

NUTRIENT LABS, A FUNCTIONAL AND INTEGRATIVE PERSPECTIVE

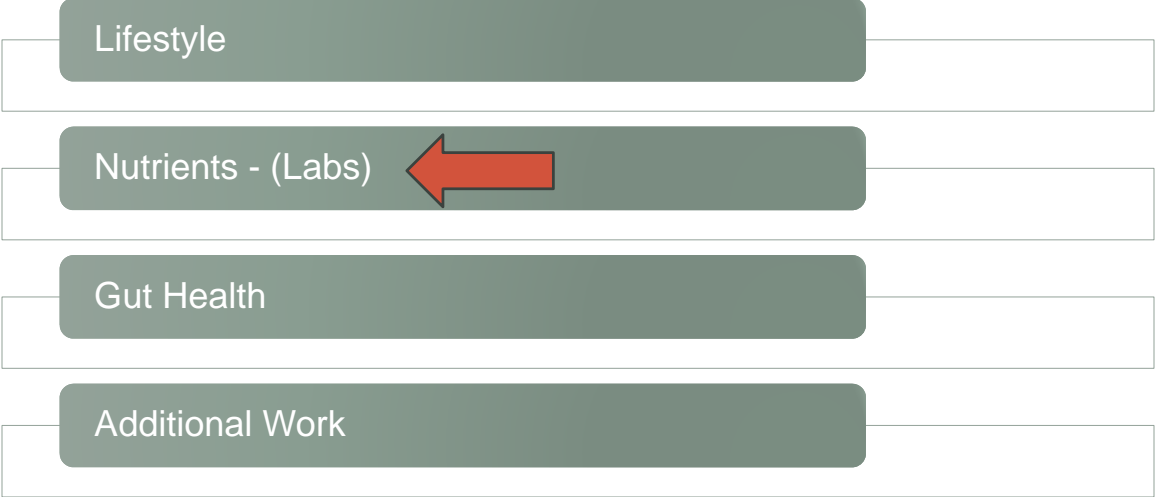


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Framework



- Lifestyle
- Nutrients - (Labs)
- Gut Health
- Additional Work

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Supplements

- Safety
 - Any potential for rare side effects – repletion x 90 days
 - Recheck? Yes, if very abnormal

- FDA regulations = Good Manufacturing Processes (GMP)
 - [Fullscript Website](#)

		Is the Therapy Effective?	
		Yes	No
Is the Therapy Safe?	Yes	Recommend	Tolerate
	No	Monitor closely or discourage	Discourage

Contact us

To order supplements, you can go directly through our [Fullscript account](#).

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JB 17-year-old



- Fatigue
 - Onset post-Covid, ME/CFS criteria w “brain fog”
- Anxiety, OCD (“vomiting phobia”)
 - Sertraline 50mg/day correlated w some improvements, + therapist
- GI: postprandial gas, bloating and nausea, food “just sits there” + reflux.
 - Gluten = bloating/abd pain/diarrhea
 - Stools: 2x/d, soft, “easy” to pass,
 - No blood in stools, weight loss or trouble swallowing
 - GI 2 yr ago, trialed H2 = some improvements, not rec rx long-term
- Missing events + school
- Family all on functional medicine journey
- Meds: sertraline + OCP

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HPI

- SLEEP:
 - 10pm-7am, melatonin, no snoring/apnea/restlessness/wakings
 - Naps 50% of days 4:30-8pm
- Screen:
 - JB + mom, “Reasonable” - some scrolling + phone at night in room
- Nutrition
 - Avoids:
 - Gluten mostly
 - Caffeine
 - Minimal meat
 - Breakfast: eggs, protein/energy bar
 - Lunch: premade salad from target + nuts
 - Dinner: eats separately not with family - sandwich, frozen packaged pot pie/pizza, mac + cheese
 - Snacks: trail mix, chips, berries, chocolate, Lay’s chips
 - Drinks: herbal tea, sparkling water

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HPI

- **Family History**
 - Father and PGM: Hashimoto's
 - Both sides: anxiety, depression, addiction, eating disorders
 - Mother w gluten/lactose intolerance
- **History - Birth and Early Childhood**
 - 39 wk SVD
 - BF x 2 mo, spit up w formula - switched to hydrolyzed
 - 5x ear infections age 1-3
 - Appendectomy age 10

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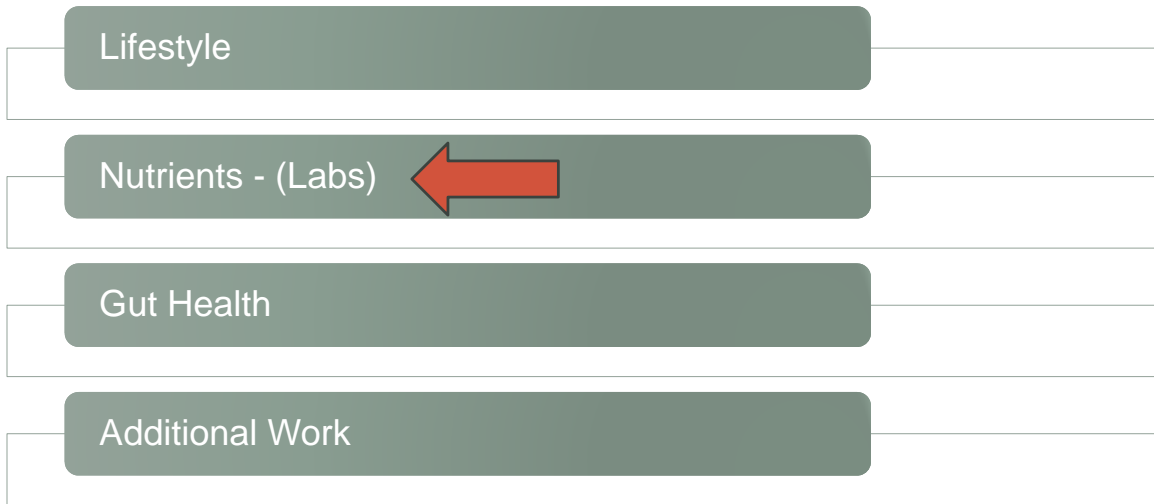
Timeline "story"

- **Antecedents**
 - Family history autoimmune and mental health
 - Formula, antibiotics, appendectomy
- **Triggers**
 - COVID
- **Mediators**
 - Processed foods, SSRI, OCP
 - Sleep schedule, screen use



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Framework



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Nutrient Labs

- Zinc
- Carnitine
- Omegas
- Vitamin D
- Iron

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Zinc conditions



- Immune system



- Brain



- Taste

- Gut healing – heals enterocytes

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Zinc - Immune Skin



White spots and horizontal lines on multiple nails.



- Eczema
 - Zinc necessary for formation of epidermal tight junctions
 - Zinc supplement reduces Th2 cytokine expression and serum IgE levels
 - Low zinc associated w AD, supplement studies mixed, meta 16 studies (Gray 2019)
- Acne:
 - Zinc anti-inflammatory, sebostatic and inhibits Cutibacterium acnes
 - Zinc beneficial in 10/14 acne studies, meta-analysis (Dhaliwal, 2020)

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Zinc – Immune System



- URI
 - Modestly **reduced duration of URI symptoms** if used early, but not incidence, Cochrane, 34 studies, n=8526 (Nault, 2024)
 - Zinc inhibits virus replication
- Autoimmunity
 - Systematic reviews and meta-analyses consistently report **lower serum and plasma zinc levels in children with autoimmune diseases** (Wessels)
 - **Pediatric nephrotic syndrome**: zinc supplementation significantly reduced relapse rates, prolonged disease-free intervals, and decreased hospitalizations, meta-analysis (Lupu, 2025)

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Zinc immune mechanisms



- **Immune System Function**
 - Essential for the development, differentiation, and function of T cells, B cells, leukocytes
- **Immune System Regulation**
 - Regulates nuclear factor kappa B (NF- κ B) master regulator of pro-inflammatory cytokines
- **Zinc supplementation**
 - **Zinc supplementation correlated w sig decreases in CRP, hs-CRP and TNF- α , IL-6**, meta 35 RCTs, n=1995 (Jafari, 2020)

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Zinc in ADHD



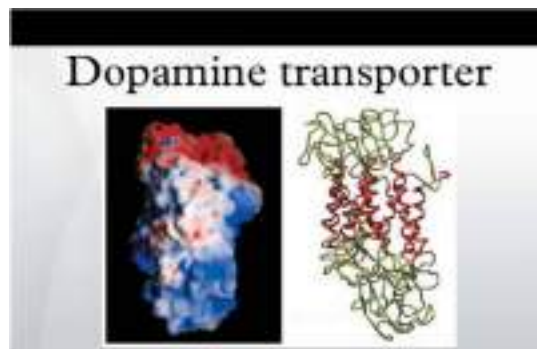
- Children w ADHD = **trend to lower zinc levels** (association)
 - meta, 22 studies, n=2428 subjects (NOT sig, but was sig w 1 study removed), (Ghoreishy, 2021)
- Zinc supplement
 - **Zinc sup = improved total ADHD** scores ($p = 0.04$) but not subscales, 6 RCT, n=489 children, (Talebi, 2022)
 - **Stimulant + zinc vs stimulant alone = greater reduction in ADHD** scores ($p = 0.03$), 4 RCT

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Zinc mechanism brain health



- Zinc (Lepping, 2010)
 - binds to dopamine transporter (DAT) sites (His-193, His-375, Glu-396)
 - conformational changes result in non-competitive blocking of dopamine uptake



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Zinc Conditions Taste



- Taste improved with zinc supplement ($p=0.0002$), meta, 12 RCT and $n=938$ adults (Mozaffar, 2023)
- Zinc deficiency independently related to picky eating ($p = 0.037$), cross-sectional, $n=201$ children (Chao, 2021)
- Gustin taste receptor – zinc dependent
- Taste bud development and maintenance – zinc dependent

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Zinc and Copper Test



- Lab: serum zinc and copper
 - **FM goal 100 zinc/ 100 copper** mcg/dL
 - Inverse relationship

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JB Zinc

- Zinc 80/ Copper 221 (OCP)
 - ONE MV Pure Encapsulations 25mg zinc/day
- Foods – nuts, seeds, tofu, meat



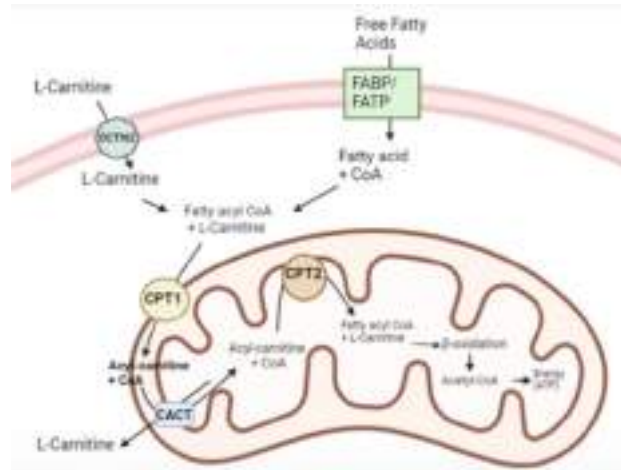
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Nutrient Labs

- Zinc
- Carnitine
- Omegas
- Vitamin D
- Iron

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Carnitine – Mitochondrial Cofactor



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Carnitine



- Mitochondrial Insufficiency vs Congenital Severe Mitochondrial Disease
- Many signs insufficiency:
 - Low-tone: constipation, gross-motor delay, core-tone, speech-delay (articulation, apraxia), drooling, breast-feeding difficulty, fatigue, exercise-intolerance, height growth, strabismus
 - Sensitive to stressors: **post-infectious fatigue**, toxin exposure, unusual regressions
- Mitochondria SENSITIVE to stressors:
 - Food flavors/dyes, Hyperglycemia, High-fat diets, Environmental (Pesticides, Solvents, Air pollutants, Endocrine disruptors, Heavy metals)
 - Valproic acid, Risperdal, Acetaminophen (NAPQI) (Chrøis, Bashir, Hu)

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Carnitine

- **Autism**
 - Mitochondrial insufficiency greater in autism vs controls (Khaliulin, 20215)
- **Cyclic Vomiting Syndrome**
 - Coenzyme Q10, L-carnitine, B2 x 4 mo, in addition to 1st line therapies (Up to Date, Li 2025)
 - CoQ10, B2, Magnesium, Vit D (NASPGHAN, Karrento 2025)
- **Fatigue**
 - Significant reductions in fatigue w supplementing L-carnitine, Co-Q10, NADH, small sample sizes and methodological issues, meta 14 studies, n=809 (Dorcok, 2025)

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Carnitine Test

- Lab: FM goal Total carnitine is **> 40 umol/L**



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JB Mitochondria



- Carnitine total 28 (27-73), FM goal > 40 umol/L
 - Rx Carnitor (levocarnitine) tablets 330mg, 3/day x 90 days
- Avoid Mitochondrial harms
 - Use fan for volatile organic compounds or non-toxic nail polish



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Nutrient Labs

- Zinc
- Carnitine
- Omega 3's
- Vitamin D
- Iron

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Omega 3's



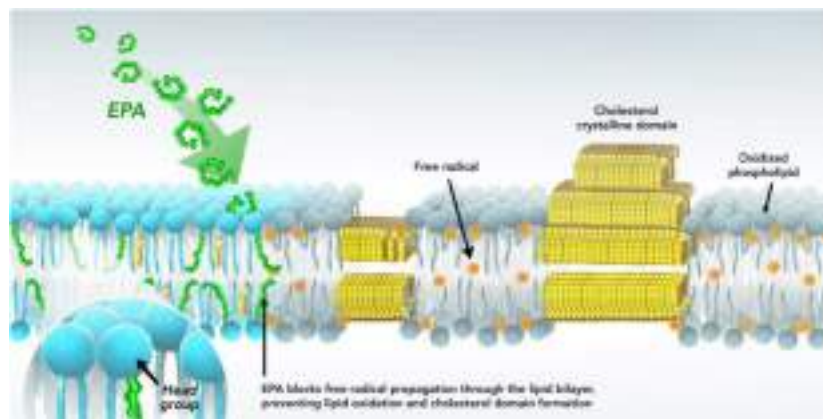
- **Brain Health**
 - **Concussion**, preclinical (2024 Valero-Hernandez)
 - Intelligence and language in term infants 47 studies (Liu, 2025)
 - ADHD, Chang, 7 RCT, n=534, (Chang, 2018)
 - Autism, cluttering speech and hyperactivity, umbrella of 7 metas (Abbasi, 2024)
- **Inflammatory Issues**
 - **Autoimmune**
 - Higher infant omega3 = Lower risk of islet autoimmunity, n=8678 (Niinisto, 2021)
 - Reduced JIA activity, pro-inflammatory cytokines (IL-1, TNF- α) and NSAID requirements, 2g/d x 12 wks, n=27 children, open-label (Gheita, 2012)
 - **Metabolic**
 - Triglycerides, BMI, 9 RCTs, n=595 (Musazadeh, 2023)
 - LFT's, US steatosis, BMI, 6 RCTs (n = 378 children w NAFLD) (Dionysopoulos, 2023)

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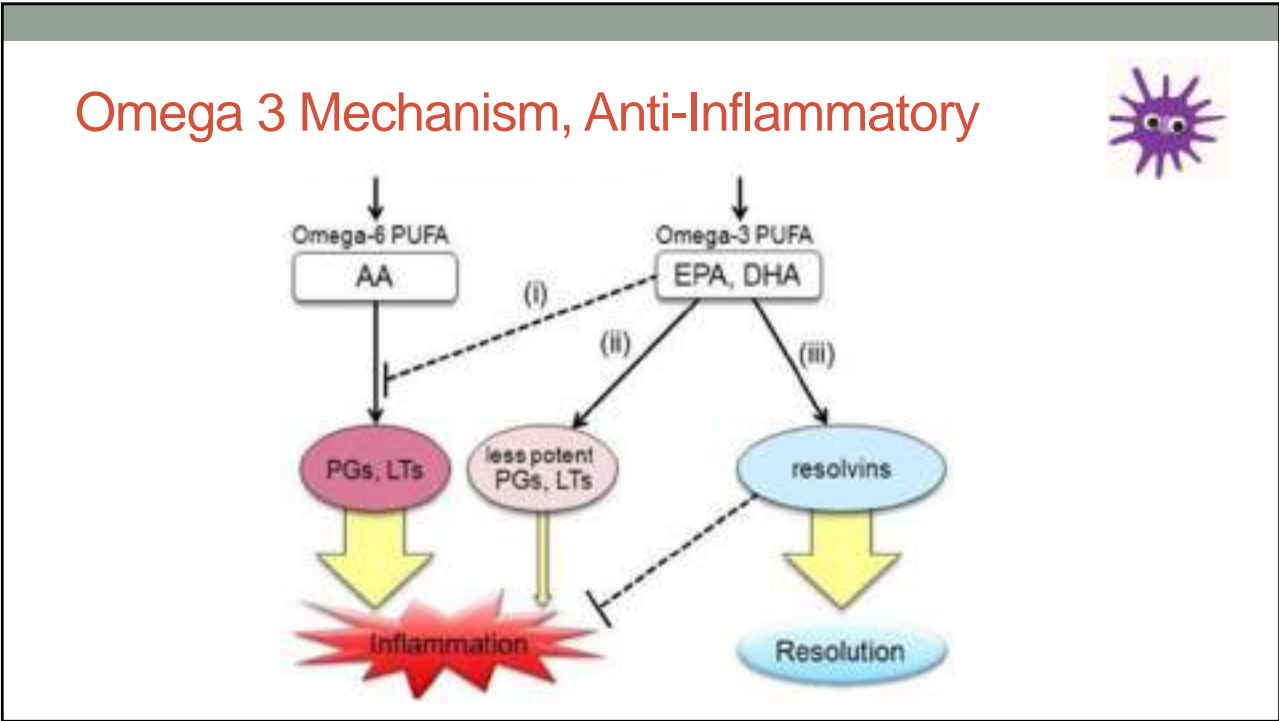
Omeegas 3 Mechanism, Cell Membranes



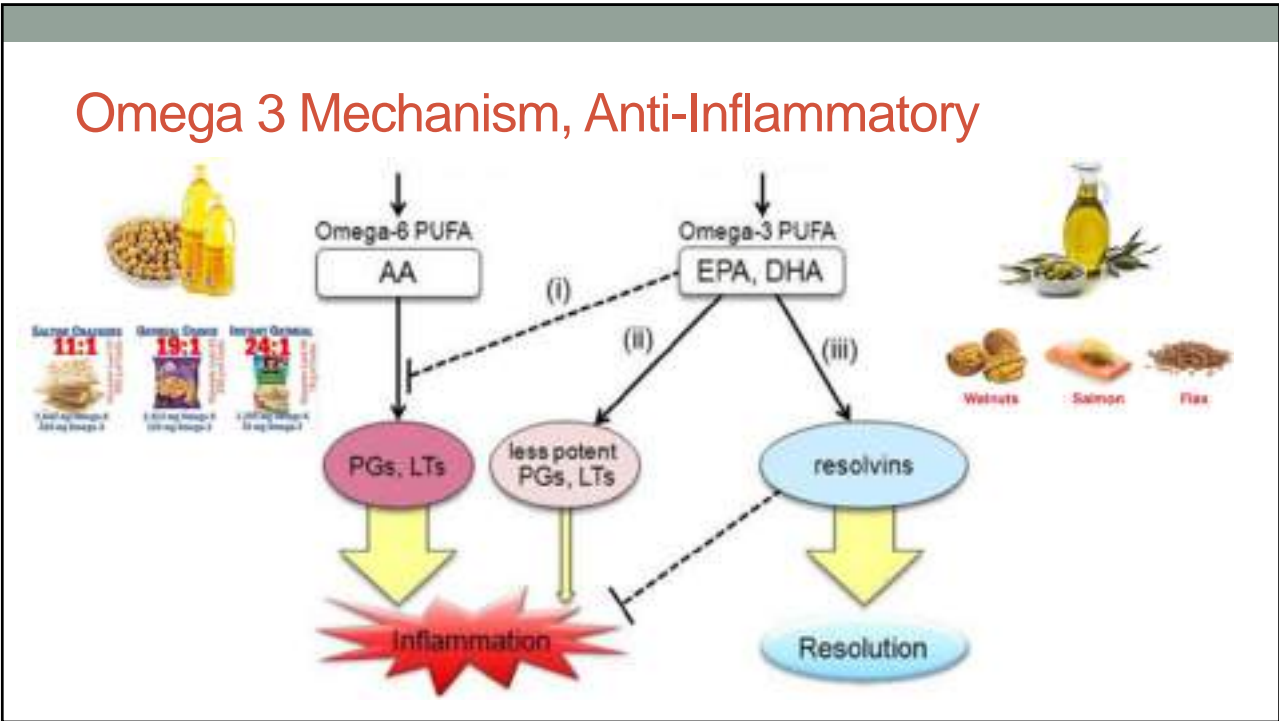
- **Brain Health**
 - Cell membrane fluidity = neurotransmission and synaptic plasticity



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Omega 3's Test

- Lab: Omega Check (Quest) > 5.4% total EPA+DPA+DHA



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JB

- Omega Check 2.5, goal > 5.4
- Supplement 1000mg = 1 cap/day x 6 mo
- Foods



<p>1 Flax Seeds</p>  <p>405% AI (6.48g) per oz 152 calories</p>	<p>2 Chia Seeds</p>  <p>318% AI (5.06g) per oz (2.25oz) 138 calories</p>
<p>3 Fish (Salmon)</p>  <p>246% AI (3.94g) per 6oz fillet 330 calories</p>	<p>4 Walnuts</p>  <p>101% AI (2.58g) per oz 186 calories</p>



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Nutrient Labs

- Zinc
- Carnitine
- Omegas
- **Vitamin D**
- Iron

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Vitamin D

- Personalization:
 - **Latitude**, sunlight, skin tones, diet, sunscreen
 - Medications (anti-seizure meds, steroids)
 - Genetic variants (*VDR*, *CYP2R1*, *CYP27B1*)
 - **Elevated BMI** = require 2-3X more vit D



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Vit D, Bones



- Bone Health
 - Vit D supports Calcium absorption
 - Added K2 directs the calcium to bones (vs vascular calcification)

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Vit D, Immune



- Autoimmune
 - D 2000 IU/d sig reduced autoimmune diseases by 22% over 5 yrs, VITAL trial, RCT, DB, PC, n=25,871 US adults (Hahn, 2022)
- Eczema
 - D reduced eczema vs controls ($p < 0.01$), 11 RCTs (n=686) (Nielsen, 2024),
- Illnesses
 - D reduced respiratory tract infections, particularly in children (Endocrine Society) (Demay, 2024)
- Asthma
 - D reduced asthma exacerbations, especially in children, improved FEV1, but did not change ACT, 10 RCTs (n=1,349) (Liu, 2022).

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Vit D, Immune



- Cytokines: suppresses pro-inflammatory IL-12, IL-23, and IL-6
- T cells: supports anti-inflammatory Th1/Th2 balance + Treg cells
- Skin
 - Upregulates stratum corneum ceramides
 - Affects filaggrin protein expression

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Vit D, Brain

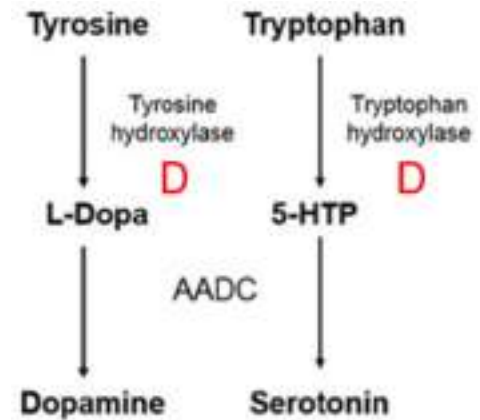


- Mental Health
 - Majority studies support **potential positive influence of vitamin D on mental health in children**, Meta 24 studies (Glabska, 2021)
 - Vit D1200 vs 400 IU **decreased risk of internalizing problems** at age 6 to 8 years n=346 RCT (Sandboge, 2023)
 - Prenatal association—Prenatal vit D deficiency assoc w **2x increased odds Autism** in offspring ($p < 0.05$), meta, 35 studies (Avram, 2025)

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Vit D, Brain

- Mental/Brain Health:
 - GABA expression
 - BDNF support
 - Anti-inflammatory
 - Serotonin and dopamine
 - upregulates tryptophan/tyrosine hydroxylase 2



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Vitamin D Test

- Lab:
 - 25(OH)D, **FM goal 50-70 ng/mL**
 - Accepted Standard > 20 ng/mL adequate to prevent nutritional rickets + maintain bone health in otherwise healthy children. AAP, IOM



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Vit D food sources

Vitamin D in Food

Food Source	Vitamin D Content
Salmon (3 oz)	210 IU
Canned tuna (1 oz)	154 IU
Milk & orange juice (fortified) (1 cup)	120 - 140 IU
Large egg (1 yolk)	41 IU
Swiss cheese (1 oz)	6 IU
Mushrooms (1 cup)	6 IU



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JB Vit D

- **D 22 ng/mL**
 - Vit D3 Rx 50,000 IU/week x 8 weeks
 - ONE MV by Pure Encapsulations = Vit D 2000 IU/day







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Nutrient Labs

- Zinc
- Carnitine
- Omegas
- Vitamin D
- **Iron**

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Iron

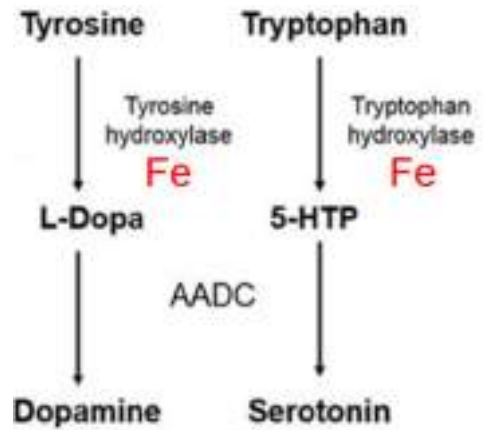
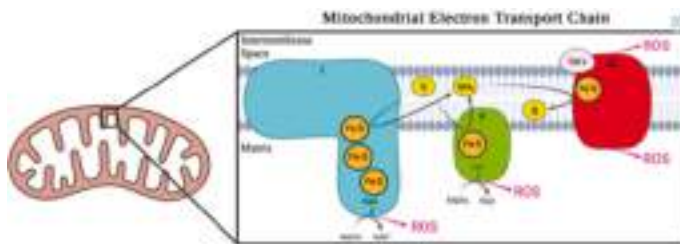


- Iron supplement improved symptoms of
 - Anxiety (d = 0.34)
 - Fatigue (d = 0.34)
 - Cognitive intelligence (d = 0.46), short-term memory (d = 0.53)
 - Physical well-being (d = 0.42)
 - But not attention or depression
 - Sig even when excluding those w ID anemia (ID may impact brain function even before anemia).
 - meta, 18 RCT studies, n=1408 (204 children) (Fiani, 2025)

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Iron mechanisms

- Iron = essential cofactor for:
 - Tyrosine and Tryptophan hydroxylase
- Iron = key cofactor in mitochondrial TCA and ETC



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Iron Test

- Lab:
 - Ferritin FM goal **> 40-70 mcg/dL**, validate w CRP, Iron studies, CBC
 - Accepted standard thresholds for pediatric insufficiency:
 - Ferritin $\geq 12 \mu\text{g/L}$ (<age 5) or $\geq 15 \mu\text{g/L}$ (> age 5), emerging evidence $20 \mu\text{g/L}$



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Iron Safety



- Toxicity – store safely
- Microbiome
 - High iron can decrease bifidoacteria/SCFA, increase pathogenic bacteria
- Oxidative Stress
 - High iron = Fenton reaction ($\text{Fe}^{2+} + \text{H}_2\text{O}_2 = \text{OH radicals}$)
 - Low iron disrupts iron-containing antioxidants, increases (ROS)

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JB Iron

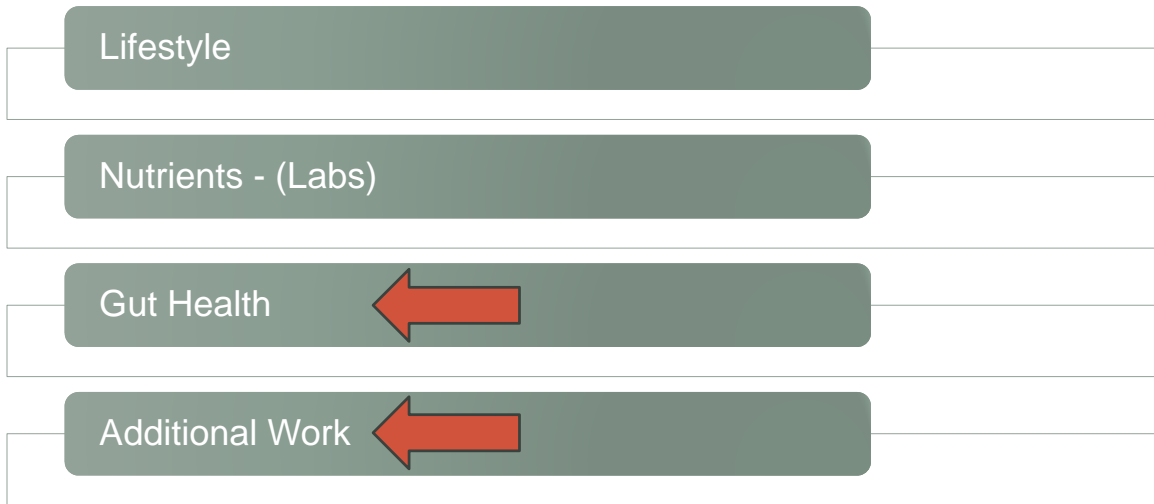


- **Ferritin 5.3**, CRP 0.4
 - Iron studies: iron low, iron sat low, TIBC high
 - CBC: hgb 12.3, high RDW, low MCV
- PLAN: Rx Fer-in-sol 65mg elemental qod or qd x 90 days and recheck



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Framework



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5R Gut Healing

- **Remove:**
 - **Suspected bacterial overgrowth** (breath test or microbiome stool test clues)
 - **Herbals** Atrantil PRO + Motilpro (ginger, 5HTP (careful w SSRI)) (Chedid, Brown)
 - Food antigens (FODMAPS aware, see nutrition)
- **Replace:**
 - Pancreatic elastase **265** (FM ped goal > 500, ref > 200), rx Creon digestive enzymes
- **Repair:**
 - **L-glutamine and zinc carnosine** (reduce permeability, repair mucosa) (Abbasi, Mahmood) **Omega's**
 - Epi-integrity Powder, GI Revive Caps x 2 mo
- **Reinoculate:**
 - Repopulate: Fiber, Phytonutrients, Ferments
 - Probiotics: Atrantil Pro includes Soil-based
- **Rebalance:** therapist, singing in shower

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A few more Labs.....

- Screeners: CBC, LFT, Creatinine, SED WNL
- Celiac test TTG IgA WNL, **IgA 32 (normal 55-300)**
 - Saccharomyces Boulardii
- TSH 1.86
- **Thyroid peroxidase Ab 166 (<34), Anti-thyroglobulin Ab 1.8 (<1)**
 - Euthyroid Hashimotos: assoc w independent psychological symptoms and TSH progression (Mussig, Peeters)
 - Zinc, Vit D, Iron + Selenium (Pace, Dura-Trave, Garofalo)
 - Aware of potential gluten-relationship (Pitichio)



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Summary at 6 months out

- Fatigue – napping “only when she wants,” homecoming, nail shop
 - Continue **ONE MV**
 - Last ferritin 22 – continue **iron** and recheck in 4-6 mo
- Anxiety, OCD – mildly improved, + SSRI
 - Recognizing influence of food on GI sx + health empowering
- Bloating and reflux – much improved, + **digestive enzymes**
- Thyroid antibodies- follow antibodies/Zinc/D/Iron q 1-2 years, low gluten
- Empowered by knowledge and choices



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Support Underlying Etiology



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