

CREATING AN EPIDEMIC OF HEALTH

MS Gut Test + Course

LESSON WORKBOOK

with Dr. Terry Wahls

Best-selling Author, Physician, and Founder of the Wahls Research Fund

CREATING AN EPIDEMIC OF HEALTH

MS Guts Test Plus Course

Terry Wahls, MD, IFMCP | The Wahls Institute, P.L.C. | Dr. Terry Wahls, L.L.C.

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CREATING AN EPIDEMIC OF HEALTH

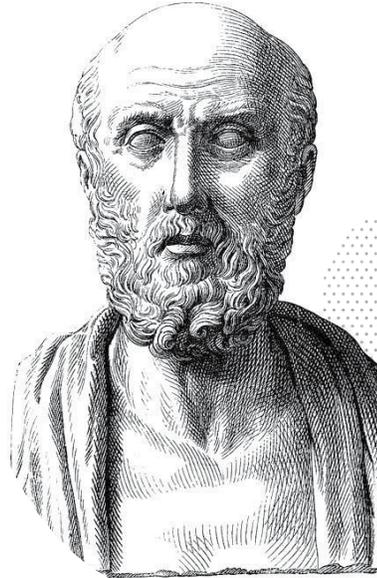
MS Guts Course Session 1

Gut Health Timeline and the 5-R Program

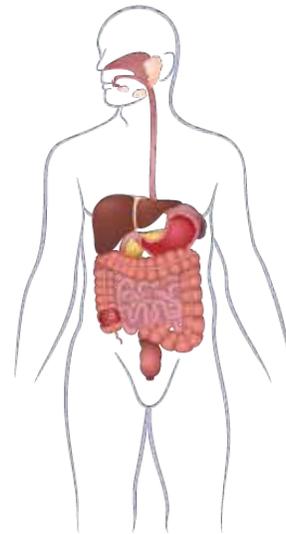
Next Steps on Improving Your

- Mouth Health
- Gut Health
- Systemic Health

All disease
begins in
the gut

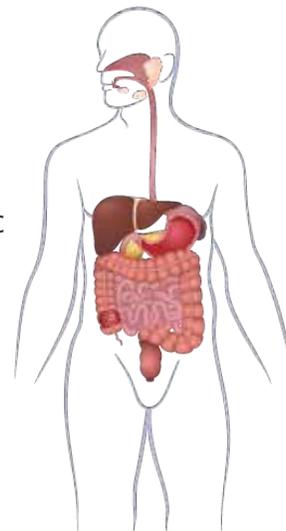


The Gut Begins In The Mouth

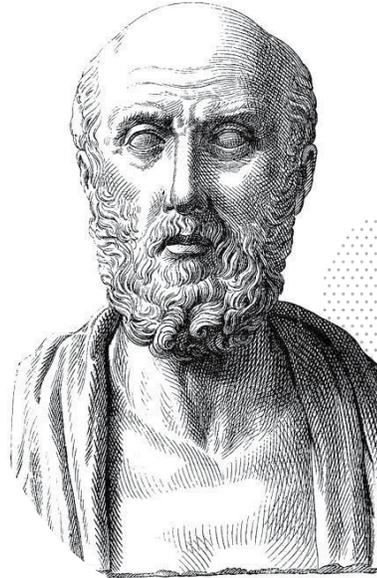


The Gut Brain Axis

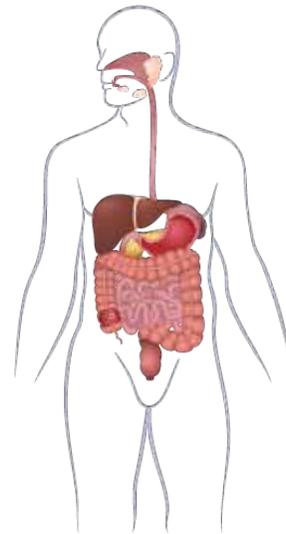
- **The brain-gut axis** = a bidirectional communication system with:
- **Neural pathways** = enteric nervous system (ENS), vagus nerve, sympathetic and spinal nerves
- **Humoral pathways** = cytokines, hormones, and neuropeptides as signalling molecules



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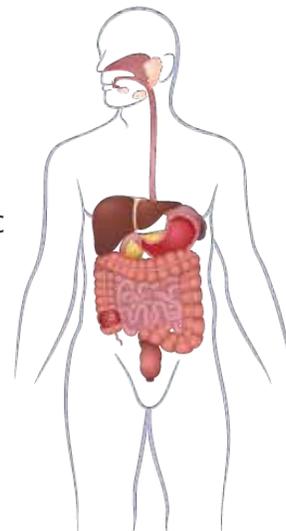


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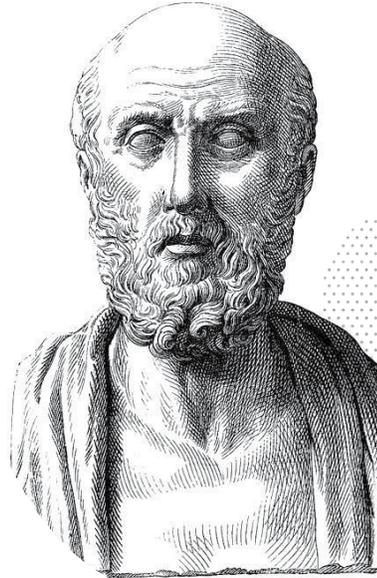


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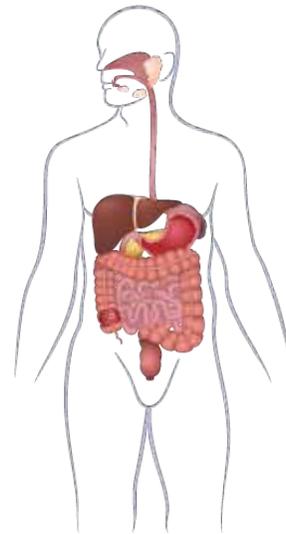
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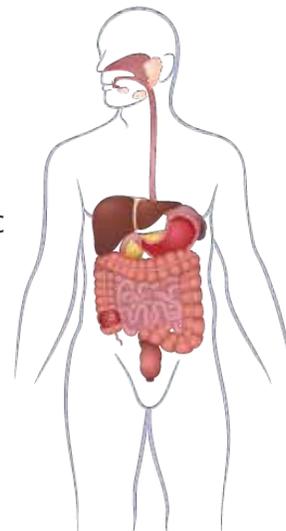


The Gut Begins In The Mouth



The Gut Brain Axis

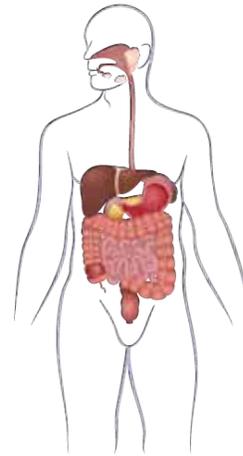
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The Gut Brain Axis

Gut dysbiosis:

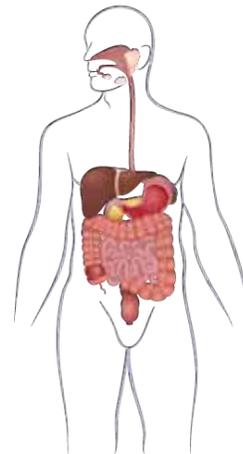
- ↑ LPS, aggregation of proteins (α -syn or β -amyloids) in ENS,
 - ↑ pro-inflammatory cytokines,
 - ↑ Th cells,
 - ↑ monocytes,
 - ↑ bacterial metabolites
- = increased intestinal and BBB permeability



The Gut Brain Axis

Gut dysbiosis:

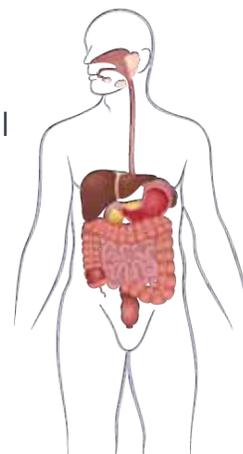
- ↑ Systemic circulation of microbes, microbial products, and inflammatory factors;
- Over-activation and dysregulation of the microglia



The Gut Brain Axis

Gut dysbiosis:

- Further upregulation of the release of several chemokines and cytokines (IFN- γ , IL-6, IL-8, MCP-1, and TNF- α) and ROS/RNS
- ↑ Neuroinflammation; accumulation of misfolded proteins, axonal damage and neuronal demyelination



The Gut Brain Axis

1. Chen X, D'Souza R, Hong ST. The role of gut microbiota in the gut-brain axis: current challenges and perspectives. *Protein Cell*. 2013 Jun;4(6):403-14. doi: 10.1007/s13238-013-3017-x.
2. Roy Sarkar S, Banerjee S. Gut microbiota in neurodegenerative disorders. *J Neuroimmunol*. 2019 Mar 15;328:98-104. doi: 10.1016/j.jneuroim.2019.01.004.
3. Shen L, Ji HF. Associations Between Gut Microbiota and Alzheimer's Disease: Current Evidences and Future Therapeutic and Diagnostic Perspectives. *J Alzheimers Dis*. 2019 Feb 19. doi: 10.3233/JAD-181143.
4. Spielman LJ, Gibson DL, Klegeris A. Unhealthy gut, unhealthy brain: The role of the intestinal microbiota in neurodegenerative diseases. *Neurochem Int*. 2018 Nov;120:149-163. doi: 10.1016/j.neuint.2018.08.005.
5. Branton WG, Lu JQ, Surette MG, Holt RA, Lind J, Laman JD, Power C. Brain microbiota disruption within inflammatory demyelinating lesions in multiple sclerosis. *Sci Rep*. 2016 Nov 28;6:37344. doi: 10.1038/srep37344.
6. Xiang S, Ji JL, Li S, et al. Efficacy and Safety of Probiotics for the Treatment of Alzheimer's Disease, Mild Cognitive Impairment, and Parkinson's Disease: A Systematic Review and Meta-Analysis. *Front Aging Neurosci*. 2022;14:730036. Published 2022 Feb 3. doi:10.3389/fnagi.2022.730036
7. Zhu Y, Yuan M, Liu Y, et al. Association between inflammatory bowel diseases and Parkinson's disease: systematic review and meta-analysis. *Neural Regen Res*. 2022;17(2):344-353. doi:10.4103/1673-5374.317981
8. Bonnechère B, Amin N, van Duijn C. The Role of Gut Microbiota in Neuropsychiatric Diseases - Creation of An Atlas-Based on Quantified Evidence. *Front Cell Infect Microbiol*. 2022;12:831666. Published 2022 Mar 14. doi:10.3389/fcimb.2022.831666
9. Rebeaud J, Peter B, Pot C. How Microbiota-Derived Metabolites Link the Gut to the Brain during Neuroinflammation. *Int J Mol Sci*. 2022;23(17):10128. Published 2022 Sep 4. doi:10.3390/ijms231710128

How Are the Bowels?

Bristol Stool Chart

| | | | | |
|--------|---|---|------------------------------------|---|
| Type 1 |  | + | 0 Wipes, the perfect poop | + |
| Type 2 |  | + | 1-2 Wipes, just enough, no more | + |
| Type 3 |  | + | 4 or 5 Wipes, a little much | + |
| Type 4 |  | + | 6-7 Wipes, excessive wiping | + |
| Type 5 |  | + | 8 or 9 Wipes, will clog the toilet | + |
| Type 6 |  | + | 10 Wipes, to on your hands | + |
| Type 7 |  | + | >10 Wipes, just take a shower | + |

Constipation precedes MS dx



Restoring Gut Health

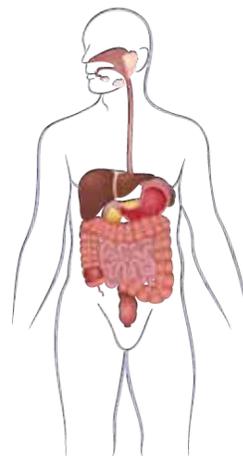
1. Treated veterans with poor gut health
2. Health and timeline review
3. Plus the 5-R program
4. Would often lead
5. Reduced fatigue
6. Improved quality of life
7. Reduced needs for Rx
8. Sometimes
9. More investigations needed
10. And Rx to address uncovered problems

The Gut Microbiome

1. Species / communities
2. Differ by location
3. Saliva – easier to collect than stool
4. Gut microbiome research using shotgun metagenomics of the saliva instead of stool
5. Problems in the gut microbiome show up in the saliva early
6. Start with the basic 5-R program

The Gut Brain Axis

- Microbial dark matter
- Swallow 100 billion bacteria each day
- Mouth 700 species of bacteria
- Plus bacteriophages (viruses), fungi, protozoa
- Rest of the gut has 500 to 1000 species



Understanding Your Health Timeline as It Relates to Your GUT

1. Will start with what you are eating now
2. How would you classify your diet
3. Circle diets in the past
4. Star current diet
5. Regular diet
6. Paleo
7. Mediterranean
8. Ketogenic

Your Usual Diet

1. Low saturated fat
2. Intermittent fasting
3. Time restricted eating
4. Fasting mimicking diet
5. Gluten free
6. Dairy free
7. Vegetarian/ vegan
8. Carnivore
9. Other

Your Usual Diet

1. How many servings of protein / day
2. Serving is deck of cards 3 ounces meat (0 g carbs, 20 g protein)
3. ½ beans + ½ cup rice (66 g carbs, 15 g protein)
4. How many servings of non-starchy vegetables / day
5. Serving is 1 cup raw, ½ cup cooked
6. How many servings of fruit / day
7. How many 8-ounce servings sugar sweetened beverages / day
8. How many servings of starch / day
9. Serving is ½ cup rice or ½ cup pasta or one small potato

Your Usual Diet

1. How many servings of fermented vegetables / day
2. Serving is 1/4 cup of sauerkraut or kimchi
3. How many 1 cup servings of kefir/ yogurt / day
4. How many 1 tbs servings of organic butter
5. How many servings of soft cheeses (not cream cheese)
6. How many servings of fermented Natto
7. Do you eat raw fish
8. Do you eat raw shellfish
9. Do you eat raw meat
10. Do you eat rare meat

Dental Care Timeline

How many...

1. White fillings _____
2. Silver fillings _____
3. What age(s) _____
4. Remove any silver (mercury) fillings Yes/ No
5. With biologic dentist or conventional dentist
6. Crowns _____
7. Root Canals _____
8. Missing teeth _____
9. Braces

Dental Care Timeline – Clues

How many...

1. White fillings - composite resins
2. Silver fillings – 50% mercury
3. What age(s) – More mercury increases risk of autoimmune, neuro and mental health issues
4. Remove any silver (mercury) fillings – mercury can be vaporized during removal
5. Crowns, root canals, wisdom teeth removal – some risk of cavitation – and smouldering infection in the jawbone
6. Braces – most often lead to narrowing of the face, at risk for sleep problems and small airway

Symptoms

1. What symptoms do you have?
2. What year did they begin?
3. Put a star if severe
4. Gut begins with the lips and ends in the anus

Mouth Symptoms

- Burning mouth
- Ulcers/ canker sores in mouth or on lips
- Bleeding gums when you brush vigorously or floss
- Lots of dental plaque that is removed when you see dentist
- Lesions or cracking along the corners of mouth
- Bad breath
- Dry mouth
- White coating on tongue
- Dental extraction
- Crooked teeth
- Mouth breathing
- Snoring, poor sleep

Mouth Symptoms

- Burning mouth – nutrient and autoimmune concerns
- Ulcers/ canker sores in mouth or on lips – virus
- Bleeding gums when you brush vigorously or floss – bacterial pathogens/ dysbiosis in the mouth
- Dental plaque is present – if calcified – may be too acidic, not enough vitamin K2mk7 or K2mk4
- Lesions or cracking along the corners of mouth - Insufficient B vitamin / minerals
- Bad breath – pathogens/ dysbiosis in the mouth
- Dry mouth – pathogens/ dysbiosis in mouth, autoimmune
- White coating on tongue – yeast overgrowth
- Braces or crooked teeth – risk for small airway
- Poor sleep – sleep study, dental sleep medicine referral if sleep study abnormal

Your Mouth Care

- How many times a day or week
- Brush _____
- Floss _____
- Water pick _____
- Scrape your tongue _____
- Foaming toothpaste _____
- Mouthwash _____
- How many alcoholic drinks each day/ week _____
- Have your teeth cleaned and dental plaque removed

Your Gut Health Timeline

- Were you born via C/section?
- Did you receive antibiotics before age 3?
- How many antibiotic courses as a child ?
- How many as an adult?
- Do you have severe constipation?
- Are you too thin and unable to gain weight?
- Is your appetite good?

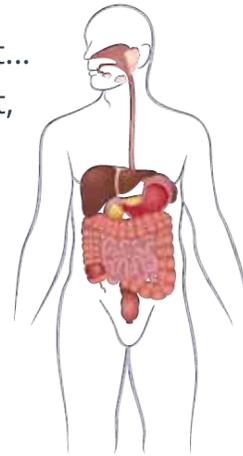
Your Gut Health Timeline

- Did you travel to the developing world?
- Do you wade in streams, ponds or lakes?
- Did you drink from streams, ponds or lakes?
- How did you treat the water?

Gut Symptoms

Moving further along, we need a healthy gut...

- To digest food, assimilate the food we eat, to grow to adulthood
- Key for healthy aging
- Maintain and repair our cells.



Gut Symptoms

- Belly pain
- Pelvic pain
- Bloating
- Heartburn/ acid reflux
- Pain elsewhere
- Acute loose stools
- Chronic loose stools
- Intermittent loose stools
- Constipation
- Bleeding in the stool
- Hemorrhoids
- Skin rashes

Who Else in Has Similar Gut Symptoms?

Blood relatives

- Children
- Parent
- Sibling
- Grandparent

Household

Adults

Children

Who Else in Has Similar Gut Symptoms?

Blood relatives – genetic clues

- Children
- Parent
- Sibling
- Grandparent

Household – genetic clues

Adults

Children

What Have You Tried

- Fill in for each symptom to the detail that is helpful
- Helpful treatments
- Ineffective treatments

What Have You Tried

- Fill in for each symptom to the detail that is helpful
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How Are the Bowels?

Bristol Stool Chart

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| Type 1 |  | Separate hard lumps, like nuts (hard to pass) | + | 0 Wipes, the perfect poop | - |
| Type 2 |  | Sausage shaped but lumpy | + | 1-3 Wipes, just enough, no more | + |
| Type 3 |  | Like a sausage but with cracks on its surface | + | 4 or 5 Wipes, a little much | + |
| Type 4 |  | Like a sausage or snake, smooth and soft | + | 6-7 Wipes, excessive wiping | + |
| Type 5 |  | Soft blobs with clear cut edges (passed easily) | + | 8 or 9 Wipes, will clog the toilet | + |
| Type 6 |  | Fluffy pieces with ragged edges, a mushy stool | + | 10 Wipes, to on your hands | + |
| Type 7 |  | Watery, no solid pieces. Entirely liquid | + | >10 Wipes, just take a shower! | + |

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Belly or pelvic pain
 Prodrome for MS
 Common comorbid problems



Constipation precedes MS dx
Autoimmune bowel disease
Parasites



Chronic Diarrhea
Autoimmune bowel disease
Parasites



Gut Restoration 5-R Program

- Repair
- Remove
- Replace
- Re-inoculate
- Rebalance

Leaky Gut Risks – Concussion

- Extreme athletic training
- Concussions
- Traumatic Brain Injury
- Loss of consciousness
- Dazed
- Sport concussions
- Soccer
- Saw stars
- Fall down the stairs
- Motor vehicle accident
- Concussion = period of leaky gut

Leaky Gut Risks – Concussion

- ASA
- Ibuprofen use
- Acid lowering treatments
- OCPs
- Other prescription Rx
- Daily alcohol
- Emulsifiers and food additives
- Fast Food
- Processed foods
- No stir peanut butter

Leaky Gut Risks – Yeast

- C/S birth – get skin microbiome from hospital
- Vaginal birth – get the microbiome from mom
- Breast fed – get oligosaccharides that help baby's microbiome
- Bottle feed – no fiber
- History of colic – probable dysbiosis / gut pathogens
- Antibiotics before age 3 - probable yeast/ dysbiosis/ pathogens
- Antibiotics longer than a 4-week period – possible yeast/ dysbiosis/ pathogens
- How many lifetime courses of antibiotics – increases risk of dysbiosis
- High carbohydrate diet feeds yeasts and sugar loving bacteria

Inflammation Markers

Bleeding gums



Inflammation Markers

Heal the mouth



Optimal Mouth Care

- Brush after meals
- String floss daily
- Water pick optional
- Scrape your tongue daily
- Foaming toothpaste never
- Mouthwash never
- Dental hygienist twice a year
- Braces not needed because breast fed, tough chewy food as a child
- Will discuss optimal diet in the next section

Optimal Mouth Care: Brush/Floss

- Tape flosses are less irritating
- Brush and floss twice daily
- Dental cleaning twice a year



Optimal Mouth Care: Brush/Floss

- Mineral toothpaste - **welnesse** hydroxyapatite
- Dentalcidin - essential oils to rebalance microbiome



Optimal Mouth Care: Brush/Floss

- Tongue scrape
- Bacteria live in the grooves
- Scrape 2X day



Optimal Mouth Care: Brush/Floss

- Oil pulling
- 1 tsp of coconut oil or olive oil
- Swish between teeth
- Daily will reduce plaque
- Rinse with water
- Salt water
(1/4 tsp in 8 ounces of water)



Optimal Mouth Care: Brush/Floss

- Water pick
- 10% hydrogen peroxide + water



Mouth Care

- Silver fillings 50% mercury
- Avoid
- Small daily release of mercury as you chew
- Removal eliminates daily release with a trade off of larger release on the day of removal



Mouth Care

- Silver fillings 50% mercury
- Biologic dentist
- Mercury detox
- Avoid large fish (e.g. tuna, sea bass)
- Filtered water
- Filtered air
- Additional sulfur support
- NAC
- Lipoic acid
- Iodine/ iodide /seaweed (consult with your medical team if on thyroid medication)



Mouth Care

- Nitric Oxide is a key signalling molecule
- Blood pressure
- Brain health
- Heart health
- Need the right bacteria in mouth



Qu M et al From Nitrate to Nitric Oxide: The Role of Salivary Glands and Oral Bacteria. J Dental Res. 2016 Dec;95(13):1452-1456. doi: 10.1177/0022034516673019. Epub 2016 Oct 7.

Mouth Care

- Nitric oxide
- Eat nitrate rich food
- Greens, beets
- Nitrate supplement
- Arginine supplement
- Enter blood stream → Saliva
- → Nitric oxide
- Only if you have the correct bacteria in your mouth



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Mouth Care

- Nitric Oxide is a key signalling molecule
- Depends on oral microbiome
- Avoid foaming toothpaste, mouth wash
- Do you have nitrate forming bacteria in your mouth
- They are key to having sufficient nitric oxide
- You may need more greens/beets
- A nitrate supplement
- Oral probiotics
- To have optimal nitric oxide

Check Bristol Oral Health Test results

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Mouth Care

- Root canals
- Tooth extractions
- Risk for cavitations
- Infections involving jawbone
- Need cone beam CT to evaluate
- Persisting face symptoms or jaw symptoms
- Biologic dentist with cone beam expertise
- Useful for those with MS and neuroimmune issues

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Gut Restoration – Repair

- Repair the mouth
- Reduce inflammation
- Repair the leaky gut
- A leaky gut is
- First step in autoimmune disease processes
- Remove food and other irritants is first step in repair

Leaky Gut Risks

- Ketogenic diet
- > 50 years of age
- 2 or more alcohol drinks per day
- Tobacco products
- Stress
- Sedentary
- Loneliness

Qu M et al. From Nitrate to Nitric Oxide: The Role of Salivary Glands and Oral Bacteria. J Dental Res. 2016 Dec;95(13):1452-1456. doi: 10.1177/0022034516673019. Epub 2016 Oct 7.

Gut Restoration – Repair

- Heal the leaky gut
- Get into parasympathetic state
- Essential oils
- Intestinal mucosa clockwise around belly button
- Anti-inflammation clockwise around belly button
- Parasympathetic on the mastoid to increase vagal tone

Gut Restoration – Repair

- Heal the leaky gut
- First step in the development of autoimmune disease
- Improve the diet
- Stop the fast food/ processed foods
- Stop tobacco
- Stop/ reduce alcohol
- Provide the key nutrients for gut microbes and colon cells
- *Targeted supplements may be very helpful*

Gut Restoration – Remove

Remove triggers for opening tight junctions

- Gluten
- Dairy
- Eggs—*consider a 2-4 week trial of no eggs*

Gut Restoration – Remove

Basic Elimination Diet

- Grains
- Dairy
- Eggs
- Legumes



Gut Restoration – Remove

More comprehensive elimination diet

- Grains
- Dairy
- Eggs
- Legumes
- Nuts
- Seeds
- Nightshades
- Citrus
- Shell fish



Optimal Diet

1. Vitamin K in greens
2. Vitamin K2—calcium uptake into teeth /bones
3. Vitamin K2MK7—bacterial conversion of vitamin K in plants
4. Vitamin K2MK4—animal forms
5. Hydroxyapatite—mineral for teeth and bones
6. Use mineral toothpaste

Optimal Diet

1. Greens every day for nitrates and vitamin K
2. K2MK7—eating greens and healthy gut
3. Natto—fermented soybeans
4. K2MK4
5. Organic grass fed butter / ghee
6. Emu oil
7. Soft cheeses if tolerated / choosing to eat dairy
8. Dairy may cross react with brain structures
9. Goat, sheep, other non-cow milks may be better tolerated

Gut Restoration – Remove ‘bad bugs’

- Microbiome is set by age 3
- Microbes in appendix will restore the microbiome back to the 3 year old microbiome



Gut Restoration – Remove yeasts

- Regular diet 300 grams carbs
- Mediterranean 125 grams carbs
- Paleo diet 80 grams carbs
- Low carb diet 50 grams carbs
- MCT ketogenic diet 35-50 grams carbs
- Ketogenic diet < 35 grams carbs
- Yeast will likely recur with higher carb diet

Gut Restoration – Remove yeasts

- Keep carbohydrates low in the diet
- Increase resistant starch and fiber to have soft bowel movement daily
- Add herbal suppression
- Herbal suppression likely needed lifelong



Gut Restoration – Replace

- Replace what is missing
- High carb diets often increase
- Autoimmune attack on stomach
- Stomach acid ↓
- > 50 y/o



Gut Restoration – Replace

- Replace stomach acid
- Apple cider vinegar dilute in water
- Drink with straw
- Betaine



Gut Restoration – Replace

- Autoimmune attack on pancreas
- Age > 50
- Fat malabsorption
- Loose stools
- Smelly stools
- Oily stools
- Insufficient enzymes
- Digestive enzymes



Replace What's Missing

- Digestive Enzymes
- Key building blocks for colonocytes
- Betaine
- Fish oil
- Glutamine
- NAC
- Collagen
- Fiber/curcumin



1. Camilleri M, Lyle BJ, Madsen KL, Sonnenburg J, et al. Role for diet in normal gut barrier function: developing guidance within the framework of food-labeling regulations. *J Physiol Gastrointest Liver Physiol.* 2019 Jul 1; 317(1): G17-G29.

2. Gutiérrez S, Svahn SL, Johansson ME. *Effects of Omega-3 Fatty Acids on Immune Cells. *Int J Mol Sci.* 2019 Oct; 20(20): 5028

Gut Restoration – Re-inoculate

- Commensals – specific to bowels
- Make the desired vitamins and nutrients
- Butyrate
- Urolithin A

Re-inoculate with Good Bacteria

- Commensal bacteria
- Feed the good bacteria
- More resistant starch
- Probiotics



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Re-inoculate with Good Bacteria

- Add more probiotic foods
- Sauerkraut
- Kimchi
- Yoghurt
- Kefir



Camilleri M, Lyle BJ, Madsen KL, Sonnenburg J, et al. Role for diet in normal gut barrier function: developing guidance within the framework of food-labeling regulations. *J Physiol Gastrointest Liver Physiol*. 2019 Jul 1; 317(1): G17–G39.
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Gut Restoration—Re-balance

- Rebalance life
- Ongoing severe stress
- Poor sleep
- Sedentary life
- Loneliness
- Lack of purpose

Make it difficult to repair gut

Gut Restoration Re-balance

- Rebalance life
- Personal trainer for exercise



Gut Restoration Re-balance

- Rebalance life
- Hobbies



Gut Restoration Re-balance

- Rebalance life
- Hobbies



Gut Restoration Re-balance

- Rebalance life
- Hobbies



Gut Restoration Re-balance

- Rebalance life
- Hobbies



Gut Restoration Re-balance

- Rebalance life
- Hobbies



Gut Restoration—Re-balance

- Rebalance life
- Vagal tone / parasympathetic support
- Stress management strategies
- Better sleep
- Exercise
- Socialization

Gut Restoration—Re-balance

- 5-R program to restore gut health
- Start with the basic program
- If still having trouble after 4 months
- May need further evaluation
- Discuss with your medical team
- Do you need further evaluation

Key Points

- Healthy gut is essential to health
- Repair the leaky gut
- Remove offending food proteins, medications and irritants that worsen leaky gut
- Remove bad bugs
- Starve the bad bacteria, fertilize the good bacteria
- Replace what is missing
- Re-inoculate with probiotics and fermented foods
- Rebalance your life
- Additional investigations are sometimes needed

Disclosures

- Grant Funding –
 - National MS Society
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Discuss what you learn from this program/ course with your personal medical team.

Always seek the advice of your physician or other qualified health provider with any questions you may have regarding a medical condition or your health prior to starting new dietary routines, exercise or supplements.