US BioTek LABORATORIES

16020 Linden Ave North
Shoreline, WA 98133
www.usbiotek.com

# Mycotoxin Building Profile Report Form
# 04/18/2024



COMPANY INFORMATION

**Company:** US BioTek
**Project:** Project Doe
**Location:** 999 Street St. Cityville, tx 99999
**Project Phone:** 19724920419
**Project Email:** NA

ORDER INFORMATION

**Accession No:** EN041824B
**Date of Service:** 04/18/2024
**Reported On:** 04/18/2024
**Contact:** Doctor USBioTek

SAMPLE INFORMATION

**Date of Receipt:** 04/18/2024
**Time of Receipt:** 20:18 CDT
**Date of Collection:** 2024-04-17
**Time of Collection:** 00:00:00 CDT
**Sample Type:** Dust

LAB INFORMATION

**Phone:** 1-972-492-0419
**Fax:** 1-972-243-7759
**Email:** info@realtimelab.com
**CLIA #:** 45D1051736
**CAP #:** 7210193
**Tax ID #:** 0669342

**PROCEDURE TYPE:** SEMI-QUANTITATIVE PROCEDURE BY ELISA

| List of Mycotoxins tested in the Panel |
|---|
| Ochratoxin A |
| Aflatoxin Group: (B1, B2, G1, G2) |
| Trichothecene Group (Macrocyclic): Roridin A, Roridin E, Roridin H, Roridin L-2, Verrucarin A, Verrucarin J, Satratoxin G, Satratoxin H, Isosatratoxin F |
| Gliotoxin Derivative |
| Zearalenone |

**RESULTS:**

| Code | Test | Specimen | Value | Result | Not Present if less than | Equivocal if between | Present if greater or equal |
|---|---|---|---|---|---|---|---|
| D8501 | Ochratoxin A | Dust | 0.04700 ppb | Not Detected | 1.8 ppb | 1.8-2 ppb | 2 ppb |
| D8502 | Aflatoxin Group: (B1, B2, G1, G2) | Dust | 0.17600 ppb | Not Detected | 0.8 ppb | 0.8-1 ppb | 1 ppb |
| D8503 | Trichothecene Group (Macrocyclic): Roridin A, Roridin E, Roridin H, Roridin L-2, Verrucarin A, Verrucarin J, Satratoxin G, Satratoxin H, Isosatratoxin F | Dust | 0.02200 ppb | Not Detected | 0.07 ppb | 0.07-0.09 ppb | 0.09 ppb |
| D8510 | Gliotoxin Derivative | Dust | 0.54300 ppb | Equivocal | 0.5 ppb | 0.5-1.0 ppb | 1 ppb |
| D8512 | Zearalenone | Dust | 0.26600 ppb | Not Detected | 0.5 ppb | 0.5-0.7 ppb | 0.7 ppb |

**REPORT COMMENTS:**
Dust

Director Signature

Director or Designee Signature _____

Tests such as this should be used only in conjunction with other medically established diagnostic elements (e.g.,symptoms, history, clinical impressions, results from other tests, etc). Physicians should use all the information available to them to diagnose and determine appropriate treatment for their patients.
Disclaimer: This test was developed and its performance characteristics determined by RealTime Lab. It has not been cleared or approved by the U.S. Food and Drug Administration. The FDA has determined that such clearance or approval is not necessary. This laboratory is certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA-88) as qualified to perform high complexity clinical laboratory testing.

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24 Fuchs, R. and M. Peraica, *Ochratoxin A in human kidney diseases.* Food Addit Contam, 2005. 22 Suppl 1: p. 53-7.
25 Yang, G.H., et al., *Apoptosis induction by the satratoxins and other trichothecene mycotoxins: relationship to ERK, p38 MAPK, and SAPK/JNK activation.* Toxicol Appl Pharmacol, 2000. 164(2): p. 149-60.
26 Johanning, E., et al., *Health and immunology study following exposure to toxigenic fungi (Stachybotrys chartarum) in a water-damaged office environment.* Int Arch Occup Environ Health, 1996. 68(4): p. 207-18.
27 Islam, Z., et al., *Purification and comparative neurotoxicity of the trichothecenes satratoxin G and roridin L2 from Stachybotrys chartarum.* J Toxicol Environ Health A, 2009. 72(20): p. 1242-51.
28 Jarvis, B.B., et al., *Study of toxin production by isolates of Stachybotrys chartarum and Memnoniella echinata isolated during a study of pulmonary hemosiderosis in infants.* Appl Environ Microbiol, 1998. 64(10): p. 3620-5.
29 Yike, I., T.G. Rand, and D.G. Dearborn, *Acute inflammatory responses to Stachybotrys chartarum in the lungs of infant rats: time course and possible mechanisms.* Toxicol Sci, 2005. 84(2): p. 408-17.
30 Lee, M.G., et al., *Effects of satratoxins and other macrocyclic trichothecenes on IL-2 production and viability of EL-4 thymoma cells.* J Toxicol Environ Health A, 1999. 57(7): p. 459-74.
31 Thrasher, J.D. and S. Crawley, *The biocontaminants and complexity of damp indoor spaces: more than what meets the eyes.* Toxicol Ind Health, 2009. 25(9-10): p. 583-615.
32 Nagase, M., et al., *Apoptosis induction by T-2 toxin: activation of caspase-9, caspase-3, and DFF-40/CAD through cytosolic release of cytochrome c in HL-60 cells.* Biosci Biotechnol Biochem, 2001. 65(8): p. 1741-7.
33 Wu, Q., et al., *Trichothecenes: immunomodulatory effects, mechanisms, and anti-cancer potential.* Arch Toxicol, 2017. 91(12): p. 3737-3785.
34 Schlam, D., et al., *Gliotoxin Suppresses Macrophage Immune Function by Subverting Phosphatidylinositol 3,4,5-Trisphosphate Homeostasis.* mBio, 2016. 7(2): p. e02242.
35 Xiao, W., et al., *Sputum signatures for invasive pulmonary aspergillosis in patients with underlying respiratory diseases (SPARED): study protocol for a prospective diagnostic trial.* BMC Infect Dis, 2018. 18(1): p. 271.
36 Kapoor, T., et al., *Forskolin, an Adenylcyclase/cAMP/CREB Signaling Activator Restoring Myelin-Associated Oligodendrocyte Destruction in Experimental Ethidium Bromide Model of Multiple Sclerosis.* Cells, 2022. 11(18).
37 Kowalska, K., D.E. Habrowska-Gorczynska, and A.W. Piastowska-Ciesielska, *Zearalenone as an endocrine disruptor in humans.* Environ Toxicol Pharmacol, 2016. 48: p. 141-149.
38 Yan, W.K., et al., *Zearalenone affects the growth of endometriosis via estrogen signaling and inflammatory pathways.* Ecotoxicol Environ Saf, 2022. 241: p. 113826.
39 Lo, E.K.K., et al., *Low dose of zearalenone elevated colon cancer cell growth through G protein-coupled estrogenic receptor.* Sci Rep, 2021. 11(1): p. 7403.
40 Kowalska, K., et al., *ERbeta and NFkappaB-Modulators of Zearalenone-Induced Oxidative Stress in Human Prostate Cancer Cells.* Toxins (Basel), 2020. 12(3).
41 Lee, R., et al., *Zearalenone Induces Apoptosis and Autophagy in a Spermatogonia Cell Line.* Toxins (Basel), 2022. 14(2).
42 Massart, F. and G. Saggese, *Oestrogenic mycotoxin exposures and precocious pubertal development.* Int J Androl, 2010. 33(2): p. 369-76.

| | Mycotoxin | Cellular Activity of Mycotoxin | Symptoms/Other | Association with a "Disease State" |
|---|---|---|---|---|
| **AFLATOXIN FAMILY**<br>**Organisms: *Aspergillus flavus, Aspergillus oryzae, Aspergillus fumigatus, Aspergillus parasiticus***<br>**Aflatoxins have been associated with liver cancer [2,3], cirrhosis [4,5], and other health issues** | | | | |
| 1 | Aflatoxin B1 | Binds DNA and proteins [6,7] | Shortness of breath [8], weight loss [10], most potent and highly carcinogenic. | Primarily attacks the liver, other organs include kidneys and lungs [11] |
| 2 | Aflatoxin B2 | Inhibits DNA and RNA replication [12] | Impaired fetal growth [13,14] | Affects the liver and kidneys [11] |
| 3 | Aflatoxin G1 | Cytotoxic, induces apoptosis in cells, DNA damage [1] | A flavus is a leading cause of invasive aspergillus in immunocompromised patients [15] | Cancer, neonatal jaundice [2,3,16] |
| 4 | Aflatoxin G2 | Cancer, neonatal jaundice [2,3,16] | Aflatoxicosis in humans and animals [15] | Malnutrition, lung cancer [2,3,16] |
| **OCHRATOXIN A**<br>**Organisms: *Aspergillus ochraceus, Aspergillus niger, Penicillium species*** | | | | |
| 5 | Ochratoxin A | Inhibits mitochondrial ATP, potent teratogen, and immune suppressor [17-19] | Fatigue, dermatitis, irritated bowel [20-22] | Kidney disease and cancer [23,24] |
| **MACROCYCLIC TRICHOTHECENES (Group D)**<br>**Organism: *Stachybotrys chartarum*** | | | | |
| 6 | Satratoxin G | DNA, RNA, and protein synthesis inhibition [25] | Fatigue [26] | Bleeding disorders, nervous system disorders [27,28] |
| 7 | Satratoxin H | Inhibits protein synthesis [25] | Fatigue [26] | Breathing issues [29] |
| 8 | Isosatratoxin F | Immunosuppression [30] | Weakened immune system [30] | |
| 9 | Roridin A | Immunosuppression [30] | Weakened immune system [30] | |
| 10 | Roridin E | DNA, RNA, and protein synthesis disruption [25,32] | Weakened immune system [30] | Lung and nasal olfactory problems [31] |
| 11 | Roridin H | Inhibits protein synthesis [25] | Weakened immune system [30] | |
| 12 | Roridin L-2 | Immunosuppression [30] | Weakened immune system [30] | |
| 13 | Verrucarin A | Immunosuppression [30] | | |
| 14 | Verrucarin J | Immunosuppression [30] | | |
| **GLIOTOXIN DERIVATIVE**<br>**Organisms: *Aspergillus fumigatus, Aspergillus terreus, Aspergillus niger, Aspergillus flavus*** | | | | |
| 15 | Gliotoxin | Attacks intracellular function in immune system [34] | Memory and breathing issues [35,36] | Immune dysfunction disorders [34] |
| **ZEARALENONE**<br>**Organisms: *Fusarium species*** | | | | |
| 16 | Zearalenone | Estrogen mimic [37,38] | Early puberty, low sperm counts, cancer [39-42] | Cancer [39,40] |

**REFERENCES:**


1 Zhang, Z., et al., *Cytochrome P450 2A13 is an efficient enzyme in metabolic activation of aflatoxin G1 in human bronchial epithelial cells.* Arch Toxicol, 2013. 87(9): p. 1697-707.
2 Wang, S.H., S.H. Yeh, and P.J. Chen, *Androgen Enhances Aflatoxin-induced Genotoxicity and Inflammation to Liver Cancer in Male Hepatitis B Patients.* Cell Mol Gastroenterol Hepatol, 2023. 15(2): p. 507-508.
3 Fan, J.H., et al., *Attributable causes of liver cancer mortality and incidence in china.* Asian Pac J Cancer Prev, 2013. 14(12): p. 7251-6.
4 Seitz, H.K. and F. Stickel, *Risk factors and mechanisms of hepatocarcinogenesis with special emphasis on alcohol and oxidative stress.* Biol Chem, 2006. 387(4): p. 349-60.
5 Chu, Y.J., et al., *Aflatoxin B(1) exposure increases the risk of cirrhosis and hepatocellular carcinoma in chronic hepatitis B virus carriers.* Int J Cancer, 2017. 141(4): p. 711-720.
6 Lin, Y.C., et al., *DNA polymerase zeta limits chromosomal damage and promotes cell survival following aflatoxin exposure.* Proc Natl Acad Sci U S A, 2016. 113(48): p. 13774-13779.
7 Poirier, M.C., *Chemical-induced DNA damage and human cancer risk.* Discov Med, 2012. 14(77): p. 283-8.
8 Le Pape, P., et al., *First case of Aspergillus calidoustus airway colonization in a Chronic Obstructive Pulmonary Disease patient.* Int J Infect Dis, 2019. 81: p. 85-90.
9 Hernandez-Martinez, R. and I. Navarro-Blasco, *Aflatoxin levels and exposure assessment of Spanish infant cereals.* Food Addit Contam Part B Surveill, 2010. 3(4): p. 275-88.
10 Melaram, R., *Environmental Risk Factors Implicated in Liver Disease: A Mini-Review.* Front Public Health, 2021. 9: p. 683719.
11 Pelkonen, O. and H. Raunio, *Metabolic activation of toxins: tissue-specific expression and metabolism in target organs.* Environ Health Perspect, 1997. 105 Suppl 4(Suppl 4): p. 767-74.
12 Madrigal-Santillán, E., et al., *Antigenotoxic studies of different substances to reduce the DNA damage induced by aflatoxin B(1) and ochratoxin A.* Toxins (Basel), 2010. 2(4): p. 738-57.
13 Tesfamariam, K., et al., *Chronic aflatoxin exposure during pregnancy is associated with lower fetal growth trajectories: a prospective cohort from the Butajira Nutrition, Mental Health, and Pregnancy (BUNMAP) Study in rural Ethiopia.* Am J Clin Nutr, 2022. 116(6): p. 1634-1641.
14 Smith, L.E., et al., *Aflatoxin Exposure During Pregnancy, Maternal Anemia, and Adverse Birth Outcomes.* Am J Trop Med Hyg, 2017. 96(4): p. 770-776.
15 Sugui, J.A., et al., *Aspergillus fumigatus and related species.* Cold Spring Harb Perspect Med, 2014. 5(2): p. a019786.
16 Raafat, N., et al., *Assessment of serum aflatoxin B(1) levels in neonatal jaundice with glucose-6-phosphate dehydrogenase deficiency: a preliminary study.* Mycotoxin Res, 2021. 37(1): p. 109-116.
17 Al-Anati, L. and E. Petzinger, *Immunotoxic activity of ochratoxin A.* J Vet Pharmacol Ther, 2006. 29(2): p. 79-90.
18 Tao, Y., et al., *Ochratoxin A: Toxicity, oxidative stress and metabolism.* Food Chem Toxicol, 2018. 112: p. 320-331.
19 Park, S., et al., *Ochratoxin A exerts neurotoxicity in human astrocytes through mitochondria-dependent apoptosis and intracellular calcium overload.* Toxicol Lett, 2019. 313: p. 42-49.
20 Wu, T.Y., et al., *Prevalence of Aspergillus-Derived Mycotoxins (Ochratoxin, Aflatoxin, and Gliotoxin) and Their Distribution in the Urinalysis of ME/CFS Patients.* Int J Environ Res Public Health, 2022. 19(4).
21 Akiyama, T., et al., *The human cathelicidin LL-37 host defense peptide upregulates tight junction-related proteins and increases human epidermal keratinocyte barrier function.* J Innate Immun, 2014. 6(6): p. 739-53.
22 Gao, Y., et al., *The Compromised Intestinal Barrier Induced by Mycotoxins.* Toxins (Basel), 2020. 12(10).
23 Clark, H.A. and S.M. Snedeker, *Ochratoxin a: its cancer risk and potential for exposure.* J Toxicol Environ Health B Crit Rev, 2006. 9(3): p. 265-96.