

# It Might Be Mold, Now What?

**Ann Shippy, MD, ABIM, CIFMP**

Board Certified Internal Medicine

Certified Functional Medicine

[AnnShippyMD.com](http://AnnShippyMD.com)

Ann Shippy MD

EVERY LIFE WELL.

# 14-year-old Boy with Severe Facial Contortion

## Cytochrome P-450

Result	Gene
✓	CYP1A1 *
●	CYP1B1 *
●	CYP2A6
✓	CYP2C9 *
●	CYP2C19 *
✓	CYP2D6
✓	CYP3A4 *

## Methylation

Result	Gene	SNP Location	Affects
++	COMT	V158M	Liver/Gut

## Acetylation (N-acetyltransferase)

### SLOW METABOLIZER POLYMORPHISM

Result	Gene	SNP Location	Affects
--	NAT1	R64W	All Cells
--	NAT1	R187Q	Liver/Gut
++	NAT2	I114T	Liver/Gut
--	NAT2	R197Q	Liver/Gut
--	NAT2	G286E	Liver/Gut
--	NAT2	R64Q	Liver/Gut

### FAST METABOLIZER POLYMORPHISM

+ -	NAT2	K268R	Liver/Gut
-----	------	-------	-----------

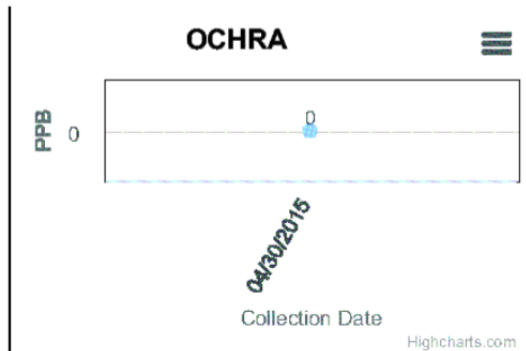
## Glutathione Conjugation (Glutathione s-transferase)

Result	Gene	Location	Affects
ABSENT	GSTM1	1p13.3	Liver/Kidney
++	GSTP1	I105V	Brain/Skin
++	GSTP1	A114V	Brain/Skin

Ochratoxin A - Procedure by ELISA  
 Aflatoxin Group - Procedure by ELISA  
 Trichothecene Group - Procedure by ELISA

Results:

Code	Test	Specimen	Value	Result	Negative if less than	Equivocal if between	Positive if greater or equal
E8501	Ochratoxin A	Urine	0 ppb	Negative	1.8 ppb	1.8-2.0 ppb	2.0 ppb
E8502	Aflatoxin Group	Urine	0 ppb	Negative	0.8 ppb	0.8-1.0 ppb	1.0 ppb
E8503	Trichothecene Group	Urine	0.05 ppb	Negative	0.18 ppb	0.18-0.2 ppb	0.2 ppb



requestId	Collection Date	Ochra Result	Afla Result	Tricho Result
<a href="#">148090</a>	04/30/2015	0 - Negative	0 - Negative	0.05 - Negative

Ochratoxin A - Procedure by ELISA  
 Aflatoxin Group - Procedure by ELISA  
 Trichothecene Group - Procedure by ELISA

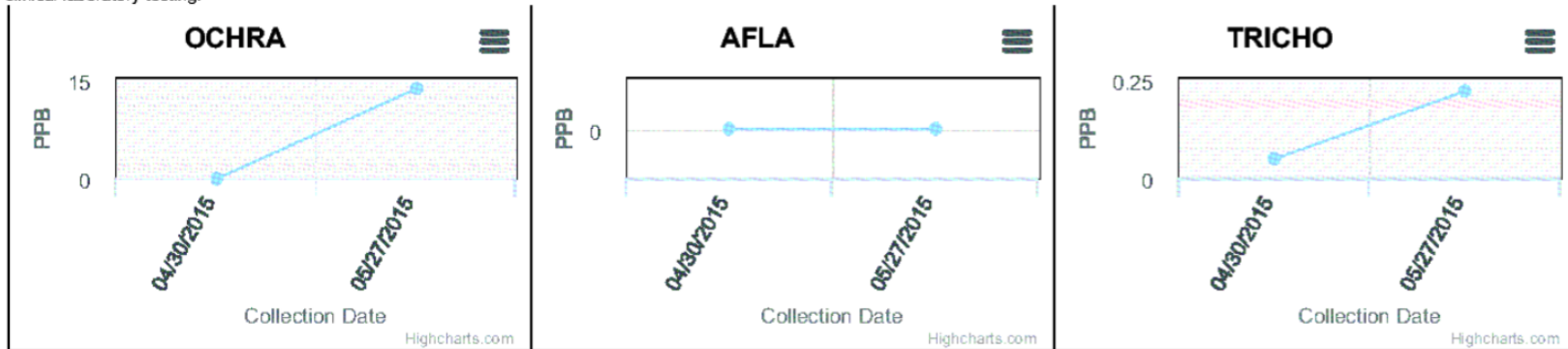
Results:

Code	Test	Specimen	Value	Result	Negative if less than	Equivocal if between	Positive if greater or equal
E8501	Ochratoxin A	Urine	13.55 ppb	Positive	1.8 ppb	1.8-2.0 ppb	2.0 ppb
E8502	Aflatoxin Group	Urine	0 ppb	Negative	0.8 ppb	0.8-1.0 ppb	1.0 ppb
E8503	Trichothecene Group	Urine	0.22 ppb	Positive	0.18 ppb	0.18-0.2 ppb	0.2 ppb

Director 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.



requestId	Collection Date	Ochra Result	Afla Result	Tricho Result
<a href="#">146618</a>	05/27/2015	13.55 - Positive	0 - Negative	0.22 - Positive
<a href="#">148090</a>	04/30/2015	0 - Negative	0 - Negative	0.05 - Negative



On 4tsp/day of Readisorb Glutathione and time at grandparents'  
Symptoms resolved in 2 months

## Glutathione; Erythrocytes

	Within	Outside	Reference Range
Glutathione*	1414		1000 - 2000 $\mu$ moles/L

Glutathione (GSH) is a tripeptide ( $\lambda$ -glutamyl-cysteinylglycine) synthesized in most cells. The level of GSH in erythrocytes is a sensitive indicator of intracellular GSH status, the overall health of cells, and of the ability to endure toxic challenges. GSH is the most abundant non-protein thiol in mammalian cells. It is involved in many biological processes including detoxification of xenobiotics, removal of oxygen-reactive species, regulation of the redox state of cells and the oxidative state of important protein sulfhydryl groups, and regulation of immune function. GSH levels are thousands of times higher in cells than in plasma. Plasma GSH represents primarily that synthesized and exported from the liver. Reduced GSH (rGSH) is the active form of the tripeptide and the ratio of rGSH: oxidized GSH (GSSH) is normally about 9:1. Once a blood sample is obtained, Erythrocyte rGSH is very susceptible to oxidation and the rGSH:GSSH ratio drops rapidly. Specimen handling to prevent the *ex vivo* oxidation of rGSH is impractical and direct measurement of rGSH *in vivo* is not feasible outside of a research setting. However, research clearly indicates that undesirable ratios of rGSH:GSSH are equally associated with abnormally low levels of total cellular GSH. Therefore, it is clinically meaningful to assess the level of total erythrocyte GSH as an indicator of GSH status and metabolism.

Low levels of GSH have been reported in cardiovascular disease, cancer, AIDS, autism, alcoholism, debilitating neurodegenerative diseases such as Alzheimer's and Parkinson's, and chronic retention of potential toxic elements (mercury, lead, arsenic, cadmium manganese, iron), chemicals, and some drugs. Intracellular GSH biosynthesis and intracellular levels can be upregulated as a protective mechanism. Some factors that result in increased biosynthesis and "high normal" erythrocyte GSH levels include, but are not limited to, moderate alcohol consumption, smoking, regular physical exercise, and acute exposure to toxic metals. Under such conditions it is essential to provide the body with the key nutrients involved in GSH synthesis in order to sustain functionally appropriate levels of GSH. Magnesium and potassium are required for both energy dependent enzymatic steps in GSH synthesis; cysteine is the rate limiting amino acid. Nutritional products that have been documented to increase erythrocyte GSH/GSH biosynthesis include high quality whey protein preparations,  $\alpha$ -lipoic acid, curcumin, oral liposomal GSH, nebulized GSH, and to a lesser extent, N-acetyl-L-cysteine.

# Finding the Source -Could I have toxic mold in my environment?

- Testing -combine
  - ERMI / HC45
  - Mycotoxin
- Traditional testing-with air samples misses 50-75%



**Laboratory Analysis Report**

Project ID: [REDACTED]

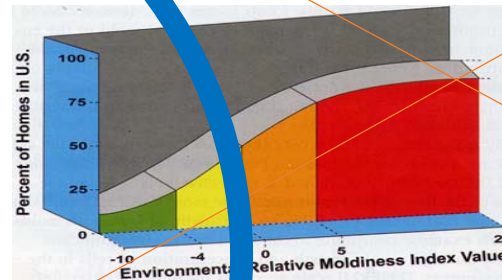
Analysis Performed: [REDACTED]

Sample Type: [REDACTED]

Sample ID	#4 ERM1
Location	~Composite 650004 SPL ~
Analyzed Sample Amount	Wipe @ 11 ft <sup>2</sup>
<b>Group 1 - Fungal QPCR Results</b>	<b>CE /sample*</b>
<i>Aspergillus flavus</i> <sup>a</sup>	525
<i>Aspergillus fumigatus</i> <sup>b</sup>	88
<i>Aspergillus niger</i> <sup>c</sup>	4,944
<i>Aspergillus ochraceus</i> <sup>d</sup>	ND
<i>Aspergillus penicillioides</i>	17,188
<i>Aspergillus restrictus</i> <sup>e</sup>	517
<i>Aspergillus sclerotiorum</i>	ND
<i>Aspergillus sydowii</i>	6,710
<i>Aspergillus unguis</i>	295
<i>Aspergillus versicolor</i>	80,544
<i>Aureobasidium pullulans</i>	548,278
<i>Chaetomium globosum</i>	54
<i>Cladosporium sphaerospermum</i>	13,797
<i>Eurotium amstelodami</i> <sup>f</sup>	54,789
<i>Paecilomyces variotii</i>	6,699
<i>Penicillium brevicompactum</i>	1,313
<i>Penicillium corylophilum</i>	ND
<i>Penicillium crustosum</i> <sup>g</sup>	ND
<i>Penicillium glabrum</i> <sup>h</sup>	ND
<i>Penicillium purpurogenum</i>	265
<i>Penicillium variable</i>	392
<i>Scopulariopsis brevicaulis</i>	40
<i>Scopulariopsis chartarum</i>	135
<i>Tachybotrys chartarum</i>	17
<i>Trichoderma viride</i> <sup>i</sup>	1,998
<i>Verticillium sebi</i>	6,815
<b>Group 2 - Fungal QPCR Results</b>	
<i>Alternaria strictum</i>	50
<i>Alternaria alternata</i>	166,927
<i>Aspergillus crustus</i>	400
<i>Cladosporium cladosporioides</i> I	149,835
<i>Cladosporium cladosporioides</i> II	1,246
<i>Cladosporium nigrum</i>	2,722
<i>Epicoccum nigrum</i>	97,455
<i>Mucor amphibiorum</i> <sup>j</sup>	662
<i>Penicillium chrysogenum</i>	ND
<i>Rhizopus stolonifer</i>	54

**Calculation of Environmental Relative Moldiness Index (ERMI<sup>SM</sup>)**

Sum of Logs for Group 1 Fungi	66.9 ± 0.5
Sum of Logs for Group 2 Fungi	30.8 ± 0.5
ERMI <sup>SM</sup> Value (= Group 1 - Group 2)	36.1 ± 3
Relative Moldiness Risk Category	<b>VERY HIGH</b>



**Data Interpretation Guideline:**

Method ID: US Environmental Protection Agency licensed technology for mold specific quantitative polymerase chain reaction (MSQPCR) analysis.

\* CE= Cell Equivalents, includes DNA from spores and hyphal fragments.

<sup>a</sup> Includes *A. flavus* and *A. oryzae*

<sup>b</sup> Includes *A. fumigatus* and *Neosartorya fischeri*

<sup>c</sup> Includes *A. niger*, *A. awamori*, *A. foetidus* and *A. phoenicis*

<sup>d</sup> Includes *A. ochraceus* and *A. ostianus*

<sup>e</sup> Includes *A. restrictus*, *A. caesillus* and *A. conicus*

<sup>f</sup> Includes *E. amstelodami*, *E. chevalieri*, *E. herbariorum*, *E. rubrum* and *E. repens*

<sup>g</sup> Includes *P. crustosum*, *P. camembertii*, *P. commune*, *P. echinulatum* and *P. solitum*

<sup>h</sup> Includes *P. glabrum*, *P. lividum*, *P. purpurescens*, *P. spinulosum* and *P. thomii*

<sup>i</sup> Includes *T. viride*, *T. atroviride* and *T. koningii*

<sup>j</sup> Includes *M. amphibiorum*, *M. circinelloides*, *M. hiemalis*, *M. indicus*, *M. mucedo*, *M. racemosus*, *M. ramosissimus*, *R. azygosporus*, *R. homothalicus*, *R. microsporus*, *R. oligosporus* and *R. oryzae*

<sup>k</sup> Includes the dominant subgroup of species

Note: ERMI was developed based on house dust.

Date of Analysis: 02/22/2016

Analysis performed by: Dr. Steven Huang

Reviewed by: Dr. Florence Wu

# Dust Sampling Increases Detection

*Anal Bioanal Chem.* 2016 Aug;408(20):5513-26. doi: 10.1007/s00216-016-9649-y. Epub 2016 Jun 2.

## Stachybotrys mycotoxins: from culture extracts to dust samples.

Došen I<sup>1</sup>, Andersen B<sup>1</sup>, Phippen CB<sup>1</sup>, Clausen G<sup>2</sup>, Nielsen KF<sup>3</sup>.

### + Author information

#### Abstract

The filamentous fungus *Stachybotrys chartarum* is known for its toxic metabolites and has been associated with serious health problems, including mycotoxicosis, among occupants of contaminated buildings. Here, we present results from a case study, where an ultra-high performance liquid chromatography-tandem mass spectrometry (UHPLC-MS/MS) method was developed for known and tentatively identified compounds characterized via UHPLC-quadrupole time-of-flight (QTOF) screening of fungal culture extracts, wall scrapings and reference standards. The UHPLC-MS/MS method was able to identify 12 *Stachybotrys* metabolites, of which four could be quantified based on authentic standards and a further six estimated based on similarity to authentic standards. Samples collected from walls contaminated by *S. chartarum* in a water-damaged building showed that the two known chemotypes, S and A, coexisted. More importantly, a link between mycotoxin concentrations found on contaminated surfaces and in settled dust was made. One dust sample, collected from a water-damaged room, contained 10 pg/cm(2) macrocyclic trichothecenes (roridin E). For the first time, more than one spirocyclic drimane was detected in dust. Spirocyclic drimanes were detected in all 11 analysed dust samples and in total amounted to 600 pg/cm(2) in the water-damaged room and 340 pg/cm(2) in rooms adjacent to the water-damaged area. Their wide distribution in detectable amounts in dust suggested they could be good candidates for exposure biomarkers. Graphical abstract *Stachybotrys* growing on a gypsum board, and some of the compounds it produces.



# ERMI and HERTSMI 2

- The scores for Ermi and HERTSMI 2 have not been a good predictor for me – too lax
- Depends on the lab doing the test
- The scores can under predict the toxicity of the environment for some patients
- If any Chaetomium or Stachybotrys chartarum is present it is usually not clean enough for the sickest patients to heal
- ?Acceptable level of Walemia, Chaetomium or Stachybotrys?

# Optimal Approach

- Combine surface (PCR) testing, surface mycotoxin testing and a knowledgeable thorough inspector to look for the subtle clues applying a detailed history of the building



# Home Water Reservoirs

PLoS One. 2016 Feb 11;11(2):e0148166. doi: 10.1371/journal.pone.0148166. eCollection 2016.

## The Black Yeast *Exophiala dermatitidis* and Other Selected Opportunistic Human Fungal Pathogens Spread from Dishwashers to Kitchens.

Zupančič J<sup>1</sup>, Novak Babič M<sup>1</sup>, Zalar P<sup>1</sup>, Gunde-Cimerman N<sup>1,2</sup>.

### Author information

#### Abstract

We investigated the diversity and distribution of fungi in nine different sites inside 30 residential dishwashers. In total, 503 fungal strains were isolated, which belong to 10 genera and 84 species. Irrespective of the sampled site, 83% of the dishwashers were positive for fungi. The most frequent opportunistic pathogenic species were *Exophiala dermatitidis*, *Candida parapsilosis sensu stricto*, *Exophiala phaeomuriformis*, *Fusarium dimerum*, and the *Saprochaete/Magnusiomyces* clade. The black yeast *E. dermatitidis* was detected in 47% of the dishwashers, primarily at the dishwasher rubber seals, at up to 106 CFU/cm<sup>2</sup>; the other fungi detected were in the range of 102 to 105 CFU/cm<sup>2</sup>. The other most heavily contaminated dishwasher sites were side nozzles, doors and drains. Only *F. dimerum* was isolated from washed dishes, while dishwasher waste water contained *E. dermatitidis*, *Exophiala oligosperma* and *Sarocladium killiense*. Plumbing systems supplying water to household appliances represent the most probable route for contamination of dishwashers, as the fungi that represented the core dishwasher mycobiota were also detected in the tap water. Hot aerosols from dishwashers contained the human opportunistic yeast *C. parapsilosis*, *Rhodotorula mucilaginosa* and *E. dermatitidis* (as well as common air-borne genera such as *Aspergillus*, *Penicillium*, *Trichoderma* and *Cladosporium*). Comparison of fungal contamination of kitchens without and with dishwashers revealed that virtually all were contaminated with fungi. In both cases, the most contaminated sites were the kitchen drain and the dish drying rack. The most important difference was higher prevalence of black yeasts (*E. dermatitidis* in particular) in kitchens with dishwashers. In kitchens without dishwashers, *C. parapsilosis* strongly prevailed with negligible occurrence of *E. dermatitidis*. *F. dimerum* was isolated only from kitchens with dishwashers, while *Saprochaete/Magnusiomyces* isolates were only found within dishwashers. We conclude that dishwashers represent a reservoir of enriched opportunistic pathogenic species that can spread from the dishwasher into the indoor biome.

Dishwashers, Toilets, Drains, Humidifiers, Washers, Dehumidifiers

# Wallboard Precontaminated

Original Article

## Pre-contamination of new gypsum wallboard with potentially harmful fungal species

B. Andersen , I. Dosen, A. M. Lewinska, K. F. Nielsen

First published: 31 March 2016 [Full publication history](#)

DOI: 10.1111/ina.12298 [View/save citation](#)

Cited by (CrossRef): 4 articles [Check for updates](#) | [Citation tools](#) ▼



[Funding Information](#)



[View issue TOC](#)  
Volume 27, Issue 1  
January 2017  
Pages 6–12

### Abstract

Gypsum wallboard is a popular building material, but is also very frequently overgrown by *Stachybotrys chartarum* after severe and/or undetected water damage. The purpose of this study was to determine whether *Stachybotrys* and other fungi frequently isolated from wet gypsum wallboard are already present in the panels directly from the factory. Surface-disinfected gypsum disks were wetted with sterile water, sealed, and incubated for 70 days. The results showed that *Neosartorya hiratsukae* ( $\equiv$  *Aspergillus hiratsukae*) was the most dominant fungus on the gypsum wallboard followed by *Chaetomium globosum* and *Stachybotrys chartarum*. Our results suggest that these three fungal species are already embedded in the materials, presumably in the paper/carton layer surrounding the gypsum core, before the panels reach the retailers/building site.

# Hidden Mold – per the EPA

In some cases, indoor mold growth may not be obvious. Mold does not need light to grow: it can grow in dark areas and on hidden surfaces, such as the backside of drywall, wallpaper, and paneling; the top side of ceiling tiles; and the underside of carpets and pads. Possible locations of hidden mold also include damp areas behind walls and in crawlspaces, inside pipe chases and utility tunnels (areas in walls where water and other pipes are run), on acoustic liners in ventilation ducts, and on roof materials above ceiling tiles.

Investigating hidden mold can be difficult and may require a professional with experience investigating water and mold-damaged buildings. Specialized equipment such as borescopes and moisture meters, and in some cases special sampling techniques, may be helpful in locating and identifying hidden mold areas. Investigating hidden mold requires caution since disturbing moldy areas may spread mold throughout the building. Opening and closing air handlers, for example, can send high levels of dust and mold into the air. Personal protective equipment (PPE) is not always needed when looking for mold, but it should always be available. If mold might be released into the air, investigators should use PPE to reduce exposure.

**Personal Protective Gear should always be available**

# Per The EPA Website

- One of the biggest problems related to mold testing happens when people misinterpret equivocal or negative findings.
- It is a common, yet serious error to conclude that a mold problem does not exist simply because tests failed to find evidence of it.
- **Most mold testing simply cannot prove the absence of a problem**, and it should never be used as the basis for dismissing complaints or to defend inadequate efforts to investigate or solve potential problems.

# EPA Presentation

## Manage the School Environment

- Health, attendance and academic performance have been shown to improve with increased maintenance.
- Schools with better physical conditions show improved academic performance.
- Schools with fewer janitorial staff personnel and higher maintenance backlogs show poorer academic performance.



Indoor Air Quality (I

Take action today to ensure every child has a school that is a safe and healthy place to learn!



Indoor Air Quality (I

# What if I have a leak? Per EPA

- Building materials and building furnishings will often get wet.
- They must be dried or "allowed to dry" quickly (within 24-48 hours) in order to avoid mold growth.
- In general, increasing air circulation and temperature will increase the speed of drying.
- Commercial firms that do mold remediation work or work on water- and fire-damaged buildings often use large fans, dehumidifiers, and other equipment to dry wet buildings and items quickly before mold has a chance to grow. This action can save money in the long run, because if the building or furnishings are dried completely and quickly, mold will not grow, and a mold remediation will not be needed.

**You have 24-48 hours to do things correctly or it is likely mold will grow**



# Foundation for Healing

- A clean living environment – low Mold DNA from ERMI results (and no chaetomium) and mycotoxin test
  - Move
  - Or Remediate (may not be possible with neurological symptoms)
  - Remove contaminated items
- Avoid Moldy environments (work, school, shopping) until well
- Avoid other environmental toxins (most become sensitive to them)
  - Pesticides
  - Formaldehyde
  - Fragrances
  - Plastics
  - Chemicals (skin care, mattresses, new car, carpet, paint)
  - Metals
  - EMF's

# Dietary Goals for Healing

- Eat foods that promote low inflammation
- Eat foods that are high in phytonutrients
- Eat foods that support detoxification and the immune system

# Anti-Fungal Diet

- No sugar, fruit, grains, alcohol  
(Feeds yeast)
- No gluten, dairy or grains  
(Inflammatory foods)
- Increase vegetables  
(Promotes healthy detox)
- Include good fats  
(Nuts, seeds, olives, avocado)
- Avoid moldy and fermented foods  
(Kombucha, kim-chi, nutritional yeast, vinegar, wine, coffee, chocolate, melons, mushrooms, processed meats)



# Steps to Healing – Functional Medicine

- Repair the gut
- Reduce colonization/ infection
- Reduce inflammation/ mast cell activation
- Detoxify - Remove the toxins
- Rebuild mitochondria
- Restore the nervous system
- Balance hormones and adrenals
- Replete base nutrients
- Optimize Methylation
- Reset limbic system

# Repair the Gut

- Critical step with mold patients
- Always disrupted
- Probiotics
- Mucosal repair – Glutamine, Aloe, others.

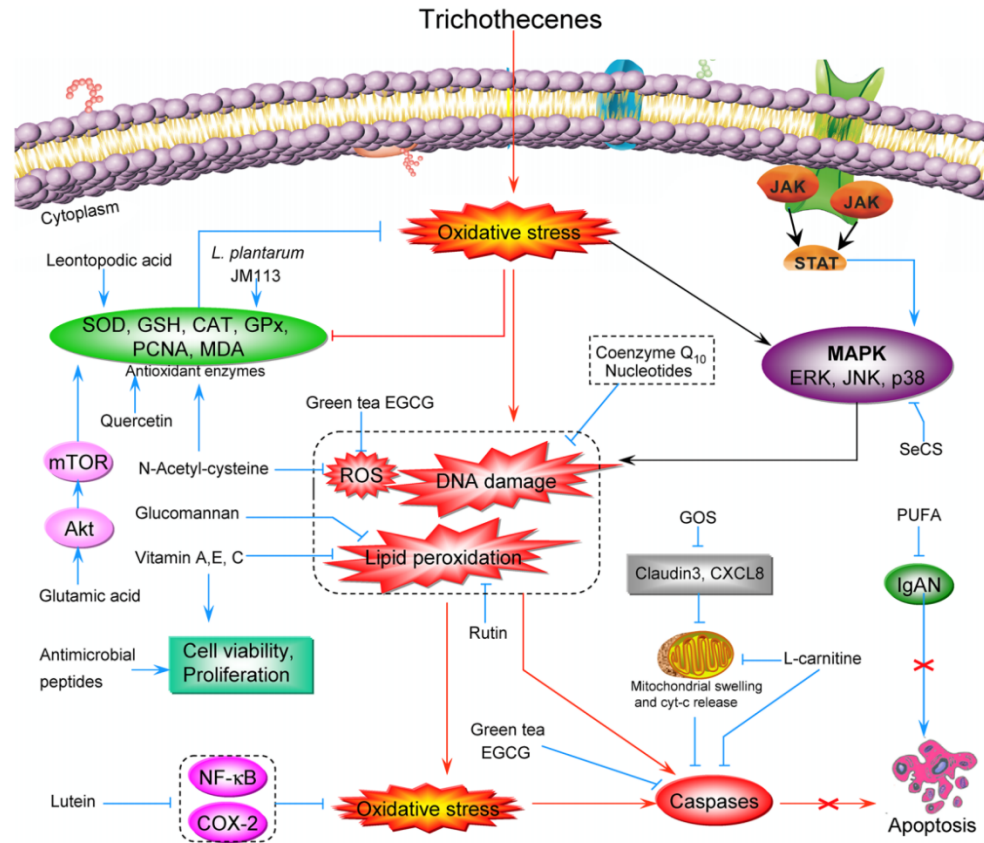
# Reduce Colonization/ Infection

- Anti yeast diet
- Herbs – caprylic acid, oregano, ginger, turmeric, olive leaf
- Grape seed extract
- Enzymes (Candex)
- Citrus nasal spray
- Prescription antifungals

# Reduce Inflammation

- Use your favorites
- Camu or liposomal Vit C
- Fish oil
- Turmeric/Curcumin
- Quercetin
- Proteolytic enzymes
- Resveratrol
- Green tea (EGCG)
- Vit A, E, coq10, carnitine

# Preventive Effects of Antioxidants on Trichotheccene-Induced Oxidative Stress



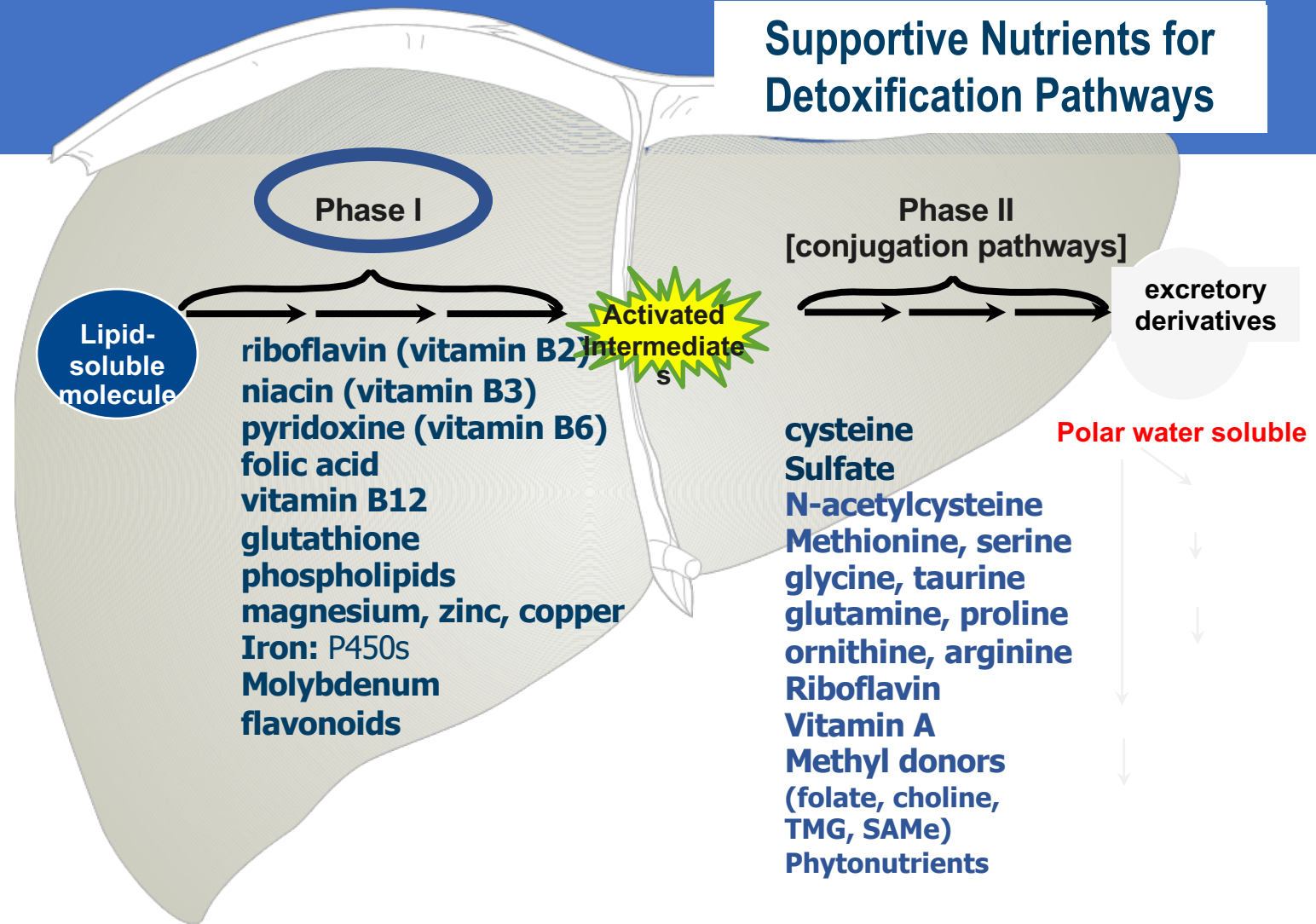
**Figure 4: Schematic illustration of the preventive effects of various antioxidants on trichotheccene-induced oxidative stress.**



# Optimal Biotransformation

- Nutritional support
  - Phase I: Macronutrients and broad-spectrum micronutrient support
  - Phase II: Cofactors for conjugation
- Antioxidants to quench free radicals produced by Phase I reactions
- Phytonutrient inducers of Phase II enzymatic reactions

# Supportive Nutrients for Detoxification Pathways



# Detoxify – Remove Toxins

- Glycine
- Liposomal glutathione
- Charcoal or clay
- Modified citrus pectin
- Liver support – Milk thistle, alpha lipoic acid, NAC
- Dietary Fiber
- Clay and Magnesium salt baths
- Infrared sauna
- Hyperbaric
- Methylation supplements – 5MTHF, B12, B6, choline, Betaine

# Sauna Can be Effective Treatment

- Compounds released in sweat:
  - Bromide, Chloride, Chromium, Copper, Iron
  - Potassium, Sodium, Magnesium Manganese, Zinc, Copper, Cobalt
  - Antimony, Cadmium, Lead, Mercury, Nickel
  - Medications
  - PCBs
  - Mycotoxins
- *Genius SJ, et al. Blood, urine, and sweat (BUS) study: monitoring and elimination of bioaccumulated toxic elements. Arch Environ Contam Toxicol. 2011 Aug;61(2):344-57.*

# Rebuild Mitochondria

- Carnitine
- Coq10
- D-ribose
- Nicotinamide riboside
- Phosphatidylcholine
- NAC and Alpha lipoic acid
- PQQ (pyrroloquinoline quinone)
- Rhodiola rosea

# Antioxidants Protect Mitochondria

## Nutritional cofactor treatment in mitochondrial disorders

BARBARA MARRIAGE, PhD, RD; M. THOMAS CLANDININ, PhD; D. MOIRA GLERUM, PhD

### ABSTRACT

Mitochondria are the powerhouses of the cell, producing energy for cellular processes. Mitochondrial dysfunction can lead to a variety of disorders, including those that affect the brain and muscles. Accumulation of toxic metabolites and reduction of electron transfer activity have prompted the use of antioxidants, electron transfer mediators (which bypass the defective site), and enzyme cofactors. Metabolic therapies that have been reported to produce a positive effect include Coenzyme Q(10); other antioxidants such as ascorbic acid, vitamin E, and lipoic acid; riboflavin; thiamine; niacin; vitamin K; creatine; and carnitine.

Accumulation of toxic metabolites and reduction of electron transfer activity have prompted the use of antioxidants, electron transfer mediators (which bypass the defective site), and enzyme cofactors.

Metabolic therapies that have been reported to produce a positive effect include Coenzyme Q(10); other antioxidants such as ascorbic acid, vitamin E, and lipoic acid; riboflavin; thiamine; niacin; vitamin K; creatine; and carnitine.

RD, 105215 RP 32, Ross Products Division, 625 Cleveland Ave, Columbus, OH 43215. E-mail: Barbara.Marriage@abbott.com  
Copyright © 2003 by the American Dietetic Association.  
0002-8223/03/10308-0010\$35.00/0  
doi: 10.1053/jada.2003.50196

Journal of THE AMERICAN DIETETIC ASSOCIATION / 1029

Marriage B, et. al. Nutritional cofactor treatment in mitochondrial disorders. *J Am Diet Assoc.* 2003 Aug;103(8):1029-38.

# Mycotoxins alter Phospholipids

- Stachybotrys chartarum mycotoxin reduces phosphatidylcholine enzyme synthesis in lung by 50%
- Fumonisin B1 disrupt membrane structure, enhances lipid oxidation leading to cell death.
- Fumonisin B1 in hepatocyte cultures changes to more rigid membrane structure by altering phospholipids
- Fumonisin B1 Alters of lipid constituents of cellular membranes, and is a possible mechanism for hepatic cancer promotion and immunotoxicology
- Mushroom toxin phallolysin damages liposomes and phospholipid membranes
- Ochratoxin A is nephrotoxic, immunotoxic and carcinogenic, possibly by altering phospholipids.
  
- *Hastings, C. et al. Toxicolo Sci 2005. Mar 84(1):186-94.*
- *Yin, JJ. Biochim Biophys Acta. 1998. Apr 22;1371(1):134-42. Buhning, HJ. Biochim Biophys Acta. 1983. Aug 24;733(1):117-23. Burger HM. Lipids. 2007 Apr;42(3):249-61.*
- *Hope. Jour Environ and Pub Health 2012. art ID 835059*

# Phosphatidylcholine

- Dosing—oral - start slow and build up (500mg – 8000mg/Day)
- Consider IV for severe cases
- Include Omega 3's and 6's



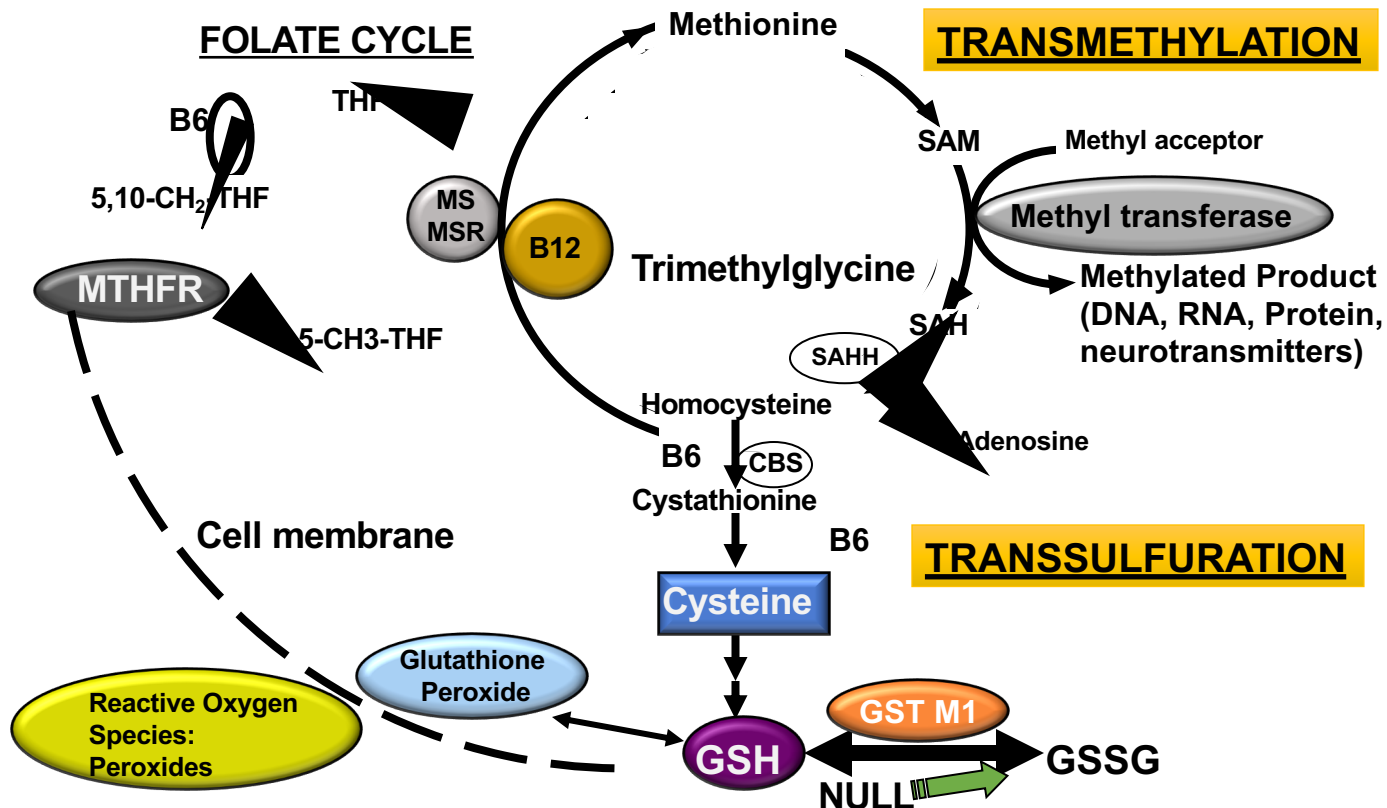
# Balance Hormones and Adrenals

- Adaptogens
- B vitamins
- Magnesium
- Low inflammation high nutrient diet
- Fiber
- Meditation
- Neurofeedback

# Replete Base Nutrients – Assess with Lab Data if Possible

- Multi-vitamin
- B12, B complex
- Magnesium and other minerals\*\*\*\*
- Vitamin D
- Calcium
- Protein powder/ green smoothie/ greens mix
- Ionic minerals

# METHYLATION/SULFATION



Courtesy of Jill James, PhD, University of Arkansas

# Methylation Profile

## Methylation Profile; plasma

PRIMARY & INTERMEDIATE METABOLITES								
	RESULT/UNIT	REFERENCE INTERVAL	PERCENTILE					
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>	
Methionine	2.8 μmol/dL	1.6– 3.6						
Cysteine	33 μmol/dL	20– 38						
S-adenosylmethionine (SAM)	83 nmol/L	86– 145						
S-adenosylhomocysteine (SAH)	15.4 nmol/L	10– 22						
					68 <sup>th</sup>		95 <sup>th</sup>	
Homocysteine	7.1 μmol/L	< 11						
Cystathionine	0.02 μmol/dL	< 0.05						

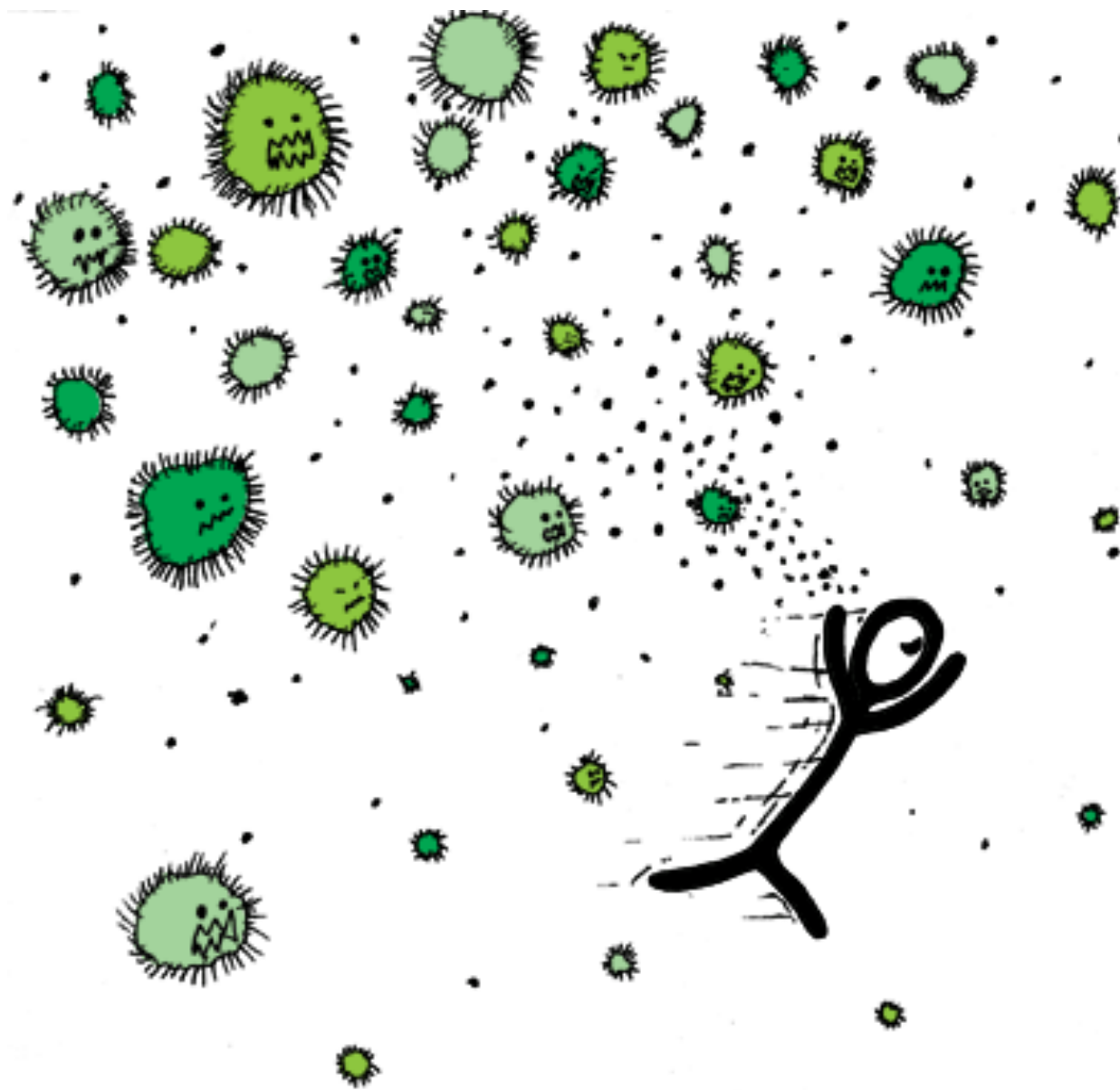
  

METHYLATION INDEX				
	RESULT	REFERENCE INTERVAL	PERCENTILE	
			68 <sup>th</sup>	95 <sup>th</sup>
SAM : SAH	5.4	> 4		

→ **Methionine**

# Limbic System

- The primary structures within the **limbic system** -include the amygdala, hippocampus, thalamus, hypothalamus, basal ganglia, and cingulate gyrus. The amygdala is the emotion center of the brain, while the hippocampus plays an essential role in the formation of new memories about past experiences
- It monitors both our internal and external environment. The Limbic System is known as the seat of social and emotional intelligence and is the brain's anxiety "switch".
- The Limbic System is also responsible for the formation of memories and regulating hormones.
- It regulates the functioning of the parasympathetic and sympathetic nervous systems, which means it controls things like pulse, blood pressure, breathing, and arousal in response to emotional circumstances.



# Reset Limbic System

- Awareness of Inner Dialog
- Meditation
  - Muse/ Neurofeedback
  - Joe Dispenza Meditations
  - Other guided Meditations
- Yoga
- Apps –headspace, calm,  
10% happier, Insight Timer
- Mindfulness training



# Labs/ Tests

- Urine Mycotoxin levels- AnnShippymd.com DIY labs
- VCS – on-line or order from Shoemaker
- Genetics – methylation, immune system and detox pathways
- Gluten Sensitivity /Celiac - Enterolab
- Neuroquant MRI
- Proteomics
- Synergistic toxins – metals, pesticides,
- Evaluate microbiome for Fungal infections
- Thorough thyroid panel
- Inflammation markers
- IGL, epigenetic markers



# Family Members Variability

- 3-year-old son – severe cough, recurrent infections, low grade fevers and night sweats, lip licking, blinking, low growth and weight, lethargy
  - Resolved by moving out of the house, antifungal, topical glutathione, probiotics, methylation cream, magnesium, curcumin, coq10, vit C
- 6-year-old daughter – developmental delays, sensitive to texture
- Mom – miscarriages, anxiety, fatigue, headache, heart racing episodes,
- Dad- night sweats, bruising, recurrent infections, tingling in hands and feet, knee pain
- House was remediated and reported clear by inspectors. All symptoms returned when they re-entered the home

# Family 2

- Mom – black spots in vision, acne, fatigue, insomnia, asthma, fatigue, irregular menses
- Dad – short fuse, sugar and alcohol craving
- 10-year-old son – Tics (PANS/ PANDAS), separation anxiety, developmental regression, allergy, asthma, brain fog,
- 7-year-old son – asthma, recurrent strep, studor, slow thinking
- Remediated chimney and master bath (aspergillus and penicillium), removed carpet, fixed drainage - Recovered
- Traveled to Dustin – musty – water damaged
  - Dad argued with son's coach, Oldest son – asthma and Tics came back with behavior regression, mom – black spots came back
- Recurrent mold exposure – exacerbates TICs and short fuse

# Family 3 – OCD, TICs, Anxiety

- Mom – severe anxiety and OCD, paranoia, tingling in back and arms, insomnia, b12 and b1 deficiency, unintentional weight loss, dizzy, sinusitis, cracked heels, brain fog, poor balance, leg cramps, mood swings
- Daughter – sensory, mood swings and melt downs, infections- dental abscess, cellulitis, molluscum,
- Son – tics, aggression, mood swing, enuresis, palilalia, transposed writing
- Dad – red eyes
- Moved out – Mold was in basement and a hidden roof leak to son's room
- Optimized methylation!!!!, liposomal glutathione, binders, PC, mitochondrial support, probiotics

# Prevention is the Best Medicine

Proactively detoxify and nourish to stay ahead of the curve

Maintain your living space and work space/schools

- Know what to do if there is a leak
- Preventive maintenance
  - Caulking / flashing – windows / vents / seams/ wet areas
  - Water heater checks
  - Heating and air conditioning systems
- Avoid wallpaper in wet areas
- Outside grading to make sure water drains appropriately

Improved Building Standards – for materials, ventilation, workmanship, humidity control

# Vision for the future



- New building guidelines
- Annual building maintenance
- Building owners aware of how to handle water intrusion
- Healthy schools
- Expanded testing for mold products in buildings and humans
- Better controls on foods
- Additional research linking genes, toxins, nutritional status to human health conditions and functional medicine solutions

# Take - Aways

This is a major health issue of epidemic proportions

It is possible to get well even with severe symptoms

Much more research is needed

- Role of genetics and nutrition
- Optimal treatment
- Testing – more toxins and molds in humans and environment
- Building requirements and remediation – acceptable levels
- Synergy of environmental toxins

# Free Guides + Resources

[annshippymd.com/free-guides](https://annshippymd.com/free-guides)

Could It Be Mold?

10 Strategies for a Better Brain

How To Be Safe In a Toxic World

Good Night's Sleep Checklist

Essential Immune Support Protocol

Finding Your Edge Quick Start Guide

Soup Reset + Recipe Guide

[Every Life Well –Vitamin Shop](#)



# Follow me on Social

- [Instagram/AnnShippyMD](#)
- [Facebook/AnnShippyMD](#)
- [LinkedIn/AnnShippyMD](#)
- [Pinterest/AnnShippyMD](#)