Exposure to Mold and Biotoxins: Implications For Treatment and Prognosis of Children with Autism Spectrum Disorder
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Pediatric Neurology
Autism Spectrum Disorders
Tick Borne Diseases
Mold and Biotxin Illness
Autoimmune Diseases
My teachers, and mentors
  - Dr. Dietrich Klinghardt
  - Dr. Charles Ray Jones
  - Dr. Joseph Jemsek
  - Dr. Eugene Shippen
  - Dr. Ritchie Shoemaker
Thank you!
Abbreviations used

- TBI – Tick borne diseases/Infections
- ASD – Autism spectrum disorders
- CIRS – Chronic inflammatory response Syndrome
- ADD – Attention deficit disorder
- SPD – Sensory processing disorder
- WDB – Water damaged building
- CSM - Cholestyramine
What We Found

- The majority of our ASD patients have multiple chronic bacterial, fungal, parasitic, and viral infections.
- The bacterial infections include Lyme Borreliosis, Bartonellosis, Babesiosis, Strep, and Mycoplasma.
- These infections could be important in the inception, progression and severity of this chronic condition.
Autism Spectrum Disorder

- We found the presence of mold exposure, CIRS and biotoxin illness inflammatory and other markers including MARCoNS in over 90% of our ASD patients tested
Microbial Induced Immune Deficiency

YOU BECOME A SITTING DUCK FOR COINFECTIONS And Toxins And Uncontrolled Inflammation
Immune Reactions Seen

- **Anergy**: found in regulatory T cells, possibly preventing them from dominating initial immune responses to foreign antigens and shutting down such responses prematurely

- **Allergy**

- **Autoimmunity and Molecular mimicry** (PANS/PANDAS, UC, etc)
About Molds

- Outdoor Molds – not a huge concern as there is competition
- Indoor molds: Under the right conditions they can overgrow and make people very sick
- Some of these include: Alternaria, Aspergillus, Cladosporium, Penicillium, Stachybotrys
Identify Where you’re Being Exposed

- Attic
- Crawl space
- All plumbing (toilet, dishwasher, washer)
- Hose bib
- Sprinklers (hitting house?)
- Air conditioner/HVAC
- Hot water tanks
- Closets
- Car, RV, Trailer

- Under carpets (home, cars, campers)
- Mattress and pillows
- Shoes
- Potted plants
- Compost bin
- Under sink cabinets (clutter hiding a leak)
- Under toilet tank (condensation)
- Windows (Ice dams)
Approximately 24% of the general population have a genetic makeup called HLA DR, that makes them unable to clear mold toxins.

This lecture is about those 24% of individuals.

Now if we factor in ASD and TBD it becomes a complex conundrum of upregulated immune responses, toxin overload, rampant inflammation and even autoimmunity.
Tucked Away Behind The Walls
There is more than mold in water-damaged buildings that cause this biotoxin response.

Metabolites of mold, bacteria, amoebas, bio-aerosols, chitinsases, actinomycetes and mycobacteria.

VOCs and other toxic chemicals in the home/building can alter these organisms as well as add to the release of toxins.

You can have a release of mycotoxins, bacterial endotoxins, beta glucans, mannans, proteinases, hemolysins, c-type lectins, spirocyclic drimanes, and volatile organic compounds.
It is technically more appropriate to call it Chronic Inflammatory Response Syndrome due to water-damaged building, rather than Mold Illness.

CIRS-WDB
What is CIRS?

Biotoxin Illness (WDB)

- NOT an “allergy”
- Multi-system illness
- Multi-symptom illness
- Innate Immune responses rule!
- Unregulated upregulated Systemic Inflammation
- NOT dose dependent. Any amount of exposure can bring on CIRS in susceptible persons.
- HLA-DR susceptible + trigger + exposure = ……..
Innate Immune system activation induced inflammation is like a blindfolded soldier with a machine gun firing non-stop in an unsuccessful attempt to remove foreign material, resulting in collateral damage.

Multi system illness
What Are BIOTOXINS?

- Mold spores (dead or alive)
- Spore Fragments
- Bacteria, Particulates, VOC’s
- Multiple Inflammatory Compounds – produced by organisms
- MANY biotoxins are NEUROTOXINS

Major Source: Water Damaged Buildings
Biotoxins

- Dissolve, can move through and can remain in fatty tissue
- Can disrupt several vital functions of nerve cells, including DNA transcription, transport of nutrients and mitochondrial respiration.
- Can disrupt the sodium and calcium channel receptors
- Can cross membranes (50% lipid content)
- Can disrupt the electrostatic function of the cell
The Biotoxin Pathway

In genetically susceptible people, biotoxins bind to pattern receptors, causing continuing, unregulated production of cytokines.

Biotoxins have direct effects, including impairment of nerve cell function.

Sleep Disturbance
Production of melatonin is reduced, leading to chronic, non-restorative sleep.

Chronic Pain
Endorphin production is suppressed. This can lead to chronic, sometimes unusual, pain.

Gastrointestinal Problems
Lack of MSH can cause malabsorption in the gut, resulting in diarrhea. This is sometimes called "leaky gut" and resembles (but is not) celiac disease. IBS is often present.

Prolonged Illness
White blood cells lose regulation of cytokine response, so that recovery from other illnesses, including infections diseases, may be slowed.

Changes in Cortisol and ACTH levels
The pituitary may produce elevated levels of cortisol and ACTH in early stages of illness, then drop to excessively low levels later. (Patients should avoid steroids such as prednisone, which can lower levels of ACTH)

Reduced ADH
Reduced MSH can cause the pituitary to lower its production of sex hormones.

High cytokine levels in the capillaries attract white blood cells, leading to restricted blood flow, and lowering oxygen levels. HIF stimulates VEGF and TGF B-1. Reduced VEGF leads to fatigue, muscle cramps, and shortness of breath (may be over-ridden by replacement with erythropoietin). TGF B-1 changes cell type and interacts with Treg cells.

Inflammation-related symptoms
High levels of cytokines produce flu-like symptoms: Headaches, muscle aches, fatigue, unstable temperature, difficulty concentrating and more. High levels of cytokines also result in increased levels of several other immune-response related substances, including TGF B-1, MMP-9, IL-1B, and PAI-1. MMP-9 delivers inflammatory elements from blood to brain, nerve, muscle, lungs, and joints. It combines with PAI-1 in increasing clot formation and arterial blockage.

Resistant Coag-negative Staph Bacteria
Colonies of MARCoNS with resistance to multiple antibiotics may develop in biofilm or mucus membranes. The bacteria produce substances that aggravate both the high cytokine levels and low MSH levels.

Reduced ADH
Reduced MSH can cause the pituitary to produce lower levels of anti-diuretic hormone (ADH), leading to thirst, frequent urination, and susceptibility to shocks from static electricity.
Biotoxins bind to surface receptors of cells and the Innate Immune Cascade once switch is “flipped”

- Cytokine effects - Brain- Nerve cells affected, hypothalamus affected, leptin receptors damaged, reduced MSH = disastrous effects on body
- Inflammation affects lungs, muscles, joints, gut, mucous membranes
- Antibiotic resistant staph bacteria and biofilm
- Capillaries – reduced blood flow & hypoxia
- Immune effects – UC, Leaky gut, Blood clotting issues
- Endocrine – multiple hormonal dysregulation – MSH, ADH, ACTH, Cortisol, Sex hormones

Adapted from Biotoxin Pathway. Dr Richie Shoemaker, 2011
Underlying Biotoxin Illness Often Seen In:

- Chronic and Post Lyme Disease
- Autism Spectrum Disorders
- Sensory Processing Disorders
- Irritable Bowel Syndrome
- Chronic Fatigue Syndrome
- Fibromyalgia
- Multiple Sclerosis
- Depression
- Multiple Chemical Sensitivity
- Bells Palsy
- Sensory-neural deafness
- Loss of vision
- Learning Disabilities
CIRS symptoms

- **General Signs & Symptoms**
  Fatigue, Weakness, malaise, flu-like Symptoms, insomnia, sensitivity to environment, anger problems, brain fog.

- **Nervous/Endocrine/Immune**
  Insomnia, headache, dizziness, mental confusion, poor concentration, poor short term memory, disorientation, decreased learning ability, frequent thirst, body temperature regulation issues, lack of libido, low blood pressure, Poor temp regulation, numbness, tingling, tremors, vertigo, mood swings, anxiety, irritable, difficulty with concentration, chronically swollen lymph nodes.
Musculoskeletal
Joint pain, shooting pains, ice-pick pains, muscle aches, weak muscles, burning pains, stabbing pains, muscle cramps, fleeting & moving pains, motor tics, hypertonic muscles, charlie horses, AM stiffness.

Extremities
Cold Hands/feet, discolored hands and feet such as white and red mottling, parts go to sleep, hands shake, clawing of fingers or toes
Symptoms

- **Digestive/Liver/Urinary**
  Nausea, vomiting, metallic taste in mouth, bile reflux, diarrhea, constipation, abdominal pain, weight loss, weight gain, Frequent urination.

- **Lungs/Heart**
  Shortness of breath, slow recovery after exercise, tachycardia (fast heart beat) with exercise, cough, wheezing, asthma, swelling or edema, heart palpitations/pounding.
Symptoms

- **Eyes/Ear/Nose/Throat**
  Blurred or hazy vision, eyes puffy/dark circles, eyes sensitive to light, Eyes tear up, night blindness, ringing in the ears, hearing loss, dizziness, chronic sinus/nasal congestion, nose bleeds, sensitive to odors, sometimes vocal cord polyps, nasal polyps, laryngitis or raspy voice, burning in throat/sore throat

- **Skin**
  Vitiligo, cherry hemangiomas, skin is sensitive, itchy, bugs crawling on skin sensations, bugs stinging or biting sensations, Bruises easy, pimples, skin sores, bumpy skin, thickened skin, peeling, burning sensations, red face, sweats - especially at night, static shocks.
Testing for CIRS-WDB biomarkers

- Comprehensive medical
- Environmental exposures
- Meticulous physical exam
- Visual Contrast Sensitivity (VCS)
- MARCoNS culture
- HLA-DR
- MSH alpha
- TGF Beta-1
- C4 A
- C3 A
- MMP-9
- VEGF
- VIP

- Anticardiolipin
- Antigliadin
- Leptin
- Anti Myelin
- ADH
- Osmolality
- PAI-1
- Cortisol
- ACTH
- DHEA-s
- Androgens

**Additional** testing in adults and/or as needed based on above results.

NOT all kids need all above
Results influence the protocol approach and the length of treatment needed.

- 11-3-52B, 4-3-53: “dreaded genotype” Worst mold susceptible HLA
- 7-2-53, 7-3-53, 13-6-52A, B,C, 17-2-52A, 18-4-52A: mold toxin susceptible
- 4-3-53, 11(12)-3-52B, 14-5-52B: multi susceptible (unable to recognize and clear any/all toxins from system)
- 15-6-51, 16-5-51, 4-7-53, 4-8-53: Lyme toxin susceptible
- 11-7-52B: MARCoNS sensitive, Immune system lacks ability to recognize & attack methicillin resistant staph infections.
Visual Contrast Sensitivity (VCS)

- [www.survivingmold.com](http://www.survivingmold.com)
- 92% of people with biotoxin illness will fail this test
  - measures your ability to see details at low contrast levels
- Computerized plus hand held versions
- Biotoxins lower the available oxygen due to reduced blood flow to the optic nerves.
- Lower oxygen to the eyes may also reduce night vision and increased light sensitivity.
Brain MRI-NeuroQuant

- Provides volumetric imaging on brain structures and compares the volumes to a normative database adjusted for age, gender and intracranial volume
- A powerful tool to help evaluate patients from ages 3 to 100
- Can detect subtle changes in specific structure volumes which cannot be seen by the naked eye
- Example - Microscopic interstitial edema
- Can help distinguish CIRS from Lyme and other conditions
NQ Provides Paired Structure Volumes

- Forebrain
- Lateral Ventricle
- Cerebellum
- Pallidum
- Inferior Lateral Ventricle
- Cortical Gray
- Putamen
- Thalami
- Caudate Nucleus
- Hippocampus
- Amygdala
PATIENT INFORMATION

Patient D: Patient Name: Sex: Age: 35
Accession Number: Referring Physician: Exam Date:

MORPHOMETRY RESULTS (1 of 2)

<table>
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<tr>
<th>Brain Structure</th>
<th>Vol &quot;m&quot; (cm³)</th>
<th>% of ICY (50/o-950/o Normative Percentile*)</th>
<th>Nqrmative Percentile</th>
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<td>Whole Brain</td>
<td>1188.89</td>
<td>74.34 (74.13 - 81.73)</td>
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<tr>
<td>Lateral Ventricles</td>
<td>46.35</td>
<td>2.90 (0.46 - 2.02)</td>
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<td>Thalami</td>
<td>11.87</td>
<td>0.74 (0.81 - 1.00)</td>
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AGE-MATCHED REFERENCE CHARTS

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Multiple antibiotic resistant coagulase negative staph resides deep in the nasal passage of 80% of people with low MSH and CIRS.

Further reduction in MSH, fatigue, chronic pain due to reduced endorphins, increased cytokines.

Hormone imbalances, mood swings, leaky gut, alternating constipation and diarrhea, lower melatonin (poor sleep), and low ADH (Antidiuretic Hormone).

The body initially raises ACTH (Adrenocorticotropic Hormone) and Cortisol in response to the increased stress thereby keeping the person functional.
Over time, ACTH and Cortisol values will fall below normal levels and adrenal fatigue sets in.

- an imbalance between lowered ADH and plasma osmolality (a measure of body hydration) results in the person being unable to hold water (frequent urination).
- May lead to frequent static shocks due to the higher than normal salt levels on the skin, along with lower back pain, fungal overgrowth, depression, allergies, obesity and other symptoms associated with chronic dehydration.
PROGene Testing soon to be available
Understanding that SNPs are not equal to those genes actually being active
Many over treat methylation SNPs
Tells us IF the gene is expressing
If expressing then how is that being activated
Interplay between mRNA and miRNA
The miRNA antagonist - Antagomir
Objective and trackable biomarkers for progress
Methylation Needs Experience!

Too Little

Too Much!
Understanding Some Parameters

- **Human Transforming Growth factor – Beta 1**
  - Key protein, Immune regulatory (especially T cells), cell growth, cell apoptosis, cell proliferation, wound healing and autoimmunity are some of its functions.
  - The EPA says that 21% of all new cases of asthma are due to exposure to WDB. If an individual develops wheezing after exposure to a water damaged building, look for remodeling to be the cause. Remodeling means "something" happens that the airway changes to be more reactive and in need of medications to reduce wheezing. Neurologic, autoimmune and many other systemic problems also are found with high TGF Beta-1.
Polypeptide, stimulates new blood vessel formation, increases blood flow in the capillary beds.

Deficiency of VEGF is a serious problem in biotoxin illness patients. If you don’t have blood flow, cells begin to starve and don’t work properly.
C4a

- Critical marker elevated by CIRS inflammation
- Part of the complement system. Inflammatory marker of great significance
- Initial rise of plasma levels is seen within **12 hours** of exposure to biotoxins
Vasoactive Intestinal Polypeptide -VIP

- Neuro-regulatory hormone with receptors in the hypothalamus.
- Regulates peripheral cytokine responses, pulmonary artery pressures, and inflammatory responses throughout the body.
- Levels low in mold patients
- This leads to unusual shortness of breath symptoms, especially during exercise.
Matrix metalloproteinase 9, MMP-9

- involved in the breakdown of extracellular matrix in normal physiological processes, such as embryonic development, and tissue remodeling, as well as in disease processes.
- implicated in pathogenesis COPD by destruction of lung elastin, in rheumatoid arthritis, atherosclerosis, cardiomyopathy, and abdominal aortic aneurysm.
- delivers inflammatory elements of blood into subintimal spaces, where further delivery into solid organs (brain, lung, muscle, peripheral nerve and joint) is initiated.
Roadmap To Recovery

- Precise step by step approach
- Compliance is key
- Regular monitoring
- Lifestyle and diet
- Continued vigilance for life
- Natural options for those with multiple sensitivities
- Rare associated conditions being encountered and studied
Restful sleep is restorative.
Treatment steps

VIP
TGF beta-1
Correct C4a
Correct C3a
Correct VEGF
Correct MMP9
Correct ADH/osmolality
Correct androgens
Correct antigliadin
Eradicate MARCoNS
CSM/Welchol
Remove from exposure
Many highly sensitive people cannot tolerate conventional medicine (allopathic)

- Homeopathy
- Herbal
- Biological
- Homotoxicology
- Ayurvedic
- Diet and nutrition
Our programs are highly individualized and exclusively tailored to each patient

- Mind – Body - Spirit
- Neurological analysis
- Sensory analysis
- Methylation analysis
- Nutrigenomics and Epigenetics
- Testing for TBD and other infections
- Testing for biotoxin illness
- Nutrition and Diet
- Family dynamics
MRI NeuroQuant provides us with powerful insights

Dr Joseph Jemsek talks about tick borne infections affecting the Amygdala

Amygdala is the integrative center for emotions, emotional behavior, and motivation.

Dr Charles Ray Jones says all of his patients have some degree of sensory processing Dr Ritchie Shoemaker talks about caudate nucleus, forebrain and other areas in the cortical grey matter affected by biotoxins and mold

Dr Rosario Trifiletti talks about PANS and the basal ganglia connection
Amygdala is the integrative center for emotions, emotional behavior, and motivation.

Newer research postulates that the specific function of the caudate nucleus may be to control approach-attachment behavior.

The Hypothalamus “monitors water concentration, hormone concentrations and body temperature. It is associated with feelings of rage, aggression, hunger and thirst”.

MARCoNS can produce by products that cleave the hormones and precursors in the hypothalamus.

Endocrine/hormone imbalances profoundly affect Sensory processing and autonomic balance in the body.

The neurons in the forebrain parenchyma fulfill three main functions: afferent neurons are used to transmit messages from sensory organs to the brain and Central Nervous System (CNS), while efferent neurons send information and commands from the CNS to the muscles and glands. The third type, interneurons, are used for communication between the other two types.

I think we are beginning to understand why these kids need a highly customized sensory integration intervention protocols.
In 2009, Dr Leonard Jason and his colleagues suggested that chronic long-term hyperarousal of the central nervous system – a form of limbic “kindling” – could lead to chronic sympathetic nervous system arousal which cause many of the physiological abnormalities documented in ME/CFS patients.

They include:

- immune system activation and movement from TH1 to TH2 dominance;
- up-regulation of the hypothalamic-pituitary-adrenal axis initially, which over time leads to reduced cortisol output and glandular depletion;
- disrupted ion channel transport;
- reduced grey matter in the brain; reduced GABA production; depleted acetylcholine;
- depleted antioxidant levels;
- eventually high levels of oxidative stress, increased opportunistic infections and reactivated latent infections, poor mitochondrial function and cardiomyopathy.
Wired and Tired?
2.5 year old female diagnosed with high functioning Autism.

Low muscle tone, club foot, lazy eye, swollen glands, recurring low grade fevers, multiple food allergies, thin, many words but no phrases, ADD, SPD, picky eater, GERD, constipated, low energy, angry, irritable, poor sleep, wakes up every 2-3 hours, sweats, always cold, fast learner but couldn’t retain, rashes, “stims” – hand shaking, facial grimacing, red and painful gums – won’t brush teeth.

Social, looking to interact with people of all ages, poor eye contact but good non verbal communication – touch, words, pointing, asking, curious, smart, into picture books.
Labs positive for Lyme, Babesia, Strep, Epstein Barr, Human Parvo virus and intestinal parasites

Mother reports being “outdoorsy type” and multiple exposures to ticks and currently has MS – Gestational Lyme?

Exposed to mold in preschool – 72 year old church and also at PT

Methylation SNPS – MTHFR, CBS, VDR, more

Shoemaker panel labs positive – CIRS

Brain MRI NeuroQuant – Significant findings
Mother chose to pursue biomedical and conventional treatments for Jessie to expedite recovery.

Genetically tailored biological medicines to address methylation, leaky gut and mal-absorption, parasites, detoxification, endocrine imbalance including thyroid and adrenal support, immune support, and sensory integration challenges.

Antibiotic protocol to address tick borne infections

Dr. Shoemakers protocol to treat CIRS
Jessie – 11 months later

- Fully recovered from rashes, fevers, lazy eye, swollen glands, red gums, rages, ADD
- Able to retain sensory retraining, new learning, toilet trained, speaking in phrases, great eye contact, good muscle tone, stronger muscles, able to run, more energy, improved motor planning, loves to chat, sleeping through the night, affectionate, no stims, GI regular, eats a great diet, demonstrates empathy towards older brother with Autism “Jack is having a hard day mommy. I think I should leave him alone today”, helps mom with sorting and putting away laundry, washing fruits and veggies etc 😊
- We are currently treating Jack and Jessie’s mom too and they are both recovering well.
Lifestyle Matters
For Lasting Results

Remember to keep your environment free of mold, moisture and mycotoxins and at the same time work on detoxing your body and building your immune system.
Conscious Pregnancy
Pre-conception Health
Know your (genetic) code!
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