

# **MICROBIOME MAGIC FOR PEDIATRIC PATIENTS**

HEALTHY BRAINS, BODIES, &  
IMMUNE SYSTEMS

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**Biocidin  
Botanicals™**



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# WHO I AM



The two things I'm most proud of:

- Mom to two awesome kids!
- Integrative pediatrician in the SF Bay Area

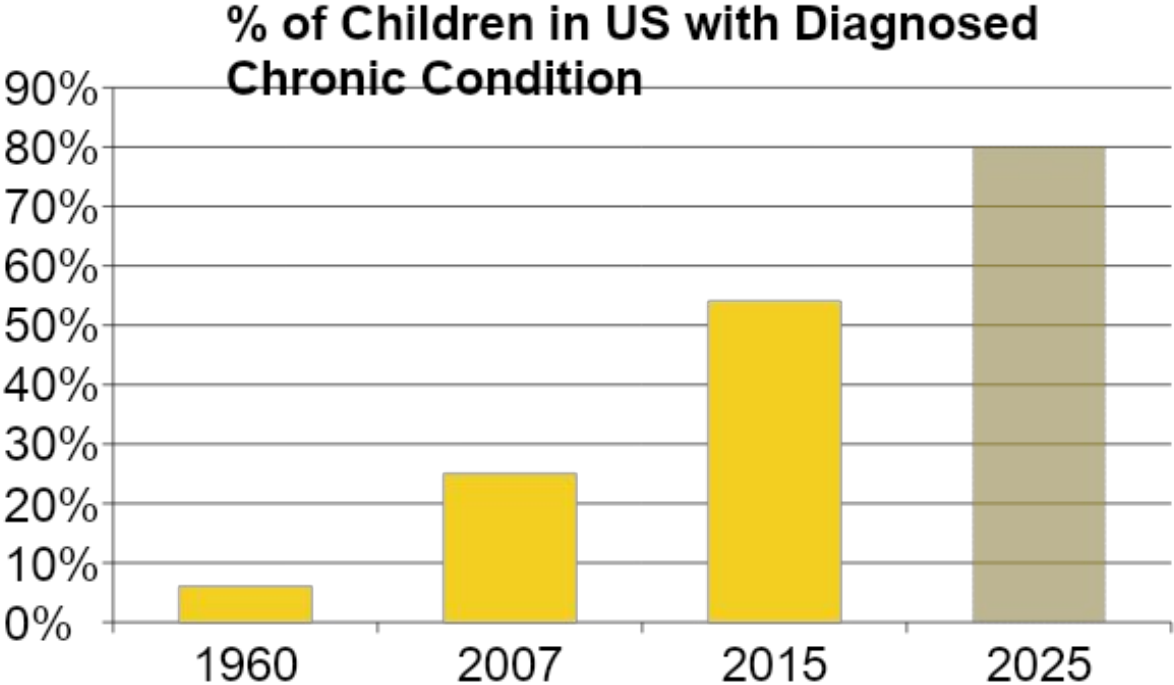
# WHO I AM

- Integrative pediatrician and pediatric functional medicine expert with over 20 years of experience
- Trained at Stanford, NYU School of Medicine, and UCSF Pediatrics Residency
- Additional training in functional medicine, homeopathy, acupuncture, herbal medicine, and essential oils
- Teach other practitioners pediatric functional medicine, pediatric acupuncture, and clinical homeopathy (A4M, IFM, CEDH, Academy for Pain Research, Center for Advanced Acupuncture Pediatrics)
- Created Healthy Kids Happy Kids, a trusted online holistic pediatric resource for parents and practitioners



# OUR KIDS ARE SICK AND GETTING SICKER ...

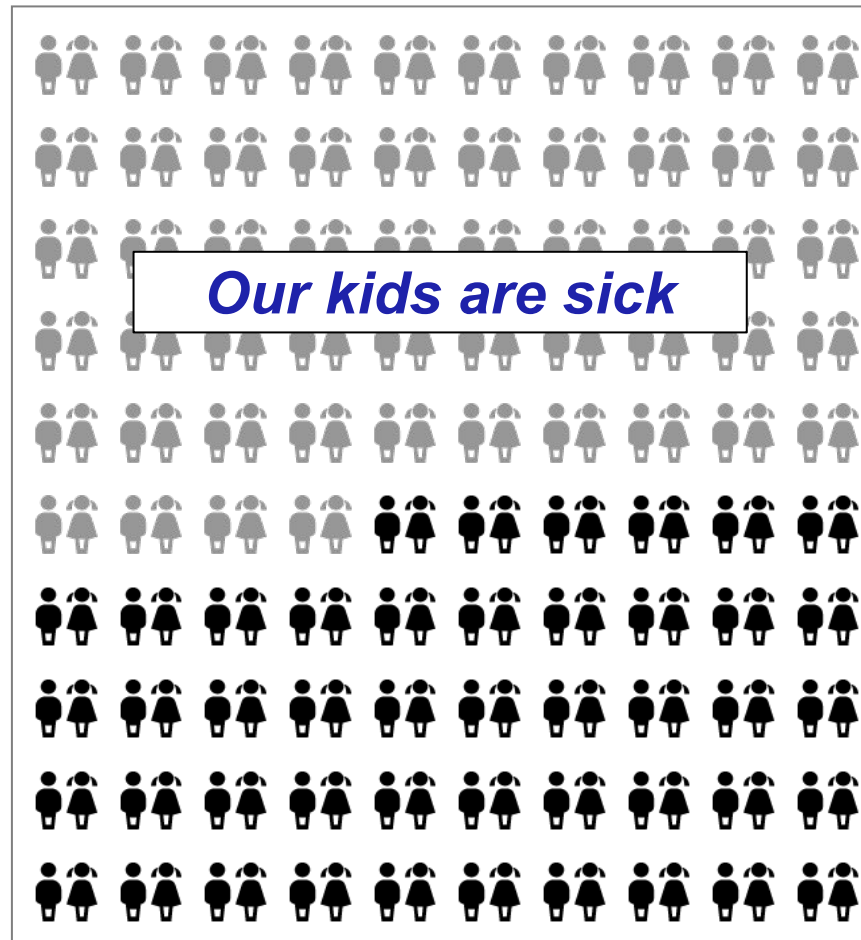
By 2025, it is expected that the vast majority of children in the U.S. will have a chronic health condition.



Ref: Bethel, Christina D. A National and State Profile of Leading Health Problems and Health Care Quality for U.S. Children. Academic Pediatrics, 2011. Estimate of future impact is conservative given historical growth rates.

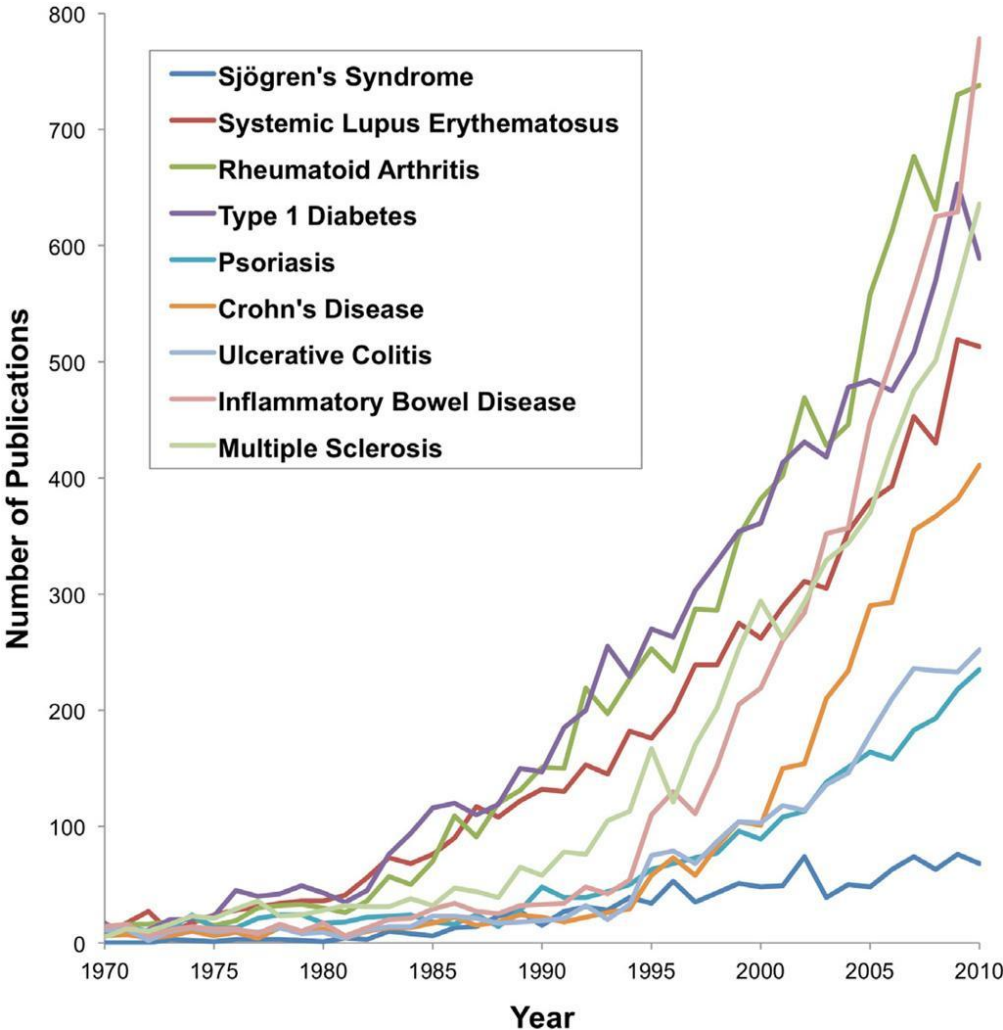
# THE “NEW NORMAL”

- Eczema
- Asthma
- Allergies
- Anxiety/Depression
- ADHD/ADD
- Autism
- Sensory Processing Disorder
- Crohn’s
- Colitis
- PANDAS/PANS
- Bipolar Disorder
- Autoimmunity
- Obesity
- Diabetes
- . . .



\*Ref: Bethel, Christina D. A National and State Profile of Leading Health Problems and Health Care Quality for U.S. Children. Academic Pediatrics, 2011.

# THE EPIDEMIC OF AUTOIMMUNITY



J A. Ice, H Li, et al. Genetics of Sjögren's syndrome in the genome-wide association era; Journal of Autoimmunity, Volume 39, Issue 1, Pages 57-63.

# RATES OF AUTOIMMUNE DISEASE IN KIDS

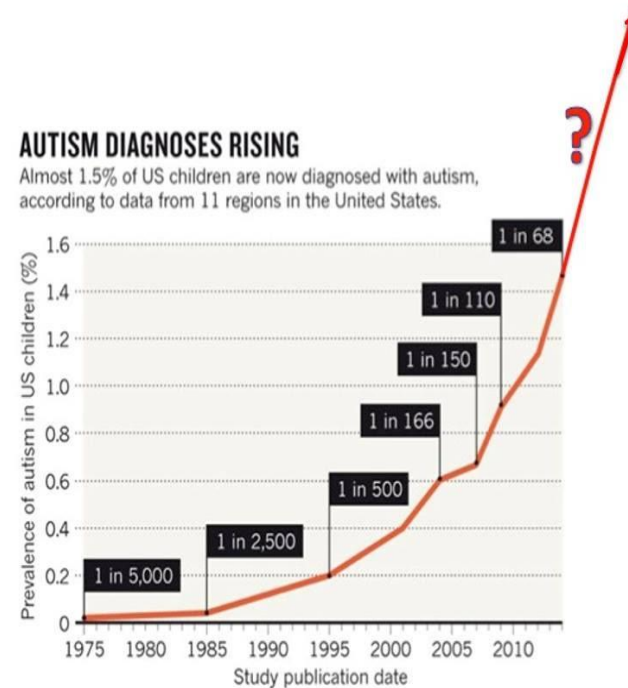
In my practice ...

- 6 month-old girl diagnosed with Crohn's Disease
- 16 month-old boy with celiac disease
- 18 month-old girl diagnosed with Ulcerative Colitis
- 5 year-old girl with autoimmune uveitis
- 5 year-old boy with JIA (8 months after receiving first vaccine – MMR 2/2015)
- 5 year-old boy with JIA (6 months after receiving first vaccine – MMR 2/2015)
- 7 year-old boy with JIA
- 9 year-old girl with MS (after post-Flumist Acute Disseminated Encephalomyelitis)
- 10 year-old girl with JRA and Crohn's
  - Younger brother diagnosed with JRA at 12 years
- More and more with PANS
- Eczema is considered autoimmune reactivity



# THE RISE IN NEURODIVERSITY: AUTISM

- Autism rates are skyrocketing
- 2018 CDC surveillance data: 1 in 44 children has autism spectrum disorder
- 4X more common among boys than girls
- 1 in 41 in New Jersey
- Higher in certain pockets of California (i.e., Silicon Valley)



**\*2033**  
**1 in 4**

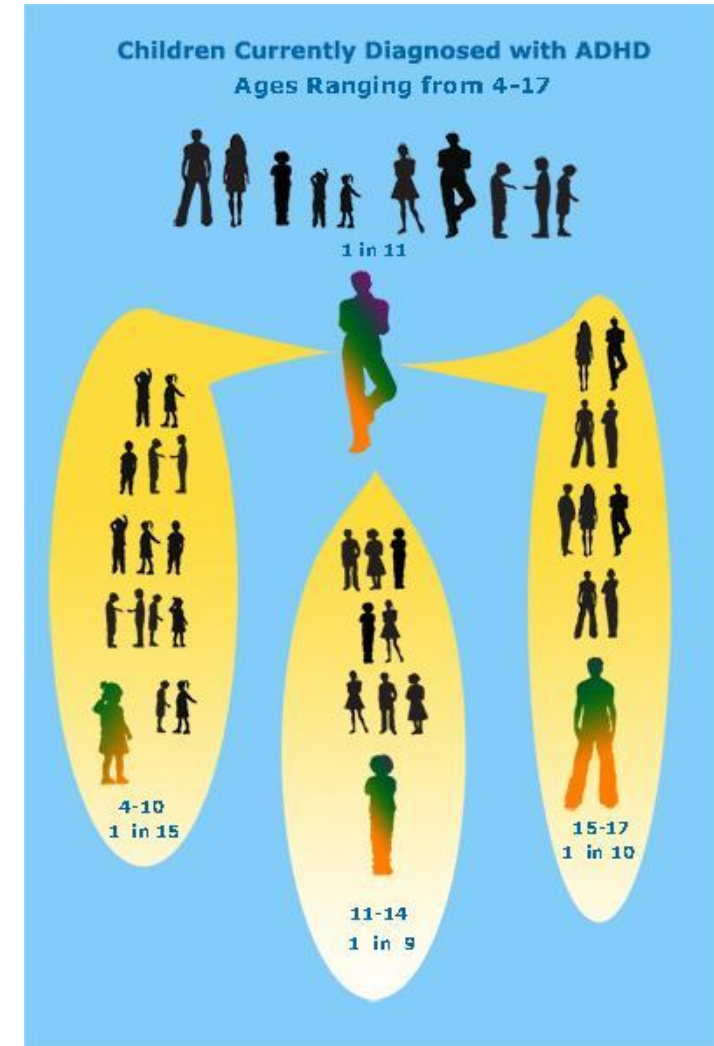
Assuming continued 13% annual growth rate.

\*K. Weintraub, Nature 479, Nov. 3 2011, 22-24.

Estimates of 1 in 4 by 2033 are based on a projected annual growth rate of 13%; MIT Scientist Stephanie Seneff has estimated that 1 in 2 children will have autism by 2025

# THE RISE IN NEURODIVERSITY: ADHD

- ADHD data for 2011-2013 (CDC)
- 5.1 million children (8.8% or 1 in 11 of this age group, 4–17 years) have a current diagnosis of ADHD
  - 6.8% of children ages 4–10 (1 in 15)
  - 11.4% of children ages 11–14 (1 in 9)
  - 10.2% of children ages 15–17 (1 in 10)
- The average age of current ADHD diagnosis was 6.2 years, including:
  - "Mild" ADHD diagnosed at 7 years
  - "Moderate" ADHD diagnosed at 6.1 years
  - "Severe" ADHD diagnosed at 4.4 years
- Comorbidities are common
  - 1 in 2 also have a behavior/conduct problem
  - 3 in 10 also have anxiety



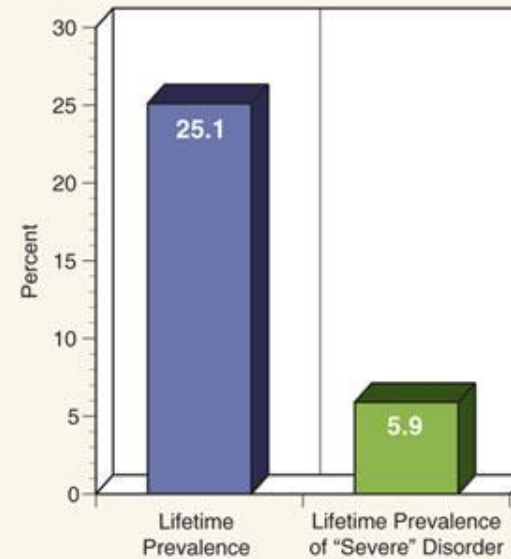
# EPIDEMIC OF CHILDHOOD MENTAL HEALTH DISORDERS

- Anxiety
  - 1 in 4 has an anxiety disorder (13-18 year-olds)
  - 1 in 15 has a "severe" anxiety disorder
- Depression
  - 1 in 10-15 teens has depression
- Any mental disorder (13-18 year-olds)
  - 46% - ALMOST 1 IN 2!!!

The pandemic has created a mental health EMERGENCY in kids (and adults)

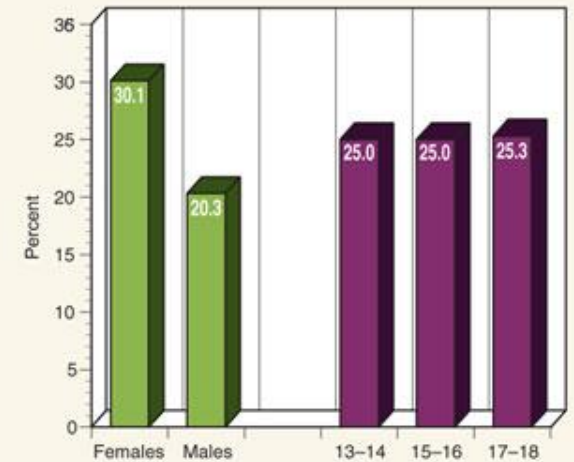
Lifetime Prevalence of 13 to 18 year olds

- **Lifetime Prevalence:** 25.1% of 13 to 18 year olds
- **Lifetime Prevalence of "Severe" Disorder:** 5.9% of 13 to 18 year olds have "severe" anxiety disorder



Demographics (for lifetime prevalence)

- **Sex:** Statistically different
- **Age:** Not statistically different



- **Race:** Statistically significant differences were found between non-Hispanic whites and other races

<sup>1</sup>Merikangas KR, He J, Burstein M, Swanson SA, Avenevoli S, Cui L, Benjet C, Georgiades K, Swendsen J. *Lifetime prevalence of mental disorders in U.S. Adolescents*. Under review.



# WHAT THE HECK IS GOING ON?



# ALL HEALTH STARTS IN THE GUT



- The gut-immune system connection
- The gut-brain connection
  - Our “second brain”
- The gut-hormone connection
  - Thyroid
  - Adrenals
- The gut-metabolism connection
  - Obesity/overweight
  - Metabolic syndrome

The Gut-WHOLE BODY CONNECTION

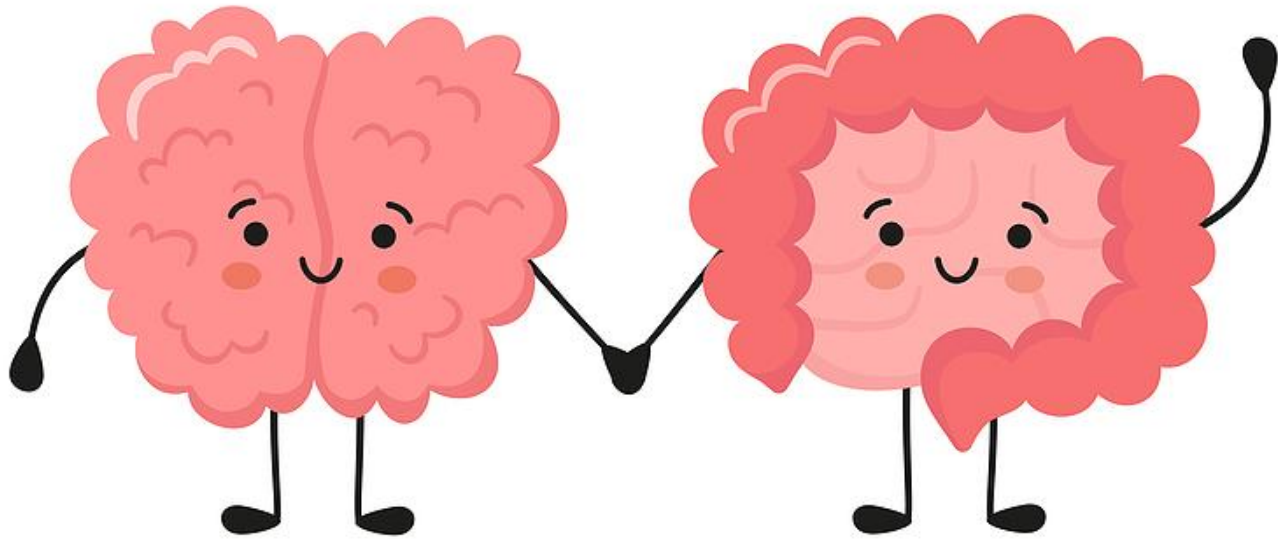


# THE GUT-IMMUNE SYSTEM CONNECTION

70% of our immune system is in our gut!



# THE GUT-BRAIN CONNECTION



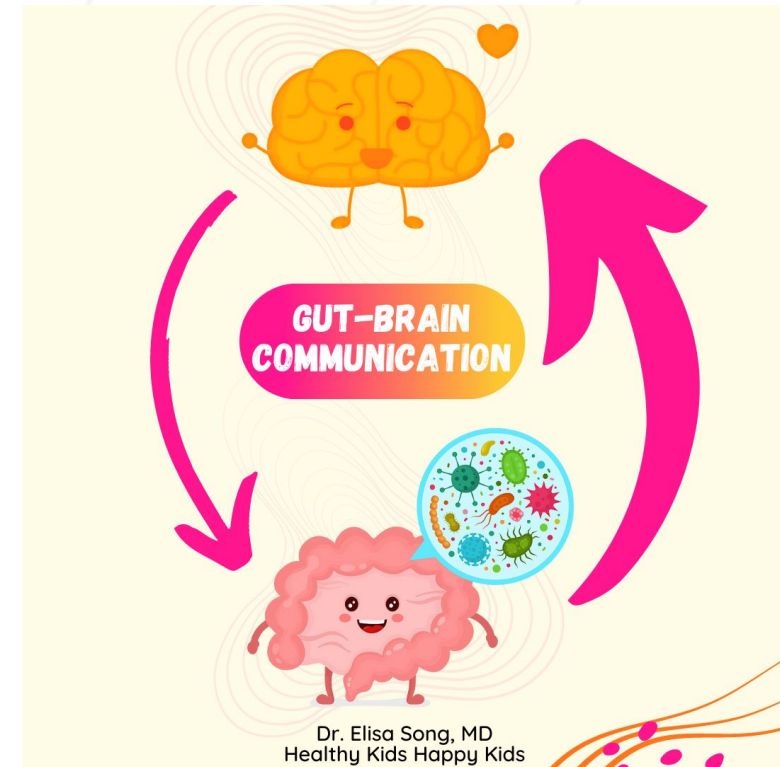
- IQ
- Temperament
- Behavior
- Sleep
- Mood
- Attention/Focus



# THE VAGUS NERVE: THE GUT-BRAIN SUPERHIGHWAY

- BI-DIRECTIONAL communication between the gut and the brain via the VAGUS NERVE
  - Gut microbiome directly influences our emotions, moods, and behavior, AND vice versa. It's a 2-way street.
- 80-90% of the communication occurs FROM the gut TO the brain!

**SO WHO'S REALLY IN CHARGE –  
OUR BRAIN, OR OUR GUT?**



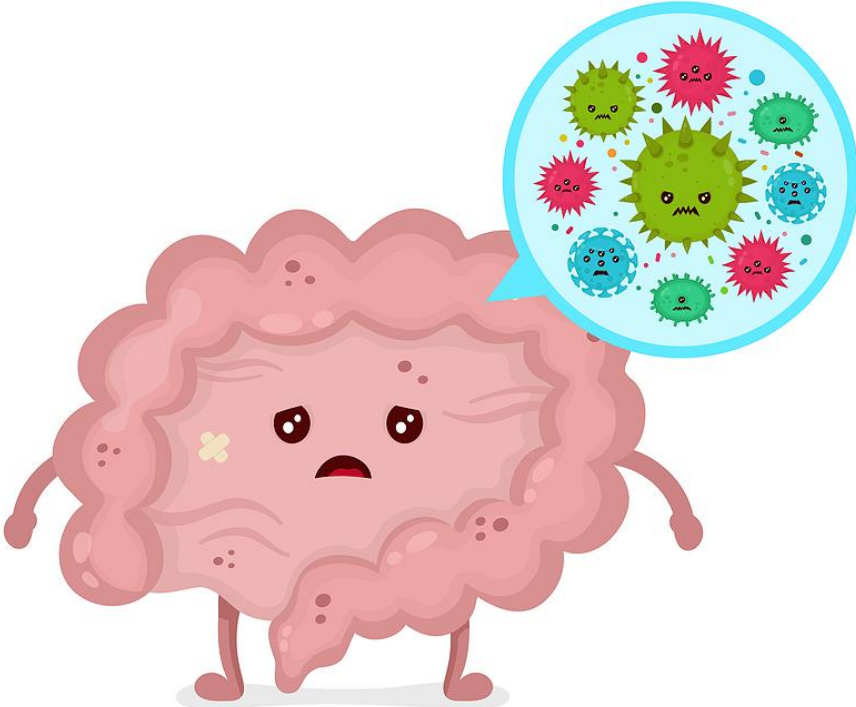
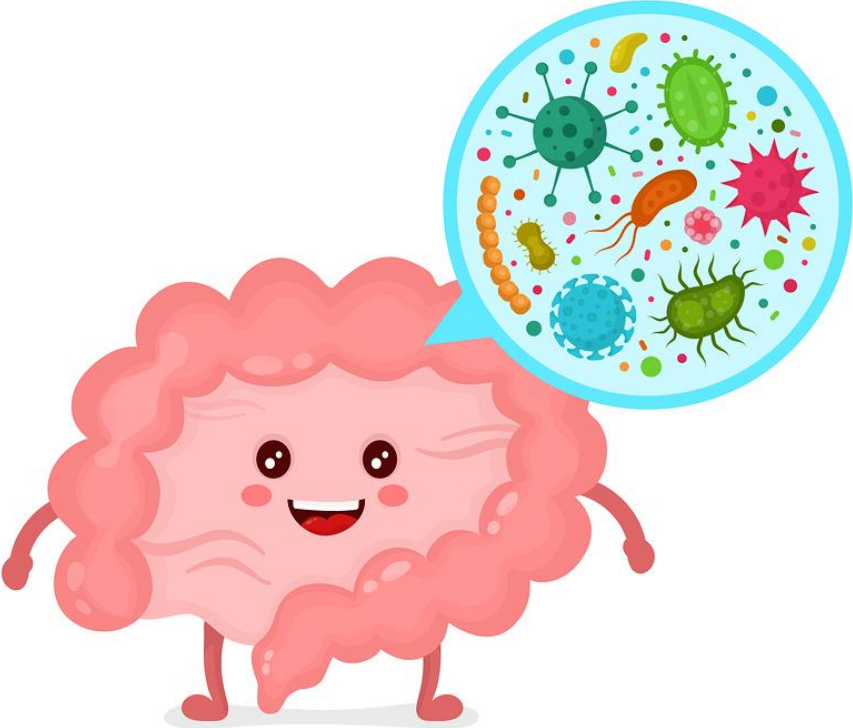




# WHAT HAPPENS WHEN THE GUT MICROBIOME BECOMES DISRUPTED?



# WHEN THE GUT MICROBIOME IS DISRUPTED – GUT DYSBIOSIS



# GUT DYSBIOSIS & CHILDREN'S HEALTH

## Eczema, asthma, allergies connection

- Antibiotics or antacid medicines in the first 6 months of life may more than **DOUBLE** the risk of every allergic disease by 4 years of age. Likely due to shift in developing gut microbiome and influence on developing immune system.
- Probiotics given to mom during 3<sup>rd</sup> trimester and while nursing may reduce risk for atopic disease in their babies by 50%.

## Autoimmune connection

- Certain gut bacteria may predispose children to autoimmunity.

# GUT DYSBIOSIS & CHILDREN'S HEALTH

## Gut-brain connection

- Antibiotic use during the first 2 years of life may increase the risk of mental health concerns later in childhood or adolescence by **up to 50%** – including sleep disorders, ADHD, mood and anxiety disorders, and other behavioral concerns.

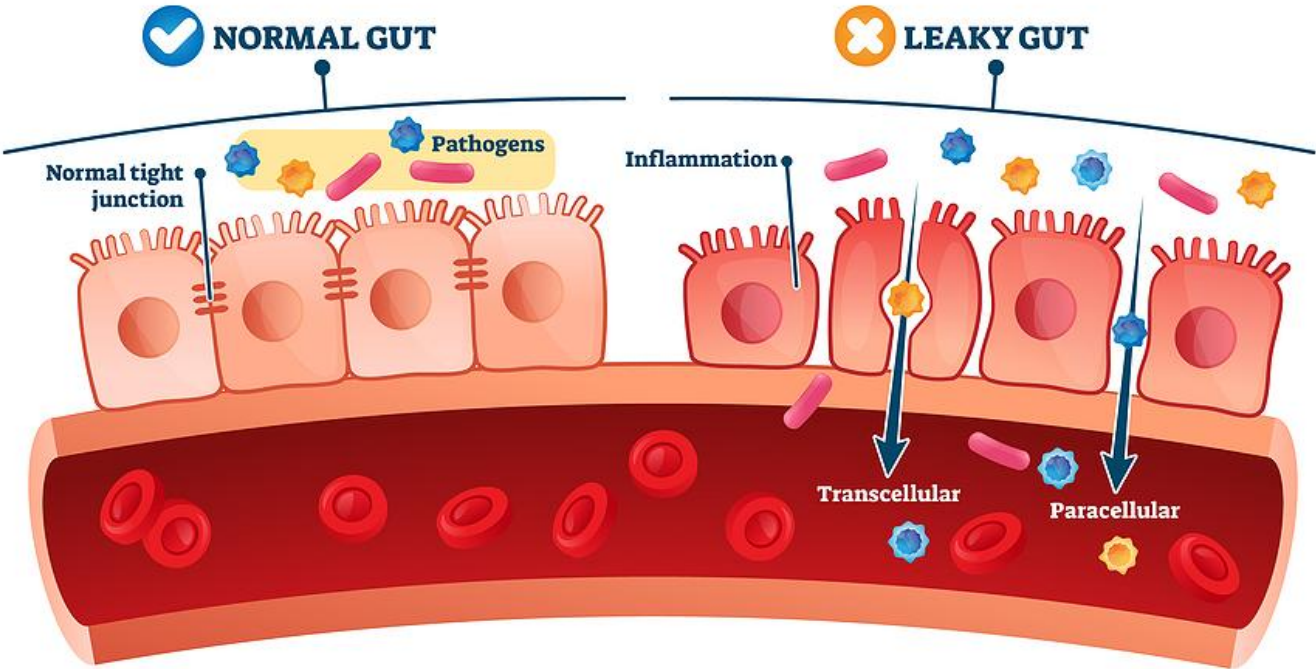
Study population: All births in Finland between 1996 - 2012; 1 million births studied for **antibiotic drug exposure: mothers during pregnancy and the children the first two postnatal years.**

- **RESULT:** 10–50% increased risks of childhood-onset sleep disorders, ADHD, conduct disorders, mood and anxiety disorders, and other behavioral and emotional disorders
- Strongest risk for antibiotic exposure **BEFORE** 6 months of age.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6879739/>

# WHEN THE GUT MICROBIOME IS DISRUPTED

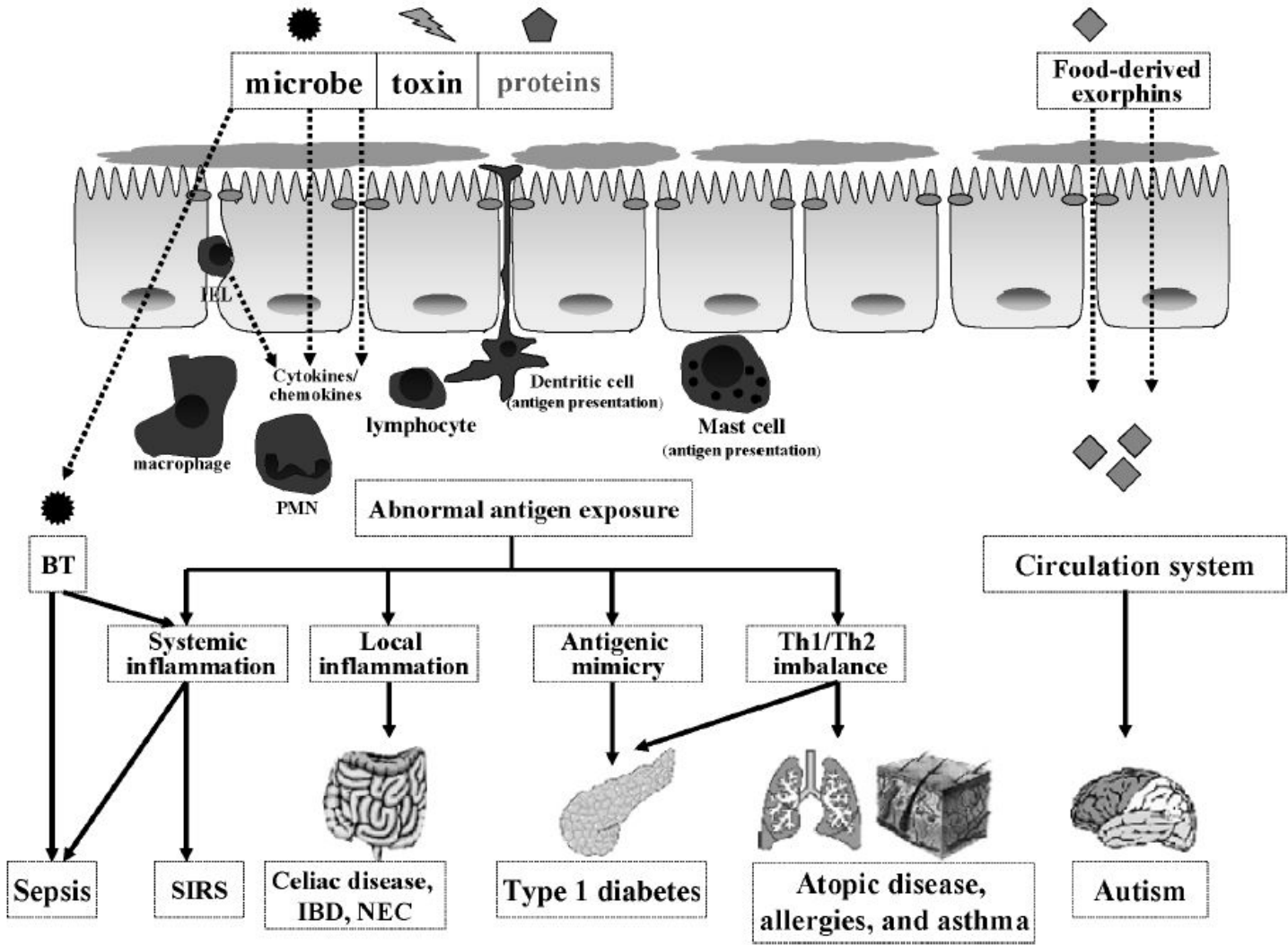
## LEAKY GUT



# LEAKY GUT & KIDS' HEALTH – HOW LONG HAVE WE KNOWN?

- 1981 Eczema
- 1982 Crohn's and celiac disease
- 1985 Food allergies
- 1986 Pollen allergies
- 1989 Migraines
- 1990 Irritable Bowel Syndrome
- 2000 Juvenile arthritis
- 2003 Autism
- 2005 Type 1 diabetes
- 2018 ADHD
- 2020 Hashimoto's thyroiditis
- 2020 Childhood obesity
- 2021 Multisystem Inflammatory Syndrome in Children (MIS-C)

# LEAKY GUT & CHILDREN'S HEALTH



Z Liu, N Li, J Neu (2005). Tight junctions, leaky intestines, and pediatric diseases; *Acta Paediatrica* 94 (4), 386–393.



# HOW DOES THE GUT MICROBIOME BECOME DISRUPTED?





# FACTORS THAT CAN DISRUPT YOUR GUT MICROBIOME

- The wrong foods – Microbiome Mischief Makers
- Medications
  - Antibiotics
  - NSAIDs (like ibuprofen)
  - Reflux/antacid medications
  - Steroids
  - Oral contraceptives
- Psychological stress



# THE STANDARD AMERICAN DIET (SAD) ...



I'll have fries with that ...



And don't forget the Diet Coke!

# THE “SAD” DIET & MICROBIOME MISCHIEF MAKERS

The Top Microbiome Mischief Makers

- FDA-approved food additives
- Added sugar
- Glyphosate

# FDA-APPROVED FOOD ADDITIVES & THE GUT MICROBIOME

- Cause direct harm to gut microbiome and cause gut dysbiosis and leaky gut
- Food additives (esp. emulsifiers) are directly correlated with an increase in autoimmunity
  - **Emulsifiers** (surfactants) disrupt tight junctions and directly cause leaky gut
  - Harmful effects of sucrose fatty acid esters found at 50 mg/L
  - FDA allows infant formula to have levels up to 120 mg/L!



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7117642/>

[https://www.gastrojournal.org/article/S0016-5085\(21\)03728-8/fulltext](https://www.gastrojournal.org/article/S0016-5085(21)03728-8/fulltext)

<https://pubmed.ncbi.nlm.nih.gov/25676324/>

<https://pubmed.ncbi.nlm.nih.gov/21300443/>

# EAT REAL FOOD!

- Ultra-processed foods are associated with ADHD, anxiety, depression, and cognitive decline
- Ultra-processed foods during pregnancy increase the risk for ADHD in offspring
- It takes only two months of a steady diet of processed foods to LOWER brain chemicals responsible for learning and memory
- 4.5 year-olds who ate a junk food diet were much more likely to have behavioral problems by the age of 7

# MAKE GUT-FRIENDLY SWAPS

YUCK!



**INGREDIENTS:** CORN MASA FLOUR (PROCESSED WITH LIME), SOYBEAN AND/OR PALM AND/OR CANOLA OIL, IODIZED SALT, SUGAR, NATURAL AND ARTIFICIAL FLAVOR, CITRIC ACID, SOY PROTEIN, YEAST, MONOSODIUM GLUTAMATE, MALTODEXTRIN, SODIUM DIACETATE, PARTIALLY HYDROGENATED SOYBEAN OIL, ARTIFICIAL COLORS (RED No. 40 LAKE, YELLOW No. 6 LAKE), ONION POWDER, HOT CHILI PEPPER (CHILE), SODIUM BICARBONATE, SODIUM GUANYLATE, SODIUM INOSINATE, SILICON DIOXIDE (ANTICAKING), ANTIOXIDANT (BHT, TBHQ, PROPYLENE GLYCOL, BHA).

MAY CONTAIN MILK, WHEAT AND EGG.



A little better



**INGREDIENTS:** STONE GROUND YELLOW CORN, VEGETABLE OIL (HIGH-OLEIC SUNFLOWER OIL, HIGH-OLEIC SAFFLOWER OIL AND/OR OLEIC CANOLA OIL), HOT CHILI & LIME FLAVORED SEASONING (SALT, YEAST, CORNSTARCH, CANE SUGAR, CITRIC ACID [ACIDULANT], YEAST EXTRACT, CORN MALTODEXTRIN, GUM ARABIC, MALIC ACID, LIME JUICE CONCENTRATE, ONION POWDER, VEGETABLE JUICE [COLOR], PAPRIKA EXTRACT [COLOR], TURMERIC EXTRACT [COLOR], NATURAL FLAVOR, BETA CAROTENE [COLOR], TOCOPHEROL [TO PRESERVE], COLEORESIN CAPSICUM), TRACE OF LIME.

DIST. & SOLD EXCLUSIVELY BY:  
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SXU# 61420

GLUTEN FREE



Better



**INGREDIENTS:** Ground Corn, Expeller-Pressed Canola and/or Sunflower Oil, Vinegar Powder (Maltodextrin, White Distilled Vinegar), Sea Salt, Rice Flour, Paprika, Paprika Extract, Yeast Extract, Onion Powder, Cane Sugar, Citric Acid (for flavor), Chile Pepper, Garlic Powder, Chile Pepper Extract, Lime Juice Powder, Lactic Acid (for flavor)

# ADDED SUGAR & THE GUT MICROBIOME

- High-sugar, high-fat Western diets induce intestinal Paneth cell dysfunction, leading to gut dysbiosis and gut inflammation

<https://pubmed.ncbi.nlm.nih.gov/34010595/>

- Sugar and yeast dysbiosis
- Sugar compromises cognitive abilities (learning and memory); ADHD
- Sugar linked with depression & schizophrenia
- Sugar worsens anxiety and body's ability to cope with stress
- Sugar and glucose/insulin dysregulation
- Sugar is as ADDICTIVE, or more, than cocaine
- Added sugar is found EVERYWHERE



There is NO nutritional benefit to eating added sugar

# HOW MUCH ADDED SUGAR IS “TOO” MUCH?

**HEALTHY KIDS ARE SWEET ENOUGH**

Kids age 2-18 should have **LESS THAN 25 GRAMS** or **SIX TEASPOONS** of **ADDED SUGARS DAILY** for a healthy heart.

*less than six...*

tsp tsp  
tsp tsp  
tsp tsp

Source: American Heart Association statement: Added Sugars and Cardiovascular Disease Risk in Children

**American Heart Association**  
life is why™

The infographic features three cartoon children on the left: a boy with dark skin and curly hair in a red and white striped shirt, a girl with blonde hair and pink glasses in a pink shirt and yellow skirt, and a girl with black hair in a green polka-dot dress. To their right, six spoons are arranged in two columns of three, each labeled 'tsp'. The background is light blue with a white banner at the top.

1 tsp = 4.2 grams sugar



# THE SUGAR ADDS UP



**Nutrition Facts** Servings: 1, **Serv. size: 1 cup (150g)**,  
 Amount per serving: **Calories 170**, **Total Fat 5g** (6% DV),  
 Sat. Fat 3.5g (18% DV), Trans Fat 0g, **Cholest.** 20mg  
 (7% DV), **Sodium 45mg** (2% DV), **Total Carb. 20g** (7% DV),  
 Fiber 0g (0% DV), **Total Sugars 18g** (Incl. 15g Added Sugars,  
 30% DV), **Protein 11g** (22% DV), Vit. D (2% DV), Calcium  
 (10% DV), Iron (0% DV), Potas. (4% DV).



2 slices = 8g of added sugar

22 Whole Grains & Seeds

27 OZ

Nutrition Facts	
16 Servings Per Container	
Serving size 1 slice (48g)	
Amount per serving	
<b>Calories 140</b>	
	% Daily Value*
<b>Total Fat</b> 3g	<b>4%</b>
Saturated Fat 0g	<b>0%</b>
Trans Fat 0g	
Polyunsaturated Fat 1.5g	
Monounsaturated Fat 1g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 220mg	<b>10%</b>
<b>Total Carbohydrate</b> 22g	<b>8%</b>
Dietary Fiber 4g	<b>14%</b>
Total Sugars 4g	
Includes 4g Added Sugars	<b>8%</b>
<b>Protein</b> 6g	<b>4%</b>
Vitamin D 0mcg	0% • Calcium 45mg 4%
Iron 1.2mg	6% • Potassium 130mg 2%
Vitamin A 0mcg	0% • Vitamin C 0mg 0%
Vitamin E 0.3mg	2% • Vitamin K 0mg 0%
Thiamin 0.1 mg	8% • Riboflavin 0.03mg 2%
Niacin 1.2mg	8% • Vitamin B6 0mg 0%
Folate 10mcg DFE	2% • Pantothe (0mcg Folic Acid)
Phosphorus 70mg	6% • Magnesium 10mg 2%
Zinc 0.5mg	4% • Selenium 0.1mcg 2%
Copper 0.1mg	10% • Manganese 0.1mg 2%

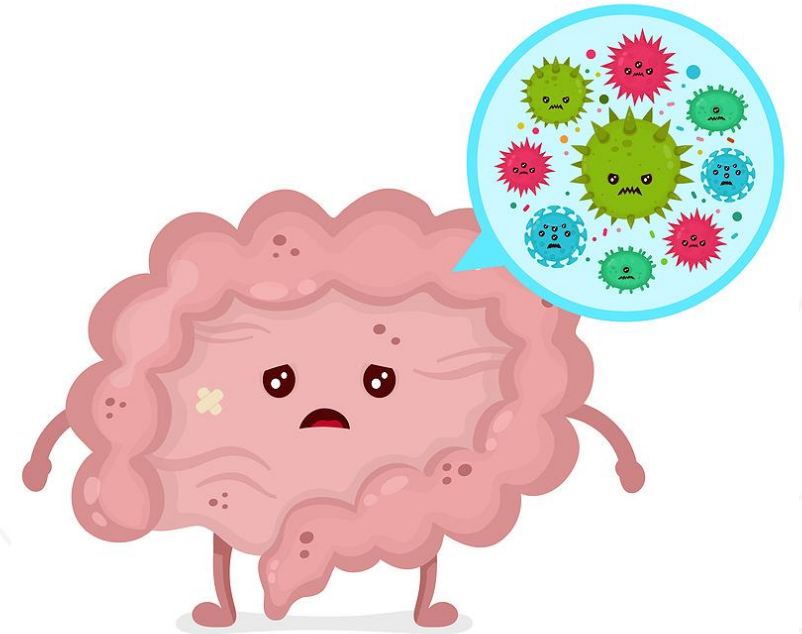
\*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a diet. A diet of 2,000 calories a day is used for general nutrition.



By lunchtime, your child could have had 29 grams of added sugar or ~ 7 teaspoons of sugar

# “SUGAR-FREE” ISN’T BETTER

- FDA-approved, artificial “high-intensity sweeteners”
  - Just as addictive as refined sugar and cocaine
    - Rats already addicted to cocaine chose saccharin over cocaine
  - Can disrupt the gut microbiome (especially saccharin and sucralose)
  - Acesulfame potassium affects the brain in mice and decreases memory and cognitive function



# “FAKE SUGAR” TO AVOID

- Saccharin
- Aspartame (NutraSweet, Equal)
- Acesulfame potassium (Ace-K)
- Sucralose (Splenda)
- Neotame
- Advantame



# GLYPHOSATE & THE GUT MICROBIOME

- Glyphosate initially patented by Monsanto in 2010 as an antibiotic
  - Broad activity against a variety of bacteria and fungi
- Implicated in increasing problem of antibiotic resistance and multiple drug-resistant bacteria
- **Directly causes gut dysbiosis**
  - Kills beneficial *Lactobacillus* and *Bifidobacterium* species
  - Preserves pathogenic *Clostridia* and *Salmonella* species
    - Directly injures tight junctions, triggers zonulin release, and causes leaky gut
    - Tight junctions also present in linings of upper respiratory tract, kidneys, and blood-brain barrier (BBB)
      - Glyphosate may cause similar damage to BBB

<https://academic.oup.com/jac/article/76/7/1655/6248211>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5972442/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6024569/>

<https://clinical-nutrition.imedpub.com/protective-effects-of-lignite-extract-supplement-on-intestinal-barrier-function-in-glyphosatemediated-tight-junction-injury.php?aid=18161>

<https://pubmed.ncbi.nlm.nih.gov/30605748/>

# ANTIBIOTICS & THE GUT MICROBIOME

Antibiotics are the single biggest ACUTE disruptor to the gut microbiome.



## **WHAT CAN WE DO?**

Live like a Gut Hero!

# A GUT HERO DIET & LIFESTYLE

## Get your Microbiome Champions IN

- Whole, organic, unprocessed/minimally processed, nutrient-dense foods rich in phytonutrients, healthy fats, and wild, free-range protein
- Fiber/prebiotics
- Probiotics/fermented foods
- Mindfulness/joy
- Daily movement
- Restorative sleep

# A GUT HERO DIET & LIFESTYLE

## Keep the Microbiome Mischief Makers OUT

- Reduce inappropriate antibiotics use
  - If antibiotics are needed, support with the Gut reSET below
- Move from an ultra-processed SAD diet to a gut-happy one!
  - Reduce food additives
  - Reduce added sugars and artificial sweeteners
  - Reduce/remove gluten and casein
  - Reduce glyphosate exposure
- Reduce heavy metals, endocrine disruptors, and other toxic exposures
  - Plastics, household cleaning & body care products, toys



# FIBER & THE GUT MICROBIOME

- Fiber – nondigestible carbohydrates in plant-based foods
- Types of fiber
  - Soluble (it dissolves in water)
  - Insoluble (it doesn't dissolve in water)
  - Viscose (it forms into a gel)
  - **Fermentable – gut bacteria can ferment it into short-chain fatty acids (SCFAs) PREBIOTICS**
    - All soluble fibers are fermentable; some insoluble fibers are as well
    - Most prebiotics are dietary fibers; but not all dietary fibers are prebiotics
    - Fermented into SCFAs like butyrate and acetate
      - Optimize gene expression and our epigenetic resilience
      - Support large intestinal lining
      - Regulate blood sugar and insulin response, reduce inflammation
      - Even cross the blood-brain barrier to support a healthy brain

# FIBER & THE GUT MICROBIOME

- The “Fiber Gap”
  - Most U.S. adults and kids get < half the recommended daily fiber intake
  - Only ~5% meet recommended intake
- Tanzania’s Hadza people
  - Average 100-150 grams of daily fiber
  - NO processed foods
  - Some of the richest gut microbial diversity in the world

The lower the fiber and higher the refined sugar/processed foods, the lower the gut microbial diversity.

Age/Gender	Recommended daily fiber intake
Adult males > 50 years	30 grams
Adult females > 50 years	21 grams
Adult males <50 years	38 grams
Adult females <50 years	25 grams
Teen males 14-18 years	38 grams
Teen females 14-18 years	26 grams
Boys 9-13 years	31 grams
Girls 9-13 years	26 grams
Children 4-8 years	25 grams
Children 1-3 years	19 grams

<https://www.healthline.com/health/food-nutrition/too-much-fiber#daily-fiber-intake>  
<https://www.science.org/doi/10.1126/science.aan4834>

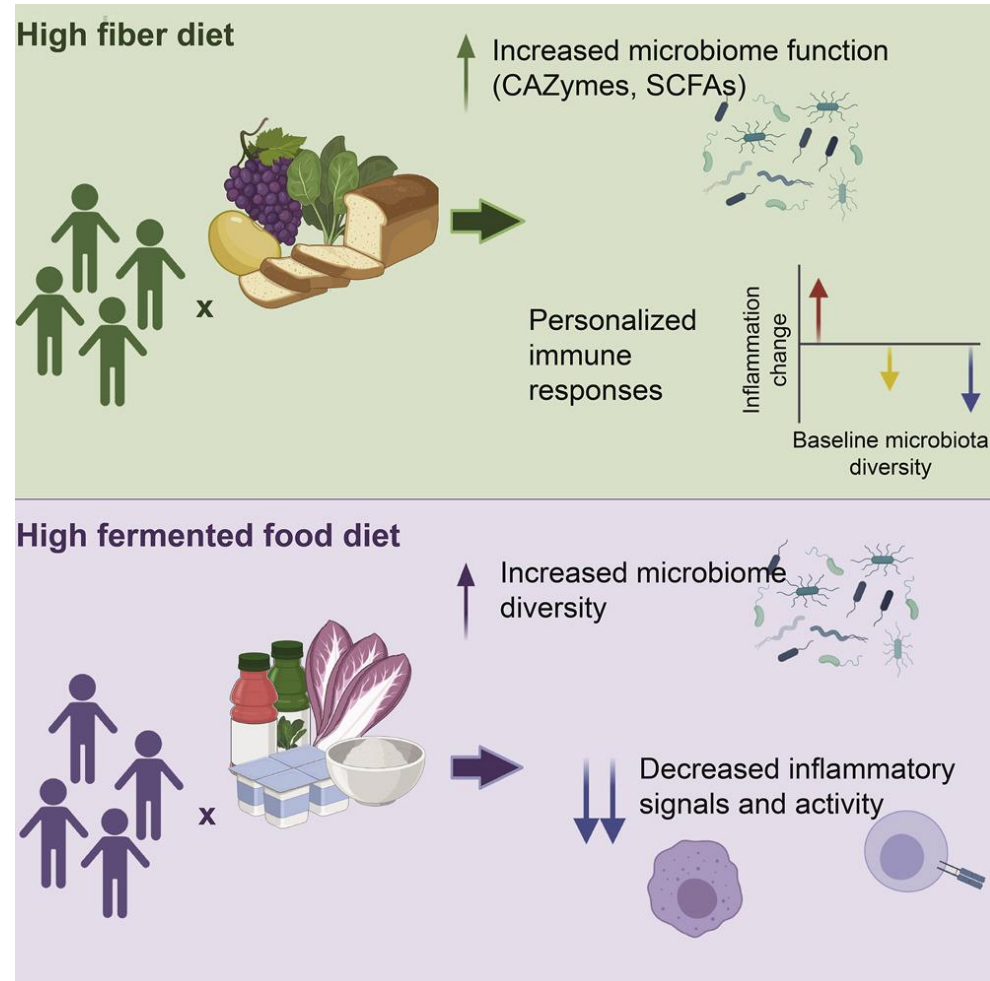
# THE COLORS OF FIBER

Red	guava, raspberries, strawberries, apples (with skin on), beets, red bell pepper
Orange/Yellow	sweet potatoes, pumpkin, carrots, apricots, persimmon, grapefruit, orange, nectarine
Green	artichoke, avocado, broccoli, kale, collard beans, spinach, cabbage, brussels sprouts, squash (crookneck, summer, zucchini, acorn), okra, green beans, peas, asparagus, kiwifruit
Blue/Purple	blackberries, blueberries, prunes, raisins, passionfruit
Tan/Brown	<u>seeds</u> (pumpkin, chia, sunflower, flax), <u>nuts</u> (coconut, almonds, chestnuts, pinenuts, pistachios, hazelnuts), <u>legumes</u> (lentil, navy, lima, adzuki, pinto, black, garbanzo, kidney), <u>whole grains</u> (whole wheat, barley, bran, quinoa, oat, popcorn, brown rice, bulgur, spelt, teff), potato (with skin), mushrooms
White	parsnips, jicama, cauliflower, kohlrabi, Asian pear, bananas, pears



# FERMENTED FOODS & THE GUT MICROBIOME

- Fermented foods may win over fiber
- 17-week randomized prospective study of plant-based fiber vs. fermented foods
- High-fiber diet increased microbiome-encoded glycan-degrading carbohydrate active enzymes (CAZymes) despite stable microbial community diversity
- High-fermented-food diet steadily increased microbiota diversity and decreased inflammatory markers
- **CONCLUSION:** "Fermented foods may be valuable in countering the decreased microbiome diversity and increased inflammation pervasive in industrialized society."



# FERMENTED FOODS CAN REDUCE SOCIAL ANXIETY

Study of 710 young adults (445 females) looked at the association between eating fermented foods, neuroticism, and social anxiety.

Patients who consumed fermented foods more frequently had less social anxiety.

**CONCLUSION:** Fermented foods that contain probiotics may have a protective effect against social anxiety symptoms for those at higher genetic risk.

Consumption of fermented foods that contain probiotics may serve as a low-risk intervention for reducing social anxiety.



# FABULOUS FERMENTED FOODS!

Probiotics with a PUNCH! Benefits may be due to POSTBIOTIC content

- Yogurt (caveat: avoid dairy if “phlegmy”)
  - Options – almond, coconut, cashew
- Kefir (dairy, coconut, water)
- Kombucha
- Kvass
- Sauerkraut
- Real pickles & pickled vegetables
- Raw, unfiltered apple cider vinegar
- Miso
- Natto
- Tempeh
- Kimchi



# MOVEMENT & THE GUT MICROBIOME

- Exercise has beneficial effects on the gut microbiome's diversity and function
  - Results INDEPENDENT of diet
- Positive effects reversed with return to sedentary lifestyle
  - You've got to keep moving it!
- Early-life exercise has even better benefits for long-term microbiome composition and lean body mass
- NOTE: Intense exercise can increase intestinal permeability (a.k.a., leaky gut)



[https://journals.lww.com/acsm-msse/Fulltext/2018/04000/Exercise Alters Gut Microbiota Composition and.14.aspx](https://journals.lww.com/acsm-msse/Fulltext/2018/04000/Exercise%20Alters%20Gut%20Microbiota%20Composition%20and.14.aspx)

<https://www.frontiersin.org/articles/10.3389/fnut.2021.637010/full>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5357536/>

# SLEEP & THE GUT MICROBIOME

- Sleep deprivation changes gut microbial composition and metabolites after 48 hours – GUT DYSBIOSIS
- Chronic sleep loss alters gut microbiota and induces systemic inflammation
- Changes are reversible after 1 week of sleep recovery



<https://www.dovepress.com/alterations-of-the-gut-microbiota-in-response-to-to-tal-sleep-deprivati-peer-reviewed-fulltext-article-NSS>



# MINDFULNESS & THE GUT MICROBIOME

- Heart Rate Variability (HRV) is a measure of Vagus Nerve function
- Happiness/positive emotions & high HRV associated with higher gut microbiome diversity in children
- High stress & low HRV associated with lower microbiome diversity in children
- **Independent of dietary intake**



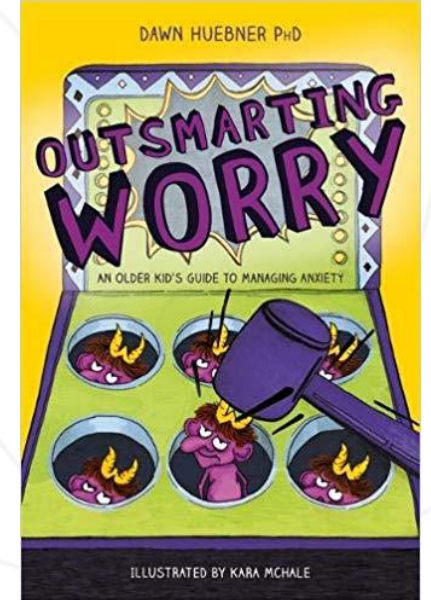
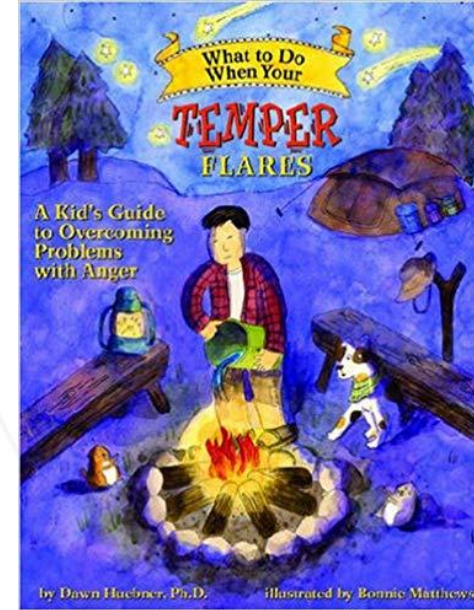
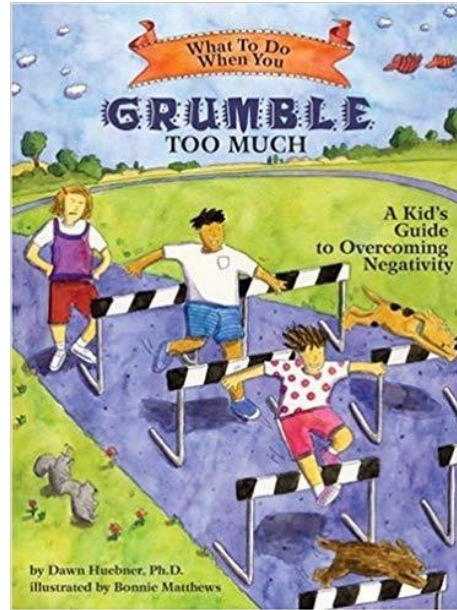
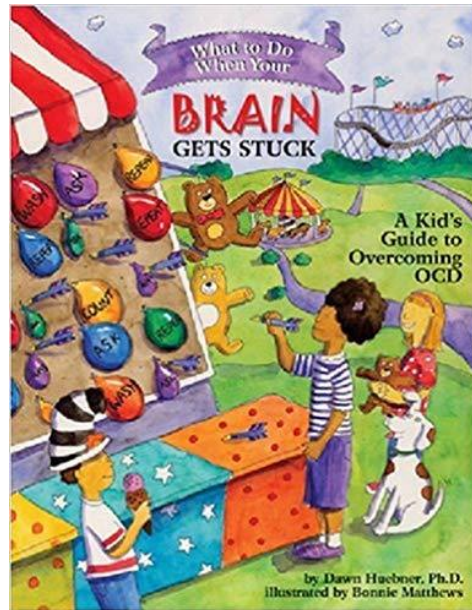
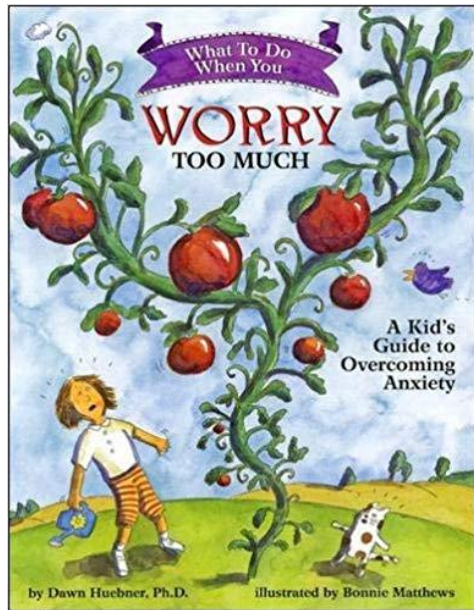
# THE GUT-BRAIN RX – MINDFULNESS AS MEDICINE

- Optimize HRV: Optimal vagus nerve function = optimal gut microbiome
- How to optimize HRV
  - Diaphragmatic breathing
  - Cognitive Behavioral Therapy
  - Mindfulness/meditation
  - HeartMath
  - Gratitude/loving-kindness
  - Laughter
  - EFT tapping

<https://www.ncbi.nlm.nih.gov/pubmed/9654763>

# OPTIMIZE HRV – COGNITIVE-BEHAVIORAL THERAPY

- CBT can increase HRV
- “Gold standard” for anxiety in teens
- Individual or group CBT
- Dawn Huebner, PhD’s “self-help books” for kids



©Elisa Song, MD – Healthy Kids Happy Kids 2023

# OPTIMIZE HRV – MINDFULNESS/MEDITATION



Mindfulness/meditation can be practiced anywhere, anytime ...  
Stop. Look. Listen.

# OPTIMIZE HRV – MINDFULNESS/MEDITATION


- Mindfulness/meditation apps
  - Insight Timer app
  - Headspace app
  - Calm app
  - Oak app

MEGAN WINKLER

## 5-Minute Breathing Meditation

★★★★★

5 min      4.3k plays      Guided

A woman with long, wavy brown hair and her eyes closed is holding a dandelion seed head. A large white play button is centered over the image. The background is a soft, out-of-focus green.

This 5-minute meditation focuses on the breath. Soft prompts guide you through this quick, mindful break and a final prompt ...

# OPTIMIZE HRV – LOVING KINDNESS MEDITATION

“Loving-kindness” meditation x 6 weeks

- Increased HRV, greater sense of connectedness to others, increased positive emotions (joy, interest, amusement, serenity, hope)

May you feel safe

May you feel happy

May you feel healthy

May you live with ease

<https://www.ncbi.nlm.nih.gov/pubmed/23649562>



# OPTIMIZE HRV – BREATHE ...

- Diaphragmatic “belly breathing” to activate of the vagus nerve
  - Get out of fight-flight-freeze
  - Get into rest-digest-heal ...
- Diaphragmatic breathing benefits:
  - Lower cortisol
  - Increased HRV
  - Increased energy, alertness, relaxation, mood
  - Decreased anxiety, depression, anger, confusion



# TEACH YOUR CHILD TO BELLY BREATHE

- Sit or lie comfortably
- Place one hand on chest
- Place the other hand on belly
- Pretend there's a balloon in the belly they need to inflate fully every time they inhale, and deflate fully with every exhale
- Breathe in through the nose and fill that balloon, noticing the hand on their belly rise, and the hand on their chest staying still
- Breathe out through the mouth, feeling the hand on their belly sink all the way down, while the hand on their chest remains still

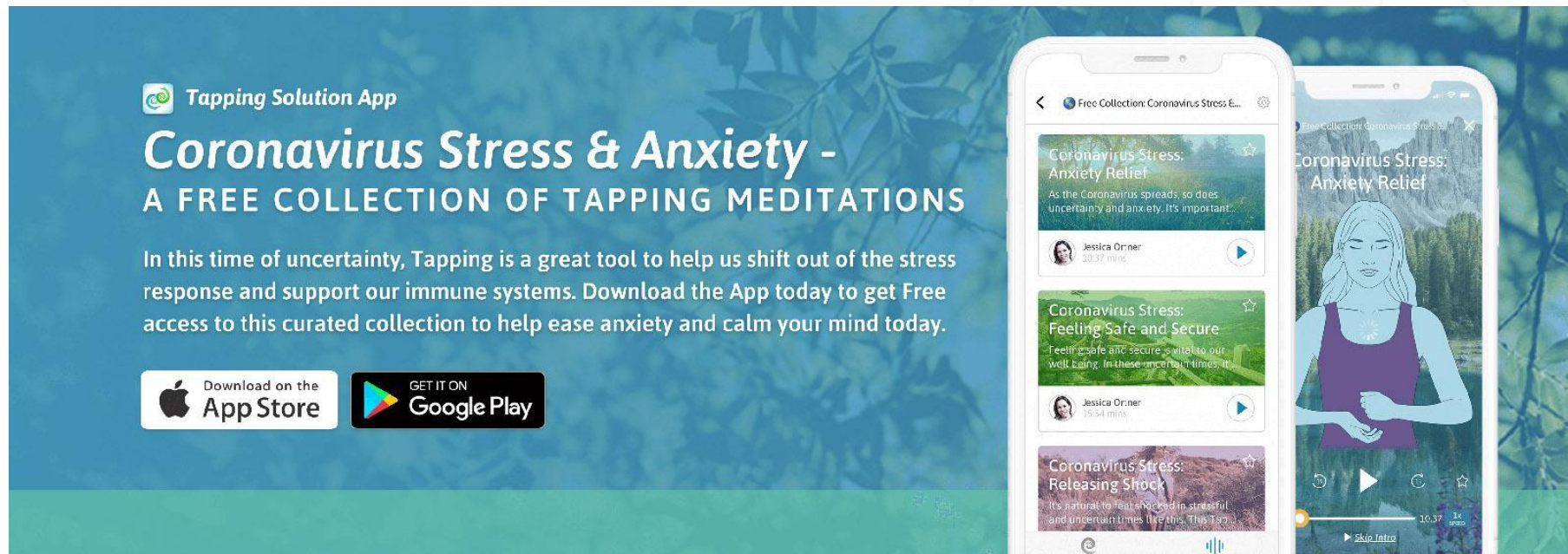
Sesame Street: Common and Colbie Caillat – “Belly Breathe” with Elmo

<https://www.youtube.com/watch?v=mZbzDOpylA>



# EMOTIONAL FREEDOM TECHNIQUE ("EFT" OR "TAPPING")

- Tapping can increase salivary IgA levels by 113%!
- Improves HRV and happiness
- Reduces cortisol, anxiety, depression, pain, cravings



The image shows a promotional graphic for the 'Tapping Solution App'. On the left, a blue background features the app's logo and the text: 'Tapping Solution App', 'Coronavirus Stress & Anxiety - A FREE COLLECTION OF TAPPING MEDITATIONS', and 'In this time of uncertainty, Tapping is a great tool to help us shift out of the stress response and support our immune systems. Download the App today to get Free access to this curated collection to help ease anxiety and calm your mind today.' Below this text are 'Download on the App Store' and 'GET IT ON Google Play' buttons. On the right, two smartphones are shown. The left phone displays a list of three meditation tracks: 'Coronavirus Stress: Anxiety Relief' (10:37 mins), 'Coronavirus Stress: Feeling Safe and Secure' (15:34 mins), and 'Coronavirus Stress: Releasing Shock' (10:37 mins). The right phone shows a meditation track titled 'Coronavirus Stress: Anxiety Relief' with a play button and a 'Skip Intro' option at the bottom.



# **WHAT IF YOUR CHILD ALREADY HAS GUT DYSBIOSIS & LEAKY GUT?**



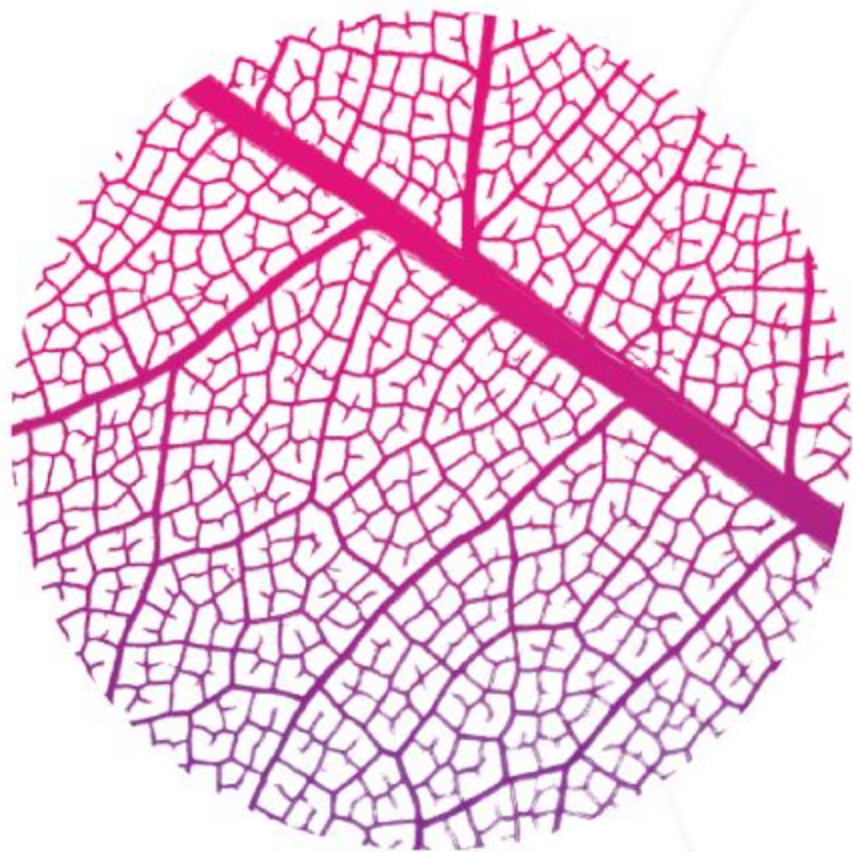
**Biocidin  
Botanicals™**

# THE GUT reSET RX

(work with a pediatric functional medicine practitioner)

## Double down on your Gut Hero diet & lifestyle

- **S**eal and heal the leaky gut
  - Give your gut a break – eliminate food sensitivities
  - Gut repair nutrients – glutamine, zinc, fish oil, quercetin
- **E**liminate dysbiotic gut microbiomes (if present)
  - Antimicrobial agents – MCT oil, Biocidin, etc.
  - Consider binders and serum-derived bovine immunoglobulin
- **T**ransform the gut microbiome
  - Pre-, pro-, postbiotic supplementation
  - Vagus nerve optimization – acupuncture, HeartMath, Apollo Neuro



**EVERYONE CAN BE A  
GUT HERO!**



**Biocidin  
Botanicals**