

- I. Why should you care about **gut health?**
 - A. Source of systemic inflammation which has implications for: cardiovascular disease, cancer, metabolic syndrome and diabetes, neurological disease, overall cognitive health, psychiatric conditions, autoimmune disease, skin health and more... likely some level of link between the gut and most diseases and conditions out there.
 - B. Hormonal balance, immune function, glucose response to food, detoxification, neurotransmitter production, and cellular energy production
 - C. If the gut isn't healthy, the human isn't healthy
- II. **Signs and symptoms**
 - A. Common but not normal
 - B. Gas, bloating, diarrhea, constipation, reflux, GI pain, mood disturbances, "brain fog", fatigue, inability to concentrate, skin issues.
- III. **First line of defense interventions**
 - A. **Diet:** there's a time and place for everything! Important to have different dietary tools in the toolbox.
 - 1. GF + DF
 - 2. Paleo
 - 3. AIP
 - 4. Low FODMAP
 - 5. Low histamine
 - 6. Carnivore
 - 7. Pegan
 - 8. Elemental diets
 - B. Polyphenols and fiber variety
 - 1. Insoluble and soluble fiber
 - C. Other problematic triggers - can cause intestinal permeability
 - 1. Coffee - Bulletproof
 - 2. EtOH
 - D. Eating in a **parasympathetic state**
 - 1. Sit down
 - 2. Avoid eating on the go
 - 3. Deep breathing
 - E. Social connection and isolation
 - 1. Social isolation alters behavior, the gut-immune-brain axis, and neurochemical circuits in male and female prairie voles
 - 2. Social relationships, social isolation, and the human gut microbiota
 - F. **Chewing**
 - 1. Supports digestion: digestive process begins in your mouth
 - a) Breakdown of food particles; increase surface area
 - b) Salivary enzymes start digestive process
 - c) Signals to your stomach to produce stomach acid and for your pancreas to produce pancreatic digestive enzymes
 - d) Increases protein bioavailability

- e) May increase [bioavailability](#) of certain nutrients like B carotene.
- 2. [GLP-1 secretion](#) - implications for glucose regulation

G. Food timing

- 1. Exercise
 - a) Reference Athlete's Gut podcast
 - b) Avoid eating too soon before or after intense exercise
 - (1) Heat + intensity → intestinal permeability; hypoxic ischemic injury; LPS translocation...
 - c) But sometimes light movement afterward can aid digestion and help with glucose regulation
- 2. Sleep
 - a) Avoid eating too close to bed
 - b) [Gut microbiome - circadian rhythm bidirectional relationship](#)
 - (1) Gut microbes and their metabolites (like SCFAs) interact with [circadian genes](#) → gut can impact circadian rhythms and vice versa
 - c) [Gut microbiome diversity is associated with sleep physiology in humans](#)
 - (1) Microbiome diversity positively associated with increased sleep efficiency and total sleep time and negatively associated with wake after sleep onset

H. Meal size

- 1. When does smaller vs larger make sense?

I. [Probiotics](#) (evidence based)

- 1. [Strain specificity](#)
- 2. [Visbiome](#) / VSL #3
 - a) [Autism](#)
 - b) Improves [tight junction protein expression](#).
 - c) Dampens inflammatory [cytokines](#) (interleukins) and inflammatory pathway activation
 - d) Enhances acid induced [ulcer](#) healing
 - e) Helps improve diarrhea predominant enteritis
 - f) Improves IBS and IBD
 - g) May help improve outcomes in [NAFLD](#)
 - h) Also implications for diabetes and obesity
 - (1) [Probiotic supplementation attenuates increases in body mass and fat mass during high-fat diet in healthy young adults](#)
 - i) Allergies
 - j) Nervous system diseases
 - k) [Atherosclerosis](#)
 - l) [Bone disease](#)
 - m) Improvement of [breast milk microbial composition](#)
- 3. [Florastor](#) (Saccharomyces boulardii CNCM I-745)

- a) [Infection](#): H pylori, C diff and others, esp causing diarrhea
- b) IBD
- c) IBS
- d) Candida overgrowth
- e) Dyslipidemia
- f) SIBO
- g) [Modulation of fecal bile acids](#) during antimicrobial therapy
- h) [Improved intestinal barrier function](#)
- i) [Regeneration](#) of the intestinal microbiota
- j) [Improves brush border enzyme function](#)

4. Mutaflor ([E coli Nissle 1917](#))

- a) [IBD](#)
 - (1) [UC](#)
- b) Modulation of [inflammatory pathways](#) (TLR-2)
- c) [IBS](#)
- d) Reduces severity of experimental autoimmune [Uveitis](#)

5. Specific strains

- a) Ex [L. rhamnosus GG](#): Infections, diarrhea,
 - (1) Colonizes gut of [infants](#) better than adults
 - (2) May shift the oral microbiota (reducing streptococcus mutans) and also have implications for respiratory health (reduces risk of RTIs)

6. No one size fits all probiotic; individual responses

J. Digestive enzymes

- 1. +/- HCl
- 2. Basic: protease, amylase, and lipase
- 3. Brush border enzymes
- 4. Alters intestinal [microbiota](#)? (in mice)
- 5. [Evaluation of the Safety and Efficacy of a Multienzyme Complex in Patients with Functional Dyspepsia: A Randomized, Double-Blind, Placebo-Controlled Study](#)
- 6. [Some patients with irritable bowel syndrome may have exocrine pancreatic insufficiency](#)
- 7. [Undiagnosed pancreatic exocrine insufficiency and chronic pancreatitis in functional GI disorder patients with diarrhea or abdominal pain](#)

K. Digestive bitters (supplemental and food)

- 1. Can help with indigestion
- 2. [Cephalic elicited vagal response vs local response](#)
- 3. Bitter greens: dandelion, mustard, arugula, radish, radicchio)
- 4. Raw ginger
- 5. [Functional foods with digestion-enhancing properties](#)

L. Tea

- 1. Mint (careful of reflux), chamomile, ginger, fennel, licorice

IV. Other helpful supplements

- A. General gut healing: reduces inflammation; helps improve integrity of the gut lining and health of gut epithelial cells
 - 1. L glutamine, aloe vera, curcumin, boswellia, quercetin, DGL, marshmallow, slippery elm, zinc carnosine...
 - 2. Enteromend, GI Revive, GI Encap, Perma Clear
 - 3. [Interventions of natural and synthetic agents in inflammatory bowel disease. modulation of nitric oxide pathways](#)
- B. SBIs
 - 1. Help restore gut function and mucus membrane integrity
 - 2. Directly support the gut immune system
 - a) Helpful for people with intestinal permeability leading to food intolerances
 - b) Bind endotoxins and decreases gut derived inflammation
 - c) By supporting the integrity of the gut lining, immune system, and decreasing inflammation, may improve nutritional status
 - 3. [New therapeutic option for irritable bowel syndrome: serum-derived bovine immunoglobulin](#)
 - 4. [Potential mechanisms of effects of serum-derived bovine immunoglobulin/protein isolate therapy in patients with diarrhea-predominant irritable bowel syndrome](#)
 - 5. [Impact of serum-derived bovine immunoglobulin/protein isolate therapy on irritable bowel syndrome and inflammatory bowel disease: a survey of patient perspective](#)
 - 6. [Serum-derived bovine immunoglobulin for children with diarrhea-predominant irritable bowel syndrome](#)
- C. ProButyrate
 - 1. Butyrate: produced by certain butyrate producers in the gut via fermentation of plant fibers
 - 2. Food for the intestinal colonocytes
 - 3. Signaling molecule
 - 4. [Short Chain Fatty Acids \(SCFAs\)-Mediated Gut Epithelial and Immune Regulation and Its Relevance for Inflammatory Bowel Diseases](#)
 - 5. [The Role of Short-Chain Fatty Acids From Gut Microbiota in Gut-Brain Communication](#)
 - 6. [Feed your gut with caution!](#)

V. Testing...

- A. Different tests
 - 1. GIMAP, GI Effects, Doctor's Data, UBiome, GutBio...
 - a) DNA PCR vs culture
 - 2. Organic acids: yeast
- B. When to test, when not to test
 - 1. Using empirical protocols based on symptoms, history
- C. Issues with testing
 - 1. Validation

- 2. Reference ranges for pathogens and microbial dysbiosis
 - a) False positives
- 3. ALWAYS treat the client or patient NOT just the test result!
- D. Food intolerance tests: should you bother?
- E. Hints something might be up in the gut on a basic blood chemistry
 - 1. Leukocytes
 - a) Total - high with acute; low with chronic infection
 - b) Neutrophils - bacterial infection
 - c) Lymphocytes - viral
 - d) Eosinophils - parasitic infection
 - 2. Albumin
 - 3. Alkaline phosphatase
 - 4. Electrolytes - diarrhea
 - 5. Nutrient status markers despite nutrient dense diet
 - a) Iron deficiency
 - (1) Ferritin as acute phase reactant - elevated with infections
 - b) MCV et al
 - c) RDW

VI. SIBO

- A. Methane dominant SIBO is now "[intestinal methanogen overgrowth](#)"
- B. [SI dysbiosis](#) rather than "overgrowth"
- C. Issues with breath test: false negatives, poor test reproducibility

VII. Pros and cons of **herbal antimicrobials**

- A. When possible, shift the gut without antimicrobials
 - 1. Alternatives... ex: **pomegranate husk powder** "[A selectively-acting GIT antimicrobial](#)"
- B. Some stronger herbs like grapefruit seed extract can significantly lower beneficial bacteria species like bifidobacteria
- C. Sometimes a necessary evil
- D. Binders

VIII. Revisiting the **4 Quadrant Model**... it applies to gut health too!