

Company:
Sex: M

Collected: 01/01/01

Patient:
Date of Birth: 01/01/0001

Received: 01/01/01

External ID:
Accession #: 000000123000

Completed: 01/01/01

Procedure Type: Semi-Quantitative ELISA (Enzyme-Linked Immunosorbent Assay)

Code	Test - Urine	Result	Value (ppb)	Reference Range
OCHRA	Ochratoxin A	Present	>70.000	<1.8 Not Present 1.8 to <2 Equivocal ≥2 Present
AFLA	Aflatoxin Group: (B1, B2, G1, G2)	Not Present	0.440	<0.8 Not Present 0.8 to <1 Equivocal ≥1 Present
TRICHO	Trichothecene Group (Macrocyclic): Roridin A, Roridin E, Roridin H, Roridin L-2, Verrucaric Acid, Verrucaric Acid, Satratoxin G, Satratoxin H, Isosatratoxin F	Present	0.248	<0.07 Not Present 0.07 to <0.09 Equivocal ≥0.09 Present
GLIO	Glutathione Derivative	Present	1.128	<0.5 Not Present 0.5 to <1 Equivocal ≥1 Present
ZEA	Zearalenone	Equivocal	0.522	<0.5 Not Present 0.5 to <0.7 Equivocal ≥0.7 Present

About These Tests:

Test results should be evaluated in relation to patient symptoms, clinical history, and other laboratory findings. Individuals should review their results with a healthcare provider.

These tests were developed and the performance characteristics determined by RealTime Laboratories.

They have not been cleared or approved by the U.S. Food and Drug Administration (FDA).

This laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA) as qualified to perform high complexity clinical laboratory testing.

The New York State (NYS) Department of Health (DOH) has allowed these tests to be offered in the NYS under the current RealTime Laboratories permit.

The NYS DOH has not evaluated any test claims nor reviewed the accuracy of these tests.

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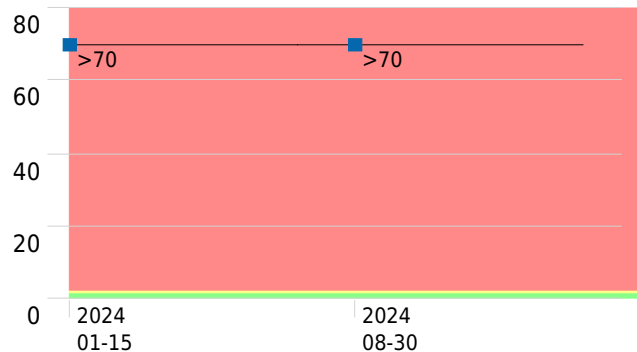
Collected: 01/01/01

Received: 01/01/01

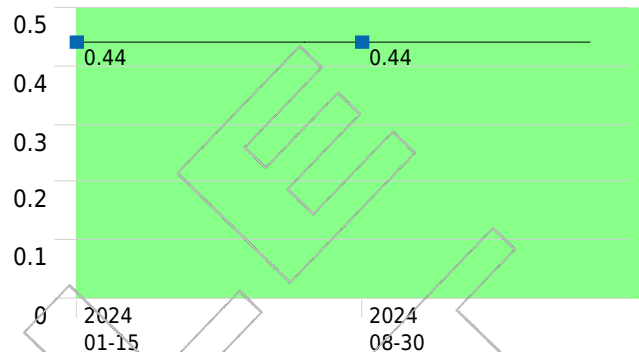
Completed: 01/01/01

Historical Results

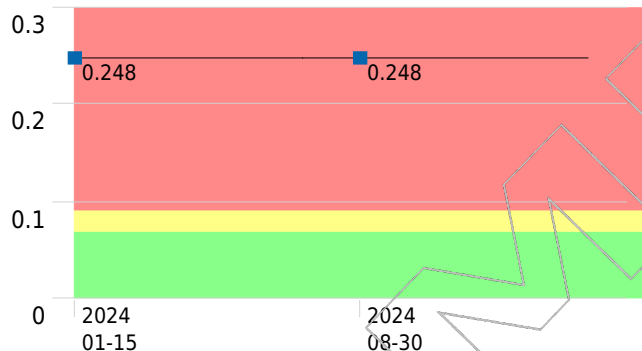
Ochratoxin



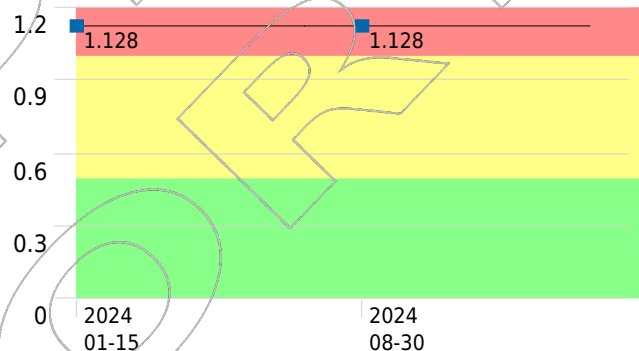
Aflatoxin



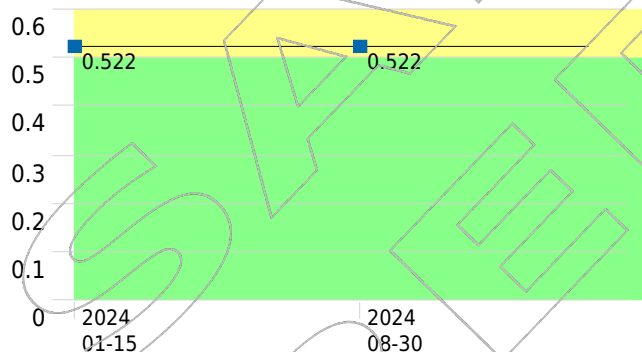
Trichothecene



Gliotoxin



Zearalenone



Accession	Collected	Ochratoxin	Aflatoxin	Trichothecene	Gliotoxin	Zearalenone
000000000000	1901-01-01	Present >70	Not Present 0.44	Present 0.248	Present 1.128	Equivocal 0.522
000000000000	1902-01-01	Present >70	Not Present 0.44	Present 0.248	Present 1.128	Equivocal 0.522

Mycotoxin		Cellular Activity of Mycotoxin	Symptoms/Other	Association with a "Disease State"
A FLATOXIN FAMILY				
Organisms: <i>Aspergillus flavus</i> , <i>Aspergillus oryzae</i> , <i>Aspergillus fumigatus</i> , <i>Aspergillus parasiticus</i> 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				
Organisms: <i>Aspergillus ochraceus</i> , <i>Aspergillus niger</i> , <i>Penicillium species</i>				
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]
MA CROCYCLIC TRICHOECENES (Group D)				
Organism: <i>Stachybotrys chartarum</i>				
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	Verrucaric A	Immunosuppression [30]		
14	Verrucaric J	Immunosuppression [30]		
GLIOTOXIN DERIVATIVE				
Organisms: <i>Aspergillus fumigatus</i> , <i>Aspergillus terreus</i> , <i>Aspergillus niger</i> , <i>Aspergillus flavus</i>				
15	Gliotoxin	Attacks intracellular function in immune system [34]	Memory and breathing issues [35,36]	Immune dysfunction disorders [34]
ZEARALENONE				
Organisms: <i>Fusarium species</i>				
16	Zearalenone	Estrogen mimic [37,38]	Early puberty, low sperm counts, cancer [39-42]	Cancer [39,40]

REFERENCES:

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Poirier, M.C., *Chemical-induced DNA damage and human cancer risk*. Discov Med, 2012. 14(77): p. 283-8.
- Le Pape, P., et al., *First case of Aspergillus caelatus airway colonization in a Chronic Obstructive Pulmonary Disease patient*. Int J Infect Dis, 2019. 81: p. 85-90.
- 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.
- Melaram, R., *Environmental Risk Factors Implicated in Liver Disease: A Mini-Review*. Front Public Health, 2021. 9: p. 683719.
- 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.
- Madrigal-Santillan, 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.
- 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.
- 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.
- Sugui, J.A., et al., *Aspergillus fumigatus and related species*. Cold Spring Harb Perspect Med, 2014. 5(2): p. a019786.
- 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.
- Al-Anati, L. and E. Petzinger, *Immunotoxic activity of ochratoxin A*. J Vet Pharmacol Ther, 2006. 29(2): p. 79-90.
- Tao, Y., et al., *Ochratoxin A: Toxicity, oxidative stress and metabolism*. Food Chem Toxicol, 2018. 112: p. 320-331.
- 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.
- 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): p. 149-60.
- 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.
- Gao, Y., et al., *The Compromised Intestinal Barrier Induced by Mycotoxins*. Toxins (Basel), 2020. 12(10): p. 149-60.
- 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.
- Fuchs, R. and M. Peraica, *Ochratoxin A in human kidney diseases*. Food Addit Contam, 2005. 22 Suppl 1: p. 53-7.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Wu, Q., et al., *Trichothecenes: immunomodulatory effects, mechanisms, and anti-cancer potential*. Arch Toxicol, 2017. 91(12): p. 3737-3785.
- Schlamm, D., et al., *Gliotoxin Suppresses Macrophage Immune Function by Subverting Phosphatidylinositol 3,4,5-Trisphosphate Homeostasis*. mBio, 2016. 7(2): p. e02242.
- 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.
- 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): p. 149-60.
- Kowalska, K., D.E. Habrowska-Gorczyńska, and A.W. Piastowska-Ciesielska, *Zearalenone as an endocrine disruptor in humans*. Environ Toxicol Pharmacol, 2016. 48: p. 141-149.
- Yan, W.K., et al., *Zearalenone affects the growth of endometriosis via estrogen signaling and inflammatory pathways*. Ecotoxicol Environ Saf, 2022. 241: p. 113826.
- 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.
- Kowalska, K., et al., *ERbeta and NFKappaB-Modulators of Zearalenone-Induced Oxidative Stress in Human Prostate Cancer Cells*. Toxins (Basel), 2020. 12(3): p. 149-60.
- Lee, R., et al., *Zearalenone Induces Apoptosis and Autophagy in a Spermatogonia Cell Line*. Toxins (Basel), 2022. 14(2): p. 149-60.
- Massart, F. and G. Saggese, *Oestrogenic mycotoxin exposures and precocious pubertal development*. Int J Androl, 2010. 33(2): p. 369-76.

SYMPTOMS OF Mycotoxins

