

1 **Are You Missing Mold Illness?**

- By proceeding, the viewer agrees that the contents of this site, such as text, graphics, images, video, and other material contained on the Dr. Crista site are for informational purposes only.
- Dr. Jill Crista does not provide medical advice, diagnosis or treatment. The content is not intended to be a substitute for professional medical advice, diagnosis, or treatment.
- Always seek the advice of your physician or other qualified health provider with any questions you may have regarding your medical condition. Never disregard professional medical advice or delay in seeking it because of something you have read on the Dr. Crista site.
- If you think you may have a medical emergency, call your doctor or 911 immediately.
- Dr. Jill does not recommend or endorse any specific tests, physicians, products, procedures, opinions, or other information that may be mentioned on the site.
- Reliance on any information provided by Dr. Jill, Dr. Jill's employees, others appearing on the site at the invitation of Dr. Jill, or other visitors to the site is solely at your own risk.

2 **The Testing Conundrum**

- Are You Missing Mold Illness In Your Patients?
- Dr. Jill Crista

3 **Testing Conundrum**

- Diagnostic Assessments
- Mycotoxin Discussion
- Shoemaker Panel Highlights
- Colonization, Allergy, Infection
- Advances In Imaging

4 **Diagnostic Assessments**

5 **Conundrum ~ Which? When? Reliability?**

- Decision points ~
- Info req'd to guide tx
- Baseline
- Pt request
- Buy-in ~ pt/fam
- "Proof" ~ Ins/occup/landlord

- Comfort w existing models
- Accuracy
- Cost
- Reassess tx progress
-

6 **Diagnostics ~ Tier 1**

- Tier 1 purpose - is it mold?
- DIRECT
- Urine mycotoxin - LC/MS
- Comprehensive stool test
- INDIRECT+HIGH CORRELATION
- Visual Contrast Sensitivity (VCS)
- Serum mycotoxin antibody
- Urine mycotoxin - ELISA
- Organic acids test
- NK cell function (diff than total)
Lytic units, <7 abn
Quest
- NK cell total (freq normal)

7

- 2,4,5 ~ Aspergillus
- 4,5 ~ Colonization
- 6 ~ Aspergillus & Candida
- 9 ~ Fusarium

8

- VCStest.com *calibrate screen first!* Technically pass/fail but the higher the score the better.
- The maximum biotoxin score is 18 in each eye and 36 for both eyes.
- Columns A, B, - green is good, red means lack of ability to see the contrast (nutritional, glyphosate, SIBO)

- Columns C, D - blue is good (mold/biotoxin illness, insect venom, cyanobacteria, dinoflagellates-esp Pfiesteria and Ciguatera, Lyme+coinfections, parasites, tobacco use*, some VOCs)
- Column E - green is good (biotoxin, metals, tobacco use*, alcohol, lead, VOCs, age, low socioeconomic status)
- Columns D, E - worse with Herx, detox

9 

- 2,4,5 ~ Aspergillus
- 4,5 ~ Colonization
- 6 ~ Aspergillus & Candida
- 9 ~ Fusarium

10 

- 2,4,5 ~ Aspergillus
- 4,5 ~ Colonization
- 6 ~ Aspergillus & Candida
- 9 ~ Fusarium

11 

- 2,4,5 ~ Aspergillus
- 4,5 ~ Colonization
- 6 ~ Aspergillus & Candida
- 9 ~ Fusarium

12 

- 2,4,5 ~ Aspergillus
- 4,5 ~ Colonization
- 6 ~ Aspergillus & Candida
- 9 ~ Fusarium

13 

- 19, 20, 21 ~ Incr oxalate metabolites - yeast, mold, food
-

14 

- 58 ~ Glutathione status
- 59 ~ Methylation ability
-

15 Diagnostics ~ Tier 2

- Tier 2 purpose - how bad is it?
- CBC
 - Fe-def anemia
 - ↓WBC~relative↓lymph↑neutr↑eos
- CMP
 - ↑ALT, AST, GGT(↓GSH), ↑bilirubin, ↓GFR, ↓albumin, creatinine>1.0
- Vit D (25-OH)↓
- Vit D (1,25)↑ (↓Intracellular GSH?)
- hs-CRP↑
- RBC glutathione↓
- Urinalysis
 - +blood, yellow-brown/yellow-green(bili), (-)leuko, ↑urobilinogen

16 Diagnostics ~ Tier 2

- IgE mold + IgG/M/A candida
 - *not useful for mycotoxins
- IgG/IgA total & subclasses
 - IgG subclass III def
 - potent pro-inflam aby
 - first to respond to viral infxn
 - gliotoxin (disulfide bonds)
- Lymphocyte Subset Panel
 - T- and B-cell total↓
- IL-6↑ → IL-10↑, TNF↑
- ANA↑
- BDG (Fungitell) Quant*↑
- Galactomannan*↑

17 Diagnostics ~ Tier 2

- Food allergy
IgG/IgA (yeasts, peanuts, coffee, mushrooms, corn, potatoes, grains)
- Kidney health
microalbumin/creatinine ratio >30
combo w creatinine >1 = concern
- ADH <1
- Copeptin 4-14
- EKG
2nd-degree AV block, atrial brady, supraventricular extrasystole, ventricular extrasystole
- Genetic mold canary
HLA DR/DQ
DRB1, DQB1, DRB3-5
Detoxification snps

18 Diagnostics ~ Tier 3

- Tier 3 purpose ~ clarification
- Shoemaker labs (next section)
- SIBO breath test
- Ferritin & clotting ~ mixed results
- Venous blood gasses (no tourniquet!)
- MCAS labs
Mayo ~ Urine 24-hr
MUST be chilled to certain temp asap
-Methylhistamine or MIA
-PGD-2
-17-Beta-PGF-2-alpha
Diff to get right, pre-arrange w lab
Not all have this capacity
First r/o mastocytosis w tryptase

19 Diagnostics ~ Differentials

- B12 & MMA (B-12 def)

- Lyme & co-infections*
- Lung CA/Mesothelioma
- GI ~ UC/Crohn's
- Liver/kidney CA
- Other autoimmune dzs
 - Celiac
 - SLE
 - Scleroderma
 - Sjogren's
- MCAS
- Alzheimer's, Parkinson's
- Glaucoma ~ eye exam
- Alcoholism

20 **STORY | Not An Alcoholic**

- Man late 50s
- Dr suspects alcoholism
- Hi GGT, AST/ALT on the rise
- BS on the rise, chol dropping 115
- Onset RUQ pain
- Episodes N/V
- Obese, pre-diabetic
- Worsening lethargy
- No alcohol ingestion, verified by wife
- Wife says lazy after kids moved out & got his man-cave
- Close door & use window air conditioner "always hot"
- Cool sanctuary, often falls asleep at his desk
- Window air conditioner was full of mold
- Mycotoxins mimicked alcohol
-

• * * *

21 **Mycotoxin Discussion**

22 **The Path of the Mycotoxin**

- In WDB exposure ~
Inspiration
Absorption - sinus mucosa to lung alveoli
Carried via blood
Liver & Kidney
Kidney - filtration
Liver - bound to bile and delivered to lumen
Left-over absorbed into lipid-rich tissue for later mgmt
- Why test urine?
Filtrate of blood
- Why test serum?
Blood & serum antibody reactions
- Note 1: Ingested mycotoxins may remain unbound in lumen
- Note 2: No data on mycotoxin secretion in sweat

23 **Mycotoxin Detection Methods**

- The question is not which - it's if, when and how
- Methods currently in use in US ~
Urine ELISA (enzyme-linked immunosorbent assay)
Urine LC-MS (liquid chromatography with mass spectrometry)
Serum antibody (IgE, IgG)
- Considerations ~
Which mycotoxins are tested?
Pt's immune status
Pt's liver & kidney health
Pt's supplementation
Cost, coverage
Compare to previous test
Practitioner comfort
Lab - certifications, ongoing independent validations, and willingness to share validation results

- PMID 32121036

24 **Mycotoxin Controversy**

- Mostly driven by insurance companies
- Source ~
 - Food - studies are mixed
 - Fat stores
 - Lifestyle - ie: smoking, coffee, alcohol
 - Certainly not WDBs
- Except, levels have been shown to decrease with removal from WDB
- Inducible ~
Independent case study
Urinary mycotoxins ↑10 fold, 4-6 hrs after sauna tx
Courtesy Dr. Joseph Brewer
- PMID: 28240164

25 **Urine Mycotoxin Split Sample**

- "Members of three fungal genera, *Aspergillus*, *Fusarium*, and *Penicillium*, are the major mycotoxin producers [in food].
- While over 300 mycotoxins have been identified, six (aflatoxins, trichothecenes, zearalenone, fumonisins, ochratoxins, and patulin) are regularly found in food, posing unpredictable and ongoing food safety problems worldwide.
- In addition to concerns over adverse effects from direct consumption of mycotoxin-contaminated foods and feeds, there is also public health concern over the potential ingestion of animal-derived food products, such as meat, milk, or eggs, containing residues or metabolites of mycotoxins."

26 **Urine Mycotoxin Split Sample**

- "Members of three fungal genera, *Aspergillus*, *Fusarium*, and *Penicillium*, are the major mycotoxin producers [in food].

- While over 300 mycotoxins have been identified, six (aflatoxins, trichothecenes, zearalenone, fumonisins, ochratoxins, and patulin) are regularly found in food, posing unpredictable and ongoing food safety problems worldwide.
- In addition to concerns over adverse effects from direct consumption of mycotoxin-contaminated foods and feeds, there is also public health concern over the potential ingestion of animal-derived food products, such as meat, milk, or eggs, containing residues or metabolites of mycotoxins."

27 Mycotoxin Study

- Sample ~
Urine, sputum, tissue biopsy (lung/liver/brain)
- Mycotoxins tested ~
Aflatoxin, Ochratoxin, Trichothecenes, Gliotoxin
- Findings ~
Normal controls ~ no detectable mycotoxins in tissues or fluids
WDB pts ~ detectable mycotoxins, varying degrees in tissues and fluids
- Why urine?
Adequate and reliable method to detect mycotoxins (though may underreport trichothecenes)
Least invasive
Lowest cost
- Study limitation - author's possible conflict of interest
- PMID: 19468319

28 Urine Mycotoxin Split Sample

- "This study was conducted to investigate mycotoxin exposure in 260 rural residents (age 18-66 years; mean age 36.9 years, average BMI was 23.0kg/m²) in Nanjing, China. All participants were healthy and free from chronic diseases.
- Paired plasma and first morning urine samples were analyzed for 26 mycotoxin biomarkers, including 12 parent mycotoxins and 14 mycotoxin metabolites, by an ultra-high-performance liquid chromatography tandem mass spectrometry (UHPLC-MS/MS) method.
- Individuals with previous medical records indicating liver, kidney or other metabolic problems were excluded from this study. "

29 Urine Mycotoxin Split Sample

- "In the plasma samples, [95 out of 260] 36.5% of samples were found to contain mycotoxins.
- OTA was the most prevalent one (incidence of 27.7%) and its concentration ranged from 0.312 to 9.18mg/L.

- AFB1-lysine, FB1, DON, ZEN and ZAN were also detected in plasma with incidences of 19.6%, 2.7%, 2.3%, 6.5% and 1.2%, respectively."

30 Urine Mycotoxin Split Sample

- "In the urine samples, one or more mycotoxins were detected in 144 out of 260 (55.4%) participants.
- DON-15-GlcA (incidence of 43.8%), a urinary metabolite of DON, was the most abundant mycotoxin in urine samples; its concentration ranged from 0.828 to 37.7mg/L (0.694e37.3mg/g Cr).
- AFM1, OTA, FB1, T-2, DON, DON-3-GlcA, ZEN and ZAN were detected in 10.4%, 1.2%, 3.1%, 2.3%, 10.0%, 15.8%, 6.9% and 7.7% of the urine samples, respectively.

31 Does Gender Matter?

- "42.7% were female and 57.3% were male. There was no significant difference in age and BMI between males and females ($p > 0.05$).
- The incidence and concentration of mycotoxins in males and females were slightly different.
- Compared to females, males presented higher levels of plasma FB1, plasma DON, urinary T-2, urinary DON-3-GlcA, urinary DON-15-GlcA, and urinary ZEN,
- but lower levels of plasma AFB1-lysine, plasma ZEN, urinary OTA, urinary DON and urinary ZAN.
- However, the differences of the mean mycotoxin concentrations between male and female were not significant ($p > 0.05$)."

32 Urine ELISA Mycotoxin

- Established use for 15 years
- Indirect measure
- The idea - due to the body's ability to modify mycotoxins, antigen detection vs molecular matching will catch more metabolites and give a better view of body burden
- Strengths ~
 - Detect both the mycotoxin in pure form and metabolites of mycotoxins due to common antigens on most modified forms
 - Levels correlate to symptoms in majority of my patients ("bell-curve")

- Challenges ~
 - Not controlled for creatinine
 - Antigen selection by lab
 - Non-specific reactions (aka background noise) w poss false-positives
 - Varying accuracy for pts w issues detoxing and excreting
 - Doesn't help answer the question of whether currently being exposed
 - Unknown degree of contamination via ingestion

33 **Urine LC-Mass Spect Mycotoxin**

- Gold standard for small molecules
- Direct measure
- The idea - molecular identification as direct detection of the presence in the urine
- Strengths ~
 - Controlled for creatinine
 - Specific metabolites of mycotoxins can be tested and reported as an individual finding, then grouped for a bigger picture
 - Levels correlate to symptoms in majority of my patients ("bell-curve")
- Challenges ~
 - Some of the molecules are similar in structure, peak together, leading to possible cross-reporting
 - May miss metabolites if not specifically identified as a structure to monitor
 - Extraction method to prep sample varies
 - Varying accuracy for pts w issues detoxing and excreting
 - Doesn't help answer the question of whether currently being exposed
 - Unknown degree of contamination via ingestion

34 **Serum Mycotoxin Antibody**

- New kid on the block commercially
- Indirect measure
- The idea - the mere presence of a mycotoxin not as important as knowing what the body thinks about it

- Strengths ~
 - Not an excretion test
 - Detection of metabolites of mycotoxins that share common antigens
 - IgE helps to answer whether it's a current exposure
- Challenges ~
 - Antigen selection by lab
 - May miss metabolites if antigens have been modified
 - Immune status of the pt
 - IgG remains positive for up to 6 months
 - Unknown degree of contamination via ingestion

35 **Urine Mycotoxin Split Sample**

- “Three extraction methods, namely salting-out liquid–liquid extraction (SALLE), miniQuEChERS (quick, easy, cheap, effective, rugged, and safe), and dispersive liquid–liquid microextraction (DLLME), were evaluated and compared based on analytical parameters for the quantitative LC-MS/MS measurement of 11 mycotoxins (AFB1, AFB2, AFG1, AFG2, OTA, ZEA, BEA, EN A, EN B, EN A1 and EN B1) in human urine.
- DLLME was selected as the most appropriate methodology, as it produced better validation results for recovery (79–113%), reproducibility (RSDs < 12%), and repeatability (RSDs < 15%)

36 **Random Urine Adequate?**

-
- Comparison study, in-house
- LC-MS method
- Creatinine controlled
- 3 variations ~
 - First-morning, 6 hour, 24 hour
- Results ~
 - Positives remained positive
 - Negatives remained negative
 - Values not necessarily the same, varied by mycotoxin

37 **Split Sample - Mass Spect vs ELISA**

38 **Split Sample - Mass Spect vs ELISA**

39 **Questions Raised**

- Controlling for creatinine ~
Does this explain the differences in OTA results?
To what degree does creatine supp affect creatinine clearance?
- Sweating/exercise ~
Was twin 2 more detoxed bc of exercise?
Are the results of mass spect falsely lower bc of "detox bolus" the night before when worked out?...OR...
- Glutathione administration ~
Falsely lower the mass spect results?
- Is the bigger issue "normal ranges"? How are these determined?
ie: OTA 1.10 (1.8-2.0) vs 9.19 (1.2-5.0)
ie: OTA 1.51 (1.8-2.0) vs 5.27 (1.2-5.0)
- Is there such a thing as a test with all zeros?
(answer - YES!)

40 **Split Sample - Baseline Twin 1**

41 **Split Sample - Mass Spect Methods**

42 **Split Sample - Mass Spect Methods**

43 **Split Sample - Mass Spect Methods**

44 **Building Test Results**

-
-
- ALL CLEAR currently!
-
- But had moved 4 mo prior from place with Fusarium in HVAC.

45 **Split Sample - Baseline Twin 2**

46 **Split Sample - Mass Spect Methods**

47 **Split Sample - Mass Spect Methods**

48 **Split Sample - Mass Spect Methods**

49 **Building Test Results**

-
- Fusarium in HVAC

-
- Asp/Pen in flooring around bathroom shower

50 **More Questions Raised**

- MPA ~
Not only from Pen. Also from Asp. Reporting on both labs confusing linkage to only Pen.
Why high on one but not the other?
What is the population norm for MPA?
- Is second method catching more because of expanded metabolites?

51 **Urine Mycotoxin Split Sample**

52 **Questions Raised**

- To what degree does Candida overgrowth alter urine mycotoxin labs?
- Gliotoxin also formed from Candida
- Are Candida/Rhodotorula cause or protective effect of mold exposure?
- Which mycotoxins are detoxed with which natural remedies?

53 **Mycotoxin Negative but Mold-Sick**

- Not testing all mycotoxins
- Confounding factors before sample~
Random urine
Exercise
Sauna
Glutathione admin
Acute viral challenge
- Exposure duration too limited
- Intimate contact/parental toxification


54 **Glutathione Pre-Assessment**

55 **Urine Mycotoxin Pre-Testing Guidelines**

- 2 days minimum before test ~
Avoid ingestion of mold/mycotoxin containing foods, bevs, supps, meds
Avoid binders
To provoke or not? If so, how?

- Do not fast more than physiological
- Morning of test ~
 - Collect first-morning's urine
 - Avoid food/water prior
 - Avoid exercise
 - Avoid intercourse
 - Avoid sauna and hot shower

56  **Serum Mycotoxin Antibody**

57  **Serum Mycotoxin - Urine Mycotoxin LC-MS**

58  **Serum Mycotoxin Antibody**

59  **Serum Mycotoxin Antibody**

60  **Serum Mycotoxin Antibody**

- "HPLC-MS/MS detection was used for the analysis of dried serum spots (DSS) and dried blood spots (DBS).
- Detection of aflatoxins (AFB1, AFB2, AFG1, AFG2, AFM1), trichothecenes (deoxynivalenol, DON; DON-3-glucuronic acid, DON-3-GlcA; T-2; HT-2; and HT-2-4-GlcA), fumonisin B1 (FB1), ochratoxins (OTA and its thermal degradation product 2'R-OTA; OT α ; 10- hydroxyochratoxin A, 10-OH-OTA), citrinin (CIT and its urinary metabolite dihydrocitrinone, DH-CIT), zearalenone and zearalanone (ZEN, ZAN), altenuene (ALT), alternariols (AOH; alternariol monomethyl ether, AME), enniatins (EnA, EnA1, EnB, EnB1) and beauvericin (Bea) was validated for two matrices, serum (DSS), and whole blood (DBS).

61  **Serum Mycotoxin Antibody**

- "HPLC-MS/MS detection was used for the analysis of dried serum spots (DSS) and dried blood spots (DBS).
- Detection of aflatoxins (AFB1, AFB2, AFG1, AFG2, AFM1), trichothecenes (deoxynivalenol, DON; DON-3-glucuronic acid, DON-3-GlcA; T-2; HT-2; and HT-2-4-GlcA), fumonisin B1 (FB1), ochratoxins (OTA and its thermal degradation product 2'R-OTA; OT α ; 10- hydroxyochratoxin A, 10-OH-OTA), citrinin (CIT and its urinary metabolite dihydrocitrinone, DH-CIT), zearalenone and zearalanone (ZEN, ZAN), altenuene (ALT), alternariols (AOH; alternariol monomethyl ether, AME), enniatins (EnA, EnA1, EnB, EnB1) and beauvericin (Bea) was validated for two matrices, serum (DSS), and whole blood (DBS).

62  **Serum Mycotoxin Antibody**

- For most analytes, LOQs (limit of quantitation) in the lower pg/mL range and excellent recovery rate were achieved using matrix-matched calibration.
- Besides validation of the method, the analyte stability in DBS and DSS was also investigated. Stability is a main issue for some analytes when the dried samples are stored under common conditions at room temperature.
- This methodical study establishes a validated multi-mycotoxin approach for the detection of 27 mycotoxins and metabolites in dried blood/serum spots based on a fast sample preparation followed by sensitive HPLC-MS/MS analysis.

63 Serum Mycotoxin Antibody

- The use of capillary blood from finger-pricks versus venous blood was evaluated. The analyte levels correlate indicating that the less invasive finger-prick sampling gives also reliable results.
- No significant hematocrit effect was observed.
- In this experiment, finger-prick samples typically consist of about 90 μ L blood. Therefore spots of 75, 100 and 125 μ L blood were prepared and analyzed. Similar to the hematocrit effect, no considerable influence was observed.

64 Serum Mycotoxin Antibody

- "The results of this study revealed for the first time a high exposure of coffee consumers to 2'R-OTA, a compound formed from OTA during coffee roasting.
- Since little information is available regarding toxicity and possible carcinogenicity of this compound, further OTA monitoring in blood including 2'R-OTA is advisable."

65 Mycotoxin Testing - Yes? No? How?

- Above all, be mindful of cost ~
If you know it's mold, skip the test and tx
And/or consider methods validated/ins coverage ie: Neuroquant
- ELISA Urine ~
Immune deficient, able to detox, body burden, track tx
- LC-MS Urine ~
Immune deficient, able to detox, body burden, track tx, liv/kidney creatinine clearance
- Serum antibody ~
Excretion/detox-challenged, liv/kidney dz, IgE - is it a "now" issue?
- Be mindful of supplement use ~
Binders, glutathione, creatine
- To provoke or not? Depends more on your pt than agent

- OR...maybe use a clinical questionnaire

66 Shoemaker Highlights

67 Shoemaker ~ Diagnostic Indicators

- Visual Contrast Test at VCStest.com
Convergence disorder
L/R eye visual processing in brain+eye m impairment
- TGF- β 1 (transforming growth factor beta-1) \uparrow
Cytokine
 \uparrow impairs T-reg fxn \rightarrow immune overactivation/asthma
Range <2380 pg/ml
(Quest \rightarrow Cambridge Biomedical)
- MMP-9 (matrix metalloproteinase 9) \uparrow
Tissue repair enzyme induces I/S stim
Range ~ 85-332 ng/ml
Drs. Patel/Farshchian - link to MCAS
(Labcorp)

68 Shoemaker ~ Diagnostic Indicators

- ADH (vasopressin) \downarrow
Range ~ 1.0-13.3 pg/ml;
Test in conjunction with blood osmolality ~ 280-300 mosmol
- VIP (vasoactive intestinal polypeptide) \downarrow
Neuro and cardio-reg hormone with receptors in the hypothalamus
Range 23-63 pg/ml
- MSH (melanocyte stim hormone) \downarrow
Pituitary hormone w neurohormonal and anti-inflammatory actions
Range 35-81 pg/ml

69 Colonization, Allergy, Infection

70 Culture Nares

- 2" depth
- Pediatric swab
- Off all nasal tx for 3 days

- +MRSA/+MARCoNS common
- Consider false neg if positive urine mycotoxins
- Specific lab (MARCoNS)
-

71 Colonization

- Posterior Nasal Culture
 - Req posterior nasal wash
 - Fungus tenaciously adhered
 - Consider false neg if positive urine mycotoxins
 - PCR/DNA better yield
 - +MARCoNS
- Ophthalmology
 - Freq changing vision w sinus colonies (empirical exper)
- BDG (Fungitell) Quantitative (<60 pg/mL)
 - (1,3)-Beta-D-glucan
 - Invasive Fungal Infection (IFI)
 - Note: not present in Mucorales, Cryptococcus, Blastomyces
 - Note: false + if taking Beta-lactam antibiotic
- Galactomannan - (<0.5 index)
 - Less sensitive than BDG (81% vs 49%)
 - Charting tx of known Aspergillosis
 - BDG option if on Beta-lactams

72 Allergy

- Skin Testing
 - RAST limitations
 - Update ~ Intradermal Provocation Neutralization
 - Training req'd
 - Caution: ↑ potential of harm
 - Off all antihistamines* incl supp

73 Infection

- Swab
 - Oral, vaginal/groin, perianal, intertrigo

- Tissue sample
Skin, scalp, toenail
- Biopsy/culture
Culture
Tissue biopsy (sinus, lung) Varying yields
Flexible laryngoscopy ~ sinus
Transthoracic CT ~ fine needle aspirate lung nodules

74 **Advances In Imaging**

75 **Imaging**

- Sinus
 - X-ray
 - CT
- Chest
 - XRay
(may not be abn in pulm fibrosis→CT)
 - High-res CT
 - Fiberoptic bronchoscopy

76 **Imaging**

- Abdomen
 - Upper endoscopy
 - Colonoscopy
- Brain
 - MRI NeuroQuant
 - SPECT - volumetric

77 **First 3 Rules of Toxic Exposure**

78 **Review**

- Diagnostic Assessments
- Mycotoxin Discussion

- Shoemaker Panel Highlights
- Colonization, Allergy, Infection
- Advances In Imaging

79  **Thank You**

-
-
-
- Dr. Jill Crista
- Naturopathic Doctor
- support@drchrista.com