PANDAS & PANS
An Integrative Approach

Dr. Jill Crista

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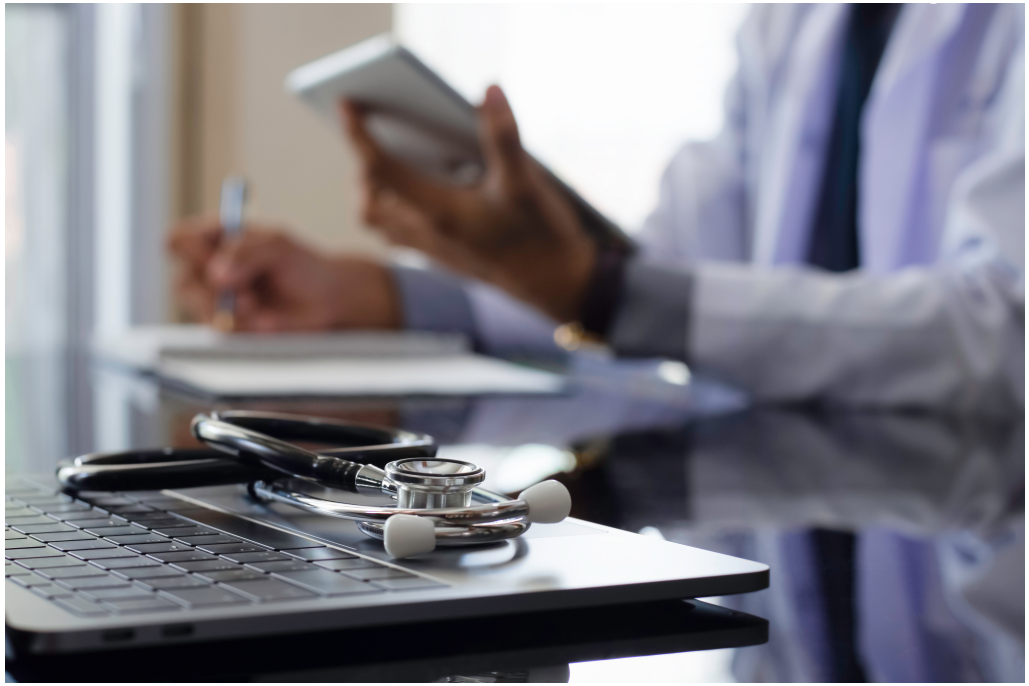
Diagnostics



Course Outline

1. Symptoms
2. Mechanisms
3. **Diagnostics**
4. Conventional treatment approach
5. Integrative treatment approach
6. Recovery essentials
7. Cases

Diagnostics

Clinical diagnosis

PE and symptoms as clues

General diagnostics

Infectious triggers

Environmental triggers

Diagnostics

Reminder ~
These are

CLINICAL DIAGNOSES

If a P/P-specific test was negative, a child can still have PANDAS or PANS.

IME, we are relying too much on antibody tests to diagnose these conditions. Because many of these kids have subclinical immune deficiency, many don't have a strong enough antibody response to affect the test. This may lead to a falsely normal test.

Be mindful of the steroid effect on antibody-based labs.

Neuro P/E relevant to BGE

Burdened appearance
Dilated pupils
Hypotonia
Motor apraxia
Dyspraxia
Normal strength
Normal reflexes, not hyperactive as in Wilson's dz
Abnormal movements
Chorea
Choreiform movements, not age appropriate
Tics
Steriotypies
Ballismus
Overall rational irrationality (they realize or have insight into the abnormality)

Presented by Dr. Elizabeth Latimer
Autoimmune Encephalitis Post-Streptococcal Evaluation & Treatment Conference Oct 2019

Honor the triggers

Once the autoimmune process has started…

Environmental exposures and infections can and will flare them.

the child knows where/who is carrying something that will put them at risk

And will tell you with their behavior - honor that.

It's not pathological. It's the innate intelligence of the system at work.

Certain spaces/places may be the trigger.

Parents/siblings/caregivers may be the trigger.

Parent self care is critical in order to not be a carrier.

Additional triggers

- Lose a tooth/dental visit
- Puberty onset
- Injury
- Sunburn
- Allergies
- Many bug bites/spider bite
- Family strife/move/loss of structure
- Loss of friendships
- Abuse

Symptoms with hints toward cause

Congenital Borrelia (Lyme) ~
 Atonia (reported 97% prevalence congenital Lyme by Dr. Charles Ray Jones)

Bartonella ~
 Rage/aggression

EBV ~
 Fatigue/“laziness”, chronic sore throat

Glyphosate + Mold ~
 Anxious

Glyphosate + Bartonella ~
 Persistent, non-specific abdominal pain

Mold ~
 Urinary frequency/urgency without infection, dysautnomia, PoTS

Mold + Bartonella ~
 Hypermobility

Candida ~
 Despair, suicidality

Diagnostics

Clinical diagnosis

PE and symptoms as clues

General diagnostics

Infectious triggers

Environmental triggers

General diagnostics

PANDAS/PANS (Cunningham)

Other neuro antibodies

Immune competence (IgGAME, PID, CVIDS, lymphocytes)

Imaging - Neuroquant

Food sensitivity

Sinunasal microbiologics

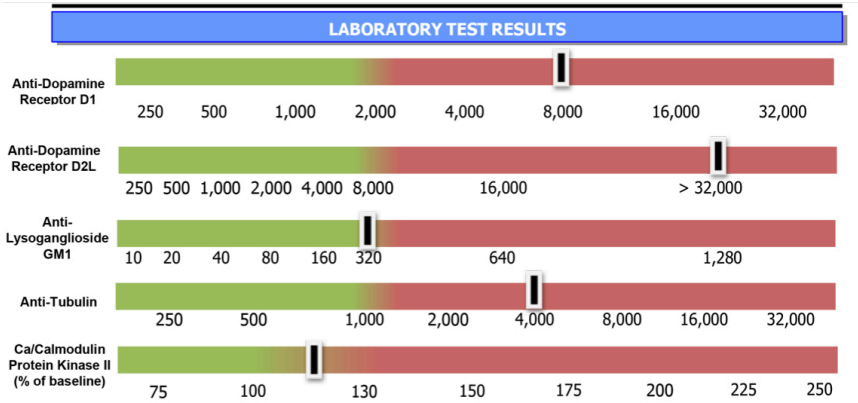
Drug metabolism

Genetic predispositions/expressions

Testing for coverage

On the horizon

Cunningham Panel ™



Considered (+) if one or more of these markers is elevated.

Suggests that neuropsych sxs may be due to an autoimmune process.

5 markers:

1. Anti-Dopamine D1 Receptor (psychosis, OCD and tics)
2. Anti-Dopamine D2L Receptor (uncontrolled motor movements, hyperactivity and impulsivity)
3. Anti-Lysoganglioside-GM1 (sleep disturbances, behavioral regression, obsessions/compulsions)
4. Anti-Tubulin (OCD-like symptoms and cognitive impairment/brain fog)
5. Calcium/calmodulin-dependent protein kinase II (CaMKII) (involuntary movements, cognitive interference, emotional lability

CaMKII is a cell stimulation assay; measures the ability of a patient's autoantibodies to stimulate the CaMKII enzyme in human brain cells. The CaMKII is involved in upregulating the production of neurotransmitters – dopa, epi, and NE.

Best suited to classic PANDAS?

Autoantibodies

Antinuclear antibodies multiplex, reflex to dsDNA, RNP, Sm, SS-A, SS-B

Demyelination Antigens ~
- Anti-tubulin IgM/IgG+IgA
- Anti-myelin basic protein IgM/IgG+IgA

BBB Disruption ~
- Anti s100b IgM/IgG+IgA (*increases with exercise)

Optical and ANS Disorders ~
- Anti-neuron specific enolase IgM/IgG+IgA

Peripheral Neuropathy ~
- Anti-GM1 IgM/IgG+IgA
- Anti-GM2 IgM/IgG+IgA

Brain Autoimmunity ~
- Anti-HSV1 IgM/IgG+IgA
- Anti-cerebellum IgM/IgG+IgA
- Anti-purkinje cell IgM/IgG+IgA
- Anti-pituitary antibodies (APA) (hypophysitis post TBI)

Immunocompetence

Quantitative IgGAME with IgG subclasses ~
Red top tube or SST? Depends on goals for testing.
Serum separator will bind some antibodies and under-report, esp in those with low Ig's.
(🙏 Dr. Paul Anderson)

NOTE that all antibody-based testing will be affected by IVIG, including other autoimmune and infection.

Lymphocyte Subset/Differential Panel ~
Offers the advantage of detecting the cell type that causes the immune defect.

3 types of lymphocytes: B, T and NK cells.
All share the same progenitor cells: hematopoietic stem cells in the bone marrow, which then give rise to multipotent progenitors, to early lymphocyte progenitors (ELP) and eventually to the differentiated progenitors of NK, B or T cells.
B and T lymphocytes are both antigen-specific lymphocytes and the main regulators of the adaptive immunity.
NK cells, in contrast, are not antigen-specific lymphocytes, thus belonging to the innate immune system.

PMID: 30248214

B cell differentiation

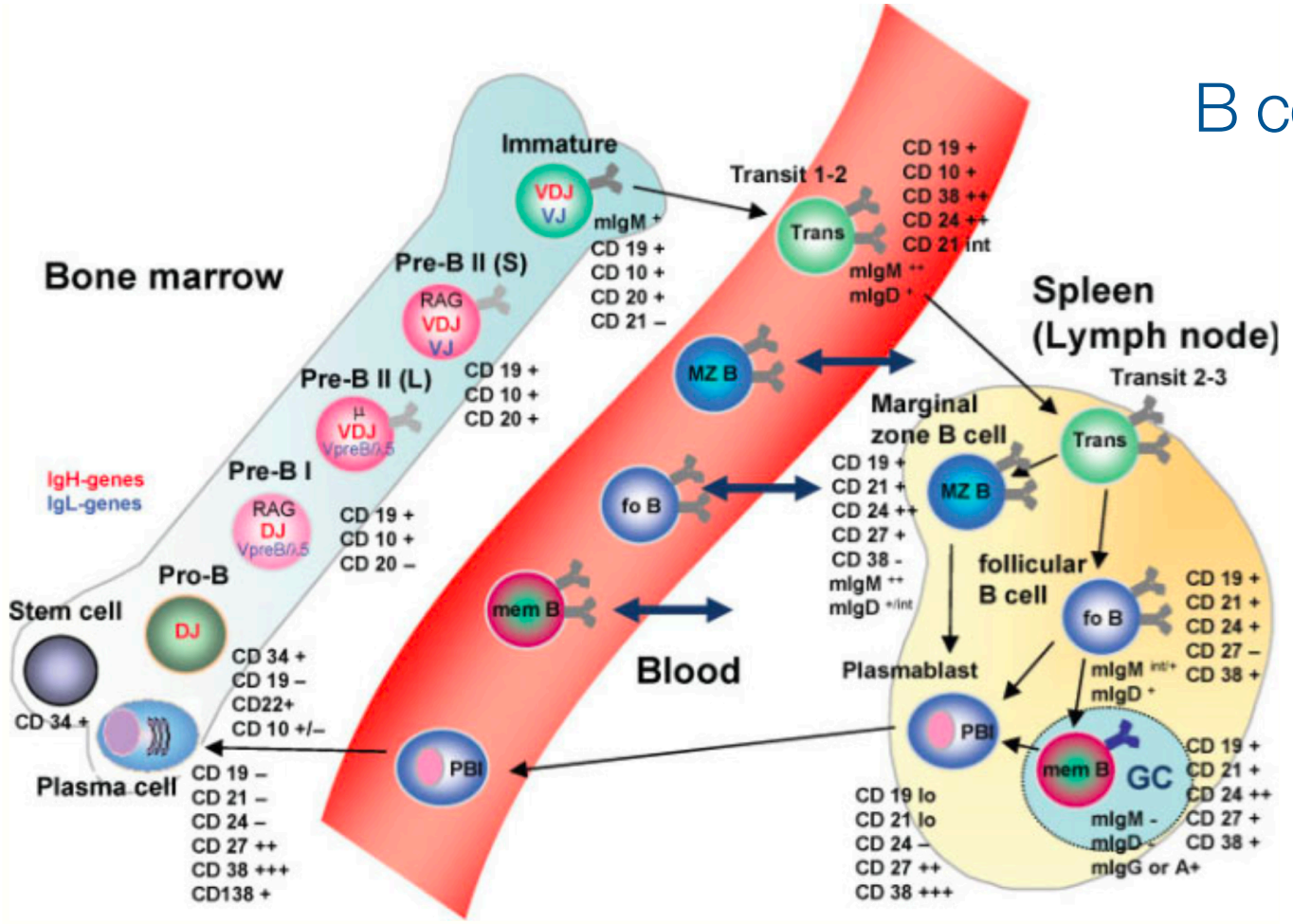


Fig. 1 The central and peripheral development and differentiation of B cells. fo B, follicular B cell; GC, germinal center B cell; mem B, memory B cell; mIg, memory immunoglobulin; MZ B, marginal zone B cell; PBl, plasmablast; Trans, Transitional B cell. Reproduced with permission from Warnatz and Schlesier.[10]

PMID: 30248214, 31694331

CD antigens, also known as cluster of differentiation, are cell surface antigens of leukocytes.

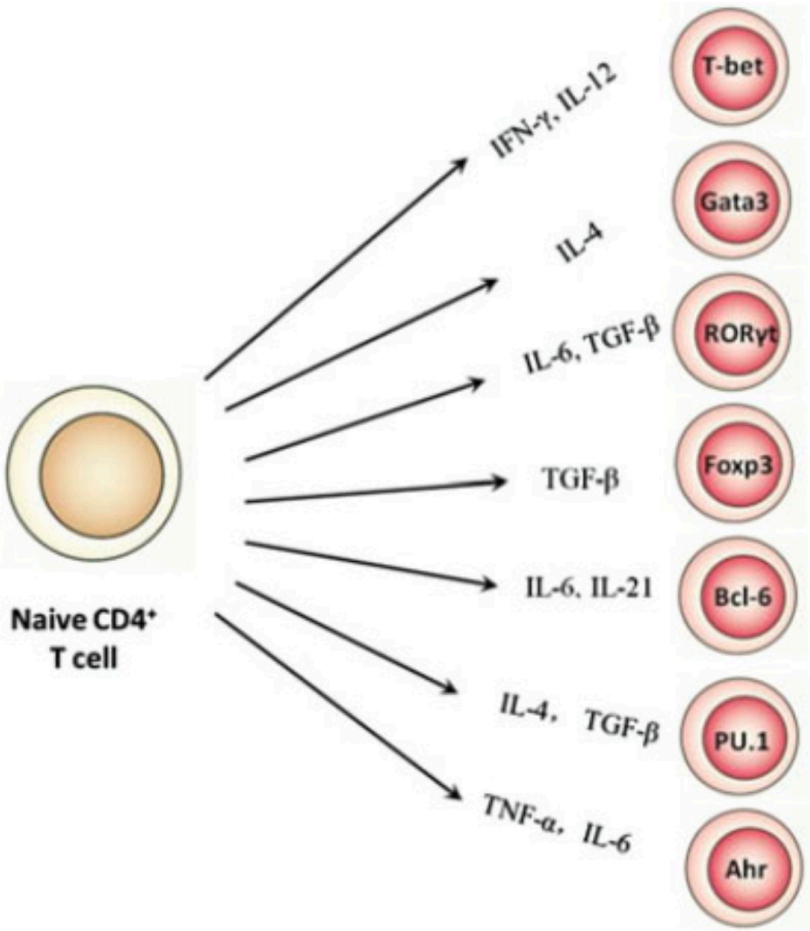
May be expressed only at certain stages of development or under certain conditions.

Some of the surface antigens are useful for delineating the cell lineage of leukocytes.

Mycotoxins dysregulate T and B cell differentiation at multiple steps —> immunosuppressive effects, such as CD27 depletion, related to multiple myeloma.

T cell differentiation

Determined by the inflammatory milieu



Th1: IFN-r
Defense against intracellular parasites

Th2: IL-4, IL-5, IL-13
Control helminths and extracellular pathogens.
Allergic inflammation

Th17: IL-17
Defense extracellular bacteria or fungi.
Autoimmunity

Treg: TGF-β, IL-10
Immune homeostasis

Tfh: IL-21
Help B cell to make antibodies, Affinity maturation and antibody class switching

Th9: IL-9
Skin homeostasis, Tissue infalmmation.

Th22: IL-22
Tissue inflammation

PMID: 30248214

Identifying Primary Immunodeficiency

Low absolute lymphocyte count (<3,000/mm^3) suggests a cellular immunity defect and constitutes a strong indication for lymphocyte subset count (LSC).
*However, normal ALC cannot exclude such a defect.

LSC is one of the initial screening tests by general pediatrician for investigation of an immunological patient, with LSC being affected by age (Table 2 - next slide.)

Imperative to order LSC when a child presents with recurrent or opportunistic infections and the ALC is <3,000/mm^3.

Combination of good clinical examination with good interpretation of LSC will facilitate the dx of most of the common PID.

Approximately 50%–60% of all identified PID are caused by defects in antibody production. Such patients usually develop upper and lower respiratory infections, especially from encapsulated bacteria, as well as chronic GI infections from Giardia lamblia or enterobacteria.

A characteristic feature of these humoral immunity defects is the deterioration of the clinical profile after the first 6 months of life, as the levels of maternal antibodies start to recede.

PMID: 30248214

Table 2 Lymphocyte subset percentages in healthy children: Distribution by age (reproduced with permission from Shearer *et al*[18])

Subset	*n*	0–3 months Median (range)	3–6 months Median (range)	6–12 months Median (range)	1–2 years Median (range)	2–6 years Median (range)	6–12 years Median (range)	12–18 years Median (range)
3	709	73 (53–84)	66 (51–77)	65 (49–76)	65 (53–75)	66 (56–75)	69 (60–76)	73 (56–84)
19	709	15 (06–32)	25 (11–41)	24 (14–37)	25 (16–35)	21 (14–33)	18 (13–27)	14 (06–23)
16/56	784	8 (04–18)	6 (03–14)	7 (03–15)	7 (03– 15)	9 (04–17)	9 (04–17)	9 (03–22)
4	709	52 (35–64)	46 (35–56)	46 (31–56)	41 (32–51)	38 (28–47)	37 (31–47)	41 (31–52)
8	709	18 (12–28)	16 (12–23)	17 (12–24)	20 (14–30)	23 (16–30)	25 (18–35)	26 (18–35)
4/45RA/62L	805	89 (61–94)	88 (64–92)	83 (58–91)	79 (62–90)	70 (50–85)	58 (42–74)	51 (31–65)
8/45RA/62L	807	79 (56–88)	77 (53–88)	72 (47–87)	71 (46–85)	64 (42–81)	58 (39–73)	56 (42–73)
4/45RA	805	90 (64–95)	90 (77–94)	86 (64–93)	81 (63–91)	71 (53–86)	59 (46–77)	53 (33–66)
8/45RA	807	93 (80–99)	94 (85–98)	91 (75–97)	89 (71–98)	86 (69–97)	80 (63–92)	79 (61–91)
4/DR/38	805	3 (01–06)	4 (02–09)	4 (01–09)	5 (02–09)	5 (02–09)	4 (01–08)	3 (02–06)
8/DR/38	807	5 (02–17)	7 (03–16)	8 (03–25)	15 (05–30)	13 (05–29)	9 (02–20)	7 (03–18)
4/DR	805	3 (02–06)	5 (02–10)	5 (02–11)	6 (02–11)	7 (03–12)	6 (03–13)	7 (04–11)
8/DR	807	5 (02–20)	7 (03–17)	10 (04–27)	16 (06–33)	16 (07–37)	12 (06–29)	12 (05–25)
4/38	805	98 (95–99)	96 (90–98)	95 (89–97)	93 (85–97)	87 (74–94)	79 (64–86)	69 (50–79)
8/38	807	97 (89–99)	95 (83–98)	93 (78–98)	91 (73–97)	82 (52–93)	70 (42–86)	64 (33–80)
4/28	806	99 (95–100)	99 (88–100)	98 (90–100)	98 (94–100)	98 (92–99)	98 (92–100)	97 (89–100)
8/28	806	76 (54–87)	75 (43–87)	70 (42–83)	69 (49–81)	63 (42–79)	60 (42–78)	58 (39–76)
4/95	806	11 (05–21)	14 (08–21)	18 (11–34)	23 (11–39)	31 (21–45)	39 (24–53)	49 (32–66)
8/95	806	12 (02–33)	15 (06–36)	22 (08–47)	31 (07–50)	34 (12–57)	36 (10–62)	44 (15–71)
3/4/45RO	676	10 (02–22)	8 (03–16)	9 (05–18)	12 (07–20)	16 (09–26)	21 (13–30)	28 (18–38)
$3/4^{-}$/45RO	672	3 (01–09)	3 (01–07)	3 (01–08)	6 (02–12)	9 (04–16)	12 (04–21)	13 (04–23)
3/45RO	676	14 (03–31)	13 (04–24)	12 (06–25)	19 (09–31)	27 (15–41)	33 (20–46)	41 (24–57)
3^{-}/19/38	686	49 (13–75)	66 (00–82)	66 (01–78)	60 (00–79)	55 (01–70)	39 (00.60)	19 (00–57)
3^{-}/19	686	50 (14–76)	69 (00–84)	67 (01–80)	63 (00–80)	61 (02–76)	46 (00–67)	21 (00–60)

PMID: 30248214

Common Variable Immunodeficiency (CVID) in peds

Mean age at symptom onset was 18 (3-204) months.

All CVID patients with pediatric onset had decreased levels of total and memory B cells, CD4+ T cells, CD4+CD45RA+ naive T cells, and recent thymic emigrant (RTE) cells.

On the other hand, they had increases in CD8+CD45RO+ memory T cells.

Specific cellular abnormalities associated with the reduction in B and NK cells and increase in CD8+ T cells were found in patients with bronchiectasis.

In pediatric CVID patients, low serum IgA levels and decreased numbers of naive T and RTE cells were determined as risk factors for chronic diarrhea.

PMID: 31901904

Neuroquant MRI

Specialized MRI must be run at specific Neuroquant centers.
- TBAR with asymmetry
- may need to order Brain Development report b/c TBAR changes may reflect neuronal development. (Dr. Gazda)

Does not require contrast. Age- and gender-matched controls.

Normal = 40-60 percentile.

May display enlargement of the caudate.
- Blue = edema/inflammation
- Red = atrophy

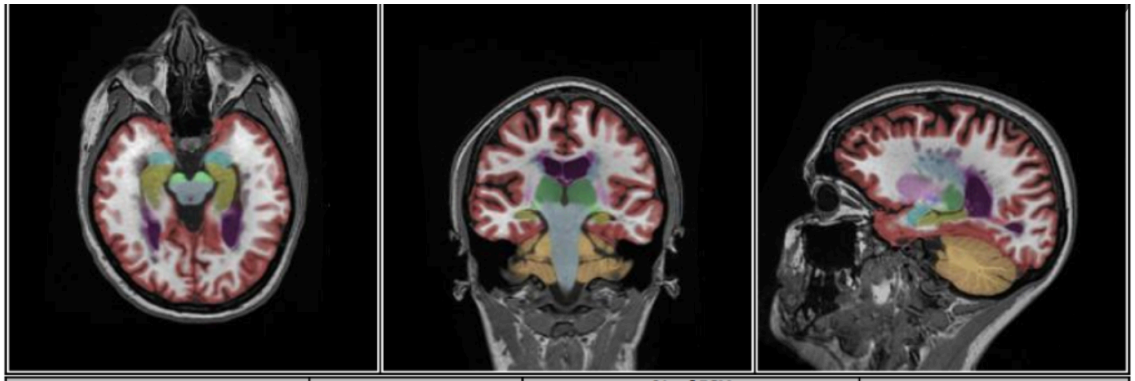
Thalamus >90% mold and Lyme. (Dr. Ackerly)

Not ideal for child with tics, as they can't remain still for imaging.

Also not ideal for sound sensitive child or child who cannot tolerate ears being covered.

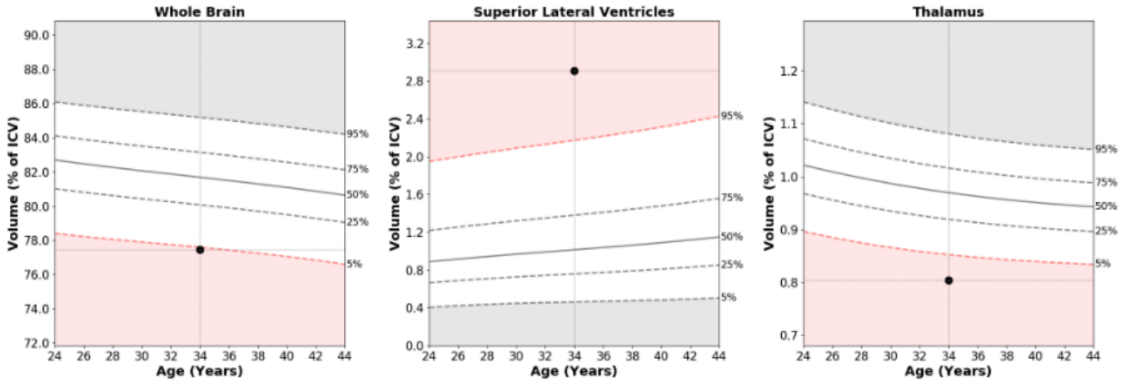
Braces/retainers will alter findings.

Neuroquant Ped Multistructure Atrophy Report

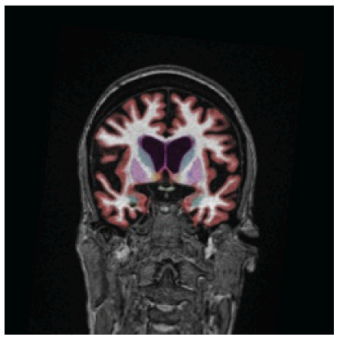
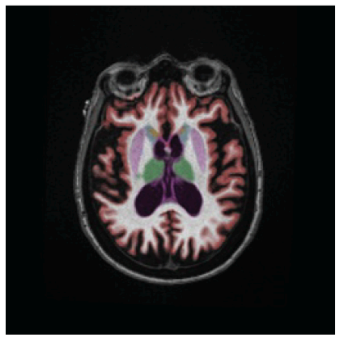
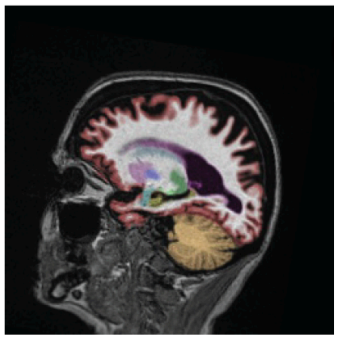


Brain Structure	Volume (cm³)	% of ICV (5%-95% Normative Percentile)	Normative Percentile
Whole Brain	1201.05	77.46 (77.59 - 85.18)	5
Superior Lateral Ventricles	45.14	2.91 (0.46 - 2.17)	99
Thalamus	12.46	0.80 (0.85 - 1.08)	1

AGE-MATCHED REFERENCE CHARTS



Neuroquant Triage Brain Atrophy Report TBAR

Brain Structure Volumes

Brain Structure	Volume (cm^3)	Normative Percentile
Intracranial Volume	1433	-
Whole Brain	918	1
Forebrain Parenchyma	775	1

Brain Structure	Normative Percentiles		
	Left	Right	Total
Cerebral White Matter	1	2	2
Cortical Gray Matter	1	1	1
Ventricle	99	99	99
Cerebral WM Hypointensities*	91	97	96
Subcortical Structures			
— Cerebellar White Matter	95	99	98
— Cerebellar Gray Matter	13	20	16
— Brainstem	-	-	3
— Thalamus	2	4	2
— Ventral Diencephalon	26	29	27
Basal Ganglia			
— Putamen	3	5	4
— Caudate	54	74	65
— Nucleus Accumbens	2	38	9
— Pallidum	1	1	1
Cingulate	55	25	35
— Anterior Cingulate	99	32	77
— Posterior Cingulate	69	85	79
— Isthmus Cingulate	1	5	1

*White matter hypointensities are abnormally low signal intensity regions within the white matter as observed on a T1-weighted MRI scan.

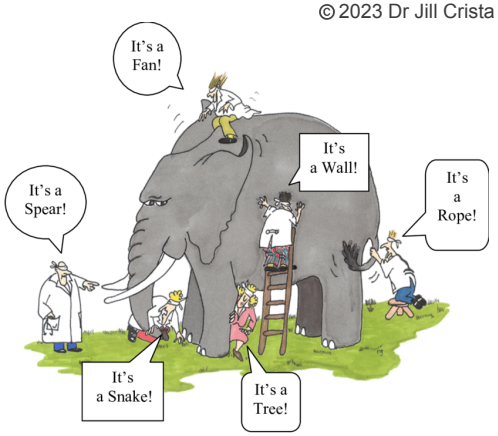
Color Code Key:

Pink: A tissue is below the 5th percentile OR a ventricle that is above the 95th percentile OR WM hypointensity that is above the 50th percentile.

Blue: A tissue is above the 95th percentile OR a ventricle is below the 5th

Brain Structure	Normative Percentiles		
	Left	Right	Total
Frontal Lobe	1	1	1
— Superior Frontal	1	1	1
— Middle Frontal	9	1	1
— Inferior Frontal	14	7	7
— Lateral Orbitofrontal	1	17	2
— Medial Orbitofrontal	3	1	1
— Paracentral	1	1	1
— Primary Motor	1	1	1
Parietal Lobe	1	1	1
— Primary Sensory	1	1	1
— Medial Parietal	1	1	1
— Superior Parietal	1	1	1
— Inferior Parietal	1	1	1
— Supramarginal	1	1	1
Occipital Lobe	1	1	1
— Medial Occipital	4	1	2
— Lateral Occipital	1	1	1
Temporal Lobe	1	1	1
— Transverse Temporal + Superior Temporal	1	1	1
— Posterior Superior Temporal Sulcus	1	1	1
— Middle Temporal	1	1	1
— Inferior Temporal	1	1	1
— Fusiform	1	1	1
— Parahippocampal	23	18	17
— Entorhinal Cortex	1	1	1
— Temporal Pole	1	1	1
— Amygdala	1	1	1
— Hippocampus	1	1	1

Food sensitivities



Proteins vs Peptides

Proteins ~

Measure immune system reactivity to whole, undigested, multi-dimensional (ie: 4D) proteins.

Challenges: only detect one aspect of "the elephant in the gut"

Limited to testing the water-soluble portions of proteins, leaving out non-water-soluble peptides (ie: gluten).

Peptides ~

Measure immune system reactivity to the small, typically not water-soluble, 2D peptides created when whole proteins are digested.

Reduces cross-reactivity; increased sensitivity because peptides are highly specific to the food from which they are derived.

Antibodies to a whole protein will not recognize or bind peptides, even if those peptides are found in that whole protein.

Clinically, testing for food sensitivities at the peptide level in addition to whole protein eliminates uncertainty around food reactions.

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Sinunasal microbiologics

Colonization involves a mixed microbial presence.

Marcons - yes, it's still "a thing", but other culprits are Pseudomonas and Klebsiella

Chronic rhinosinusitis patients undergoing endoscopic sinus surgery. Those with biofilm had ~
More severe disease preoperatively
Persistence of postoperative sxs
Ongoing mucosal inflammation
Increase infections

Fungal cultures inherently under-report due to inappropriate medium and duration (fast-growing species eat all the food, miss more pathogenic species.)

Dx via NGS qPCR and appropriate culturing.

Drug metabolism genetics

Ultrasensitive to psychiatric medication ~
Due to BBB integrity or genetics?

Better to know child's drug clearance *before* prescribing, especially if the effect is slower metabolism and reduced drug clearance, concentrating the drug.

Testing provides Gene-Drug interaction chart.

Also be familiar with co-enzymes that up- or down-regulate that pathway.
ie: B2, B6, NAD

Genetic predispositions/expressions

PANS: HLA alleles:

HLA-B 38, 52, 55

My own observations:

Snps related to IgG: Fcγ Receptors

Snps related to NTs: COMT, MAOA

Snps related to detox:

Phase I: CYP1A2, CYP1B1, CYP3A4 (mold)

Phase II: GSTM1, MTHFR, SUOX

Snps related to histamine: DAO

Metagenomics/metabolomics

The fine art of insurance coverage

Set up for IVIG coverage in case it's needed in the future (analogous to starting an IV in the ER)

don't put PANDAS or PANS Dx in chart, unless you're in a state which mandates coverage

Test IgG and IgA (plus subclasses) ~
- Using SST tubes
- Test after 3 weeks without any integrative supportive measures (test the child's true nature.)
- Test at the tail end of a steroid burst, if needed.

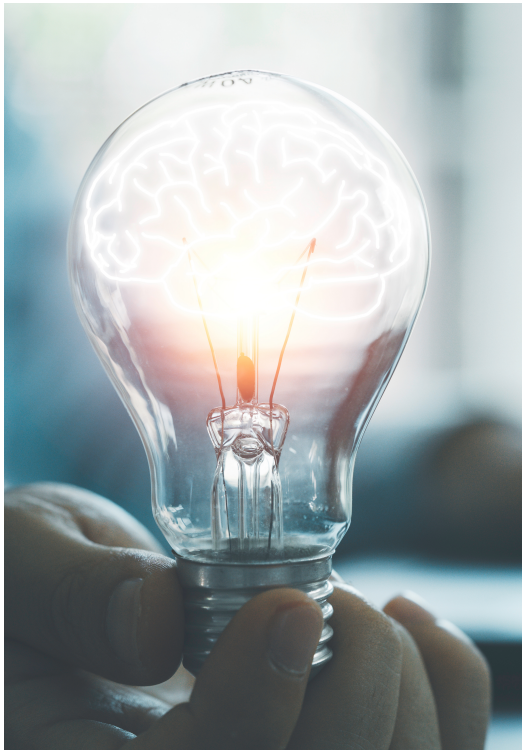
Also engage parent help. Bring child in every time they get sick to get it on the medical record.

Parent needs to keep school absence records, sports absence records, performance absences, etc.

Cautions ~
Zinc lozenges, silver nasal sprays, propolis throat sprays turn positive Strep tests to negative.
Diet, supplements, sleep routines, chiropractic adjustments, and all the other integrative treatments really work! We see immune numbers improve, which is great for the child, but bad for proving the need for treatment.
A hiatus helps reveal the baseline.

Pneumococcal vaccine titers are not necessary, plus may be falsely lower in kids with hypogam. Push back against insurance on this.

On the horizon?



Metagenomics: NGS qPCR of brain/CSF

Metagenomic NGS is a novel diagnostic test with the potential to revolutionize the diagnosis of pediatric meningitis and encephalitis through unbiased detection of bacteria, viruses, parasites, and fungi in cerebrospinal fluid.

"We recommend NGS should be considered as a *front-line diagnostic test in chronic and recurring presentations* and, given current sample-to-result turn-around times, as second-line in acute cases of encephalitis."

PMID: 29305150, 34951470

Diagnostics

Clinical diagnosis

PE and symptoms as clues

General diagnostics

Infectious triggers

Environmental triggers

Infectious triggers

Group A Beta-Hemolytic Streptococcus Pyogenes

Mycoplasma pneumonia

Chlamydia pneumonia

Bartonella species

Borrelia species (Lyme and Tickborne Relapsing Fever [TBRF])

Encephalitis viruses

Influenza

SARS-CoV-2

Periodontal

Streptococci

Streptococci are part of the normal human respiratory flora

Commensal and non-commensal - most are protective

Passed by respiratory droplets and saliva ~
Not considered highly transmissible on surfaces but is possible

Immunity to one strain does NOT confer immunity to any other

20 different subgroups of beta-hemolytic strep; not a homogenous population ~
Hundreds of different strains (220 M proteins x 25 T proteins)
Capsule is different for each of the Lancefield groups
Exotoxins also different

High antigenicity of Streptococcal exotoxins ~
Can turn on 20-40% of T-cells
This is how Strep doesn't need to be *in* the brain to affect the brain.

B. J. B. Wood et al. (eds.), The Genera of Lactic Acid Bacteria © Chapman & Hall 1995

Group A Strep (GAS)

GAS is the dominant respiratory pathogen ~

Accounts for 20%-40% of cases of pharyngitis in children; the remaining are caused by viruses

GAS infections ~

Strep pharyngitis, otitis media, sinusitis, skin infections (perianitis)

Colonization posited in sinuses and GI

GAS sequelae ~

Scarlet fever, cellulitis, necrotizing fasciitis, rheumatic fever, Streptococcal toxic shock syndrome, and post-Streptococcal glomerulonephritis

Strep shoots the messenger

Rewires the immune system for its survival

Unique in its abilities to ~
Direct I/S remodeling in nose/throat (possibly perianally)
Promote its own replication
Alter I/S responses

“Shoots the messenger”: GAS virulence factors modulate maturation and survival of dendritic cells (DC) aka the “delivery" cells, effects that are likely to have a critical impact on activation of innate and adaptive immune responses.

Only 6 of 24 GAS strains tested induced surface expression of MHC class II and co-stimulatory molecules consistent with DC maturation.

The majority of the strains did not promote DC maturation, and many triggered DC apoptosis.

PMID: 19712038

Strep Pharyngitis (GAS)

Symptoms ~

- Sore throat
- Pain with swallowing
- Red or swollen tonsils
- Swollen cervical lymph nodes
- Fever
- Headache
- Red petechiae or pinpoint dots on the roof of the mouth
- Angular cheilitis

Ddx ~

Viral cause. Children with Strep pharyngitis typically do not have cough, runny nose, hoarseness, mouth ulcers, or pink eye. These symptoms suggest a viral cause.

Seasonality ~

Winter & spring

Perianal Strep Dermatitis (GAS)

Symptoms ~
- Red rash around the anus with a well-defined margin
- Sore rectum or anus
- Anal pruritus
- Pain with bowel movements or when wiping
- Constipation

Ddx ~
- Candidiasis, pinworms, eczema, and contact dermatitis from soaps, detergents, and fragrances

Seasonality ~
- Winter & spring

Culture all perianal rashes AND culture to confirm successful treatment.
- Not uncommon to have pharyngeal culture neg, but perianal positive.

Skin infections: Suppurative

Impetigo - honey-colored crust, superficial - heals without scarring.

Ecthyma - deeper lesion, below dermis, indolent. Starts as a pustule and erodes to an ulcer. Often multiple lesions.

Erysipelas - raised red rash with very sharp borders. In the lymphatics of the skin. Fever and pain from skin swelling. IV Abx.

Cellulitis - border vague and irregular. Skip areas/bare areas. Painful, may not have fever. Associated with a break in skin.

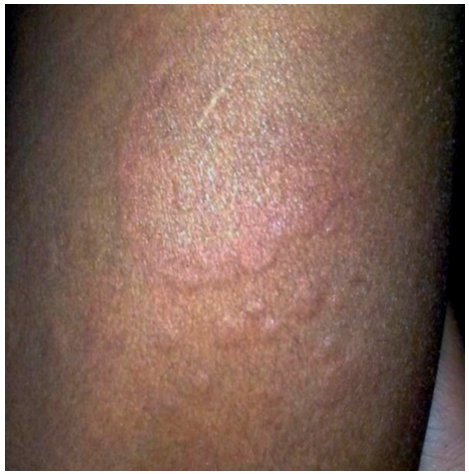
Lymphangitis - rapidly progressive infection with initial cutaneous focus but spread of infection through lymphatics.

Necrotizing fasciitis/streptococcal myositis - Streptococcal gangrene. Superficial and possibly deep layers of muscles are killed. Pain and swelling are disproportionate to everything else. Needs surgery.

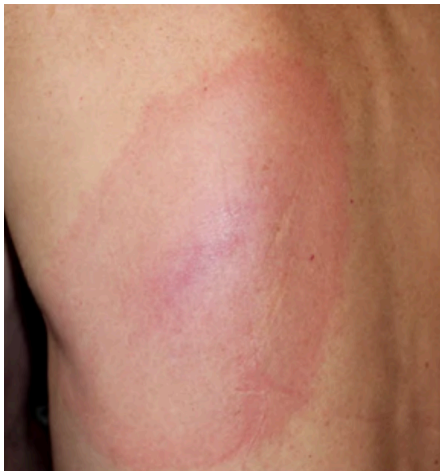
Streptococcal pupa fulminans - Skin and all structures underneath necrose. Blood vessels thrombose. + blood culture usually.

Skin: Nonsuppurative

marginatum (Strep)



migrans (Borrelia)



Sandpaper skin

Desquamation fingers/toes (also mold)

Fingernail/1˚ thumb - splinter hemorrhages

Scarlet fever: strain dependent. Diffuse erythematous rash due to the production of pyrogenic exotoxin, most commonly assoc w pharyngitis.

Scarlet fever - forms pastia's lines (bright red coloration of the creases under the arm and in the groin), strawberry tongue.

Guttate (drop-like) psoriasis.

Erythema marginatum - assoc w ARF. Rash location may change over time. Pink to red with central clearing and serpiginous (wavy) spreading edges and often are unnoticed by the patient or parent because they are painless and non-pruritic.
(distinction from Lyme erythema migrans.)

PMID: 27051572; Steere, A., Strle, F., Wormser, G. et al. Lyme borreliosis. Nat Rev Dis Primers 2, 16090 (2016). https://doi.org/10.1038/nrdp.2016.90

Other exposures

Strep “carriers” ~
- Check parent/siblings tonsils
- Often child’s are small and parents/siblings are enlarged or boggy (may also be EBV)
- Check skin infections of other family members

Pets ~
- Animals cannot get infected by Strep as it’s strictly a human pathogen
- Transfer via saliva from licking carrier’s face or skin infection

Probiotics ~
- Until we know which peptide or protein induces an immune reaction, I recommend **avoiding Strep-based probiotics**

Neonatal (Group B)

Group B Streptococcus

Debated the degree to which Group B Strep in mom before birth contributed to the development of PANDAS, but doctors specializing in PANDAS have reported a correlation.

Vaginal swab culture

Why worry about Strep in PANS?

Strep is kryptonite in kids with PANDAS -and- PANS

Even though it may not have been the triggering infection, Strep can trigger flares in PANS.

Strep detection

Culture culture culture ~

Antibody response is more complex than previously understood. A negative rapid strep test can still be culture positive. F/U negative rapid with culture.

Rapid strep tests ~

Very high specificity (98-99%) = very few false positives.
However, sensitivity lower (90-95%) = greater chance of false negatives.
Package insert recommends F/U negative tests with a culture.
Lawsuits against docs who didn't F/U with culture, missed Strep, and serious sequelae.

Cochrane Database Systematic Review 2016 ~

Out of 100 children with strep throat:
- 86 would be correctly detected with the rapid test
- 14 would be missed and not receive antibiotic treatment

Is clinical over-reliance in rapid strep tests a contributing factor for the rise in PANDAS/PANS?

PMID: 27374000

Additional Strep labs

Anti-DNase B - repeat in 2–6 weeks for antibody rise or fall
Note: not anti-human DNA. DNase B or Deoxyribonuclease B is an antigen produced by group A streptococci which contributes to Strep's pathogenicity.

ASO - repeat in 2–6 weeks for antibody rise or fall ~
Significant prevalence of seronegative ASO (Dr. Cleary)

Streptozyme - similar to Anti-DNase B.

How to test others if not your patient? (harder since EMR)

Mycoplasma pneumonia

Look for it, and look again, and again. It's ubiquitous and often asymptomatic or only mild illness.

Shares many of the same skills as Strep in evading the I/S and affecting the brain. Second most favorite places to play in the body are brain and CNS.

Can cause encephalitis. CNS complications are seen more so in kids. Just like Strep, certain proteins on Mycoplasma mimic brain tissue.

Been shown to be able to persist in an intracellular environment. Antibiotic resistance issues.

Do not develop lifelong immunity to Mycoplasma.

More common in the winter and is estimated to be much more common than previously understood.

A super-spreader: takes up to 3 weeks before symptoms develop and is shed from the respiratory tract for many weeks after symptom abatement.
Equates to **up to 6 weeks of potential transmissibility with one infection**.

Sometimes, Mycoplasma's main hideout is the tonsils. For children whose tonsils have become Mycoplasma reservoirs, removing the tonsils may be helpful.

Mycoplasma pneumonia symptoms

Symptoms of respiratory Mycoplasma in children under 5:

- Watery eyes
- Runny nose or sneezing
- Sore throat
- Digestive changes such as diarrhea or vomiting

Symptoms of respiratory Mycoplasma in children 5 years or older:

- Feel tired
- Low-grade fever
- Sore throat
- May have a headache
- Slowly worsening dry cough that may last for weeks

The cough is normally dry. Even though it commonly takes weeks for the cough to go away, it should stay dry. If the cough becomes productive, and is accompanied by worsening fever or chills, or feeling SOB, r/o “walking pneumonia”.

Mycoplasma may cause other non-lung symptoms, such as achy muscles and joints, skin rashes, heart symptoms, liver inflammation, and eye symptoms such as pink eye and anterior uveitis.

Also mimics RBCs and can lead to hemolytic anemia. May be mistaken for Babesia, which infects RBCs and causes many of the same circulatory symptoms.

Mycoplasma detection

IgG may or may not be positive with a positive IgM.

IgM remains positive much longer than other microbes, so can be a false positive.

Confirm IgM+ via immunofluorescence (Mayo) - titers vary wildly by the moment.

T-cell option

Chlamydia pneumonia

Respiratory infection, not the STI Chlamydia trachomatis.

Obligate intracellular bacteria that infects the respiratory epithelial tissue and may play a role in chronic inflammatory dzs.

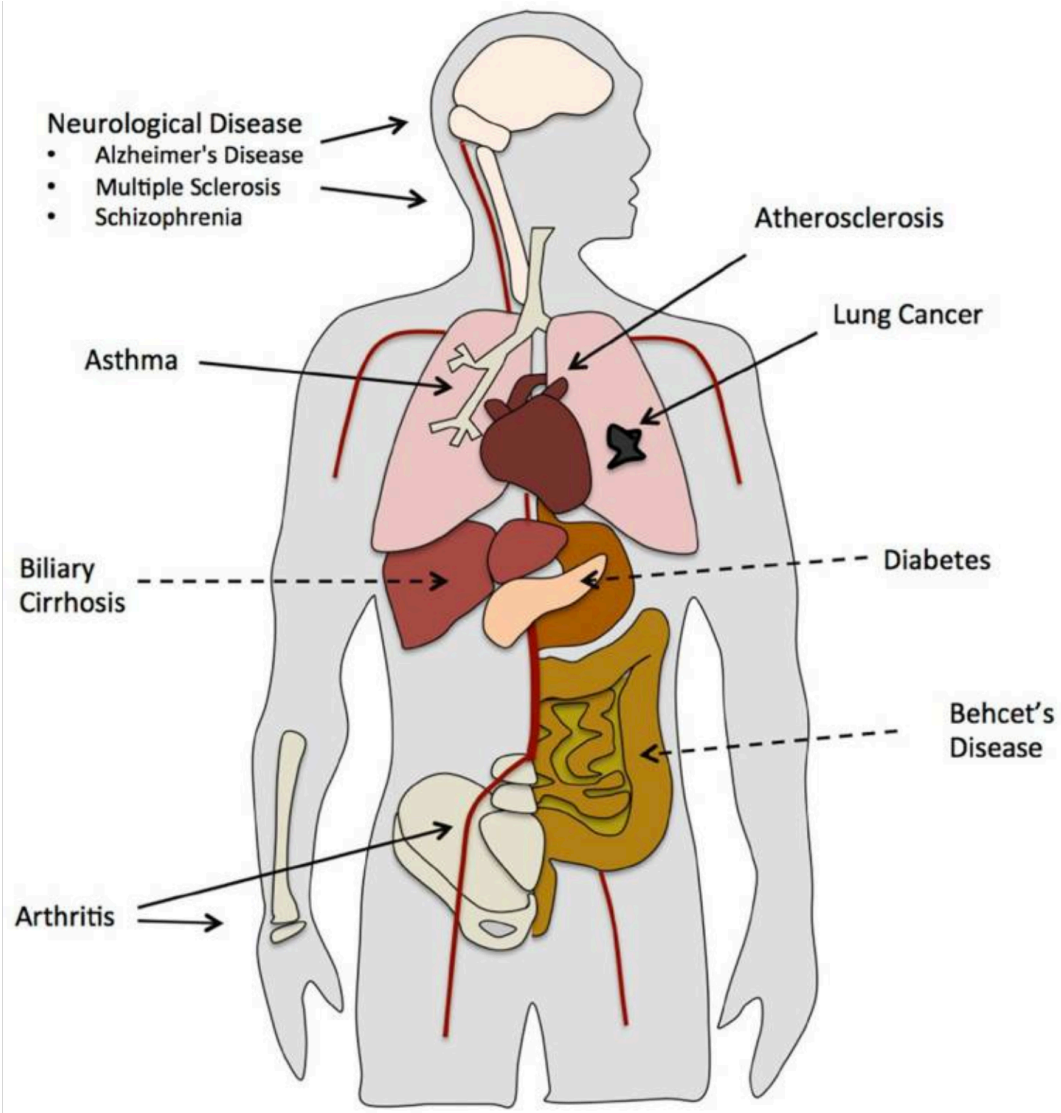
Majority of individuals are exposed throughout their lifetimes with an antibody prevalence of 50% by age 20 and 80% by 60–70 years old.

Predominantly asymptomatic or mild, but can result in the development of acute upper and lower respiratory illness including bronchitis, pharyngitis, sinusitis, and pneumonia/community-acquired pneumonia.

CNS can also be a target.

Co-infection of C. pneumoniae and M. pneumoniae with SARS-CoV-2 is associated with more severe features.

PMID: 30687565, 23218799, 11371760, 33482238



C. pneumonia

May contribute to a range of inflammatory diseases.

Dissemination from the lung throughout the body can possibly lead to atherosclerosis, arthritis, as well as neurological diseases, such as Alzheimer's, MS, and schizophrenia.

May also be associated with biliary cirrhosis, diabetes, and Behcet's disease.

C. pneumonia detection

T-cell

Chronic infection is somewhat more difficult to determine and requires the detection of persistent IgG levels, which is complicated by the fact that IgG has a half-life of weeks to months and may therefore be present for some time following acute infection.

It has been proposed that IgA levels may provide a better indication of chronic infection, but according to Dowell et al., the use of IgG and A serological markers alone should not be used.

Identification of C. pneumoniae messenger RNA (mRNA) by PCR can also be used to determine whether C. pneumoniae is in a metabolically activated state.

PCR detects presence within tissues (ie: tonsils.)

PMID: 8665464, 11462186

Bartonella spp

Include a number of different species, which are growing in number as detection improves.

Transmitted through flea bites, tick bites, and scratches or bites from an infected animal. Vertical transmission during pregnancy.

Best known as cat scratch fever, but that's misleading.
- A scratch isn't required (vector bite).
- Not just cats - also dogs, rabbits, and many other pets such as hamsters and gerbils.

Can disperse far and wide in the body, and can migrate in and out of the blood. This causes a relapsing-remitting pattern, making it quite difficult to discern between a chronic Bartonella infection and a PANDAS or PANS flare.

Each species causes a slightly different symptom picture, which makes diagnosis difficult. There are commonalities based on favorite tissues to infect, those being the brain, nervous system, and connective tissue, especially collagen.

Bartonella

Formerly, considered an issue only for those with severe immune compromise.

New research is supporting what many of us working with P/P kids have found—it's far more common and often chronic. May even be "asymptomatic", but with the rising prevalence of anxiety and hypermobility in kids, one wonders about that.

Anxiety is the most common brain-related symptom with Bartonella, as well as neuropathies. We also see mood swings that can be quite drastic and seemingly unprovoked. These may present as out-of-control anger and rage events.

Regarding connective tissue, research suggests that Bartonella impairs collagen synthesis and repair. (So does mold.) This mechanism accounts for the "Bartonella stretch marks."

This collagen-interrupting effect is why many cases of hypermobility are due to undetected, chronic Bartonella in kids and teens living in moldy environments.

We worry about Bartonella's effect on the connective tissue of our hardest-working tissues, such as the eyes and the heart, where it can weaken and infect the heart valves.

Acute cases typically fit the classic s/sxs, but chronic Bartonellosis is missed frequently due to the variance in how it presents in different children.

Acute Bartonella spp

Fever

Ice-pick pains, especially of the ear

Skin rashes or nodules

Stretch marks that don’t blanch

Extremely enlarged lymph nodes

Anger or rage events

Hemolytic anemia

Joint pain

Uveitis

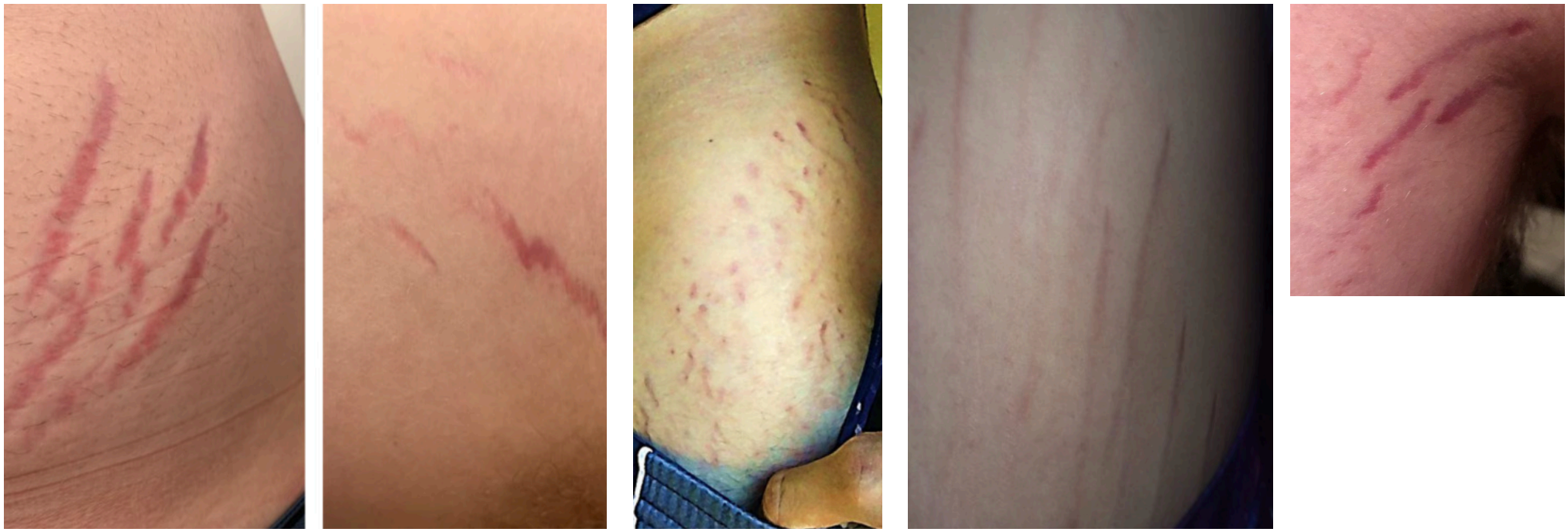
Neuroretinitis

Encephalitis

Endocarditis

Bartonella: Cutaneous lesion presentation depends on strain. “Bart striae” or non-blanching stretch marks.

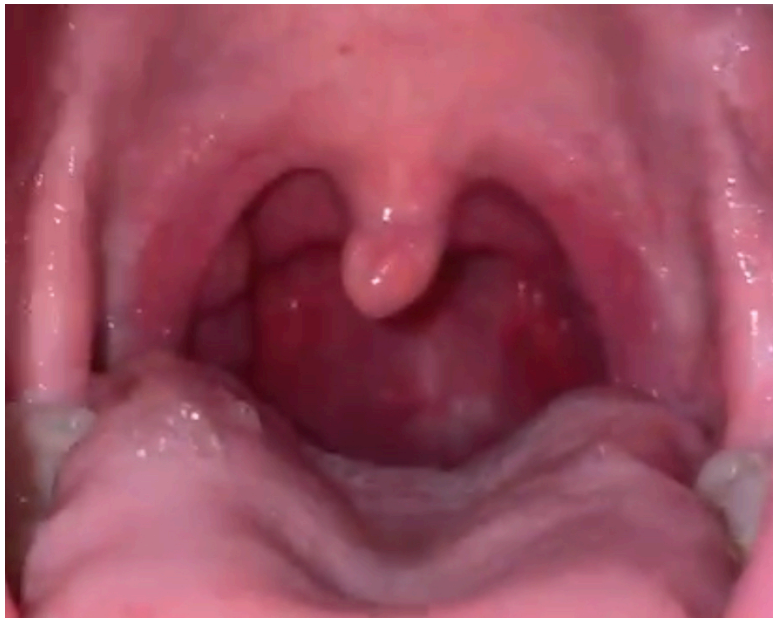
PMID: 33291688

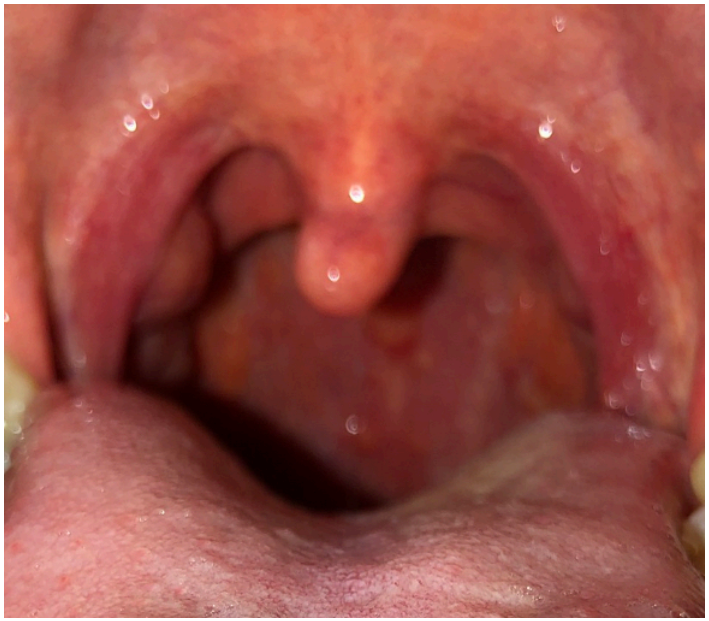


Chronic Bartonella spp

Anxiety
Mood swings
Memory problems
Fatigue
Low-grade fever
Headache, migraine
Eyes sensitive to light
Red crescents at the back of the throat that come and go
Generalized ear or throat pain
Occasional problems with swallowing
Crawling sensation on skin
Nerve zinging, vibration, or pain
Hypercoagulability
Generalized lymphatic stagnation
Gastritis, reflux
Heart palpitations with or without chest pain
Hypermobility
Migrating joint and muscle pain
Injuries slow to heal
Plantar fasciitis, worse on first steps in the morning

Bartonella throat crescents





Bartonella diagnostics

Acceptable to treat based on a presumptive diagnosis.

Famously difficult to detect due to their migratory pattern from the blood into tissues, evading the I/S.

IFA, PCR, T-cell

“ILADS folklore” - draw between 2-4pm

May provoke with homeopathics for 1 week prior.

Borrelia

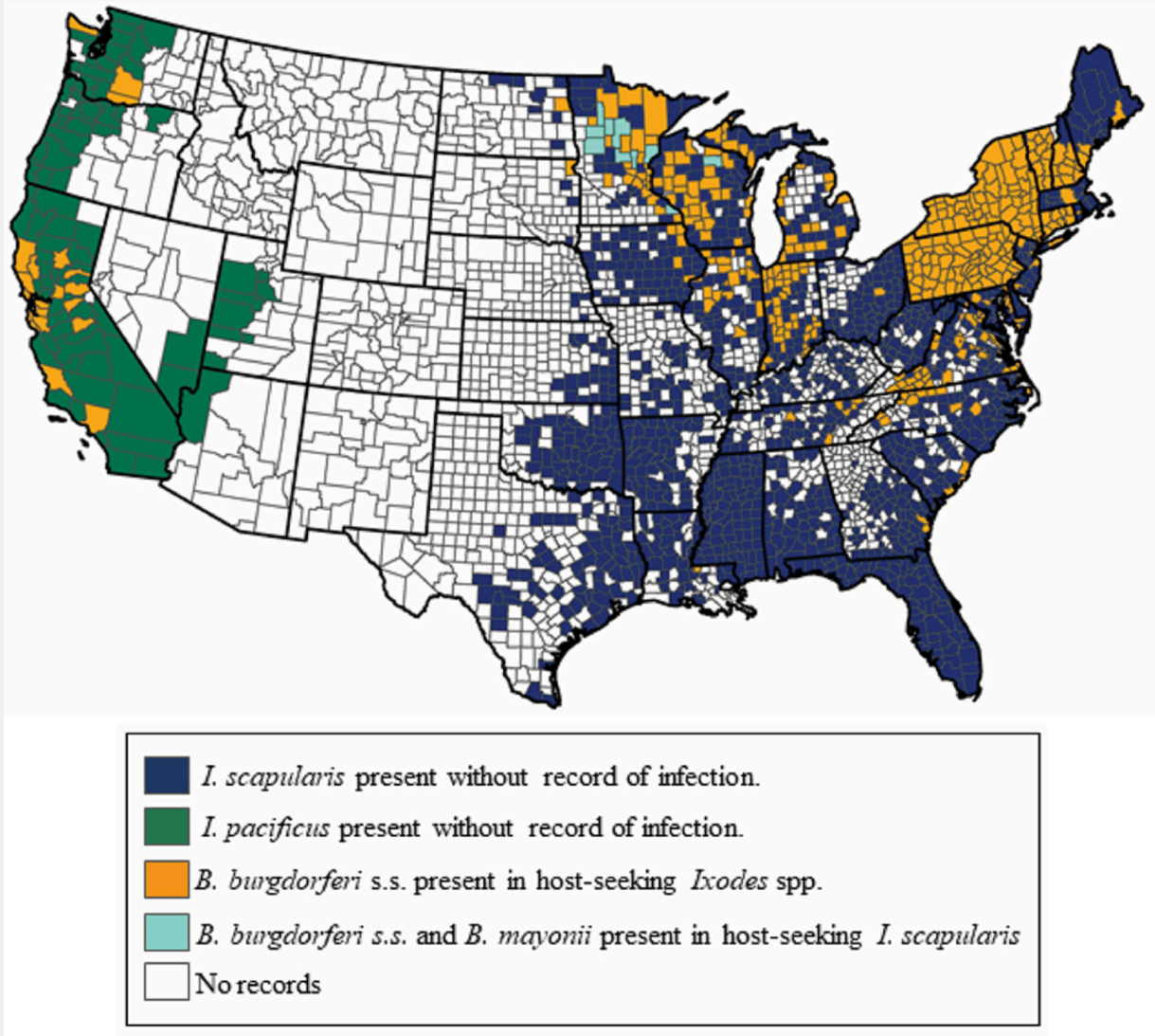
Ticks that transmit Lyme Disease reported in 48.6% of US counties (Ixodes scapularis and pacificus)

Technically refers to Borrelia burgdorferi sensu lato
- Encompasses 18 known species
- (ex: B. burgdorferi sensu stricto, afzelii, garinii, mayonii, californiensis, japonica, andersonii, lusitaniae, bissettii, spielmanii)
- The most human pathogenic species to date (N of equator) ~
- - B. burgdorferi sensu stricto (US & Europe)
- - B. afzelii, garinii (Europe & Asia)

Tick-borne relapsing fever Borrelia (TBRF) ~
- B. hermsii, turicatae, parkeri, miyamotoi

Louse-borne relapsing fever Borrelia (LBRF) ~
- B. recurrentis

Coinfection is the norm, not the exception ~
- Bartonella, Babesia, Anaplasma, Ehrlichia, Powassan, Franciscella (Tularemia), Rickettsia (RMSF), Q Fever, etc



Prevention is Key

Attractors ~

- CO_2 is the tick attractor.
- Also pheromones from Lyme carriers.
- Certain mosquito-attracting (flavi)virus-induced skin volatiles:
  - Acetophenone, a volatile compound that is predominantly produced by the skin microbiota, is enriched in the volatiles from the infected hosts to potently stimulate mosquito olfaction for attractiveness.
  - An effect partially combatted by Vitamin A.

Defense ~

- Treated clothing
- Essential oil - lemon eucalyptus, yarrow (acaricidal); reapply often (min hourly)
- Coming inside: clothes stripped and in hot dryer x 10 min
- Tape roll pets
- Tick tubes around outdoor spaces

PMID: 35777355, 36905473

“Never had a tick bite” “Not outdoorsy”

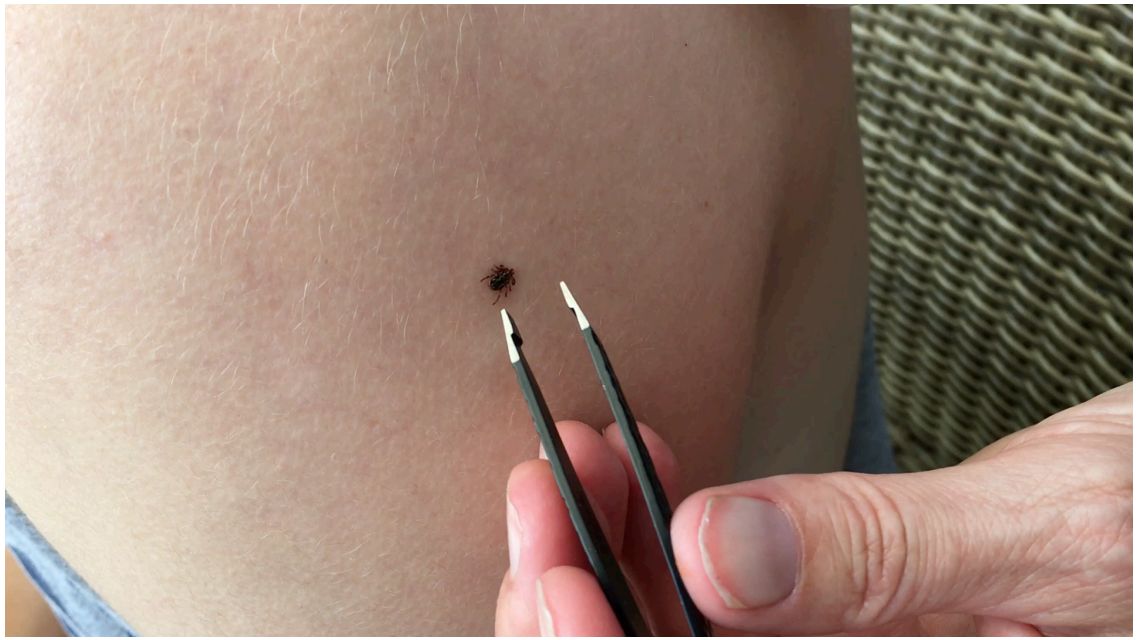
Tick saliva contains an anesthetic

Also anticoagulant and immunosuppressive substances

Provides a localized environment at the site of the bite to evade detection — enhancing infection

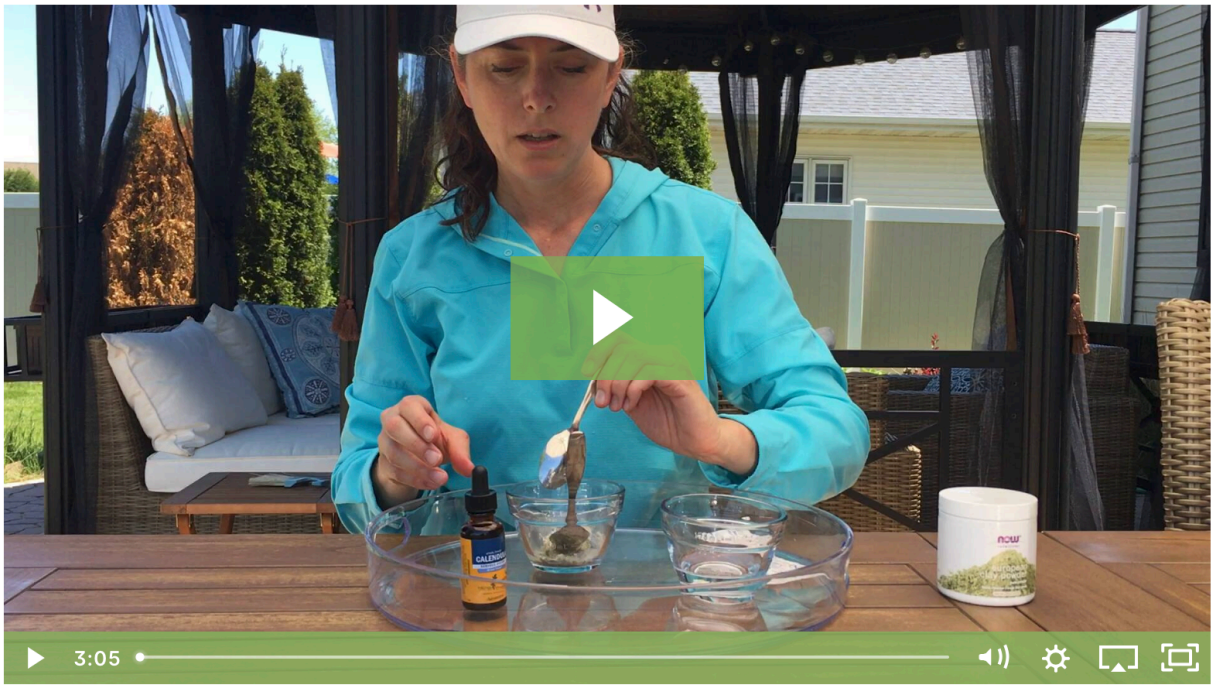
Soft-sided ticks (TBRF) are “snackers” — may self-detach and find new host, won't necessarily engorge

Migratory birds carry ticks anywhere the bird can go (even Home depot)



Tweezer removal method.
YouTube & https://drcrista.com/2018-5-26-lyme-the-best-way-to-remove-a-tick/

Lyme: How To Make A Poultice To Extract Embedded Tick Head



Found A Tick

Ledum 30c Homeopathic

Remove with Tweezers & Apply Poultice

Check Incidence Maps

Non-Lyme Endemic Area

Save Tick for Testing
(Check testing algorithm)

Lyme Endemic Area

Send Tick for Testing

Call Lyme Literate Doctor

Begin Antimicrobial Treatments
(Prophylactic)

Monitor for Symptoms

If Symptoms Develop, Begin Treatment Immediately

Wait for Tick Test Results
(Upgrade if Needed)

4 - 6 Weeks Later - Get Tested for Lyme Disease

Symptoms

Headache
Fever
Malaise
Lethargy
Fatigue
Aches / Flu
Stiff Neck
Joint Pain
Muscle Pain

Enlarged Lymph Nodes

Maybe Rash

Monitor for 6 weeks

Dr JILL CRISTA™ NATUROPATHIC DOCTOR

Design by Dr. Christina Carew

Dr JILL CRISTA™

Tick bite management

Save the tick - moistened paper towel inside ziploc x 2. Freezer.

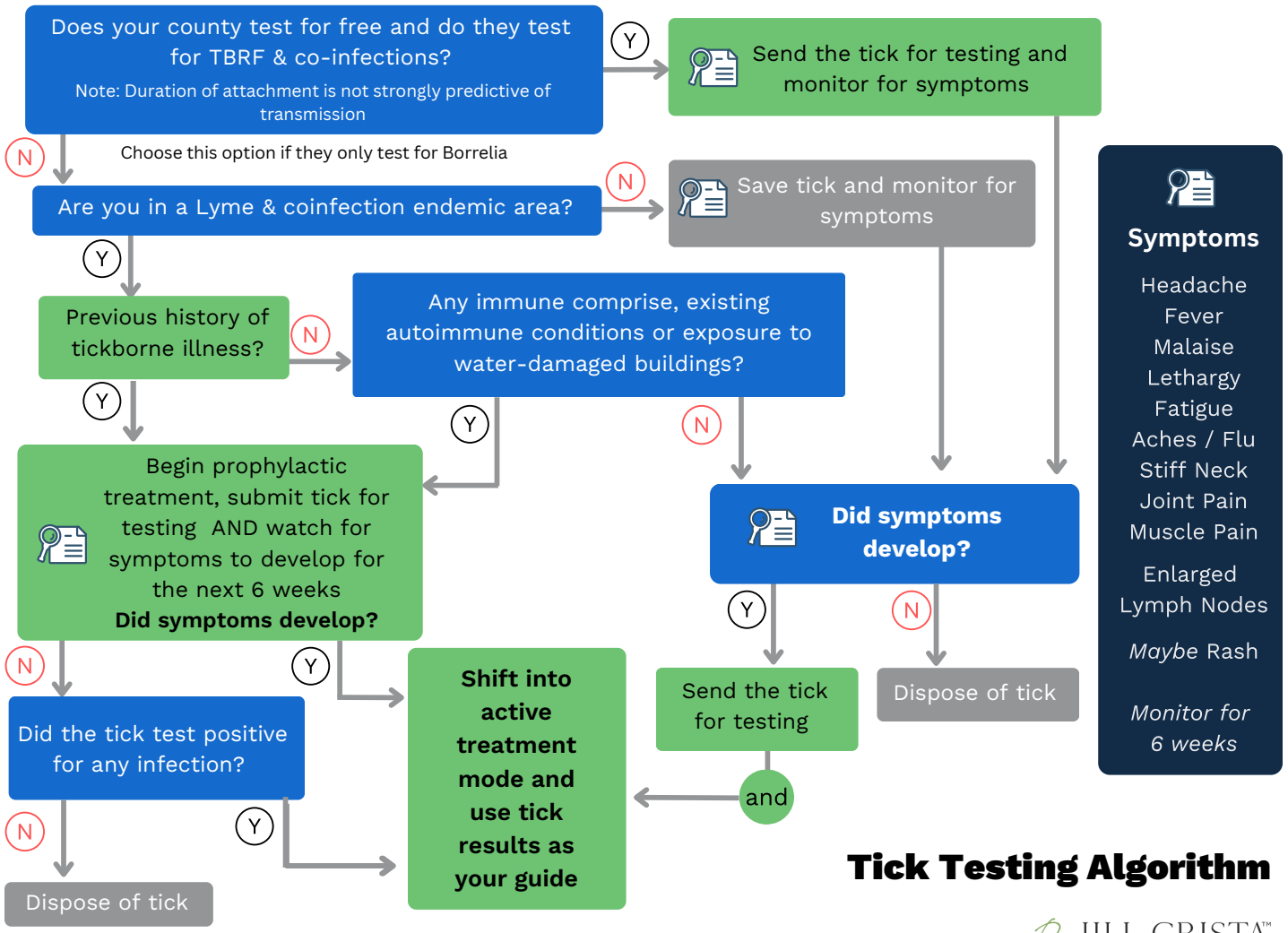
Treat bite area (tick feces) - andrographis tincture (Dr. Chesney), povidone iodine.

Snap a pic of the bite area immediately and then every day after for 10days.

Histamine reaction vs EM rash ~

EM has increased erythema at farthest edge from bite
Either may expand irregularly
Called “Erythema migrans” not “erythema in scopum” (target)
so “migration” is the unique feature

Submit tick for testing - algorithm.



Tick Testing Algorithm

Dr JILL CRISTA™

Tick tests can be falsely negative. Treat the patient and not the lab. Use symptoms as a guide if negative.

Design by Dr. Christina Carew

Dr JILL CRISTA™ NATUROPATHIC DOCTOR

Acute Borrelia spp “Lyme”

Onset from 1 day to 1 month after bite.

Tick saliva induces migration of Borrelia into the blood stream, and out of stationary phase.

* if symptomatic at day 1, consider a possible reactivated persistent Borreliosis, treat as acute Lyme+

Influenza-like illness ~

Low-grade fever (co-infxn higher), headache, stiff neck, malaise/ lethargy, joint pn, muscle pn, localized L/A

Sick within a day, also consider:

Powassan virus - transmitted in 15 minutes

Anaplasma/ehrlichia

Early disseminated

Onset weeks to months after bite.

Early disseminated Lyme can occur even if no acute sxs.

Areas ~

- HT - carditis, A-V block
- Neurological - cranial/peripheral neuropathy
- M/S - migratory arthralgias
- Eye - all the “itis”s - uveitis keynote, retinal tears
- Skin/lymphatics
- Liver/kidney - LFTs, proteinuria

Late or “chronic” Lyme

Onset months to years after tick bite.

Can also occur w/o any prior sxs.

Dr. Horowitz’s Lyme/MSIDS Questionnaire is the premiere sx list.

May have never felt well since, or triggered by stressor (mold, MVA, surgery, dental, mental/emotional, pregnancy, puberty, menopause, etc)

Correlated with extreme morbidity.

Chronic progressive multisystem illness in:

- M/S
- Neuro
- Skin - acrodermatitis chronica atrophicans (European)
- Hormone

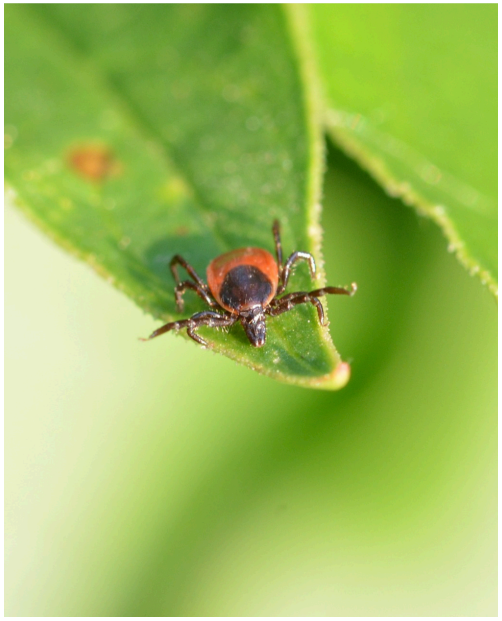
Non-Lyme Borrelia - TBRF

Tick-borne relapsing fever

Transmission - soft-sided ticks (don't engorge, they "snack" and may move hosts,) lice, fleas, possible spider bites

Tests negative on Lyme disease tests.

In Children - Early Lyme



Early Lyme disease:

- Fever
- Fatigue
- Flu-like illness, including achiness and malaise
- Headache
- Stiff neck
- Swollen lymph nodes
- Weakness or numbness in one side of face, or develops paralysis
- Spreading red rash or target rash (less than half of cases)
- Muscle and/or joint pain that migrates around the body
- Swollen joints
- Carditis or inflammation of the heart

In Children: Early TBRF

Early Tickborne Relapsing Fever:

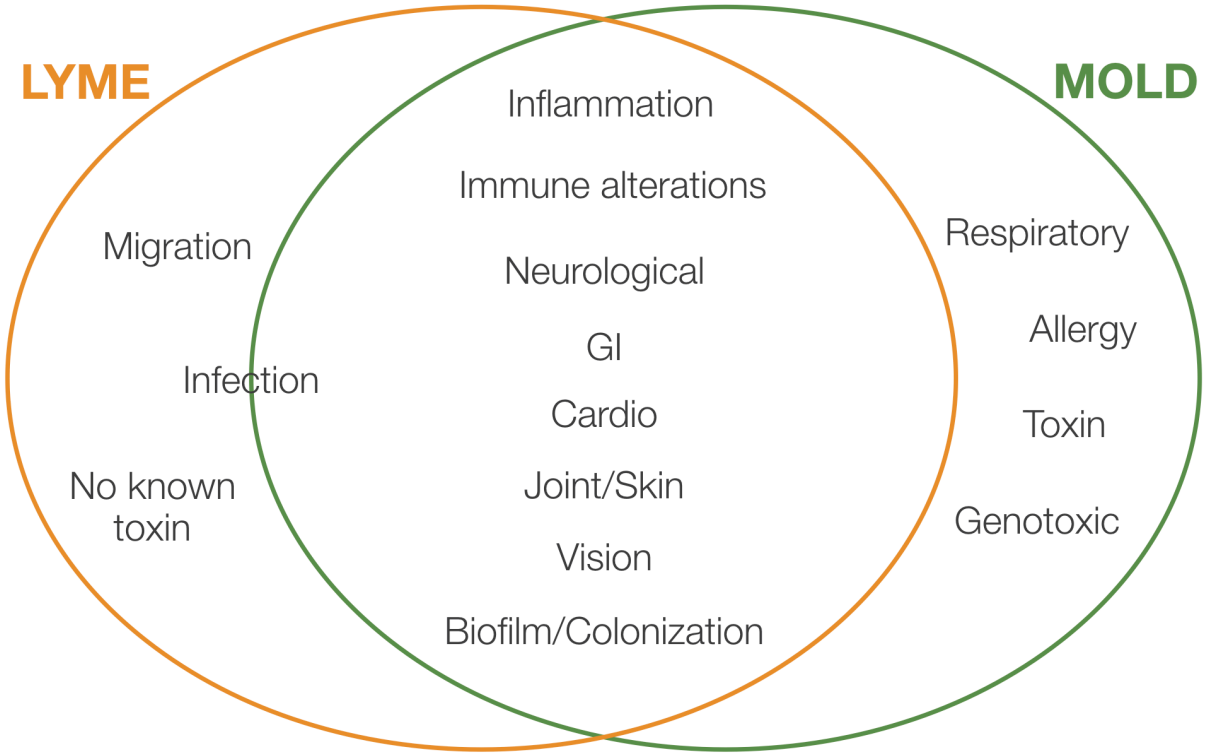
- High fever, chills
- Headache
- Muscle and joint aches
- Fever relapses and lasts for about 3 days
- Rarely a rash

In Children - Persistent/Chronic Borrelia

Persistent or chronic Lyme disease or Tickborne Relapsing Fever:

- Fatigue
- Brain fog
- Problems remembering new learning
- Child avoids play or friends
- Mood changes, depression, anxiety
- Insomnia
- Headaches
- Frequently changing vision
- Rashes that come and go
- Nerve pain, numbness, tingling, or random hot or cold feeling
- Heart palpitations
- Digestive problems
- Muscle and/or joint pain that migrates around the body
- Frequent musculoskeletal injuries
- Generalized heightened body pain

The Great Imitators



Understanding Symptoms

Borrelia OSPs bind to the glycosaminoglycan (GAG) chains of host proteoglycans, binding promotes tissue colonization

Gravitates to ECM and other areas rich in GAG nutrients ~
- Endothelial glycocalyx
- Tubules of the teeth (peg teeth = congenital)
- Eyes
- Joints
- Cardiac nerve bundles
- CNS
- Neuromuscular junctions (fibromyalgia TPs, congenital atonia)
- GB

Migrates (as seen in rash)

Unilateral (ie: Bell's palsy)

PMID: 29116038

Take-Aways

"Lyme" has become an umbrella term used to describe many iterations of tick-borne infections
- different infections/combinations of infections
- different stages/states

2-tier reflex to WB missing an inordinate number of cases

ER/Urgent care labs too early to detect

Clinical diagnosis is sufficient to initiate Tx

Known tick bite is not required to Dx

Rash is not required to Dx

Tx for 7-10 days is not sufficient

Delayed onset of Tx is correlated to worse outcomes

"Post treatment Lyme syndrome" is an erroneous Dx. IME culprit is surviving bacteria, but is blamed on the immune system gone awry

"Antibiotic refractory" - a research term - IME from undertreated and/or missed acute Dz → widely disseminated, genetically savvy bacteria (more later)

Reportable Dz - if they'll accept it (my story of Advanced Labs culture +)

Vertical transmission has been reported, positive cord blood and culture positive neonate

Borrelia Testing

Culture-enhanced PCR

Draw between 2-4pm - better chance of catching migrating spirochete

Alternate for suppressed pt: provocation with deep tissue massage from immediately prior to up to ~4-6 hrs before draw

Off ALL antimicrobials (including herbal) of all kinds for the culture to be reliable (one dose GSE turned negative)

Itraconazole will affect this test. It acts on an ergosterol biosynthesis pathway that Borrelia uses to defend itself.

Food-based antifungals in small amounts are likely okay, but be cautious of the stronger ones that also work against bacteria such as garlic, onions, thyme, oregano.

Borrelia Testing

Immunoblot > WB
- Band 31 highly correlated with autoimmune sequelae

T-cell - best choice for hypogammaglobulinemia pts but limited by the strains tested, and potentially weaker reaction to Borrelia than co-infections.

Phage -
- Good for immunocompromised patients (hypogam+mold reduced T-cell)
- Reactive for bacteria (Borrelia), not nec for parasites (Babesia)

Provoke with Lyme Nosode ~
- 10 drops under tongue daily, 2wks prior
- Administer away from anything by mouth for 15 minutes before and after the dose

*Reminder - positive test NOT required for Dx or Tx

VIRUS	CONDITION	TRANSMISSION
Herpes Simplex 1	Cold sores	Oral contact
Herpes Simplex 2	Genital herpes	Genital contact
Epstein-Barr	Mononucleosis	Direct saliva contact
Varicella Zoster	Chicken pox and shingles	Airborne
Human Herpes 6	Sixth disease	Saliva Congenital possible
Coxsackie B	Hand, foot, and mouth	Respiratory droplets Direct contact Contact with infected feces
Parvovirus B19	Fifth disease	Respiratory secretions Congenital
West Nile	West Nile fever	Mosquito bite
Chikungunya	Fever, joint pain	Mosquito bite

Encephalitis Viruses

Predilection for the brain

Can induce neuroinflammation even with mild infections

Flare may occur weeks after infection

children

MDPI

Review

PANDAS/PANS in the COVID-19 Age: Autoimmunity and Epstein–Barr Virus Reactivation as Trigger Agents?

Stefano Pallanti [1,2,*] and Michele Di Ponzio [3]

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[3] Department of Psychology and Cognitive Studies, Institute of Neurosciences, 50121 Florence, Italy
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Abstract: COVID-19 impacted the entire world's population, frequently resulting in long-lasting neuropsychiatric complications. Furthermore, social distancing, lockdowns and fear for one's personal health worsen individual psychological wellbeing, especially in children and adolescents. Herein, we discuss the results of studies that specifically reported data about the impact of the COVID-19 pandemic or infection on children with Pediatric Acute-Onset Neuropsychiatric Disorders (PANS). Furthermore, we present the cases of five adolescents with PANS whose symptomatology increased following SARS-CoV-2 infection. What emerged from this study was that COVID-19 resulted in the exacerbation of obsessions, tics, anxiety and mood symptoms and decreased wellbeing. Moreover, new symptoms, as well as new PANS cases, are reported to have arisen after COVID-19 infection. Here, we hypothesize that the pathogenic mechanisms of silent viruses, such as the Epstein–Barr virus, are related to neuroinflammation, immune responses and reactivation, with additional roles played by social-isolation-related inflammatory processes. The discussion of PANS, which represents a model of immune-mediated neuropsychiatric manifestations, is particularly relevant, with the aim of uncovering the mechanisms that lead to neuropsychiatric Post-Acute COVID-19 Syndrome (PACS). Prospects for future studies and treatment implications are discussed.

Citation: Pallanti, S.; Di Ponzio, M.

Early antigen (EA) - add-on

Chronic/reactivated pattern ~
- VCA-IgG - pos
- VCA-IgM - neg
- EA-IgG - pos
- EBV-NA - highly pos
- (if 3-4x positive, consider chronic/reactivated)

vs Past infection pattern ~
- EA - neg
- NA - lower pos

Influenza

Very commonly reported cause of PANS and flares by parents.

Influenza symptoms:

- Fatigue
- Fever
- Chills
- Cough
- Sore throat
- Runny or stuffy nose
- muscle or body aches
- Headaches
- Less commonly, vomiting and diarrhea

Monitor for secondary bacterial infections - sinus, ear, lung, pneumonia

If child is reporting fever sxs with no rise in temp ~

- Concern for CDR1, innate immunodeficiency (mold/NK cell fxn)
- Increased risk factor for autoimmune activity

Mold mycotoxin exposure makes flu worse

frontiers in Immunology

ORIGINAL RESEARCH
published: 04 October 2018
doi: 10.3389/fimmu.2018.02297

Check for updates

Aflatoxin B_1 Promotes Influenza Replication and Increases Virus Related Lung Damage via Activation of TLR4 Signaling

Yuhang Sun[1,2], *Jiarui Su*[1,2], *Zixuan Liu*[1,2], *Dandan Liu*[1,2], *Fang Gan*[1,2], *Xingxiang Chen*[1,2] *and Kehe Huang*[1,2*]

[1] *Department of Animal Nutrition and Immunology, College of Veterinary Medicine, Nanjing Agricultural University, Nanjing, China,* [2] *Institute of Nutritional and Metabolic Disorders in Domestic Animals and Fowls, Nanjing Agricultural University, Nanjing, China*

Cellular Physiology and Biochemistry

Cell Physiol Biochem 2018;49:1151-1167
DOI: 10.1159/000493294
Published online: 6 September, 2018
Accepted: 28 August, 2018

Original Paper

Low-Level Aflatoxin B_1 Promotes Influenza Infection and Modulates a Switch in Macrophage Polarization from M1 to M2

Yuhang Sun[a,b] Zixuan Liu[a,b] Dandan Liu[a,b] Jin Chen[a,c] Fang Gan[a,b] Kehe Huang[a,b]

[a]College of Veterinary Medicine, Nanjing Agricultural University, Nanjing, [b]Institute of Nutritional and Metabolic Disorders in Domestic Animals and Fowls, Nanjing Agricultural University, Nanjing, [c]National Research Center of Engineering and Technology for Veterinary Biologicals, Jiangsu Academy of Agricultural Sciences, Nanjing, China

Low level exposure ~

Promotes infection

Increases inflammatory responses

Immune organ damage

Induce a switch in alveolar macrophage polarization from M1 to M2

Confer poorer outcomes in SIV-infected in mice

SARS-CoV-2

Multiple entry routes into the brain - olfactory bulb, thalamus, and brain stem may be infected through a trans-synaptic transfer of the virus. Additional vagal nerve delivery via dendritic cells.

Induces release of chemokines, cytokines, and inflammatory signals to the BBB and infects the astrocytes, which causes neuroinflammation and neuron death; neurodegenerative implications.

Pathogenic effect on the CNS with specific impact on the **midbrain dopamine neurons which abundantly express ACE-2 receptors**.

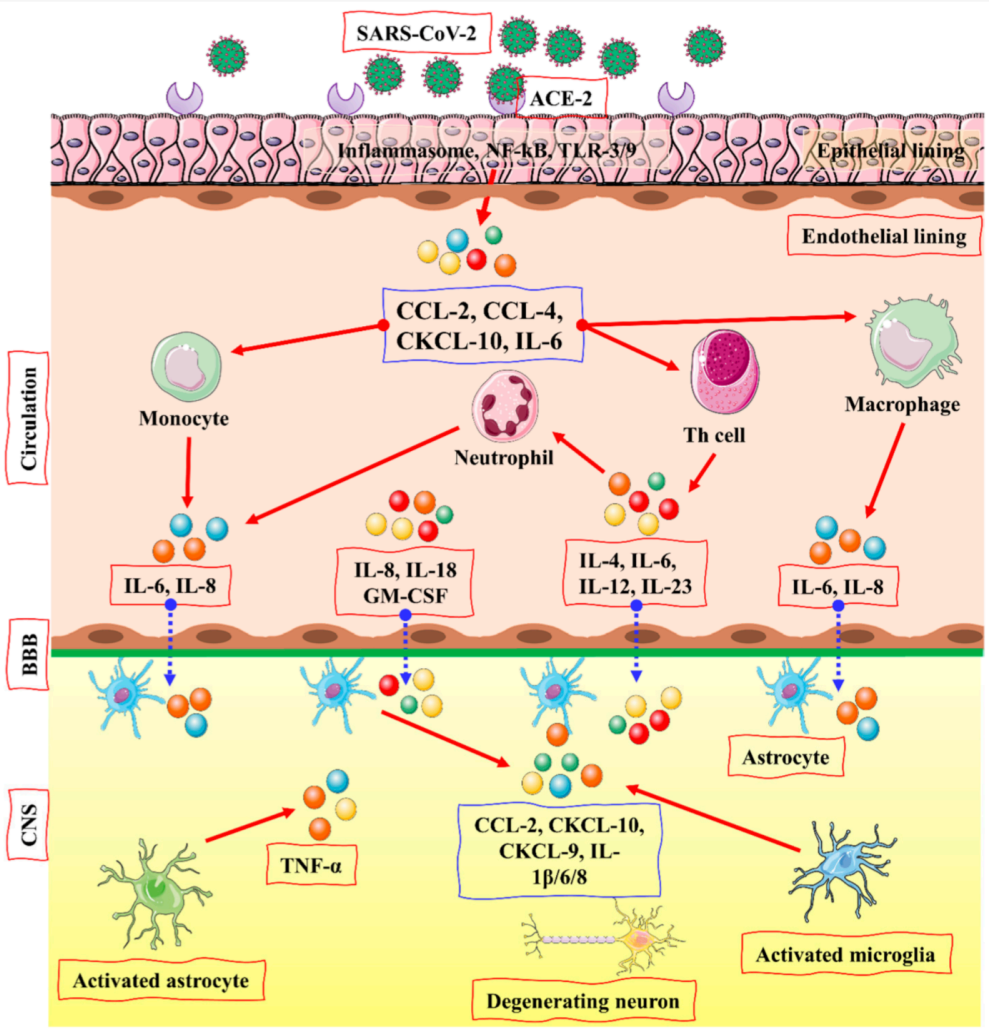
Spike protein can reach different brain regions, irrespective of viral brain replication. Can itself cause BBB dysfunction and damage neurons either directly, or via activation of brain mast cells and microglia and the release of various neuroinflammatory molecules.

Spike protein alters microglial purinergic signaling in vitro, may potentiate the Cell Danger Response.

Published case report examined adolescents who acutely developed new OCD, neuropsychiatric, and motor dysfunction symptoms consistent with PANS, having a temporal correlation, 2 weeks after a diagnosis of Covid-19.

“Highly likely that neural autoantibody production is facilitated by SARS-CoV-2 infection…”

PMID: 35601258, 36899824, 33158605, 33936086, 37114062, 37606433, 35883527, 33748620, 35390636



Cytokine cascade

Entry in the brain via ACE2 (abundantly expressed in midbrain.)

TLR or NF-κB signaling activate the pro-inflammatory self-defense inflammasome after viral attachment.

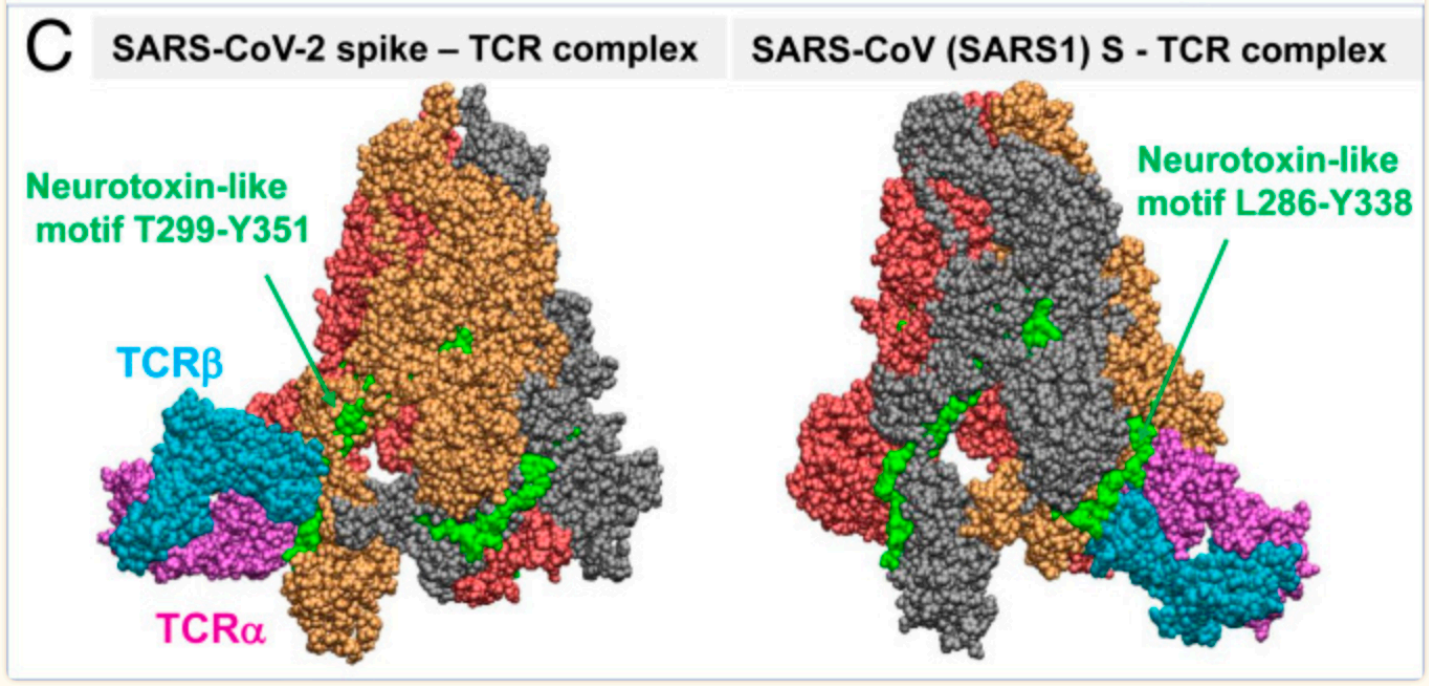
Pro-inflammatory feedback loop activates CNS immune cells, astrocytes and microglia, which induce IL-1, IL-6, TNF- α, and IL-8.

Several CNS-related illnesses are linked with elevated levels of these inflammatory cytokines.

Neurotoxic components

"Superantigenic" neurotoxin-like motif exhibits a high tendency to bind T-cell receptors.

PMID: 32989130 (Oct 2020)



Periodontal infections

A major under-recognized contributor to PANDAS/PANS and neuroinflammation.

ID via qPCR Next-Generation Sequencing. Also tests for resistance in strains.

Dentist or periodontist collects a small amount of fluid from an infected pocket in the gums, as well as a saliva sample.

Avoid ozone for 1 week prior to sample collection as it's a potent antimicrobial.

Treatments using ozone are well-tolerated by P/P ~

Multiple published case studies using ozone gas to treat "untreatable" periodontal conditions (3-4 month nightly rinse.)

Some evidence (15-day trial) ozone rinse is not as effective against gingivitis as commonly used chemicals (chlorhexidine) but is a viable alternative for chemically-sensitive. Need a longer duration study - empirically quite effective.

PMID: 36570588, 32594645

Infectious triggers

Group A Beta-Hemolytic Streptococcus Pyogenes

Mycoplasma pneumonia

Chlamydia pneumonia

Bartonella species

Borrelia species (Lyme and Tickborne Relapsing Fever [TBRF])

Encephalitis viruses

Influenza

SARS-CoV-2

Periodontal

Diagnostics

Clinical diagnosis

PE and symptoms as clues

General diagnostics

Infectious triggers

Environmental triggers

Environmental triggers

Top 7 from my clinical practice ~

1. Herbicides
2. Mold
3. EMFs
4. Mercury
5. Pesticides
6. Vaccine adjuvants

(Food dyes get a dis-honorable mention)

Commonality? All are neurotoxins and immunotoxins.

Glyphosate (Roundup)

Genetically modify crops to be “roundup ready”.

Allows the GM plant to survive the mechanism of the chemical.

But not just for killing weeds anymore!

Additionally used as a desiccant for non-GMO grains, spraying enough to kill the greenery via desiccation for easier harvest of grains, equating to higher than approved levels just before harvest.

Increases incidence of Fusarium mold infestation in storage.

“Coherent and compelling evidence that glyphosate and glyphosate-based formulations are a cause of non-Hodgkin lymphoma (NHL) in humans exposed to these agents.”

Successful legal case linking exposure to NHL resulted in it being quietly taken off the market for residential use.

Commercial use allowed to continue!

PMID: 34052177, 31342895

No human effects?

Affects shikimate pathway - not found in human cells but is utilized by our gut microbiome

Reduces gut immunity and confuses the definition of “self”, increasing the incidence of autoimmunity via Th17 and mast cell infiltration

Salmonella and Clostridia are resistant to it

Glyphosate-induced intestinal dysbiosis impacts CNS, in emotional, neurological and neurodegenerative disorders

In mice, low-level “subchronic” exposure increased anxiety and depressive-like behaviors

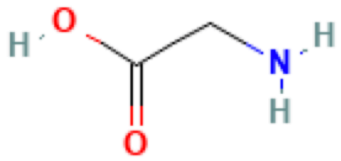
Low-level exposure linked to gut dysplasia

Animal studies, low-level maternal glyphosate exposure linked to increased incidence of ASD

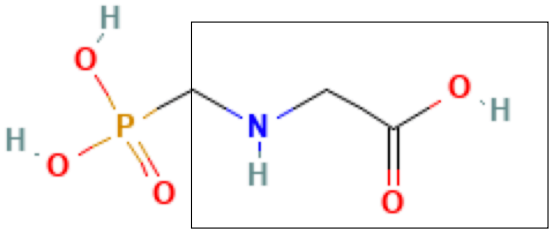
PMID: 31442459, 29635013, 20012598, 28848410, 32398374

Glycine backbone

Gly-cine



Gly-phosate



Core of the molecule is glycine
∴ may displace glycine metabolically

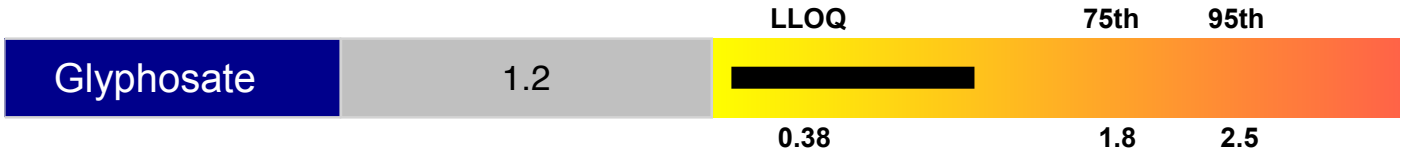
Impacts ~
Neurotransmitter (calming NT)
Glutathione (one of the AAs)
Glycine membrane channels (leading to channelopathies)

Possible fertility impacts ~
alters testicular morphology and testosterone levels

Glyphosate urine test

Glyphosate Profile

Metabolite	Result ug/g creatinine	Reference Range
Glyphosate	1.2	LLOQ 0.38 / 75th 1.8 / 95th 2.5



Atrazine - “pre-emergent” herbicide

Endocrine disrupting chemical with neuroendocrine/epigenetic toxicity.

Targets hypothalamus-pituitary-gonadal (HPG) axis.

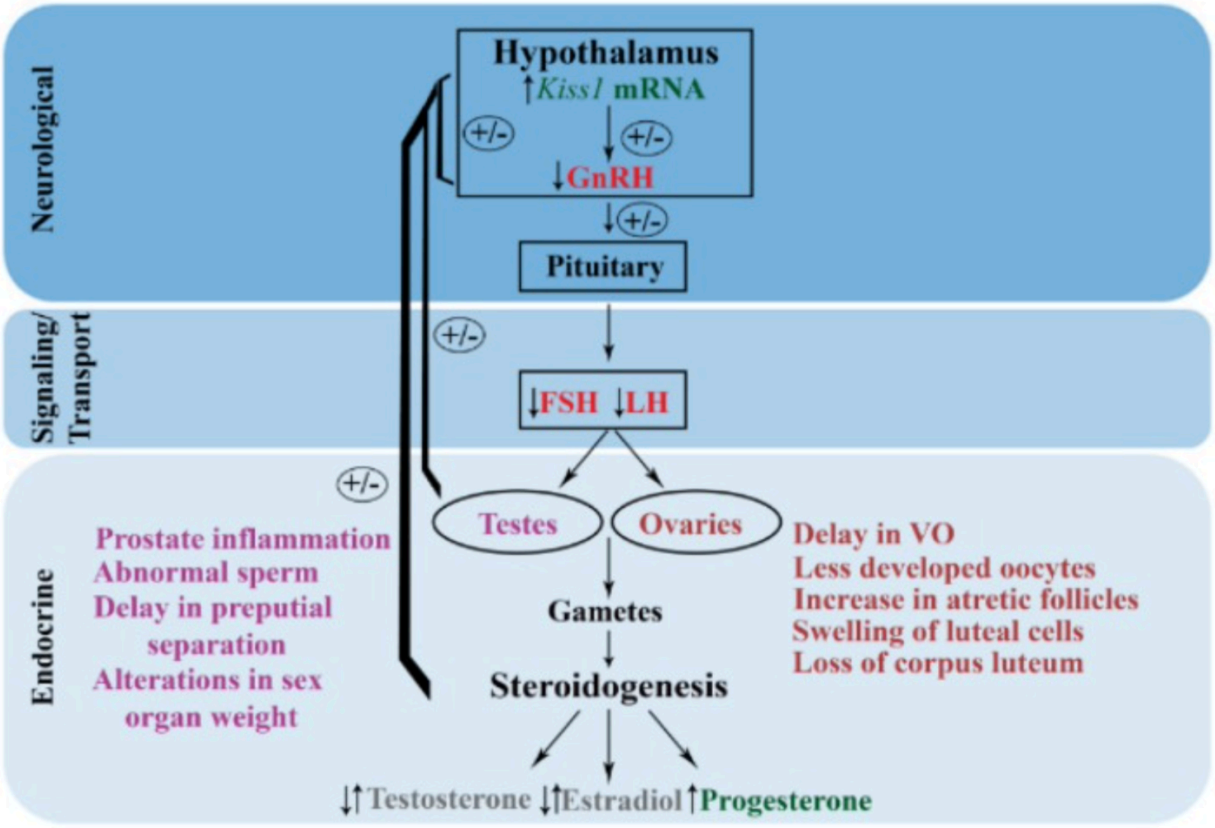
Frogs: low exposure males become females, high exposure males can procreate.

Evidence of crosstalk between systems affected by Atrazine exposure, causing widespread dysfunction and leading to changes in behavior, even with no direct link to the hypothalamus.

EU banned Atrazine use in 2003 recognizing the health risks of Atrazine exposure as a public health concern with no way to contain contamination of drinking water.

Yet, the US recently reapproved Atrazine's use in the fall of 2020.

PMID: 27413107, 35410624



Histological and morphological alterations in the ovaries and testes are observed; dependent on duration of exposure and dose.

Green = increases

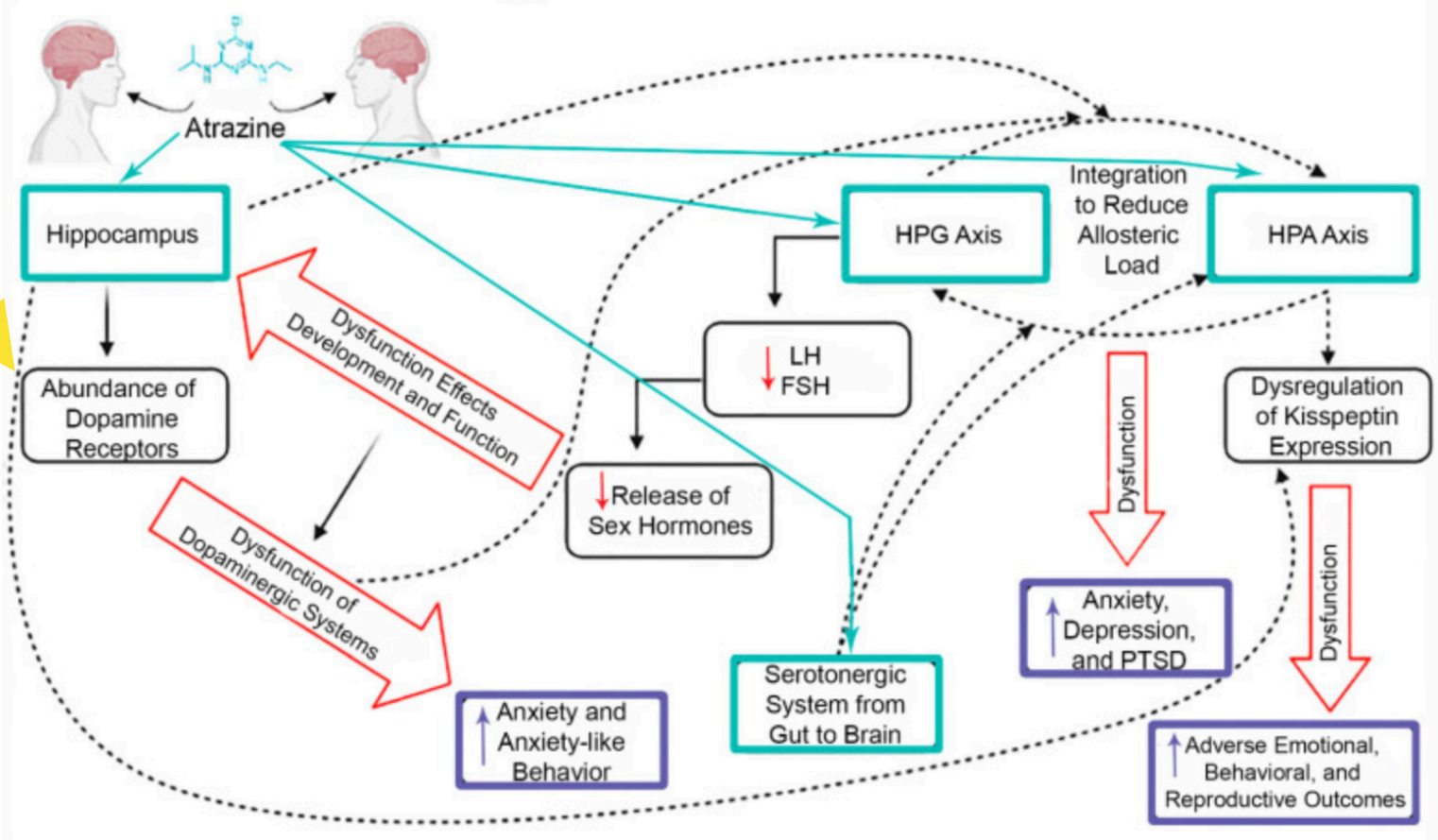
Pink = reductions

Grey indicates that both increases and reductions are reported

Effects in males are in purple

Alterations in females are in red (VO: vaginal opening)

PMID: 28713818



Abundance of DRs → dysfunction of dopaminergic systems → ↑anxiety/anxiety-like behavior
Might destruction of DRs be a compensatory reaction to Atrazine exposure?

PMID: 34564358

Atrazine urine test

Organophosphate pesticides

Test Name (mcg/g)	In Control	Moderate	High	Current Level	Previous Level 10/29/2021
Diethyldithiophosphate (DEDTP)	≤0.20	0.21~0.48	≥0.49	0.02	4.19
Dimethyldithiophosphate (DMDTP)	≤0.80	0.81~5.08	≥5.09	0.29	5.75
Diethylthiophosphate (DETP)	≤0.70	0.71~2.76	≥2.77	0.17	7.49
Dimethylphosphate (DMP)	≤5.20	5.21~37.19	≥37.20	0.19	3.11
Diethylphosphate (DEP)	≤0.80	0.81~12.59	≥12.60	0.76	3.50
Dimethylthiophosphate (DMTP)	≤4.60	4.61~29.20	≥29.21	4.20	9.82
Atrazine	≤0.02	0.03~0.05	≥0.06	<0.01	7.16
Atrazine mercapturate	≤0.03	0.04~0.06	≥0.07	0.03	7.04


Adobe licensed video

MOLD

Natural function of fungi is to compost and recycle

Excrete 1° and 2° metabolites ~ inhaled, ingested, and dermally absorbed

1° metabolites ~ necessary for survival aldehydes, alcohols, odors, digestive enzymes, and structural elements (ie: beta-glucans)

2° metabolites ~ competitive antimicrobials, mycotoxins (energetically expensive for the mold to make)

Mold is tenacious

Moisture ~ 1° element for growth,
2° is organic substrate

Obvious or visible water not necessary

Relative humidity above 50% promotes growth

Grows on WD surface within 24-48 hours

Difficult to kill ~ any intact spore is dormant,
not dead (a dead spore is a fragment)

Spore formation and release increases more
when drying than when wet
(survival of species)

More than “spore illness”

Spores

IgE | Allergic rhinitis, asthma, hypersensitivity pneumonitis (CDC)
Non-IgE | Non-IgE mediated Asthma exacerbation (CDC)
Infection | Aspergillosis (CDC)
Mast cell | Recruitment, degranulation, enhanced survival

Fragments

“Mold-othelioma”

Other Mould Dangers

Chemicals | VOCs, aldehydes, alcohols, MPA
Mycotoxins | Colonization

Biofilm

Water-damage=increased microbial diversity (ie: actinomycetes, endotoxin)
Quorum behavior

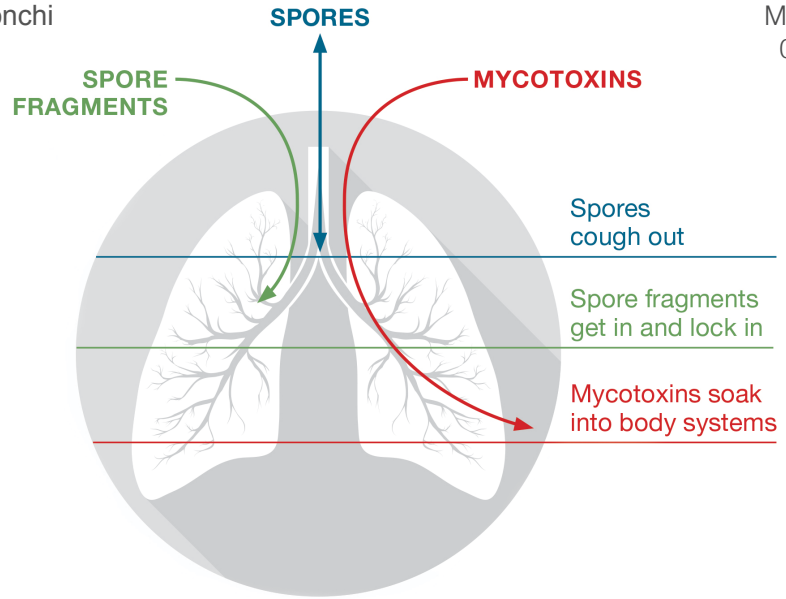
PMID: 24368325, 20537281, 24368325, 23710148

Dr JILL CRISTA NATUROPATHIC DOCTOR

Respiratory system vs Mold

RESPIRATORY SYSTEM

- >7m Nasal
- 5-7m Pharynx
- 3-5m Trachea
- 3-5m 1° Bronchi
- 2-3m 2° Bronchi
- 1-2m Terminal bronchi
- <1m Alveoli



MOLD

Spores-
- Cladosporium 3-5m
- Aspergillus 2-5m
- Penicillium 1-5m

Fragments-
- 1-2m

Mycotoxins-
- 0.1m

Mycotoxins

Aflatoxin
Aspergillus flavus, A. parasiticus

Chaetoglobosin A,C
Chaetomium globosum

Citrinin
Aspergillus, Penicillium, Monascus

Enniatin B_1
Fusarium spp

Gliotoxin
Aspergillus fumigatus, Candida spp

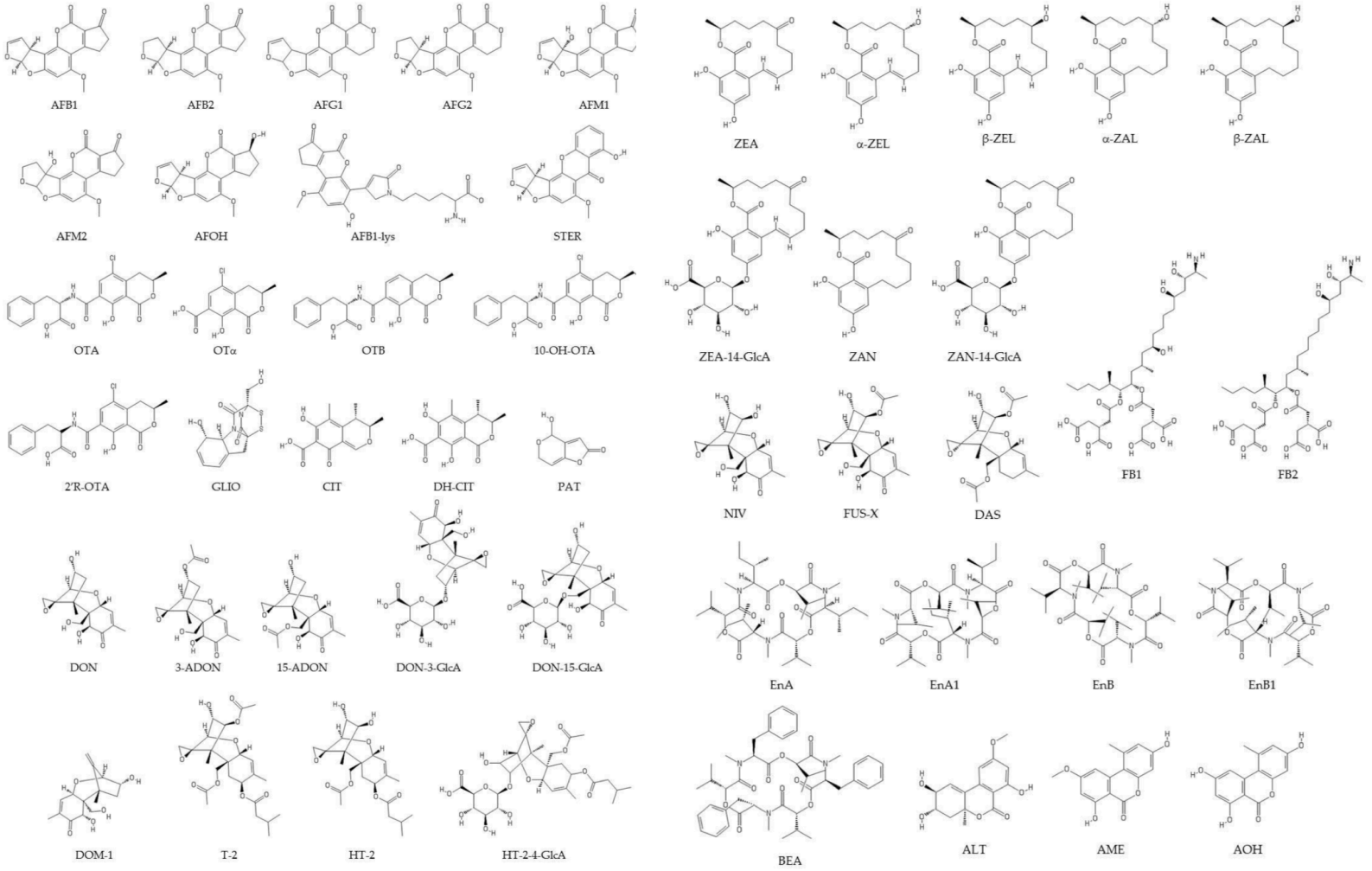
Ochratoxin A
A. ochraceus, A. niger, Penicillium verrucosum, P. nordicum, P. chrysogenum

Patulin
Aspergillus spp, Penicillium spp, Mucor, Fusarium spp

Sterigmatocystin
Precursor of Aflatoxin, A. versicolor

Trichothecenes (Roridin, Verrucarin, Nivalenol, Deoxynivalenol, Diacetoxyscirpenol, Satratoxin)
Stachybotrys chartarum, Trichoderma viride, Fusarium spp, Myrothecium

Zearalenone
Fusarium spp



PMID 32121036

Mycotoxin health impacts summarized

Lipophilic

Immunotoxic

Neurotoxic

Alimentary toxic

Dermatoxic

Nephrotoxic

Hepatotoxic

Hepatocarcinogenic

Genotoxic

Teratogenic

Carcinogenic

PMID: 26474839, 27178040, 25449202,12221236, 26600019

Comparative Study > J Assoc Off Anal Chem. 1983 Nov;66(6):1485-99.

Analysis for Fusarium toxins in various samples implicated in biological warfare in Southeast Asia

C J Mirocha, R A Pawlosky, K Chatterjee, S Watson, W Hayes

PMID: 6643363

Abstract

Samples of leaves, water, cereal grains, soil, and yellow powder as well as blood, urine, and body tissues from chemical warfare victims were analyzed for Fusarium toxins by using gas chromatography and mass spectrometry. The leaves, water, and yellow powder samples contained various combinations of T-2 toxin, diacetoxyscirpenol, deoxynivalenol, nivalenol, and zearalenone in concentrations ranging from trace (1.0 ppb) amounts to 143 ppm. These trichothecenes do not occur naturally on the substrates described and were correlated with the so-called "yellow rain" chemical attacks against Hmong people in Southeast Asia. Analysis of leaves, soil, water, and cereals collected in areas adjacent to but apart from the area where chemical attacks had been staged did not contain any Fusarium toxins. Moreover, T-2 and HT-2 toxins were found in human blood, urine, and body tissues (heart, esophagus, kidney, lung, and large intestine) of alleged victims. In addition, diacetoxyscirpenol was found in the kidney of one person who had died.

Mycotoxins have a long history of use as a biological warfare weapon.

"Yellow rain" T-2 toxin use against the Hmong people in Southeast Asia.

So, yes, they affect everyone.

Multisystem Multisymptom

More common than not that each person in an exposure environment has a completely different presentation.

Every living being is affected.

Depends on type of mould, presence of mycotoxins, duration and dose of exposure, and individual susceptibility.

CATEGORY 1:

GENERAL:
- ☐ Fatigue that doesn't otherwise make sense
- ☐ Trouble sleeping
- ☐ Worse after eating
- ☐ Worse after exercise
- ☐ Increased thirst
- ☐ Stubborn weight gain
- ☐ Anemia

SENSITIVITY:
- ☐ Bothered by tags and seams on clothing
- ☐ Chemical sensitivities
- ☐ Sensitive to light, sound, or touch

HEAD/MIND:
- ☐ Slowed thinking or brain fog
- ☐ Unsettled feeling, unquieted mind, overwhelm
- ☐ Headaches
- ☐ Dizziness, vertigo, or drunken feeling
- ☐ Unexplained mood changes, anxiety, or depression

EENT:
- ☐ Allergies/hay fever year-round
- ☐ Eye irritation
- ☐ Dark circles under eyes
- ☐ Floaters in your vision
- ☐ Vision blurry, frequently changes, or difficulty reading
- ☐ Sneezing or persistent runny nose
- ☐ Acute sense of smell for mold
- ☐ Recent sinusitis
- ☐ Ears feel plugged or clogged
- ☐ Itchy or sore ear canals
- ☐ Sores in the mouth
- ☐ Post-nasal drip or frequent throat clearing
- ☐ Chronically sore throat
- ☐ Coated tongue

RESPIRATORY:
- ☐ Easily irritated lungs
- ☐ Episodic cough
- ☐ Shortness of breath, air hunger, or yawn/sigh often

CARDIOVASCULAR:
- ☐ Easy bruising
- ☐ Heart palpitations
- ☐ Lower extremity edema
- ☐ Protruding veins on limbs

DIGESTIVE:
- ☐ Nausea
- ☐ Bloated abdomen or flatulence
- ☐ Unexplained change in digestion/bowels
- ☐ Recent change in appetite
- ☐ Crave carbs, sweets, or alcohol

GENITOURINARY:
- ☐ Overactive bladder
- ☐ Bladder infections

SKIN:
- ☐ Skin rash, redness or flushing

IMMUNE:
- ☐ Frequent infections or delayed recovery from colds

MUSCULOSKELETAL:
- ☐ Increased body pain

Total CATEGORY 1 boxes checked : _____

0 - 4 symptoms =	Score 0
5 - 7 symptoms =	Score 1
8 - 10 symptoms =	Score 2
11+ symptoms =	Score 3

ENTER CATEGORY 1 SCORE : _____

CATEGORY 2:

GENERAL:
- ☐ Voice sounds nasally
- ☐ Frequent or strong static shocks
- ☐ Histamine intolerance
- ☐ Non-obstructive sleep apnea
- ☐ React poorly to musty spaces

SENSITIVITY:
- ☐ Sensitivity to EMFs

HEAD/MIND:
- ☐ Migraines
- ☐ Difficulty thinking clearly or memory loss
- ☐ Confusion or disorientation

EENT:
- ☐ Allergies are not well-controlled by medication
- ☐ Chronic sinusitis
- ☐ Nose bleeds
- ☐ Ear ringing or ear pain that's new or worsening

RESPIRATORY:
- ☐ Asthma or wheezing
- ☐ Chronic cough
- ☐ Burning lungs

CARDIOVASCULAR:
- ☐ Episodes of fast heart beat
- ☐ Chest pain
- ☐ Low platelets

DIGESTIVE:
- ☐ Increased food sensitivities
- ☐ Frequent vomiting
- ☐ Irritable bowel or alternating constipation/diarrhea
- ☐ Digestive ulcer or blood in the stool
- ☐ Celiac or non-celiac intestinal disease
- ☐ Fatty liver
- ☐ Liver pain or swelling

GENITOURINARY:
- ☐ Unexplained menstrual changes
- ☐ Bacterial vaginosis
- ☐ Kidney pain or swelling

SKIN:
- ☐ Itchy or burning skin
- ☐ Peeling or sloughing skin
- ☐ Raynaud's syndrome
- ☐ Eczema or psoriasis

IMMUNE:
- ☐ Epstein-Barr virus activation

MUSCULOSKELETAL:
- ☐ Slow reflexes
- ☐ Balance issues or incoordination
- ☐ Joints easily injured
- ☐ New or worsening nerve pain, numbness or tingling
- ☐ Muscle weakness or spasm

Total CATEGORY 2 boxes checked : _____

0 - 2 symptoms = Score 0
3 - 5 symptoms = Score 1
6 - 8 symptoms = Score 2
9+ symptoms = Score 3

ENTER CATEGORY 2 SCORE : _____

CATEGORY 3:

GENERAL:
- ☐ Current exposure to mold
- ☐ Previous exposure to damp, musty or water-damaged building any time in your life
- ☐ Mold allergy
- ☐ Abnormal reaction to medications or supplements
- ☐ Autism or sensory processing disorde
- ☐ Chronic fatigue syndrome
- ☐ Chronic inflammatory response syndrome (CIRS) or positive Shoemaker tests

SENSITIVITY:
- ☐ Feeling of an internal vibration

HEAD/MIND:
- ☐ Dysautonomia or Postural Tachycardia Syndrome (PoTS)
- ☐ Dementia

EENT:
- ☐ Daily use of sinus spray, sinus prescription, or Neti pot
- ☐ Nasal polyps
- ☐ Sinus surgery at any time in your life
- ☐ Hearing loss
- ☐ MARCoNS
- ☐ Oral thrush

RESPIRATORY
- ☐ Asthma that's difficult to control with medication
- ☐ Lung scarring or nodules
- ☐ Pulmonary Edema
- ☐ Idiopathic Pulmonary Fibrosis
- ☐ Respiratory distress or Idiopathic pneumonitis
- ☐ Lung cancer

CARDIOVASCULAR:
- ☐ Arrhythmia
- ☐ Coagulation abnormalities
- ☐ Arteriovenous abnormality
- ☐ Churg Strauss Syndrome

DIGESTIVE:
- ☐ Peanut allergy
- ☐ Cyclical vomiting syndrome
- ☐ Eosinophilic esophagitis
- ☐ Non-alcoholic steatohepatitis (NASH)
- ☐ Hepatocellular carcinoma or other liver cancer

GENITOURINARY:
- ☐ Infertility
- ☐ Chronic pelvic pain
- ☐ Interstitial cystitis
- ☐ History of kidney stones
- ☐ Reduced GFR (glomerular filtration rate)
- ☐ IgA nephropathy, nephrotic syndrome, nephritis, or other kidney disease
- ☐ Kidney cancer

SKIN:
- ☐ Recurrent yeast infections or fungal skin infections, including athlete's foot, jock itch or yeast vaginitis
- ☐ Erythema nodosum
- ☐ Toenail fungus

IMMUNE:
- ☐ Autoimmunity
- ☐ Mast cell activation syndrome (MCAS)
- ☐ Aspergillosis, current or history of
- ☐ Previous or current cancer diagnosis, not otherwise specified
- ☐ Aplastic anemia
- ☐ Sarcoidosis

MUSCULOSKELETAL:
- ☐ Hypermobility or Ehlers-Danlos syndrome
- ☐ Tremors or tics
- ☐ Difficulty walking

Total CATEGORY 3 boxes checked : _____

Score 1 for each box checked.

Total items checked and the Category Score will be the same for this category.

ENTER CATEGORY 3 SCORE : _____

TOTAL MOLD RISK RESULTS

Gather your Category Scores from the 3 previous categories.

CATEGORY 1 SCORE: _____
CATEGORY 2 SCORE: _____
CATEGORY 3 SCORE: _____

Add Category Scores together to calculate your total mold risk.

TOTAL MOLD RISK_____

0 - 4 = Not Likely Mold-Related Illness
5 - 9 = Possible Mold-Related Illness
10+ = Probable Mold- or Biotoxin-Related Illness

OTHER THINGS TO CONSIDER:
Lyme Disease, MSIDS, Tick-Borne Co-Infections (Use HOROWITZ MSIDS-LYME QUESTIONNAIRE)
Other environmental toxins (IE: glyphosate, mercury, lead, PM2.5, VOCs, etc.)
Intestinal parasites
Chronic viral syndromes or other stealth infections
Food sensitivities
CVIDS or immunodeficiency syndromes

Research Study

MoldIQ

Welcome!

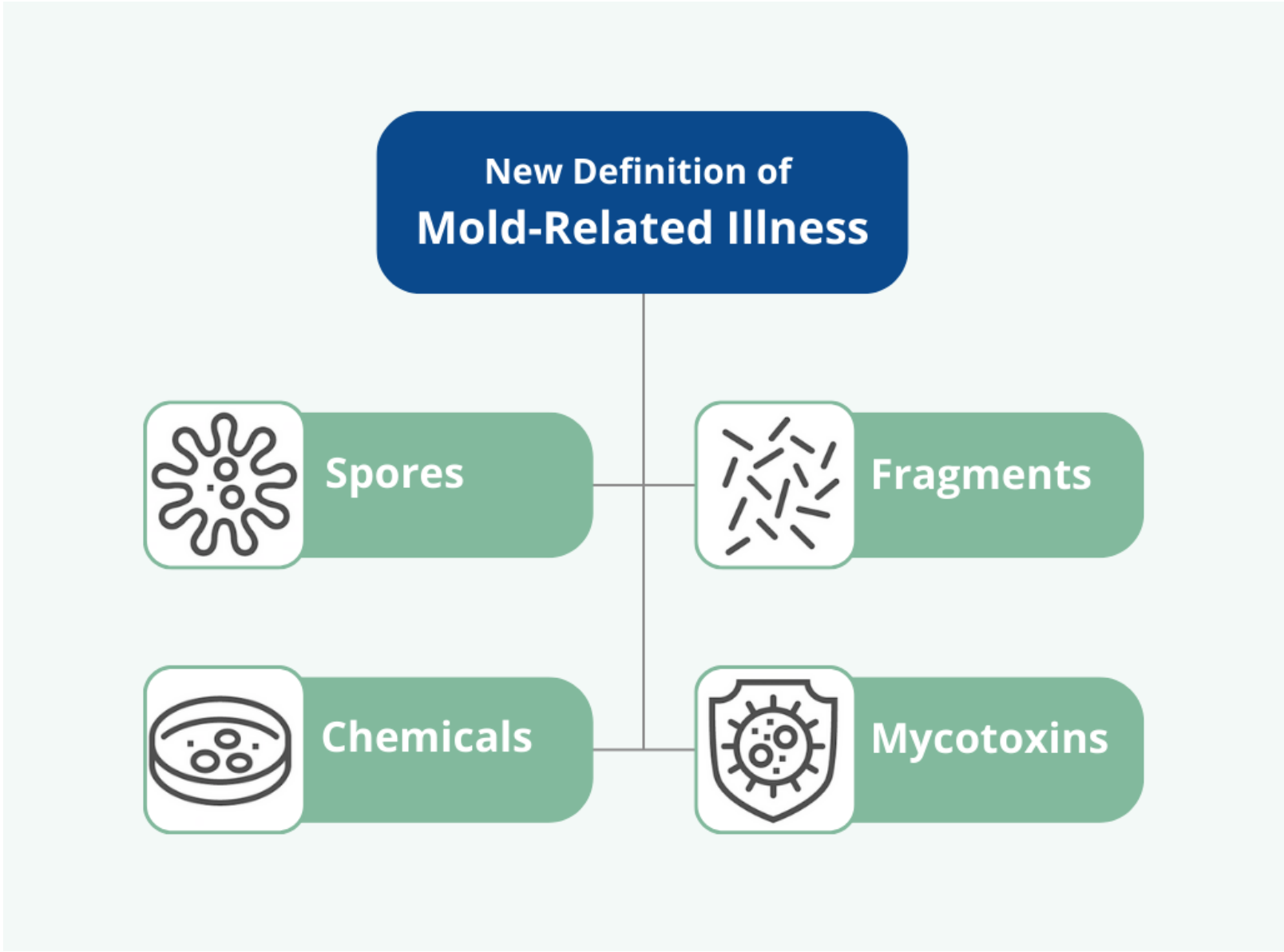
Thank you for participating in the Mold Illness Questionnaire (MoldIQ) Research Initiative. The purpose of this research is to gather meaningful clinical data regarding mold-related illness, with the goal of publishing the findings in peer-reviewed medical journals. This research has the potential to inform the design of future studies looking into the effects of indoor mold exposure on humans, with a focus on developing accepted treatments.

If you take part in this study, you will be asked to:

- Complete a symptom questionnaire
- Answer questions about your living space
- Submit digital copies of certain laboratory results

The survey will take about 5 minutes to complete.

MoldIQ.org



What Explains Symptom Persistence?

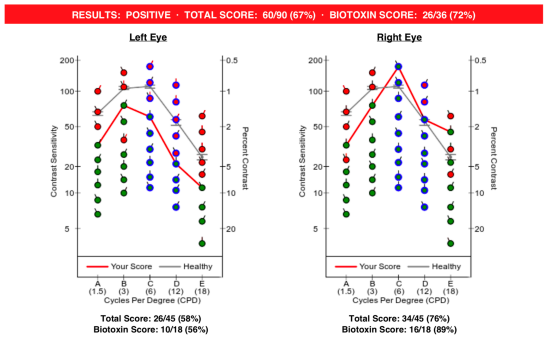
Occupational studies ~
Coin flip: ~50/50 persister/recovered
Do they stay symptomatic out of the building?
**likely different stats for home exposure*

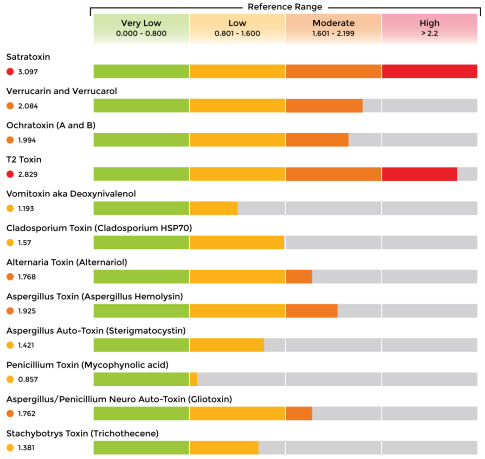
CFS study ~
Normal controls: +fungus, -mycotoxins
CFS pts from WDB: +fungus, +mycotoxins

Damp or WDB exposure is the key
Mould is the trigger
Colonization is the result

PMID: 23580077 Brewer et al, Detection of mycotoxins in patients with chronic fatigue syndrome

Mold Assessments





Direct Tests ~
Urine mycotoxin (LC-MS method)
Stool microbial assay +yeasts

Indirect Tests ~
Visual Contrast Sensitivity (vcstest.com)
Serum IgE/G *mycotoxin* antibody
IgE/G mold spore antibody (standard)
Urine mycotoxin (ELISA method)
CBC:
- ↓WBC, relative lymphopenia
- ↑NLR, microcytic anemia

Vit D (↓25-OH and ↑1,25)
Liver function - esp ↑GGT
↓NK cell *function* with ↓ or normal NK cell total
↑MMP-9 (mast cell correlate)
Organic Acids Urine Test
NeuroQuant (1˚ neuro sxs)

Dr JILL CRISTA NATUROPATHIC DOCTOR

Electrosmog

eEMFs

Electromagnetic frequency radiation (external) - the invisible toxin of our time.

Emitted from mobile phones, Wi-Fi, Bluetooth devices, smart meters, microwave ovens, many electrical devices, power and transmission lines, and wiring problems *involving bad grounding*.

Thermal effects: increase BBB permeability to macromolecules.

Main action is non-thermal via voltage-gated ion channels leading to channelopathies: oxidative stress, sperm/testicular damage, neuropsych effects including EEG changes, apoptosis, cellular DNA damage, endocrine changes, and calcium overload.

Behavioral studies have particularly concentrated on the effects of eEMFs on learning, memory, anxiety, and locomotion.

Study in adolescents: change in memory performance over 1 year was strongly negatively associated with eEMF dose.

PMID: 26474271, 31463749, 20550949, 29573716, 26300312

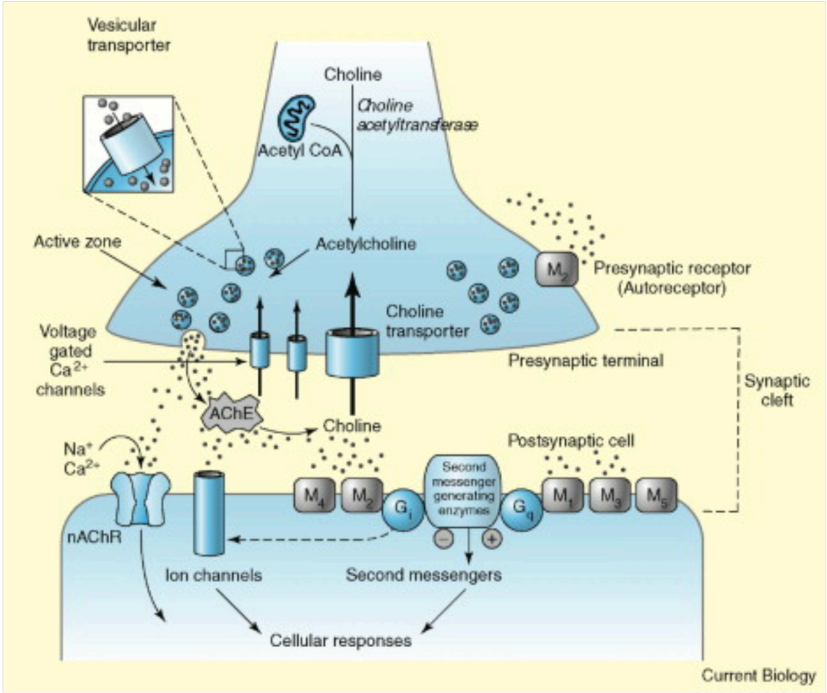
Voltage-gated channelopathies

Synaptic vesicles in the presynaptic terminal contain a high density of voltage-gated Ca2+ channels.

When an action potential arrives at the distal end of the axon – the presynaptic terminals – the inrush of positive charge activates voltage-sensitive Ca2+ channels.

Ca2+ entry then initiates the release of NTs into the synaptic cleft.

When NTs, such as ACh or glutamate, activate cation (for example Na+ or Ca2+) channels, and are thus depolarizing, they can be described as excitatory.



PMID: 15753022

eEMFs

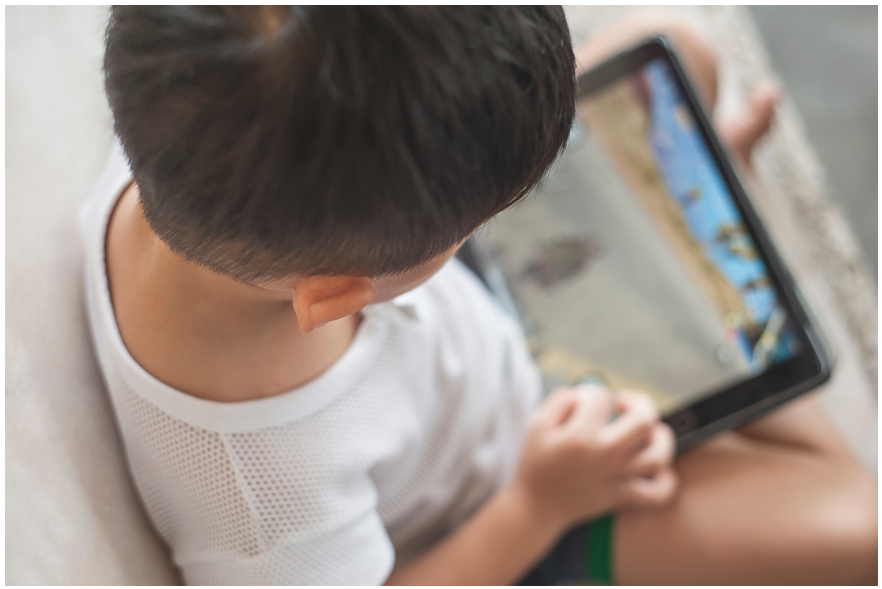
Signs ~

EEG changes consistent with voltage-gated calcium channel activation

Symptoms ~

Sleep disturbance/insomnia
Headache
Depression/depressive symptoms
Fatigue/tiredness
Dysesthesia
Concentration/attention dysfunction
Memory changes
Dizziness
Irritability
Loss of appetite/body weight
Restlessness/anxiety
Nausea
Skin burning/tingling/dermographism

Screen reliance



Only safe space for many P/P kids is virtual spaces

Virtual school often required

Screen addiction common (dopamine)

eEMF Blocking ~
Lap pads, sleep canopies

eEMF Grounding ~
Nature!, grounding mats

eEMF Discharging ~
Movement (produces non-polarized internal or iEMFs)

eEMF Diagnostics

Test spaces, no known “body” test at this time.

Guard sleep space the most.

Resources:

Building Biology Institute (buildingbiologyinstitute.org)

EMF Analysis (emfanalysis.com)

Environmental Health Trust (ehtrust.org)

Physicians for Safe Technology (mdsafetech.org)

Tech Wellness (techwellness.com)

*Beware of over-reliance on EMF protection gadgets.
Reduction of exposure is the best mitigation measure.

Mercury

WHO March 2017 ~

- Considered by WHO as 1 of the top 10 chemicals or groups of chemicals **of major public health concern**.
- Even small exposure amounts may cause serious health problems, and is a threat to the development of the child in utero and early in life.
- May have toxic effects on the nervous, digestive and immune systems, and on lungs, kidneys, skin and eyes.

Comparison of typical exposures versus regulatory safety standards suggests that many people receive unsafe exposures.

1 in 6 women have mercury levels high enough to create a neurologic risk for their children.

Norway was the first country that banned the use of mercury in all products in 2008 including dental amalgam, followed by Sweden and Denmark.

2018: the EU banned the use of dental amalgam for children under 15 and for pregnant/nursing women.

PMID: 34941760, 24420334

Mercury sources

Organic ~

Methylmercury - fish/water contamination from coal-fired power plants

Ethylmercury (Thimerosal) - vaccine adjuvant, preservative (ie: contact lens solutions)

Inorganic/elemental ~

-“Silver” dental amalgams (about 50% mercury).

-Dentists like its malleability and hardness as compared to other materials.

-Continuously release elemental mercury vapor.

-Amalgam surface area that exceeds the safe level of airborne mercury in the intraoral cavity:

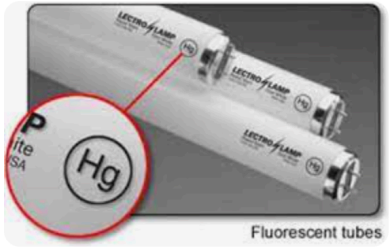
Adult: >0.8 surface of a tooth

Child: >0.6 surface of a tooth

- ∴ **more than one small filling is harmful to a child’s health**

PMID: 21782213, 34941760

Mercury sources



Household Hazardous Waste

- Average amalgam filling - 1000mg
- Thermometers - 500mg
- Barometers
- Electronics
  - LCD screens/monitors
  - Laptop screen shutoffs
- Antiques; jewelry, clocks, glass/mirrors
- Old appliances & vehicle switches
- Medical
  - Preservative - eye, nasal, skin, injections
  - Skin ointments (hemorrhoid cream)
  - Antiseptics (Mercurochrome)
  - Pharmaceuticals (diuretics)
  - BP cuffs
- Some batteries
- Fluorescent lightbulbs - 4mg
- Food ~
  - Seafood: 1 can tuna - 15-60 mcg
  - High-fructose corn syrup
- Flu shot - 25 mcg per 0.5-mL dose

Dental mercury amalgams in children

Evidence of safety of dental mercury amalgams in children has been based on 2 key studies from 2006 known as the Children's Amalgam Trials; followed >500 children each over 5/7 years.

Both studies found no difference in neurobehavioral outcomes between the amalgam group and the composite (non-amalgam) group—although in both trials the amalgam group showed a statistically significant increase in urinary mercury levels.

These two studies, in addition to being widely cited in the literature, are cited by the FDA and the ADA as providing evidence for the safety of amalgam.

However, a 2011 reanalysis suggests harm, and >boys with common genetic variants.
-Reanalysis used an exposure metric based on amalgam size and years of exposure
-Found a significant association between amalgam and the porphyrin biomarkers for mercury-related enzyme blockage

"Dental amalgams are a significant
chronic contributor to mercury body burden."

PMID: 24420334, 21053054

Dental amalgams disperse

Mercury doesn't stay in the tooth!

A study quantifying the excretion and distribution of mercury in biological samples after dental amalgams found ~
-Concentrations of Hg in the biological samples of those with amalgams were found 6-8 times higher than the non-amalgam users (control).
-Spike in Hg in RBCs, plasma, and urine on 1st day of filling, but not in hair or nails.
-Accumulation in hair and nails by day 12, but reduced in RBCs, plasma, and urine.

Mercury levels in the blood, urine or other biomarkers do not reflect the mercury load in critical organs.

Gestational mercury exposure ~
-Gestational exposure in infants of mothers who did not consume fish, had an elevated risk of URIs requiring a doctor visit.
-Alterations in both T cells and gene expression in placenta at birth.

Amalgams continuously release elemental mercury vapor (up to 20 micrograms per day.)
Odorless and tasteless.
Primarily absorbed in lungs where it can disperse widely, even xBBB.

PMID: 27464660, 30743244, 34129869

Exposure estimates

Organic mercury is more genotoxic than inorganic/elemental, yet “Amalgam-related Hg exposure [which is inorganic/elemental form] exceeds that from fish or other sources for the majority of the population.”

The highest allowable average mercury concentration in fish per serving when eating 1 serving per week = 0.46 µg/g

Whereas, estimates of Hg exposure from amalgam fillings “based on the least conservative of the scenarios evaluated, it was estimated that some 67.2 million Americans would exceed the Hg dose associated with the reference exposure level (REL) of 0.3 µg/cubic meter of air established by the EPA.”

Exposure estimates are consistent with previous estimates presented by Health Canada, and amount to 0.2-0.4 µg/day per amalgam-filled tooth *surface*, or 0.5-1 µg/day per amalgam-filled *tooth*, depending on age/other factors.

PMID: 21782213, 34941760

Dentists and dental hygienists

Study of dentists in Iran found that the mean of the mercury level in the urine, nail, and blood was higher than the standard of the WHO.

"So, in accordance with Article 10 of the European Union Regulations (EUR), in the context of the Minamata Convention (MC) on Dental Amalgam (DA), in order to avoid the dangers of mercury exposure in dentists, it is necessary for Iran and other countries to approve laws and to implement a national plan to reduce mercury levels and replace the appropriate materials."

"Numerous studies have reported neurobehavioural effects in dental personnel occupationally exposed to *chronic low levels* of mercury (Hg)."
- elevation of amyloid protein expression, deterioration of microtubules and increase or inhibition of transmitter release at motor nerve terminal endings.
- neurodegenerative diseases such as Alzheimer's, MS and mood disorders.
- idiopathic disturbances in motor functions, cognitive skills and affective reactions.

PMID: 33312669, 30589214

Amalgams vs fish

Reference Dose of safety - *level of exposure that is reasonably certain to be without appreciable risk for a population exposed over a long period of time.*

EPA set RfD for methylmercury consumption in women of childbearing age (and their fetuses). No other population of defined, not even children.
Reference Dose = 0.1 mcg/kg/day methylmercury. [45 lb child = 2 mcg/day]

Amount of elemental mercury vapor from one amalgam filling =
1 surface = up to 20 mcg/day.
The lower the body weight, the more increased the concentration.

"Throughout the world, efforts are underway to phase down or eliminate the use of mercury dental amalgam." (PMID 24420334) Yet there are no RfDs set for amalgams in the US, not even for those with lower body weight.

**I acknowledge this is comparing different forms of mercury and so may have different health/absorption/accumulation effects*

Mercury health impacts

Neuro ~

As vapor: can xBBB and lipid cell membranes, and can be accumulated into the cells in its inorganic forms.
Methylmercury can xBBB and placental barriers, causing serious damage in the CNS.
Animal studies: motor and cognitive impairment and neural loss.

Nephrotoxic.

Oral microbiome ~

Marked differences in the composition of the oral microbiome, associated with dental decay, found with even low concentrations of salivary mercury.

Gut ~

Gut connection to neurotoxicity: Healthy intestinal microbiota demethylates MeHg and promotes excretion through feces.
But in so doing, it impacts the gut microbiota and metabolites related to gut-brain interactions.
Induces changes of intestinal microbial community structure which induces changes to regulating neuron activity.
Elemental Hg induces archaea (methanogens) conversion to methylmercury in vitro.

PMID: 29777524, 32887894, 31918252, 33242089

Mercury, mast cells, and histamine

Mercury induces histamine release from basophils.

Mercury induces inflammatory mediator release from mast cells, specifically VEGF and IL-6.

Animal models:
- Induces a Th-2-dominated autoimmune syndrome with tissue injury in the form of a vasculitis and arthritis.
- Sensitizes mast cells for mediator release and interleukin-4 expression.
- Impacts mast cell survival.

Links to autoimmunity, disruption to BBB and subsequent neuroinflammation.

PMID: 20222982, 11222498, 19604304, 22103852, 9492216

Oral galvanism

Electromotive forces and electrical currents discharged from a tooth when two or more dissimilar metals coexist in the mouth (i.e. as used to make the “amalgam”.)

Interact with salivary electrolytes, worse acidic saliva.

Also occurs with contact between occluding metallic restorations.

Can be measured (biological dentist): the threshold for pathological values of 5 microA for galvanic currents and 100 mV for galvanic voltage.

A long-lasting influence (>15 hours) of galvanism can, in sensitive and genetically susceptible individuals, influence lymphocyte proliferation and surface molecule expression.

“After removal of the electro-active restorations, both the contents of metals in saliva and galvanic currents decreased in comparison with the levels before the treatment.”

German study concluded that the removal of dental amalgam leads to “the permanent improvement of various chronic complaints in a relevant number of patients in various trials.”

PMIID: 14917837, 15789284, 19178813, 15451237, 16804514

Mercury s/sxs

Symptoms are variable and nonspecific. Neuropsych sxs have high cross-over with P/P.

Poor resistance to infection, especially to yeast and yeast overgrowths.

Anxiety, depression, “mercurial mood”, irritability, suspicious, impulsive

Memory problems, incoordination, movement abnormalities, a sense of internal vibration, paresthesias particularly of the hands and feet

Neuromuscular junction: fasciculations, tremors

Halitosis, excessive salivation, metallic or salty taste, aphthous ulcers, tongue or tooth shocks, sensitive teeth, frequent dental caries, gingivitis, gums bleed easily, burning mouth syndrome, acute or chronic pharyngitis, perioral rashes

Night sweats, over-sensitivity to changes in temperature (think thermometer) and environments

Intestinal Methanogen Overgrowth (IMO), IBS

Urinary frequency, kidney conditions

Increased allergic and mast cell related conditions

Increased fasting blood glucose

Increased risk for autoimmune conditions, esp Hashimoto’s

**Tip: for toxic metals, look up homeopathic materia medica for complete list of sxs*

Mercury diagnostics

Due to rapid dispersal from plasma into tissue, and tissue accumulation, blood reference ranges are often not reliable indicators of health impact.

Blood ~
- May apply to organic sources (diet and injected)
- If positive, consider active/very recent exposure
- >1.8 mcg/L associated with risk of Thyroglobulin Ab (Hashimoto's)
- Normal does not rule out low-grade chronic exposure or tissue accumulation.

Urine ~
- May apply to elemental sources (amalgam vapor)
- Both pre- and post-provoked may be helpful
- Why provoke? Assess chelating agent efficacy
- Elevated unprovoked urine levels (95th percentile) considered significant for exposure.
- *Abstain from eating fish/taking fish oil supplements for 1 wk prior to sample collection.

Correlated to higher levels of fasting glucose.

Empirically, also correlated to chronic Candida/yeast burden.

Toxic Metals; urine

TOXIC METALS				
		RESULT µg/g Creat	REFERENCE INTERVAL	WITHIN REFERENCE / OUTSIDE REFERENCE
Aluminum	(Al)	1.6	< 15	
Antimony	(Sb)	0.074	< 0.18	
Arsenic	(As)	12	< 40	
Barium	(Ba)	0.88	< 5	
Beryllium	(Be)	<dl	< 0.10	
Bismuth	(Bi)	0.091	< 0.8	
Cadmium	(Cd)	0.35	< 0.6	
Cesium	(Cs)	11	< 9	
Gadolinium	(Gd)	<dl	< 0.5	
Lead	(Pb)	2.1	< 1.1	
Mercury	(Hg)	0.55	< 0.8	
Nickel	(Ni)	7.7	< 4	
Palladium	(Pd)	<dl	< 0.2	
Platinum	(Pt)	<dl	< 0.1	
Tellurium	(Te)	<dl	< 0.2	
Thallium	(Tl)	2.2	< 0.4	
Thorium	(Th)	<dl	< 0.007	
Tin	(Sn)	0.19	< 3	
Tungsten	(W)	<dl	< 0.4	
Uranium	(U)	<dl	< 0.03	

URINE CREATININE			
	RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine	32.5	35 – 240	

Pesticides (Insecticides)

Notoriously persistent chemicals in the tissues of mammals, especially those higher up the food chain.

The dose makes the poison, or does it?
Chronic low-level exposure more detrimental than a single poisoning event.

Neurotoxins ~
The issue comes when the molecular target is shared by non-target species.
Critical need for improved translation from animal models to humans.

Pesticides such as organophosphates are linked to increased risk of neurological dz and dysfunction in humans, including chronic organophosphate-induced neuropsychiatric disorders in a time and dosage dependent manner.

Easily absorbed: inhalation, any cutaneous/mucocutaneous, ingestion.

PMID: 31197504, 21402100, 30144465, 35439576

Pesticides (Insecticides)

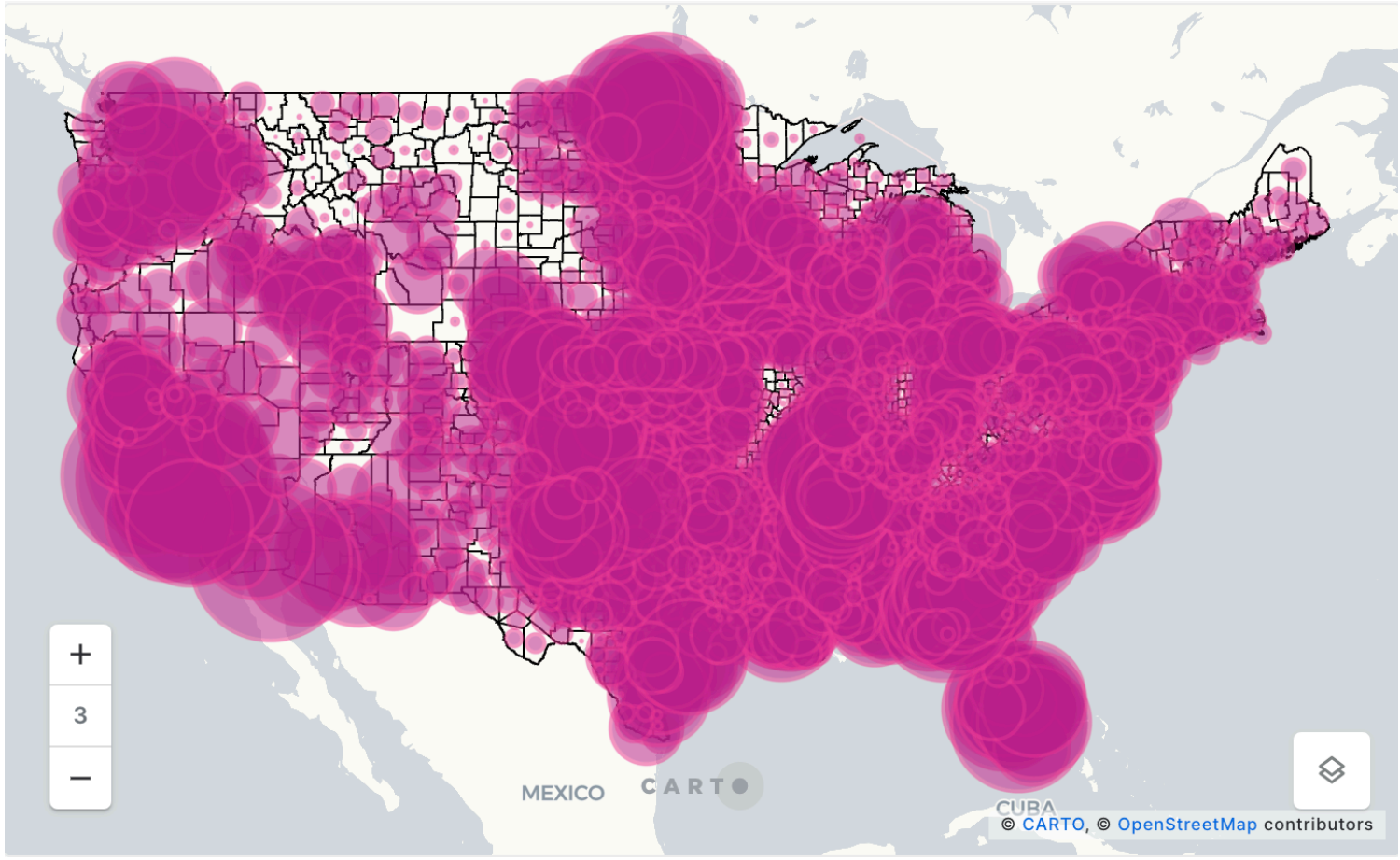
Exert neurotoxicity primarily through the inhibition of acetylcholinesterase (AChE).
Leads to a buildup of ACh in the synapse, and hyperstimulation of cholinergic receptors in the CNS/PNS. Acute poisoning “cholinergic crisis”.

Dopaminergic neuronal cells ~
Significantly alter dopaminergic neurochemistry.
Additive/synergistic effects of different pesticides that act on different targets within the dopaminergic system.
Promote severe ox stress, mainly due to mitochondrial dysfunction, accompanied by significant upregulation and activation of caspases, thereby leading to apoptosis.

In vivo: damaged brain mitochondria marked by significantly reduced levels of catalase, glutathione (GSH) and superoxide dismutase (SOD), and increased lipid peroxidation.

PMID: 31197504, 21402100, 30144465

Organophosphate use in the US



https://earthjustice.org/feature/organophosphate-pesticides-united-states#:~:text=Organophosphate%20Pesticides,-Learn%20about%2017%20of%20the

Pesticide urine test

Organophosphate pesticides

Test Name (mcg/g)	In Control	Moderate	High	Current Level	Previous Level ~~10/29/2021~~
Diethyldithiophosphate (DEDTP)	≤0.20	0.21~0.48	≥0.49	0.02	4.19
Dimethyldithiophosphate (DMDTP)	≤0.80	0.81~5.08	≥5.09	0.29	5.75
Diethylthiophosphate (DETP)	≤0.70	0.71~2.76	≥2.77	0.17	7.49
Dimethylphosphate (DMP)	≤5.20	5.21~37.19	≥37.20	0.19	3.11
Diethylphosphate (DEP)	≤0.80	0.81~12.59	≥12.60	0.76	3.50
Dimethylthiophosphate (DMTP)	≤4.60	4.61~29.20	≥29.21	4.20	9.82
Atrazine	≤0.02	0.03~0.05	≥0.06	<0.01	7.16
Atrazine mercapturate	≤0.03	0.04~0.06	≥0.07	0.03	7.04

Vaccines

🙏 Please allow me to preface this section with a humble admittance that I exist in extreme uncertainty about this subject, and I am far from being an expert.

What I am is a “curious digger”, a clinician researcher.

I’m presenting my understanding as of this moment, which is simply my own understanding.

I welcome scientific dialogue and hope we can, together, advance our collective understanding.

I invite you to remain curious, and promise that I will too.

Risk of prevention vs infection

In my PANDAS/PANS patient population, vaccines have consistently induced flares, *but obviously so have infections.*

How to counsel parents on each of the 72+ vaccinations to fulfill the childhood vaccination schedule?

What is the risk ratio of infection:vaccination for each?

Problematic situation:
No data on PANDAS/PANS kids.

Even more problematic:
In fact, there's no placebo-controlled data in healthy children either!

Wait, . . . what!?

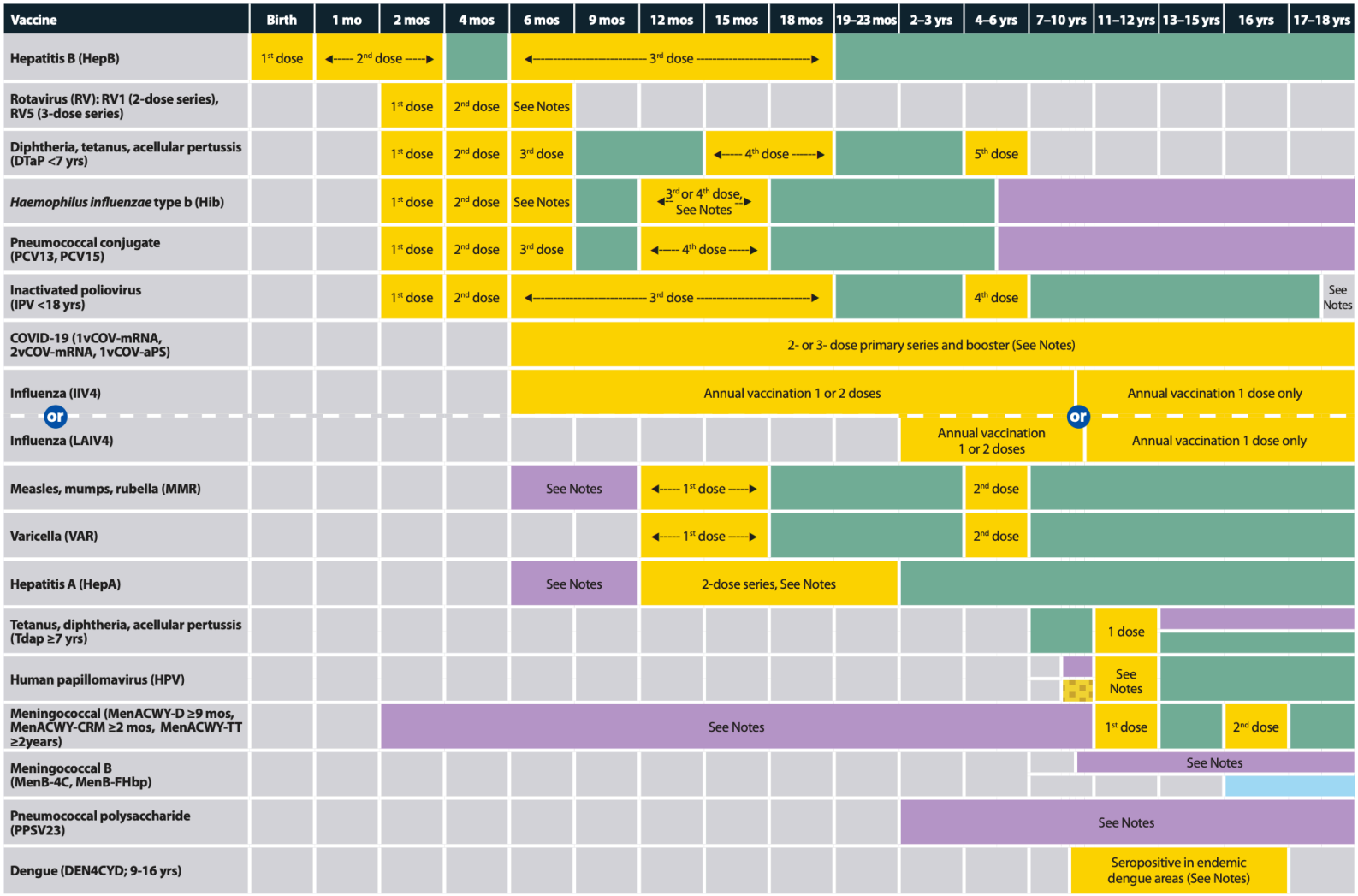
Vaccine safety

NO single childhood vaccine or combination of childhood vaccines has been tested against non-vaccinated controls in clinical trials, *ever*.

Only a few have been studied against “controls" but the “controls” were either ~
- the adjuvants, rather than inert placebo. (ie: PedvaxHIB) By design, adjuvants are intended to evoke an immune response.
- other experimental vaccines (ie: Pneumonia: compared against an experimental meningitis vaccine that has never been approved, and to this day is still not approved. Yet the vaccine was not only approved for licensure, it became the “control” for the next generation pneumococcal vaccine trial.)

CDC’s own definition of placebo from their website ~
“Placebo: A substance or treatment **that has no effect on living beings**, usually used as a comparison to vaccine or medicine in clinical trials.”
https://www.cdc.gov/vaccines/terms/glossary.html#P

These “controls" do not meet the definition of placebo-controlled.



Vaccine adjuvants

NO vaccine adjuvants have been tested as single agents *or* in any combination against placebo controls to show that they're safe to be injected into children, *ever.*

FDA recommends Aluminum not to exceed 5 mcg/kg/day parenterally.

Children get an estimate of 622 mcg/kg of Aluminum in the CDC schedule (average of 4mg per child).

A recent paper found a 4-fold increase in the incidence of childhood asthma per 1mg Aluminum. This **increases the risk of asthma by a factor of 16** (4mg x 4-fold increase).
(Read the raw data, not the the abstract. I have provided access to the full study in your course materials.)

Strictly economically speaking, in 2007, the US economic burden of asthma was estimated at $56 billion. (I struggled to find a more recent estimate.)

PMID: 36180331, 22477831

More details on Aluminum and asthma study

Exclusion criteria and stratification by eczema diagnosis:
From an initial population of 398,191 children, 15,036 (3.8%) did not meet inclusion criteria, 30,976 (7.8%) had vaccine-related exclusions, and 25,188 (6.3%) were excluded due to asthma diagnosed prior to age 24 months. The final study cohort comprised 326,991 children, among whom 14,337 (4.4%) were diagnosed with eczema before age 12 months.

The incidence rate of asthma appeared to increase with increasing levels of aluminum exposure in the eczema and no eczema cohorts.

Among children with eczema after adjustment for covariates, cumulative vaccine-associated aluminum was positively associated with persistent asthma (adjusted hazard ratio [aHR] 1.26 per 1 mg increase in aluminum, 95% CI 1.07, 1.49).

For children with eczema, the mean and median cumulative vaccine-associated aluminum were 4.07 mg (SD 0.60), and 4.18 mg (IQR 3.97, 4.43), respectively.
For children without eczema, the mean and median were 3.98 mg (SD 0.72) and 4.18 mg (IQR 3.93, 4.43), respectively.

PMID: 36180331

Mercury controversy

Claim: Methylmercury (found in fish) and ethylmercury (thimerosal as sodium ethylmercurithiosalicylate) have different health effects…?
They're both organic form. Studies?

2016 industry flyer - "Thimerosal use is still permitted in multi dose vaccines and contact lens solutions at concentrations of up to *100 and 70* ***mg****/kg respectively*."
*mg, not mcg

CDC's National Immunization Program statement in 2004 - "…thimerosal-free vaccine costs more than the thimerosal-containing vaccine—about $12 versus $8.50 per dose."

*https://assets.thermofisher.com/TFS-Assets/CMD/Application-Notes/AN-43141-ICP-MS-Mercury-Contact-Lens-Solution-AN43141-EN.pdf

Ethylmercury on the mind

Thimerosal-derived ethylmercury is a mitochondrial toxin in human astrocytes; inhibits mitochondrial respiration with concurrent increases in the formation of ROS.

Cell studies provide evidence for the passive and active transport across the BBB.

Animal and clinical studies specifically examined whether mercury accumulates in the brain after exposure to ethylmercury-containing compounds (thiosalicylate) or Thimerosal.

The results indicate that ethylmercury-containing compounds are **actively transported across membranes** by the L (leucine-preferring)-amino acid transport (LAT) system, **the same as methylmercury-containing compounds**.

Further, 22 studies from 1971 to 2019 show that exposure to ethylmercury-containing compounds (intravenously, intraperitoneally, topically, subcutaneously, intramuscularly, or intranasally administered) **results in accumulation of mercury in the brain**.

In total, these studies indicate that ethylmercury-containing compounds and Thimerosal readily cross the BBB, convert, for the most part, to highly toxic inorganic mercury-containing compounds, which significantly and persistently bind to tissues in the brain, **even in the absence of concurrent detectable blood mercury levels**.

PMID: 31841767, 22811707

Vaccine efficacy

NO vaccination on the childhood schedule has been tested for *efficacy* against non-vaccinated controls in clinical trials - *ever.*

Do childhood vaccinations actually protect from the disease they're targeted against? How could we know? It's never been tested in a clinical trial.

Duration of non-placebo "controlled" trials from which vaccines have been licensed track for an average of 4-5 days. (Ie: Hep B)

What about long-term health outcomes?

Human and animal data suggest vaccine adjuvants increase the risk of developing an autoimmune disease, including RA, SLE, Sjögren syndrome, autoimmune thyroiditis and antiphospholipid syndrome.

PMID: 26275795, 27417999

Vaccine efficacy

The full extent of inquiry is *one* retrospective analysis by Dr. Paul Thomas of over 11,000 children born into his pediatric practice, where he had a statistically significant cohort of his patients who's parents decided to forgo vaccination and those who vaccinated their children - providing a treatment group and a control group.

Among the vaccinated, 25.16% had a family history of autoimmunity, whereas among the unvaccinated, 31% had the same characteristic.

The Quality Assurance Analysis showed ~

> Vaccinated children had 4-5x more health issues than the unvaccinated children, including allergic conditions, asthma, neurodevelopmental conditions such as ADHD, and infectious diseases, including those for which they were vaccinated against.

*these results were using his vaccine-friendly plan, which staggers vaccinations to reduce immune aggravation and allow for clearing of adjuvants.

This paper was retracted and to this date there's been no discernible reason why.

PMID: 33266457

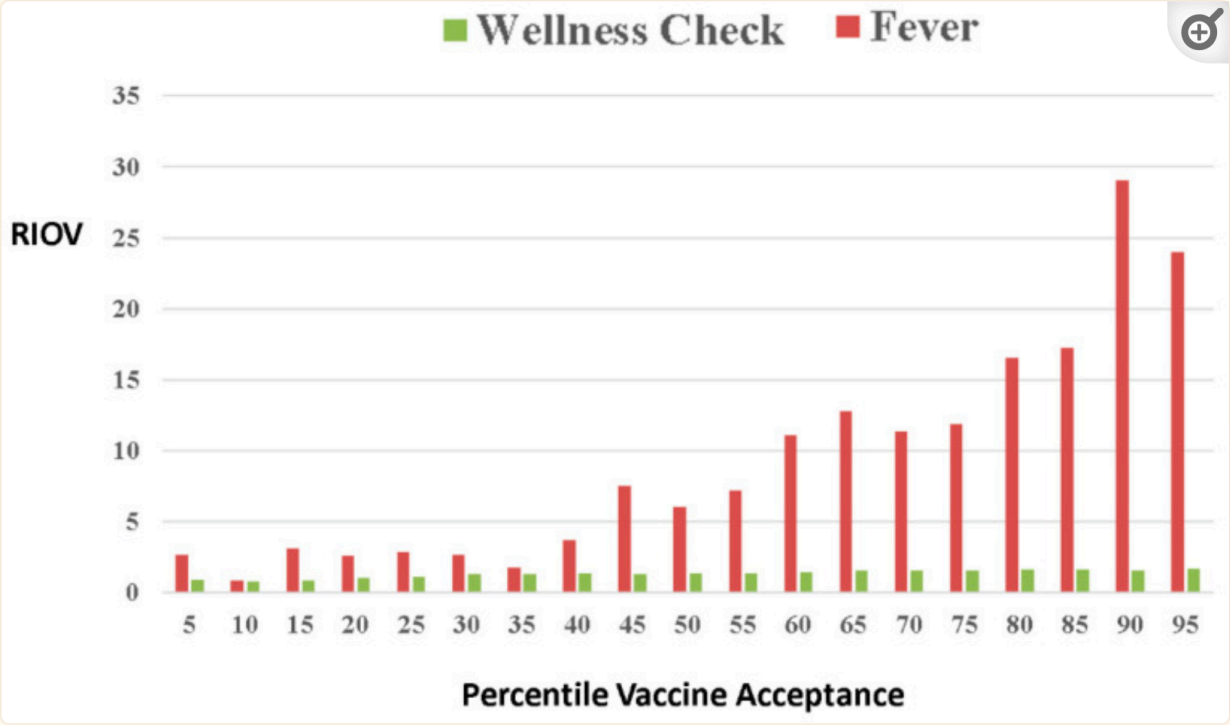
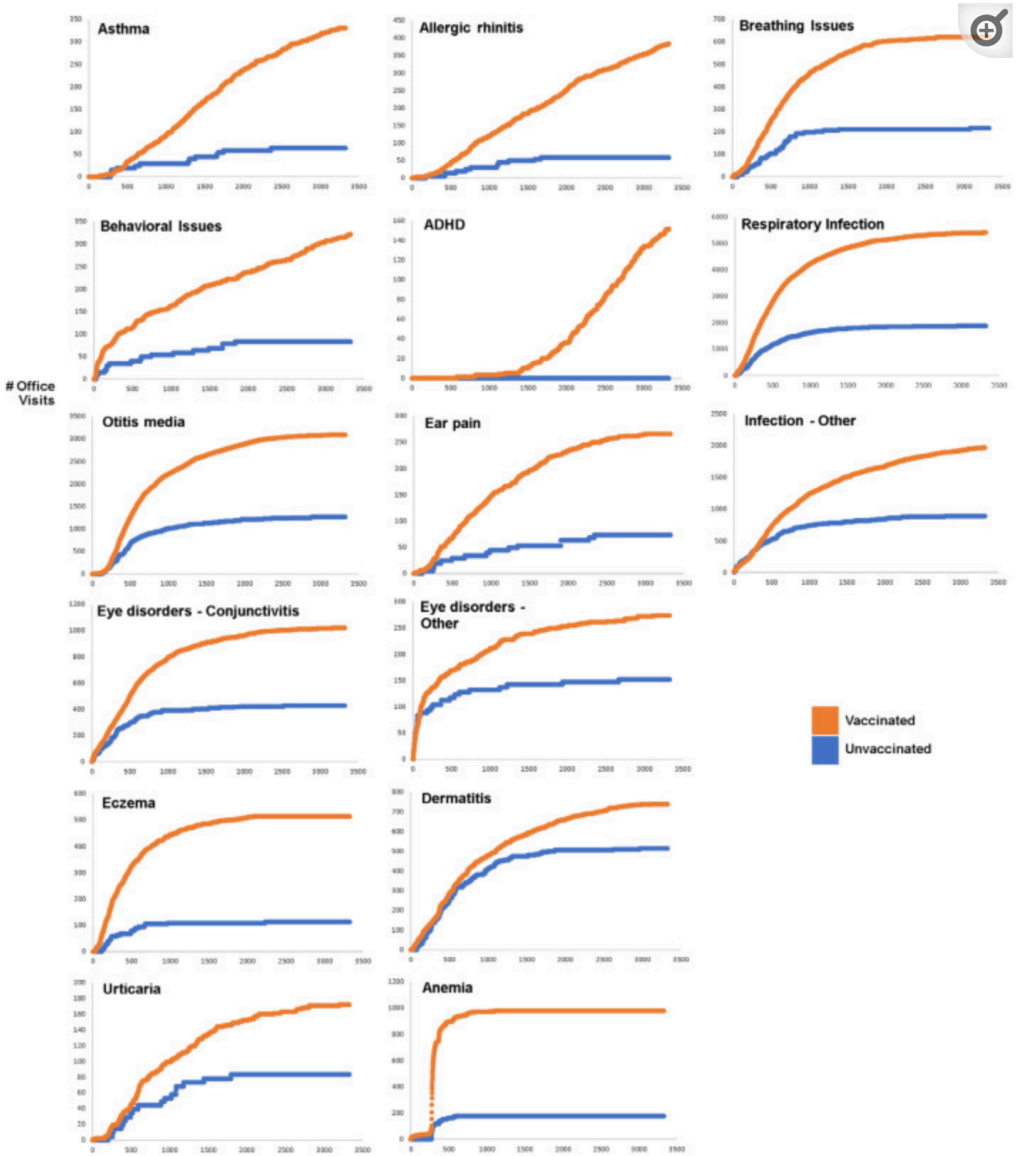


Figure 3

Relative Incidence of Office Visit (RIOV) percentile vaccinated vs. unvaccinated design of analysis: power decreases from left to right; thus, a stable trend (increase or decrease) becomes noteworthy. The data shown are for the Relative Incidence of Office Visits (RIOVs) to average incidence ratio of billed office visits related to fever in the vaccinated compared to the unvaccinated (OV_V/OV_{UV}) conditions and for "Well Child" visit on the right. For all the clinical conditions studied, RIOV reflects the total number of billed office visits per condition per group, reflecting the total disease burden on the group and the population that it represents.

PMID: 33266457



Published Reanalysis

Dr. Thomas's paper was retracted based on the complaint of one person—after it had passed peer review, was published, and had been read by over 250,000 people.

"His complaint hinged on the supposition — unsupported by any data —that vaccinated children made their scheduled HCVs more regularly than unvaccinated, implying that those unkept appointments led to fewer diagnose.

We show, here, new data from the same practice that the opposite is true.

We have shown, using a variety of exhaustive methods, that the anonymous reader's concerns that led to the retraction of Lyons-Weiler and Thomas (2020) were unfounded. …we conclude that the paper was wrongfully retracted…"

SOURCE: James Lyons-Weiler PhD and Russell L. Blaylock, MD. *Revisiting Excess Diagnoses of Illnesses and Conditions in Children Whose Parents Provided Informed Permission to Vaccinate Them*, International Journal of Vaccine Theory, Practice, and Research. September 26, 2022 p. 603. https://doi.org/10.56098/ijvtpr.v2i2.

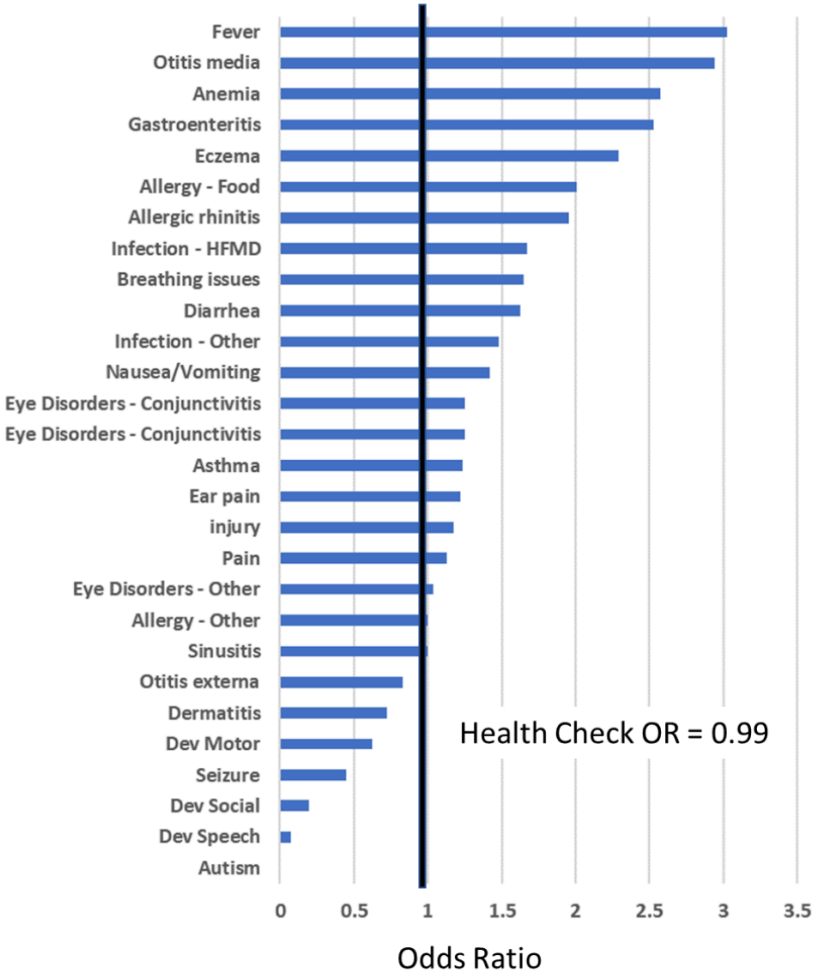


Figure 4. Odds ratio of office visits for specific health issues in the comparison of 561 unvaccinated and 561 vaccinated patients in the matched analysis.

When the data for vaccinated versus unvaccinated children are examined, the critic's claim is exactly reversed.

Relative Risk and Odds Ratios sustain and augment the original report. Additional office visits, beyond scheduled HCVs, are quantified, controlling for variation in kept HCVs and age/days of care.

Estimates of Health Care Incidence (HCI) show that visits above regular HCVs increase due to vaccination by 2.56 to 4.98 additional office visits for vaccine-related health issues per unit increase in vaccination per year.

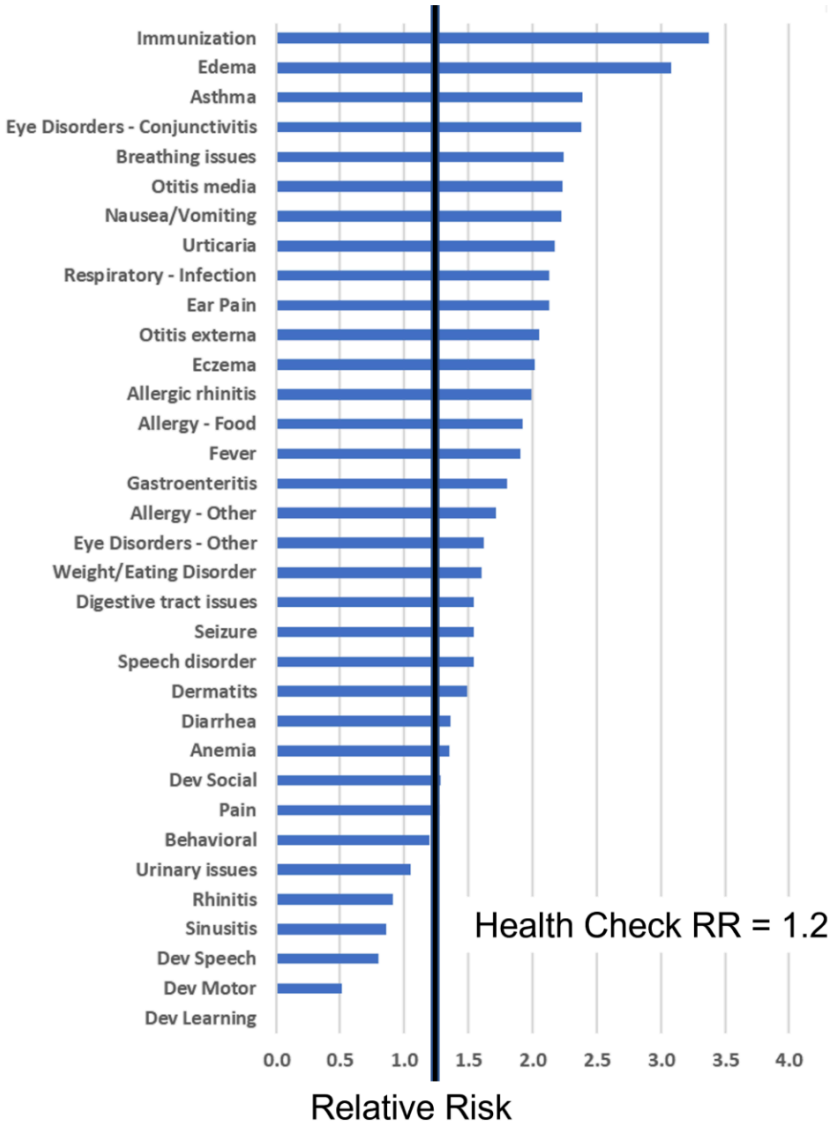


Figure 7. The age-matched effects of vaccine cessation. High Relative Risk values denote increased risk of a given health outcome in patients receiving more vaccines in the older age group (>1,500 days of age). The black bar shows the Relative Risk of HCV between these groups as a baseline.

Additionally, the comparison of the High- and Low-vaccinated patients aged 1,500 days or more shows that vaccine cessation leads to a reduction in many conditions (thus the increased relative risk in the vaccinated patients;[.]"

1 study. 1 reanalysis.

Why hasn't this been repeated?

Does volunteer reporting work?

VAERS put in place by the CDC to monitor vaccine safety; voluntary, complaints about time it takes to submit a report.

So HHS commissioned the Agency for Healthcare Research and Quality (AHRQ) for a pilot project with Harvard researchers to use machine learning to facilitate detection and clinician reporting of vaccine adverse events directly into VAERS. Goal: improve completeness, validity, and timeliness of physician-approved case reports to VAERS compared to the existing spontaneous reporting system.

EHR from all ambulatory care encounters in a large multi-specialty practice. Every patient receiving a vaccine was automatically identified, and for the next 30 days, their health care Dx codes, lab tests, and prescriptions were evaluated for values suggestive of an adverse event.

Protocol was reviewed in advance by the CDC's Clinical Immunization Safety Assessment (CISA) Network.

Electronic Support for Public Health–Vaccine Adverse Event Reporting System (ESP:VAERS) Report, PI: Lazarus, 2010

Results

Preliminary data were collected from June 2006 through October 2009 on 715,000 patients. 1.4 million doses (of 45 different vaccines) were given to 376,452 individuals.

Of these doses, 35,570 possible reactions that fit the criteria of an adverse event were identified (2.6 percent of vaccinations.) Equates to an average of 1 in 37 vaccines given. (At the time, CDC was reporting the occurrence of 1 in 1 million.)

This is an average of 1.3 events per clinician, per month.

Found that fewer than 1% of vaccine injuries reported to doctors and recorded by an encounter within 30 days were actually being reported on VAERS. The VAERS system is underreporting more than 99% of adverse events.

These data were presented at the 2009 AMIA conference.

Electronic Support for Public Health–Vaccine Adverse Event Reporting System (ESP:VAERS) Report, PI: Lazarus, 2010

Conclusion

"Low reporting rates preclude or slow the identification of "problem" drugs and vaccines that endanger public health. New surveillance methods for drug and vaccine adverse effects are needed. Barriers to reporting include a lack of clinician awareness, uncertainty about when and what to report, as well as the burdens of reporting: reporting is not part of clinicians' usual workflow, takes time, and is duplicative. Proactive, spontaneous, automated adverse event reporting imbedded within EHRs and other information systems has the potential to speed the identification of problems with new drugs and more careful quantification of the risks of older drugs."

Response? CDC shut down the pilot project.

Researchers: "the necessary CDC contacts were no longer available and the CDC consultants responsible for receiving data were no longer responsive to our multiple requests to proceed with testing and evaluation."

Electronic Support for Public Health–Vaccine Adverse Event Reporting System (ESP:VAERS) Report, PI: Lazarus, 2010

Timing and ethics

Once a vaccine is licensed, it is considered unethical to conduct a placebo-controlled clinical trial, as you'd be denying the child the standard of care . . .
*even though licensure was granted without a placebo-controlled clinical trial.

We are in a pickle:
How do we weigh the risk of infection against vaccination with limited data in kids with neurological autoimmunity.
How do we stratify which child's immune system will go too far?

In fairness, many of the herbs and other natural treatments that I'll be teaching about have never been tested against placebo controls. I'm fully aware that natural is not the same thing as safe.

Weighing the risks

Doctor, did you know that because the CDC hasn't done the appropriate research, the determination of whether any vaccination is *safe* or *effective* for your patient, or whether it increases their risk for developing allergies, asthma, ADHD, autoimmunity, or even the very infection it's intended to treat, **is being left up to you?**

> *"We need more investment in vaccine safety science,"*
> *Heidi Larson, Director, WHO Vaccine Confidence Project*

Ultimately it's the parent's decision, with "informed-as-much-as-possible-with-limited-data" consent.

Parents are beginning to sue doctors since they can't get compensation for injury or death from the pharmaceutical companies for anything classified as a "vaccine" (per 1986 The National Childhood Vaccine Injury Act.)

Did you know you were being asked to take on that much personal medicolegal risk?

https://aaronsiri.substack.com/p/clinical-trial-to-license-rotateq

Coverage

This is the parent's responsibility. Do not allow abdication of the responsibility to you. However, do your duty to inform as much as possible.

Require parents to sign a consent form for either decision; vaccinate or not. Consider each vaccine separately.

Copy the entire package insert and require that the parent read it before signing your consent form ~
Federal Regulatory Code
-Pre-2006 approved: § 201.80 “The labeling shall be revised to include a warning as soon as there is reasonable evidence of an association of a serious hazard with a drug; a causal relationship need not have been proved.”
https://www.ecfr.gov/current/title-21/chapter-I/subchapter-C/part-201/subpart-C/section-201.80
-After 2006: § 314.70 “To add or strengthen a contraindication, warning, precaution, or adverse reaction for which the evidence of a causal association satisfies the standard for inclusion in the labeling under § 201.57(c) of this chapter;”
https://www.ecfr.gov/current/title-21/chapter-I/subchapter-D/part-314/subpart-B/section-314.70

Consent form includes, but not limited to ~
-The risk of the getting the infection (sxs, severity, duration)
-Have a check box where the parent attests
“_X_ I have read the vaccine package insert for ____”
“_X_ I understand that this vaccine has not been compared for safety or efficacy against true placebo-control in clinical trials, nor has it been compared against non-vaccinated children in a clinical trial.”
-Make sure parents are aware that therefore it’s impossible to provide a true “informed consent”.

Check your malpractice coverage for vaccine injury and injury from not vaccinating.

Mitigating vaccine reactions

Many parents choose to vaccinate.

Alternate schedule - one at a time, separate by weeks
Pro - allows for I/S response resolution/adjuvant detox between, know what immunization is easier/harder on child, doesn't overwhelm I/S or toxicities
Con - more needle sticks/doctor visits, increased chance of losing to follow-up

Preservative-free or low preservative option (only addresses thimerosal)

Prep with homeopathy ~
Ledum 30c - 3 pellets under tongue 15-30min before injection
Thuja 30c - 3 pellets under tongue right after injection, and repeat immediately if any neuro sxs arise

Glutathione ~
450mg bid the day before, the day of, and day after injection

AVOID acetaminophen! (depletes glutathione)

Environmental triggers

Top 7 from my clinical practice ~

1. Herbicides
2. Mold
3. EMFs
4. Mercury
5. Pesticides
6. Vaccine adjuvants

(Food dyes get a dis-honorable mention)

Commonality: all are neurotoxins and immunotoxins.

Diagnostics

Clinical diagnosis

PE and symptoms as clues

General diagnostics

Infectious triggers

Environmental triggers

Kid in a bubble?

Natural for parents to want to protect their child.

Soften your perspective, and…

LISTEN to the child's behaviors!

Prognosis

Do they grow out of it? In my practice, not without treatment.

Seem better outwardly, as they learn how to cope better/not disturb others = extreme inward suffering with outward “norm’ing”.

Some improvement even without treatment after the hormone swings of puberty calm down.

Most can get back to life but must prioritize health/minimize environmental and infectious exposures.

With adequate treatment, most grow into independently-living adults with careers, hobbies, relationships, etc.


Diagnostics
Next up:
Conventional
Approach
Adobe licensed image