Meet Your Microbiome: Eating for Gut Health

TODAY’S AGENDA:
• Introduction & Housekeeping
• Speaker Introduction
• Presentation
• Q&A
• Closing

WEBINAR HOST:
Keith Hine MS, RD
Sr. Director of Healthcare & Sports
Orgain

WEBINAR PRESENTER:
Mary Purdy, MS, RDN
Integrative Eco-Dietitian

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MEET YOUR MICROBIOME: EATING FOR GUT HEALTH
PRESENTER: MARY PURDY, MS, RDN
DISCLOSURES & AFFILIATIONS OF PRESENTER:
MARY PURDY, MS, RDN, INTEGRATIVE “ECO-DIETITIAN”

Adjunct Faculty at Bastyr University

Board Member: Dietitians in Integrative and Functional Medicine & Hunger and Environmental Nutrition & Planetary Health Collective

Host of The Podcast “The Nutrition Show”

Faculty at IFNA “Integrative and Functional Nutrition Academy”

Author: “The Microbiome Diet Reset”

Online Dietitian for The Inner Circle Wellness of Kris Carr online community
LEARNING OBJECTIVES

Describe the influences on the makeup of the gut microbiome and the role it plays in human health

Describe the positive and negative impacts of specific foods and environmental inputs on the balance of the microbial population in the human intestinal tract

Implement practical dietary and lifestyle strategies for supporting the human gut microbiome

Effectively interpret emerging research connecting diet and environment to microbial health and gut function
THE FUNDAMENTALS: WHAT IS THE MICROBIOTA/MICROBIOME?

- 100 trillion microbes that colonize the mucosal surfaces of our body = **MICROBIOTA**
  - Bacteria, fungi, archaea, protozoa and viruses
  - Found in lungs, intestine, vaginal canal, oral and nasal cavity & on skin
  - + their genes = ** MICROBIOME**
- 3 times more bacterial cells than our own human cells
- Up to 1,000 species of bacteria
- The total weight of intestinal microbiota is up to 1.5kg
  - 50% of daily poops = microbiome
- Research and science is still emerging and some may be in preliminary stages but the profound influence on health is undeniable

MAJOR “PHYLAS” (FAMILIES) OF BACTERIA

MAJORITY (90%) ARE IN THE BACTEROIDETES & FIRMICUTES FAMILY

WITHIN EACH ARE “GENUS”’S

<table>
<thead>
<tr>
<th>Phylum</th>
<th>Example Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacteroidetes</strong></td>
<td>Bacteroides, Prevotella (shown to be both beneficial to some and correlated with inflammation in others.)</td>
</tr>
<tr>
<td><strong>Firmicutes</strong></td>
<td>Lactobacillus, Clostridium, Staphylococcus, Enterococcus, Faecalibacterium, Eubacterium, Roseburia, Ruminococcus,</td>
</tr>
<tr>
<td><strong>Proteobacteria</strong></td>
<td>E.coli, other coliforms, Campylobacter Desulfovibrio</td>
</tr>
<tr>
<td><strong>Actinobacteria</strong></td>
<td>Bifidobacterium, Propionibacteria</td>
</tr>
<tr>
<td><strong>Verrucamicrobia</strong></td>
<td>Akkermansia</td>
</tr>
</tbody>
</table>

The Bacteroidetes/Firmicutes ratio specifically is not consistently shown to play role as previously suggested.
SOME FAMILIAR SPECIES IN THE GENUS LACTOBACILLUS AND BIFIDOBACTERIUM

- **GENUS: Lactobacillus** (L. _____) (Produce lactic acid)
  - Lactobacillus acidophilus
  - Lactobacillus brevis
  - Lactobacillus casei
  - Lactobacillus cerevisiae
  - Lactobacillus casei
  - Lactobacillus reuteri
  - Lactobacillus rhamnosus

- **GENUS: Bifidobacterium** (B. ______)
  - (Often low in those with IBS & potentially protective for those with T2D)
  - Bifidobacterium longum
  - Bifidobacterium breve
  - Bifidobacterium bifidum

- **GENUS: Akkermansia** (shown to be low in T2D)
  - Akkermansia Muciniphila (helpful for appetite)
POLL #1: WHAT IS NOT LIKELY TO HAVE AN Impact ON THE HUMAN GUT MICROBIOME?

a) Medications
b) Our current agricultural system
c) Being bottle vs. breast fed
d) Dietary habits
e) All of these can have an impact
INFLUENCED AND AFFECTED BY…..?

- Gestational age at birth
- Mode of birth
- Maternal microbiome
- Breastfed vs bottle fed
- Antibiotics in childhood
- Current sanitation measures
- Regular bathing
- Antibiotics in adulthood
- Medications
- Agriculture (Agrichemicals, Soil health)
- Diet (explains ~50% of variation)

MAJOR ROLES OF THE GUT MICROBIOTA

∞ Digestion and absorption of our nutrients (enhances absorption of minerals: iron, calcium)

🌱 Creates SCFA’s (Short Chain Fatty acids) Ensures the integrity of our gut lining

🍃 Influences the development of and supports/informs/drives the activity of our immune function

❤️ Protects against pathogens & aids in detoxification by metabolizing carcinogens

🧬 Synthesizes amino acids and a variety of vitamins: Vitamin K, B12, Riboflavin, Biotin and Thiamine

📚 Helps to determine how much energy we burn, how we metabolize glucose and fats, how much fat we store

📖 Role in insulin sensitivity and modulating inflammation

={["Synthesizes neurotransmitters: Emerging research on the significant effect it has on brain function and mood – “Gut Brain Axis”"]}
WHAT IS THE “OPTIMAL” MICROBIOME MAKEUP?

No one answer

Everyone is different: Bio-individuality

Diversity = Key

• Diverse ecosystem = healthy and more resilient ecosystem
• Diverse microbiotas: associated with better health
• Ensuring sufficient “good bacteria”
SCFA’S: SHORT CHAIN FATTY ACIDS PRODUCED BY GUT BACTERIA WHEN THEY CONSUME FERMENTABLE FIBER & RESISTANT STARCH

Benefits

- Decrease Intestinal PH
- Nourishing to gut. Increase gut integrity (mucosal lining intact)
- Decrease inflammation & support immunity
- Protects the digestive tract from harmful bacteria
- Support appetite regulation
- Aid in “energy harvesting” (aka calorie burning)
- Key messengers by which microbes communicate with the host organs regulate metabolism
- Support Healthy cholesterol levels
- Promote microbial diversity


SCFA’S: SHORT CHAIN FATTY ACIDS PRODUCED BY GUT BACTERIA WHEN THEY CONSUME FERMENTABLE FIBER & RESISTANT STARCH

Highlight on SCFA: “Butyrate”

• May help prevent obesity, insulin resistance (increases fatty acid oxidation)
• Reduces NF-kB (Inflammatory pathway)
• Can reduce gut permeability
• SOURCES:
  • Bovine Milk
  • Breast milk


SCFA’S & IMMUNITY AND INFLAMMATION

Table 9 Effects of dietary components on immune parameters

<table>
<thead>
<tr>
<th>SCFA</th>
<th>TLR</th>
<th>WAT</th>
<th>Met Endo</th>
<th>LPS</th>
<th>CRP</th>
<th>IL-6</th>
<th>IL-10</th>
<th>IgA</th>
<th>References</th>
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<td>↑</td>
<td>[83, 88, 97–99, 103]</td>
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<td>[115, 117, 122]</td>
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<td>Animal protein</td>
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<td>[39–41]</td>
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<td>[31]</td>
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</tbody>
</table>

SCFA short chain fatty acids, TLR toll-like receptor activation, WAT white adipose tissue inflammation, Met Endo metabolic endotoxemia, LPS lipopolysaccharide levels, CRP C-reactive protein, IL-6 interleukin-6, IL-10 interleukin-10, IgA immunoglobulin A

- Inflammation decreases with decreased IL-6 & CRP, & decreased inflammatory mediators from white adipose tissue and increased anti-inflammatory IL-10
- IL-10 – may improve glucose metabolism
- Higher IgA – associated with improved mucosal immunity

Changes in the proportions of different gut flora populations have been found in many health conditions, including:

- Inflammatory bowel disease, Celiac & irritable bowel disease
- Metabolic syndrome
- Type 1 & 2 diabetes (often with excess adipose tissue)
- Cardiovascular disease
- Obesity
- Liver disease (including non-alcoholic steatohepatosis & cirrhosis)
- Neuropsychiatric disease (including autism spectrum disorder, depression, multiple sclerosis)
- Autoimmune issues/diseases
- Asthma & Lung infections
- Play a role in driving chronic inflammation
LPS: “LIPOPOLYSACCHARIDES”

- Molecules created as by products of “bad” bacteria (gram negative) that act as “Endotoxins”
- Endotoxemia → Inflammatory
- Shown to alter immune and glucose homeostasis
- Associated with and may be trigger for development of obesity and Type 2 Diabetes
- Associated with visceral fat, metabolic syndrome and diabetic nephropathy in Type 1 Diabetes

- SCFA’s help to prevent endotoxemia by strengthening intestinal barrier
  - Thus...the need for more fiber in diet

AUTOIMMUNITY: MICROBES AS INTESTINAL WALL PROTECTORS

- **COMBO**: Gene + Environment + Diet + Lifestyle + Gut health
- **“Short chain fatty acids”** nourish the cells of the intestine and strengthen the gut barrier

- A strong and resilient “intestinal barrier” or “gut wall”: keeps unfriendly microbes & LPS from interacting with epithelial cells (barrier) and allowing other large molecules to escape the digestive tract and making their way into the bloodstream and extra-intestinal tissues.

- **One culprit**: Elevated “zonulin” (protein) → increases gut permeability
  - Associated with inflammatory issues
  - Can be triggered by bacteria and gliadin (gluten)

AUTOIMMUNITY: MICROBES AS INTESTINAL WALL PROTECTORS

- **Intestinal Barrier Breakdown**
  - From bacterial starvation, *(Bacteria may feed on mucosal lining of the intestines)* + imbalances or ongoing exposure to toxic compounds → foreign bodies (including bacterial metabolites like LPS) more able to cross from the inside of the intestines to the bloodstream → potentially cause an overactive immune response & high inflammation

- Prolonged or repetitive deviation from the optimal microbial homeostasis (dysbiosis) may lead to **loss of self-tolerance** and spreading of proinflammatory signals and effector cells

DYSBIOSIS

Reduced abundance of good bacteria or OVER abundance of bad bacteria

- Lack of short chain fatty acids and lactic acid
- Increase in methane and hydrogen production
- → Inflammation & imbalance
- Less communication with the immune system
- Associated with chronic diseases
- Rodent Studies: dysbiosis caused by dietary changes → Loss of microbiota diversity – translates to future generations.

How does this happen?

LESS STOMACH ACID

- Meant to keep out pathogenic bacteria (H. Pylori)
- Reduces with age
- Chronic Stress: can → hypochlorhydria

**Medications that reduce acid:**
- Proton Pump Inhibitors and Acid Blockers
- Antacids: Omeprazole, Zantac, Tums, rolaids,

MEDICATIONS AFFECT MICROBIAL POPULATIONS

- Proton Pump inhibitors may also inhibit certain beneficial bacteria
- Anti-biotics
- Biguanides (decrease in bacteria that produce SFCA’s)
- Statins
- Laxatives
- Oral Contraceptives
- Oral steroids
- SSRI’s

This isn’t about eliminating the medication but increasing awareness around their potential impact and ensuring strategies for microbiome support.


**Western Diets** (poor quality fats/carbs/protein) can disrupt balance of the microbiome

**Ultra-processed foods** may negatively affect the microbiome → Growth of less favorable bacteria in gut promoted

**Lack of diet diversity**: Diversity of diet is linked to more diverse microbiota and better health outcomes.

**Significant shifts have been found in response to dietary intake**
- Alter the balance of the microbiome within 24hrs with a shift back to baseline within 48 hrs of halting the change


POLL #2 WHAT FOOD BELOW IS THE BEST SOURCE OF FIBER?

a) 1 Tbs chia seeds
b) 1 apple
c) 1/2 cup of chickpeas
d) 1 oz (1/4 cup) almonds
Table 8 Effects of special diets on gut microbiota

<table>
<thead>
<tr>
<th>Diet</th>
<th>Food constituents</th>
<th>Total bacteria</th>
<th>Bifidobacteria</th>
<th>Lactobacilli</th>
<th>Prevotella</th>
<th>Eubacteria</th>
<th>Roseburia</th>
<th>Bacteroides</th>
<th>Enterobacteria</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>High animal fat/protein</td>
<td>↓</td>
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<td>[26, 29, 48]</td>
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<tr>
<td>Mediterranean</td>
<td>High fiber/antioxidants/UFA low red meat</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>[41, 129, 192]</td>
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<tr>
<td>Gluten-free</td>
<td>No gluten</td>
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<td>↓</td>
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<td>[125, 126, 193–195]</td>
</tr>
</tbody>
</table>

UFA unsaturated fatty acids

6 SUPPORTERS FOR OPTIMAL MICROBIAL HEALTH
FIBER (SURPRISE!) IS FOOD FOR THE MICROBES

25-40 GRAMS/DAY (VARIUES FROM PERSON TO PERSON)

Food for microbes and supporting elimination. Increase production of SCFA’s.

Undigestible fiber gets broken down → lactic acid to help with lactose digestion, stimulate immune function & prevent diarrhea.

Goal = VARIETY: 30 different plant foods weekly to ensure microbial diversity.

Focus on plant based proteins: beans, whole grains, nuts, seeds, fruits and vegetables.

Beans: dips, burgers, soups; chili, salads, pea protein powders
Grains: salads, grain bowls,
Produce: Add to sandwiches, soups, sauces

PHYTO-CHEMICALS: (POLYPHENOLS) COLORFUL COMPOUNDS FOUND IN PLANTS (VARIETY IS KEY!)

- Shown to inhibit the growth of pathogenic bacteria (anti-microbial)
- Stimulate beneficial bacteria
- Reduce inflammation in the gut & prevent permeability
- Associated with lower amounts of LPS
- Variety increases diversity in gut ecosystem
- Healthy soil provides additional exposure to friendly microorganisms
- Add to soups, smoothies, roast, raw, drink, Green tea, herbs in salads; moderate wine; greens powders added to smoothies;


PROBIOTIC-RICH FOODS

Provide the host with beneficial microorganisms & increase SCFA’s

Help to reduce the presence of less favorable gut bacteria

Fermentation also has been shown to increase the antioxidant activity and availability of the nutrient content of many foods

Yogurt, kefir (coconut & nut versions too!) Fermented sauerkraut on sandwiches, with eggs, in grain bowls; Kim Chi, miso, tempeh, Functional foods with probiotics mixed in.

PRE-BIOTICS

Undigestible components of foods that feed probiotics and help them to thrive → Increase SFCA’s reducing gut permeability

Helped to improve insulin sensitivity, cardiovascular and joint inflammation issues

Specific types of fiber called “inulin” and fructo-oligosaccharides” or “FOS” found in foods like onions, garlic, leeks, maple syrup, bananas, asparagus, Jerusalem artichokes
• Studies showed improvement in fasting blood glucose & reduced LPS

Cook with garlic, onions or add to salads and sauces, sweeten with maple syrup – add to dressings or drizzle on plain yogurt.
BETA GLUCANS

Compounds in mushrooms and grains like oats or barley

Immune building
Prebiotic properties: enhance the growth of some of our good bacteria

Protect the gut lining
Support lung health

Enjoy a bowl of oatmeal or toss some mushrooms in salad, soup or stir fry periodically

REFERENCES
OMEGA 3 FATTY ACIDS

Higher intake correlated with greater diversity
Can favorably influence gut microbe composition

Maintains intestinal wall integrity

Helps to reduce inflammation

Walnuts: Omega 3 + polyphenols

Replace meat with fish; Buy grass fed, pastured meats/eggs; Add walnuts to oatmeal, snacks. Add flax/chia/hemp to cereals, yogurts, smoothies. Add in soy foods.

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Tindall, A et al. Walnuts and Vegetable Oils Containing Oleic Acid Differentially Affect the Gut Microbiota and Associations with Cardiovascular Risk Factors: Follow-up of a Randomized, Controlled, Feeding Trial in Adults at Risk for Cardiovascular Disease. The Journal of Nutrition, 2019.

ENVIRONMENTAL CONSIDERATIONS

- How food is grown affects our microbiome
  - Organic or regenerative agricultural practices
    - Use fewer pesticides
    - No till and less fertilizer protect the soil microbiome
    - Healthier soil → more nutrients and polyphenols in plants
    - Fewer heavy metals – toxic to Microbiome
    - Diversity of crops builds biodiversity in soil and in human digestive ecosystem
    - Effects of antibiotics from animal agriculture?
    - Advocate for these when/if you can

PERSONALIZE: INCLUDE CULTURAL FOODS
RECOMMENDATIONS MUST ALIGN WITH CULTURE, FINANCES, ACCESS
# How to Feed Beneficial Gut Bacteria

## Prebiotic Fiber
- garlic
- onion
- green onion
- leeks
- flax meal
- rolled oats
- leafy greens
- beans
- pulses
- acacia powder
- barley
- apple
- berries
- seaweed
- jicama root
- yacon root
- konjac root
- asparagus
- dandelion root

## Resistant Starch
- sweet potato
- potato
- brown rice
- quinoa
- barley
- sorghum
- oats
- black beans
- soy beans
- pinto beans
- fava beans
- cannellini beans
- plantains
- potato starch
- unripe bananas
- soba noodles
- shirataki noodles
- cooked + cooled starches

## Polyphenols
- cacao powder
- flax seeds
- olives
- blackberries
- raspberries
- blueberries
- cherries
- strawberries
- apples
- bell peppers
- grapes
- turmeric
- quinoa
- brown rice
- green tea
- coffee
- dark chocolate
- cloves
- black currants

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**How many of these have you had this week?**

Ayten Salahi, MS (eplanetary.nutritionist)
5 DISRUPTORS TO OPTIMAL MICROBIAL HEALTH
REFINED SUGAR AND CARBOHYDRATES:
“ULTRA-PROCESSED FOODS”
SWEETS BUT ALSO REFINED FLOUR CRACKERS, CHIPS BREADS, PASTAS.

Associated with lower gut microbe diversity

These foods create an environment in the gut that feed bad microbes (Eg: C.Diff) → promote inflammatory diseases including obesity.

High fructose corn syrup can alter the helpful short chain fatty acids (SCFA’s), damage the intestinal wall and drive inflammation.

Recommendations: Naturally sweet fruits and vegetables; New herbs and spices; Nuts/seeds to replace chips; Seek out the “why” for sweet cravings: Balanced meals? Meal timing? Dehydration?


Individuals consuming large amounts of these types of foods are at greater risk of being obese than people who consume relatively little

HIGH AMOUNTS OF RED AND PROCESSED MEATS

Alter the gut microbiome in a less favorable direction by helping the bad bacteria flourish and contributing to intestinal inflammation.

Associated with lower levels of short chain fatty acids (SCFA’s).

Associated with higher levels of unhealthy compound, called “Trimethylamine N-oxide” (“TMAO”) which can increase the risk for heart disease.

Recommendations: Combine bacon WITH veggies! Opt for bean burgers or tempeh reubens or hummus sandwich.

Meatless Mondays

https://www.mondaycampaigns.org/meatless-monday

Effects of Proteins on Microflora

Table 2 Effects of protein on gut microbiota

<table>
<thead>
<tr>
<th>Microbial diversity</th>
<th>Bifidobacteria</th>
<th>Lactobacilli</th>
<th>Bacteroides</th>
<th>Alistipes</th>
<th>Bilophila</th>
<th>Clostridia</th>
<th>Roseburia</th>
<th>Eubacterium Rectale</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal protein</td>
<td>↑</td>
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<td>Pea protein extract</td>
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</table>

Arrow thickness corresponds to relative number of studies supporting the relationship

Fig. 2 Impact of dietary protein on intestinal microbiota and health outcomes. SCFA’s short chain fatty acids, TMAO trimethylamine N-oxide, Tregs T regulatory cells, CVD cardiovascular disease; IBD inflammatory bowel disease

Effects of Lipids on Microflora

High fat diet also associated with increased LPS

Table 3: Effects of fats on gut microbiota

<table>
<thead>
<tr>
<th></th>
<th>Lactic acid bacteria</th>
<th>Bifidobacteria</th>
<th>Clostridiales</th>
<th>Bacteroides</th>
<th>Bilophila</th>
<th>Faecalibacterium prausnitzii</th>
<th>Akkermansia muciniphila</th>
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<td>[45, 49, 50]</td>
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* Lactic acid bacteria include Lactobacillus and Streptococcus

Fig. 3: Impact of dietary fats on intestinal microbiota and host metabolism. TLR toll-like receptor, WAT white adipose tissue, LDL low-density lipoprotein

FOOD CHEMICALS AND ADDITIVES

NON-NUTRITIVE SWEETENERS. (AKA ARTIFICIAL SWEETENERS)

Alter the composition and function of the microbiota & May also result in dysbiosis

Emerging research around emulsifiers (Carageenan) and gut inflammation

Add honey or maple syrup instead. Cook with pureed dried fruits, banana, Coconut, vanilla. Mindful of excess intake of emulsifiers.


https://www.nature.com/articles/s41598-018-29376-9

PESTICIDES

DESIGNED TO DESTROY PESTS

Numerous animal and observational studies indicate that these chemicals significantly alter the gut microbiome.

May affect bacterial communications.

Affects quality of the soil microbiome → impacts human microbiome.

IF POSSIBLE: Buy organic or pesticide free
Peel, buy produce with thicker peels
https://www.ewg.org/foodnews/dirty-dozen.php

POTENTIAL EFFECTS OF CURRENT INDUSTRIAL AGRICULTURAL SYSTEM ON SOIL HEALTH, PLANTS & BIODIVERSITY

FERTILIZERS  TILLING SOIL  MONO-CROPS

Lin, W. et al. The Effects of Chemical and Organic Fertilizer Usage on Rhizosphere Soil in Tea Orchards. PLoS ONE 14; 2019
Shown to increase production of short-chain fatty acids and helping bring balance back to a disrupted microbial community

Often small, short term, sometimes animals BUT…still worth paying attention to.

Seek out “broad spectrum” or “multi strain” of different probiotic species. Synergistic effects. Refrigerated likely better.

Good "Families" to look for:

- Bifidobacteria & Lactobacillus

  Beneficial for those with IBS, IBD and diarrhea, (Especially C. Diff) from frequent antibiotic usage.

  Bifido: Eczema, lung infections


ADDITIONAL POSITIVE RESULTS WITH PROBIOTIC SUPPLEMENTATION

- Improved digestion
- Decrease in rheumatoid arthritis conditions
- Reduction in cognitive issues in Alzheimer’s and Parkinson’s
- Reduction in anxiety and depression.
- Improvements in blood glucose regulation (animal and human studies)

Important to consider individual variation & baseline. Understanding initial pattern may help predict success.


ADDITIONAL POSITIVE RESULTS WITH PROBIOTIC SUPPLEMENTATION

SPECIFIC STRAINS HELPFUL (L= Lactobacillus and B= Bifidobacteria)

- **MOOD:** L. casei, salivarus, acidophilus, brevis, helveticus; B Bifidum & Longhum
- **GI ISSUES:** L. Plantarum, Casei, acidophilus, rhamnosus. B Bifidum & Longhum
- **AUTO-IMMUNE ISSUES:** L. Infantis, Rhamnosus,
- **BLOOD SUGAR ISSUES:** L. acidophilus, L. casei, B. Bifidum, B. Lactis. (Symbiotic effects;)
  - Akkermansia Mucinophila: may improve metabolic profile of Type 2 Diabetes

PROBIOTIC SUPPLEMENTATION

- **VSL #3 (Also “Visbiome”)** most studied for being an effective intervention for IBD (Also helpful for IBS)
  - 8 live bacterial strains:
    - *Streptococcus thermophilus*,
    - 4 strains of *Lactobacilli* (*L. paracasei, L. plantarum, L. acidophilus, and L. delbrueckii*),
    - 3 strains of *Bifidobacteria* (*B. longum, B. breve, and B. infantis*).

- **Probiotic yeast: Saccharomyces boulardii**
  - May prevent and treat antibiotic-associated diarrhea.
  - Aids in preserving and restoring intestinal barrier function.

OTHER POTENTIAL GUT & DIGESTIVE-SUPPORTIVE SUPPLEMENTS & TIPS

- Digestive enzymes
- Zinc (often low in those with diabetes)
- Omega 3 fatty acids: Fish or algae oil
- Glutamine: Amino acid that nourish and soothe the intestinal environment and restore intestinal barrier function and strength
- Eat slowly and mindfully
- Increase fluids as fiber is increased
- Move body to facilitate elimination

SUPPLEMENTAL CONSIDERATIONS:

- Supplements are not a silver bullet especially if other dietary/lifestyle patterns aren’t shifting in a more supportive direction
- Quality is key: Are live organisms still “alive”?
- May work for some but not others: Experiment!

RESOURCES:

- **Labdoor, [labdoor.com](http://labdoor.com)**: This is an independent company that tests supplements and is a great way to ensure that supplements you purchase are of high quality.
- **Microbiome Labs, [microbiomelabs.com](http://microbiomelabs.com)**: Not only is this an excellent supplement company with a trustworthy and effective product, but their site provides educational blogs and webinars, as well as information about clinical trials and upcoming conferences.
STRESS

Chronic cortisol production can negatively affect the makeup of the microbiome

Can reduce the production of short chain fatty acids

High stress – exacerbates IBS
A disruption of microbiome status has been associated with stress related disorders

Stress mgmt. is key – whatever that looks like for the patient.


Deeper and longer periods of sleep are associated with a more diverse gut bacteria population.

Poor sleep patterns can result in higher levels of inflammation.

A healthy microbiome has been shown to have positive impacts on sleep.

Sleep hygiene: rituals, avoiding blue light; sleep environment.

PHYSICAL ACTIVITY

Positively correlated with a more diverse and resilient microbiome.

Alters composition and functional capacity of the gut microbiota, independent of diet.

Can help to improve elimination/digestion.

Supports stress levels and sleep patterns.
SUMMARY

**Increase**
- Fiber & Resistant starch: beans, whole grains, nuts and seeds, vegetables
- Polyphenol intake: bright colored fruits, vegetables, herbs, spices, green tea
- Pro & Prebiotics: Yogurts or non-dairy yogurts/kefirs; Fermented foods, onions, garlic, asparagus
- Omega 3 fatty acid rich foods: fish, seeds,

**Minimize or Reduce**
- Processed and refined carbohydrates and fats
- Excessive animal and processed meats
- Artificial sweeteners
- Chemicals in foods including pesticides

**Consider**
- Supplements
- Lifestyle support: stress reduction, sleep hygiene, exercise
REFERENCES


REFERENCES


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