. In contrast, serum ELISA antibody testing merely detects immune sensitization, not active exposure, and lacks both clinical validation and regulatory support for exposure assessment.

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