Probiotics, Beneficial Bacteria & the Microbiome Sources

As Hippocrates, the father of modern medicine, so simply stated many years ago, “All Disease begins in the gut”. If this is true, then we could also say “A healthy gut prevents disease” and “a healthy gut equals a healthy body”.

Keep Cultivating a Healthy Microbiome. This is something you must actively keep doing after you finish this program.

Why?

The state of our gut and what lives inside it, our gut flora, plays a huge role in determining our immune health, digestive health, mood via the gut-brain-axis, health and overall vitality. If your gut flora is dis-regulated and unhealthy the rest of the body will suffer. The gut is the epicenter of human health. More and more research is linking things like heart disease, cancer, autoimmune disorders, brain fog, depression, weight gain, chronic obesity, and other seemingly unrelated diseases, to the pathogenic bacteria in the gut.

“It is often presented as common knowledge that, in the human body, bacteria outnumber human cells by a ratio of at least 10:1. Revisiting the question, we find that the ratio is much closer to 1:1.”

Sender, Ron et al. “Are We Really Vastly Outnumbered? Revisiting the Ratio of Bacterial to Host Cells in Humans.” *Cell* vol. 164,3 (2016): 337-40. doi:10.1016/j.cell.2016.01.013

https://pubmed.ncbi.nlm.nih.gov/26824647/

They are responsible for regulating our digestion, immune function, absorption of nutrients, and keeping our gut-lining strong, and intact and regulating the motility of the gut (moving food through the digestive tract).

What is the Microbiome?

In the article "Regulation of neurotransmitters by the gut microbiota and effects on cognition in neurological disorders” published on 31 January 2022 in the peer-reviewed journal ‘Nutrients’ it states:

“The intestinal tract is the largest microecosystem in the human body. There are approximately 1014 bacteria from more than 2000 known species living in the human intestinal tract, which collectively contain more than 100 times the genomic DNA of humans [1]”

Chen, Yijing, Jinying Xu, and Yu Chen. "Regulation of neurotransmitters by the gut microbiota and effects on cognition in neurological disorders." *Nutrients* 13.6 (2021): 2099.
https://www.mdpi.com/journal/nutrients

In the article “Introduction to the human gut microbiota" published on 16 May 2017 published in the journal ‘*Biochemical journal’* it states:
“The collection of bacteria, archaea and eukarya colonising the GI tract is termed the ‘gut microbiota’ and has co-evolved with the host over thousands of years to form an intricate and mutually beneficial relationship [2,3].”

“The number of microorganisms inhabiting the GI tract has been estimated to exceed 10^{14}, which encompasses ~10 times more bacterial cells than the number of human cells and over 100 times the amount of genomic content (microbiome) as the human genome [2,4].“

“The microbiota offers many benefits to the host, through a range of physiological functions such as strengthening gut integrity or shaping the intestinal epithelium [7], harvesting energy [8], protecting against pathogens [9] and regulating host immunity [10]. However, there is potential for these mechanisms to be disrupted as a result of an altered microbial composition, known as dysbiosis.”
Thursby, Elizabeth, and Nathalie Juge. "Introduction to the human gut microbiota." *Biochemical journal* 474.11 (2017): 1823-1836.
https://portlandpress.com/biochemj/article/474/11/1823/49429/Introduction-to-the-human-gut-microbiota

IBS has been linked to get infections and pathogenic overgrowth as well as bacterial overgrowth in the small intestine.

In the article “Bacteria and irritable bowel syndrome: The evidence for small intestinal bacterial overgrowth” published in July 2006 in the journal ‘*Current Gastroenterology Reports’,* it states:

“Recent data suggest the increasing importance of bacteria in the pathophysiology of IBS. Some studies have shown that IBS can be precipitated

by an acute case of gastroenteritis. These pathogenic organisms may contribute to long-term gut dysfunction. “

‘Lee, Hyo-Rang, and Mark Pimentel. "Bacteria and irritable bowel syndrome: the evidence for small intestinal bacterial overgrowth." *Current gastroenterology reports* 8.4 (2006): 305-311.’

https://link.springer.com/article/10.1007/s11894-006-0051-3

What do Beneficial Bacteria DO?
Beneficial bacteria:
1.Keep the motility in the gut healthy

In the article “Microflora modulation of motility” published in 2011 in the ‘*Journal of neurogastroenterology and motility*’, it states:

“That gastrointestinal motility can influence the gut microbiota has been known for decades and the clinical consequences of impaired motility, in terms of the bacterial population of the small intestine, amply illustrated by the syndrome of small intestinal bacterial overgrowth which so commonly accompanies diffuse intestinal motility disorders.”

Quigley, Eamonn MM. "Microflora modulation of motility." *Journal of neurogastroenterology and motility* 17.2 (2011): 140.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093005/

The study “Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults” published in the journal ‘*Scandinavian journal of gastroenterology*’ states:

“To assess the impact of Bifidobacterium lactis HN019 supplementation on whole gut transit time (WGTT) and frequency of functional gastrointestinal (GI) symptoms in adults.”

Waller, Philip A., et al. "Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults." *Scandinavian journal of gastroenterology* 46.9 (2011): 1057-1064.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Waller+PA%2C+Gopal+PK%2C+Leyer+GJ%2C+et+al.+Dose-response+effect+of+Bifidobacterium+lactis+HN019%E2%84%A2+on+whole+gut+transit+time+and+functional+gastrointestinal+symptoms+in+adults.+Scandinavian+J+Gastroenterology.+2011%3B46%3A1057-1064&btnG=#d=gs_qabs&t=1672821154412&u=%23p%3DmuudFp0cN4oJ

2.Entrain your immune system (immunes tissue)

“Here we review the current knowledge of how commensal bacteria regulate the production and bioavailability of immunomodulatory, diet-dependent nutrients and metabolites and discuss how these commensal bacteria–derived products may regulate the development and function of the mammalian immune system.”

Brestoff, J., Artis, D. Commensal bacteria at the interface of host metabolism and the immune system. *Nat Immunol* **14**, 676–684 (2013). https://doi.org/10.1038/ni.2640

https://www.nature.com/articles/ni.2640

“Intestinal microbiota is an element of the bacterial ecosystem in all mammalian organisms. These microorganisms play a very important part in the development, functioning, and modulation of the immune system from the moment of birth.”

“Short-chain fatty acids (SCFAs), act not only locally in the intestines colonized by commensal bacteria, but also influence the intestinal immune cells, and modulate immune response by multi-protein inflammasome complexes. SCFAs have been confirmed to contribute to the maintenance of the immune homeostasis of the urinary system (kidneys), respiratory system (lungs), central nervous system, and the sight organ.“

Ratajczak, Weronika et al. “Immunomodulatory potential of gut microbiome-derived short-chain fatty acids (SCFAs).” *Acta biochimica Polonica* vol. 66,1 (2019): 1-12. doi:10.18388/abp.2018_2648

https://pubmed.ncbi.nlm.nih.gov/30831575/

Also, there is gut-associated lymphoid tissue (GALT) that plays an important role in keeping the immune system healthy.

(See pg 80 Naomi Whittle)

3.Beneficial Bacteria are a defense against pathogenic bacteria. Lose her numbers of beneficial will crowd out the pathogenic bacteria.

"… (beneficial bacteria) assists with an appropriate immune response against pathogenic microbes…"

Fernández, Mariana F., et al. "Breast cancer and its relationship with the microbiota." *International journal of environmental research and public health* 15.8 (2018): 1747.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6121903/#!po=0.431034

"Pathogenic bacteria generally compete directly against commensals for nutrients and colonization sites within the intestine (18, 19)."

Lustri, Bruna C., Vanessa Sperandio, and Cristiano G. Moreira. "Bacterial chat: intestinal metabolites and signals in host-microbiota-pathogen interactions." *Infection and Immunity* 85.12 (2017): e00476-17.

https://journals.asm.org/doi/10.1128/iai.00476-17

4.Beneficial bacteria keep your gut lining healthy by creating short chain fatty acids (SCFAs)

"…(beneficial bacteria) helps to maintain intestinal barrier function"

Fernández, Mariana F., et al. "Breast cancer and its relationship with the microbiota." *International journal of environmental research and public health* 15.8 (2018): 1747.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6121903/#!po=0.431034

"The formation of SCFA is the result of a complex interplay between diet and the gut microbiota within the gut lumen environment."

Morrison, Douglas J, and Tom Preston. “Formation of short chain fatty acids by the gut microbiota and their impact on human metabolism.” *Gut microbes* vol. 7,3 (2016): 189-200. doi:10.1080/19490976.2015.1134082

https://pubmed.ncbi.nlm.nih.gov/26963409/

“Butyrate treatment improved the intestinal barrier function by increasing colonic mucin and tight junction (TJ) proteins. This modulation further ameliorated metabolic functions such as insulin intolerance and improved renal function.”

Gonzalez, Austin et al. “Sodium butyrate ameliorates insulin resistance and renal failure in CKD rats by modulating intestinal permeability and mucin expression.” *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association* vol. 34,5 (2019): 783-794. doi:10.1093/ndt/gfy238

https://pubmed.ncbi.nlm.nih.gov/30085297/

In the article “Recognition of commensal microflora by toll-like receptors is required for intestinal homeostasis” published in 2004 in the journal ‘*Cell’,* states*:*

“…commensal bacteria are recognized by TLRs under normal steady-state conditions, and this interaction plays a crucial role in the maintenance of intestinal epithelial homeostasis.”

Rakoff-Nahoum, Seth et al. “Recognition of commensal microflora by toll-like receptors is required for intestinal homeostasis.” *Cell* vol. 118,2 (2004): 229-41. doi:10.1016/j.cell.2004.07.002

https://pubmed.ncbi.nlm.nih.gov/15260992/

“The well-studied probiotic yeast *S. boulardii* plays a crucial role in the preservation and/or restoration of intestinal barrier function in multiple disorders.”

Terciolo, Chloe, Michel Dapoigny, and Frederic Andre. "Beneficial effects of Saccharomyces boulardii CNCM I-745 on clinical disorders associated with intestinal barrier disruption." *Clinical and experimental gastroenterology* 12 (2019): 67.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6375115/

5.Beneficial Bacteria help you extract synthesize Vitamins and produce Vitamins B and K

"…(beneficial bacteria) are essential in digestion and absorption of indigestible carbohydrates for humans (dietary fiber), production of vitamins B and K.."

Fernández, Mariana F., et al. "Breast cancer and its relationship with the microbiota." *International journal of environmental research and public health* 15.8 (2018): 1747.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6121903/#!po=0.431034

"Commensal bacteria, in particular, are key participants in the digestion of food, and are responsible for the extraction and synthesis of nutrients and other metabolites that are essential for the maintenance of mammalian health. Many of these nutrients and metabolites derived from commensal bacteria have been implicated in the development, homeostasis and function of the immune system, suggesting that commensal bacteria may influence host immunity via nutrient- and metabolite-dependent mechanisms."

Brestoff, J., Artis, D. Commensal bacteria at the interface of host metabolism and the immune system. *Nat Immunol* **14**, 676–684 (2013). https://doi.org/10.1038/ni.2640

https://www.nature.com/articles/ni.2640#citeas

"We propose that in addition to diet, the gut microbiota is an important source of B-vitamins, and that changes in the gut microbiota composition can severely affect our dietary B-vitamin requirements."

Magnúsdóttir, Stefanía, et al. "Systematic genome assessment of B-vitamin biosynthesis suggests co-operation among gut microbes." *Frontiers in genetics* 6 (2015): 148.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4403557/

6.Beneficial Bacteria produce and modulate nerotransmitters

In the article “"Regulation of neurotransmitters by the gut microbiota and effects on cognition in neurological disorders” published on 31 January 2022 in the peer-reviewed journal ‘Nutrients’ it states: “Recent studies show that the metabolites produced by the gut microbiota also include some neurotransmitters such as glutamate, GABA, serotonin, and dopamine Neurotransmitters”

Chen, Yijing, Jinying Xu, and Yu Chen. "Regulation of neurotransmitters by the gut microbiota and effects on cognition in neurological disorders." *Nutrients* 13.6 (2021): 2099.
https://www.mdpi.com/journal/nutrients

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8234057/

7.Beneficial bacteria keep the motility in the gut healthy.

In the article “Bacteria and irritable bowel syndrome: The evidence for small intestinal bacterial overgrowth” published in July 2006 in the journal ‘*Current Gastroenterology Reports’,* it states:

“ … it has been demonstrated that the fermentation of methane in the gut is associated with and can result in the slowing of intestinal transit, resulting in constipation.”

‘Lee, Hyo-Rang, and Mark Pimentel. "Bacteria and irritable bowel syndrome: the evidence for small intestinal bacterial overgrowth." *Current gastroenterology reports* 8.4 (2006): 305-311.’

https://link.springer.com/article/10.1007/s11894-006-0051-3

8.Beneficial bacteria may protect you from cancer. The microbiome of patients with Breast cancer and Colon Cancer is different than healthy patients.

“Colorectal cancer (CRC) is the third most common newly diagnosed cancer in both men and women in the Unites States.”
“…there have been new links established between bacteria and the development of CRC.”

Dahmus, Jessica D., et al. "The gut microbiome and colorectal cancer: a review of bacterial pathogenesis." *Journal of gastrointestinal oncology* 9.4 (2018): 769.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6087872/

“Recent research suggests that the microbiota of women with breast cancer differs from that of healthy women, indicating that certain bacteria may be associated with cancer development and with different responses to therapy.”

Fernández, Mariana F., et al. "Breast cancer and its relationship with the microbiota." *International journal of environmental research and public health* 15.8 (2018): 1747.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6121903/#!po=0.431034

9.Beneficial bacteria may prevent IBS from reoccurring.

“A growing body of evidence indicates dysbiosis as a hallmark of IBS (Table 1). Despite divergences between studies, there is good evidence that the microbiota is a predominant factor in the IBS pathophysiology. In general, data suggest that there is a relative abundance of proinflammatory bacterial species including *Enterobacteriaceae*, with a corresponding reduction in *Lactobacillus* and *Bifidobacterium*. A decreased percentage of *Lactobacillus* and *Bifidobacterium* genera has also been described in the IBS microbiota.”

“Additionally, the *Bifidobacterium* genus, *Clostridiales* order, *Ruminococcaceae* and *Erysipelotrichaceae* families, all short chain fatty acids (SCFAs) producers, have been found in lower proportions in IBS patients.“

Rodiño-Janeiro, Bruno K., et al. "A review of microbiota and irritable bowel syndrome: future in therapies." *Advances in therapy* 35.3 (2018): 289-310.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C44&q=A+Review+of+Microbiota+and+Irritable+Bowel+Syndrome%3A+Future+in+Therapies&btnG=

10.The Microbiome influences your skin due to the gut-skin-axis.

"…the gut microbiota communicates with the skin as one of the main regulators in the gut-skin axis."

Salem, Iman, et al. "The gut microbiome as a major regulator of the gut-skin axis." *Frontiers in microbiology* (2018): 1459.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6048199/

1..Pathogenic bacteria may be negatively affected by PPIs.

"The differences between PPI users and non-users observed in this study are consistently associated with changes towards a less healthy gut microbiome. These differences are in line with known changes that predispose to C. difficile infections and can potentially explain the increased risk of enteric infections in PPI users. On a population level, the effects of PPI are more prominent than the effects of antibiotics or other commonly used drugs.

Imhann, Floris et al. "Proton pump inhibitors affect the gut microbiome." *Gut* vol. 65,5 (2016): 740-8. doi:10.1136/gutjnl-2015-310376

https://pubmed.ncbi.nlm.nih.gov/26657899/

12.Our Microbiome affect your hormonal health. According to Dr Gersh, If your Microbiome is disrupted and unbalanced, the estrobolome (microbes in your Microbiome that help recycle estrogen) also gets out of balance, causing hormonal imbalances in the body. She recommends high amounts of fiber and a variety for a healthy microbiome. (see pg 80-81 Naomi's book) Fiber helps the microbiome function at its best and produce neutrotrasmitters such as Serotonin and Meletonin.

Whittel, Naomi. *High Fiber Keto: A 22-Day Science-Based Plan to Fix Your Metabolism, Lose Weight & Balance Your Hormones*. Hay House, Inc, 2020: pg 80-81.

Lactobacillus Strains:

"…in three recent studies that found an increase in the *Lactobacillus* genus or *Lactobacillales* order in IBS-D."

Rodiño-Janeiro, Bruno K., et al. "A review of microbiota and irritable bowel syndrome: future in therapies." *Advances in therapy* 35.3 (2018): 289-310.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5859043/#!po=7.32484

“Gut microbes were demonstrated to be an essential factor in intestinal inflammation in IBD (Tamboli et al., 2004; Sartor, 2008). Some studies suggest that dysbiosis occur in IBD (Frank et al., 2007; Casen et al., 2015; Putignani et al., 2016; Halfvarson et al., 2017), and a broad microbial alteration pattern was revealed including reduction in diversity, decreased abundances of bacterial taxa within the Phyla *Firmicutes* and *Bacteroides*, and increases in the *Gammaproteobacteria.”*

“In IBD, it has been consistently shown that there is a decrease in biodiversity, knowingly α diversity, and in species richness, a measure of the total number of species in a community. Patients with CD exhibited a reduced α diversity in the fecal microbiome, compared with healthy controls.”

Zuo, Tao, and Siew C. Ng. "The gut microbiota in the pathogenesis and therapeutics of inflammatory bowel disease." *Frontiers in microbiology* (2018): 2247.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6167487/#!po=6.77419

Bifidobacterium lactis HN019

May help boost gut transit time and relieve constipation:

The study “Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults” published in the journal ‘*Scandinavian journal of gastroenterology*’ states:

“To assess the impact of Bifidobacterium lactis HN019 supplementation on whole gut transit time (WGTT) and frequency of functional gastrointestinal (GI) symptoms in adults.”
“Decreases in mean WGTT over the 14-day study period were statistically significant in the high dose group (49±30 to 21±32 h, $p< 0.001$) and the low dose group (60±33 to 41±39 h, $p= 0.01$), but not in the placebo group (43±31 to 44±33 h).”

“Daily B. lactis HN019 supplementation is well tolerated, decreases WGTT in a dose-dependent manner, and reduces the frequency of functional GI symptoms in adults.”

Waller, Philip A., et al. "Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults." *Scandinavian journal of gastroenterology* 46.9 (2011): 1057-1064.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Waller+PA%2C+Gopal+PK%2C+Leyer+GJ%2C+et+al.+Dose-response+effect+of+Bifidobacterium+lactis+HN019%E2%84%A2+on+whole+gut+transit+time+and+functional+gastrointestinal+symptoms+in+adults.+Scandinavian+J+Gastroenterology.+2011%3B46%3A1057-1064&btnG=#d=gs_qabs&t=1672821154412&u=%23p%3DmuudFp0cN4oJ

Spore Probiotics aka Soil Based

In th **Spore Probiotics aka Soil Based**

In the article “Bacillus spp. spores—a promising treatment option for patients with irritable bowel syndrome” in the journal’*Nutrients’, it states:*

“In this study we compared the effects of treatment with a spore-based probiotic mixture of five *Bacillus* spp. (MegaSporeBiotic)”

“…treatment with MegaSporeBiotic a mixture of spores of five *Bacillus* spp. for medium-term (34 days) (G2)…”

“… our results demonstrate that *Bacillus* spp. spore-based probiotics have the capacity to reduce gut dysbiosis to a similar degree as antibiotic treatment.”

“*Bacillus* spp. are of particular interest to humans due to their tolerance of and ability to survive in environments of gastric acidity or the hostile environment of the intestine.”

“…*Bacillus* spp. have a high biotherapeutic potential for production of antimicrobial peptides, production of additional vitamins (e.g., cobalamin, riboflavin) and for modulating the host microbiota …”

Catinean, Adrian, et al. "Bacillus spp. spores—a promising treatment option for patients with irritable bowel syndrome." *Nutrients* 11.9 (2019): 1968.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C44&q=MegaSporeBiotic+&btnG=

“Bacillus clausii as a treatment of small intestinal bacterial overgrowth” Gabrielli, Maurizio et al. “Bacillus clausii as a treatment of small intestinal bacterial overgrowth.” *The American journal of gastroenterology* vol. 104,5 (2009): 1327-8. doi:10.1038/ajg.2009.91

Methane Dominant SIBO: Bifidobacterium lactose HN019

“Of particular interest were the changes in constipation, irregular bowel movements, and flatulence since symptoms were reported with the highest frequency at baseline. For each of these symptoms, the relative decrease in symptom frequency was approximately two-fold greater in the *B. lactis* HNO 19 groups compared to placebo.**”**

“The beneficial effect of daily *B. lactis* HN019 on WGTT is at least equivalent to that of dietary fiber.”

“Subjects in the present study suffered from functional gastrointestinal symptoms with constipation, irregular bowel movements, and flatulence as the predominant symptoms. The outcomes of this study suggest that *B. lactis* HN019 supplementation reduces the frequency of many common upper and lower gastrointestinal symptoms.”

Waller, Philip A et al. “Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults.” *Scandinavian journal of gastroenterology* vol. 46,9 (2011): 1057-64. doi:10.3109/00365521.2011.584895

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3171707/

Lactobacillus Plantarum (Methane Dominant SIBO)

“The addition of the cell-free supernatant of Lactobacillus plantarum 80 (LP80) to ruminal samples during short-term batch experiments (24 h) led to significant increases in volatile fatty acid (VFA) production (5–30%) and to significant decreases in CH4 production (5–15%), accompanied by H2 accumulation.”

Nollet, Lode, et al. "Effect of the addition of Peptostreptococcus productus ATCC 35244 on reductive acetogenesis in the ruminal ecosystem after inhibition of methanogenesis by cell-free supernatant of Lactobacillus plantarum 80." *Animal Feed Science and Technology* 71.1-2 (1998): 49-66.

https://www.sciencedirect.com/science/article/abs/pii/S0377840197001351

“This study investigated the suppression of in vitro rumen methane (CH4) output by the supernatant of Lactobacillus plantarum…”

O'Brien, M., et al. "The impact of Lactobacillus plantarum TUA1490L supernatant on in vitro rumen methanogenesis and fermentation." *Anaerobe* 22 (2013): 137-140.

https://www.sciencedirect.com/science/article/abs/pii/S1075996413000930

Saccharomyces boulardii (Hydrogen Dominant SIBO)

“The SB (Saccharomyces boulardii) and M (metronidazole antibiotic) + SB groups had decreased diarrhea, abdominal pain, and gas/bloating/flatulence, but M remained unchanged. Reductions in expired hydrogen at 45 to 60 min were as follows: M + SB 48% and 44%, M 18% and 20%, and SB 53% and 60% at the first and second months, respectively ($p < 0.01$).

García-Collinot, Grettel et al. “Effectiveness of Saccharomyces boulardii and Metronidazole for Small Intestinal Bacterial Overgrowth in Systemic Sclerosis.” *Digestive diseases and sciences* vol. 65,4 (2020): 1134-1143. doi:10.1007/s10620-019-05830-0

https://pubmed.ncbi.nlm.nih.gov/31549334/

“The non-pathogenic yeast *Saccharomyces boulardii* CNCM I-745 has demonstrated its effectiveness as a probiotic in the prevention and treatment of antibiotic-associated, infectious and functional diarrhea.”

“The well-studied probiotic yeast *S. boulardii* plays a crucial role in the preservation and/or restoration of intestinal barrier function in multiple disorders.”

Terciolo, Chloe, Michel Dapoigny, and Frederic Andre. "Beneficial effects of Saccharomyces boulardii CNCM I-745 on clinical disorders associated with intestinal barrier disruption." *Clinical and experimental gastroenterology* 12 (2019): 67.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6375115/

Everard, Amandine, et al. "Saccharomyces boulardii administration changes gut microbiota and reduces hepatic steatosis, low-grade inflammation, and fat mass in obese and type 2 diabetic db/db mice." MBio 5.3 (2014): e01011-14

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Everard%2C+Amandine%2C+et+al.+%22Saccharomyces+boulardii+administration+changes+gut+microbiota+and+reduces+hepatic+steatosis%2C+low-grade+inflammation%2C+and+fat+mass+in+obese+and+type+2+diabetic+db%2Fdb+mice.%22+MBio+5.3+%282014%29%3A+e01011-14&btnG=

Pontier-Bres, Rodolphe, et al. "The Saccharomyces boulardii CNCM I-745 strain shows protective effects against the B. anthracis LT toxin." *Toxins* 7.11 (2015): 4455-4467.

https://www.mdpi.com/2072-6651/7/11/4455

Bifidobacterium

Bifidobacterium are the bacteria of youth! Healthy babies have lots of this strain!

Lau, Amy Sie-Yik, Jin-Zhong Xiao, and Min-Tze Liong. "Bifidobacterium for infants: essence and efficacy." *Beneficial Microorganisms in Medical and Health Applications*. Springer, Cham, 2015. 39-72.

Bifidobacterium lactis HN019
(Prevalent in infants)

Prasad, Jaya, et al. "Detection of viable Bifidobacterium lactis HN019 (DR10™) in stools of children during a synbiotic dietary intervention trial." *International Dairy Journal* 30.2 (2013): 64-67.

https://www.sciencedirect.com/science/article/abs/pii/S095869461200266X

Bifidobacterium lactis HN019

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“To assess the impact of Bifidobacterium lactis HN019 supplementation on whole gut transit time (WGTT) and frequency of functional gastrointestinal (GI) symptoms in adults.”
“Decreases in mean WGTT over the 14-day study period were statistically significant in the high dose group (49±30 to 21±32 h, $p < 0.001$) and the low dose group (60±33 to 41±39 h, $p = 0.01$), but not in the placebo group (43±31 to 44±33 h).”
“Daily B. lactis HN019 supplementation is well tolerated, decreases WGTT in a dose-dependent manner, and reduces the frequency of functional GI symptoms in adults.”

Waller, Philip A., et al. "Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults." *Scandinavian journal of gastroenterology* 46.9 (2011): 1057-1064.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Waller+PA%2C+Gopal+PK%2C+Leyer+GJ%2C+et

+al.+Dose-response+effect+of+Bifidobacterium+lactis+HN019%E2%84%A2+on+whole+gut+transit+time+and+functional+gastrointestinal+symptoms+in+adults.+Scandinavian+J+Gastroenterology.+2011%3B46%3A1057-1064&btnG=#d=gs_qabs&t=1672821154412&u=%23p%3DmuudFp0cN4oJ

Ibarra, Alvin, et al. "Effects of 28-day Bifidobacterium animalis subsp. lactis HN019 supplementation on colonic transit time and gastrointestinal symptoms in adults with functional constipation: a double-blind, randomized, placebo-controlled, and dose-ranging trial." *Gut Microbes* 9.3 (2018): 236-251.

https://www.tandfonline.com/doi/full/10.1080/19490976.2017.1412908

Bifidobacterium lactis HN019
May help boost cellular immune activity in healthy elderly subjects.

“Miller, Larry E., Liisa Lehtoranta, and Markus J. Lehtinen. "The effect of Bifidobacterium animalis ssp. lactis HN019 on cellular immune function in healthy elderly subjects: systematic review and meta-analysis." *Nutrients* 9.3 (2017): 191.”

https://www.mdpi.com/2072-6643/9/3/191

“The results demonstrate that dietary consumption of B. lactis HN019 can enhance natural immunity in healthy elderly subjects,”

Arunachalam, K., H. S. Gill, and R. K. Chandra. "Enhancement of natural immune function by dietary consumption of Bifidobacterium lactis (HN019)." *European Journal of Clinical Nutrition* 54.3 (2000): 263-267.

https://www.nature.com/articles/1600938

Grimm, Verena, Christina Westermann, and Christian U. Riedel. "Bifidobacteria-host interactions—an update on colonisation factors." BioMed Research International 2014 (2014).

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Saez-Lara, Maria Jose, et al. "The role of probiotic lactic acid bacteria and bifidobacteria in the prevention and treatment of inflammatory bowel disease and other related diseases: a systematic review of randomized human clinical trials." BioMed Research International 2015 (2015).

Shin, Hea Soon, et al. "Hypocholesterolemic effect of sonication-killed Bifidobacterium longum isolated from healthy adult Koreans in high cholesterol fed rats." Archives of Pharmacal Research 33.9 (2010): 1425-1431.

Childs, C. E., et al. "Bifidobacterium longum bv. infantis CCUG 52486 combined with gluco-oligosaccharide significantly reduces the duration of self-reported cold and flu-like symptoms among healthy older adults after seasonal influenza vaccination." Proceedings of the Nutrition Society 72.OCE1 (2013): E10.

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Spaiser, Samuel J., et al. "Lactobacillus gasseri KS-13, Bifidobacterium bifidum G9-1, and Bifidobacterium longum MM-2 Ingestion Induces a Less Inflammatory Cytokine Profile and a Potentially Beneficial Shift in Gut Microbiota in Older Adults: A Randomized, Double-Blind, Placebo-Controlled, Crossover Study." Journal of the American College of Nutrition 34.6 (2015): 459-469.

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Bartosch, Sabine, et al. "Microbiological effects of consuming a synbiotic containing Bifidobacterium bifidum, Bifidobacterium lactis, and oligofructose in elderly persons, determined by real-time polymerase chain reaction and counting of viable bacteria." Clinical Infectious Diseases 40.1 (2005): 28-37.

Tabbers, M. M., et al. "Is Bifidobacterium breve effective in the treatment of childhood constipation? Results from a pilot study." Nutrition Journal 10.1 (2011):

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Mortaz, Esmaeil, et al. "Anti-Inflammatory Effects of Lactobacillus Rahmnosus and Bifidobacterium Breve on Cigarette Smoke Activated Human Macrophages." PloS One 10.8 (2015): e0136455.

Groeger, David, et al. "Bifidobacterium infantis 35624 modulates host inflammatory processes beyond the gut." Gut Microbes 4.4 (2013): 325-339.

Smecuol, Edgardo, et al. "Exploratory, randomized, double-blind, placebo-controlled study on the effects of Bifidobacterium infantis natren life start strain super strain in active celiac disease." Journal of Clinical Gastroenterology 47.2 (2013): 139-147

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“In children with IBS a mixture of *Bifidobacterium infantis M-63*, *breve M-16V*, and *longum BB536* is associated with improvement in AP (Abdominal Pain) and QoL (Quality of Life).”

Giannetti, Eleonora, et al. "A mixture of 3 bifidobacteria decreases abdominal pain and improves the quality of life in children with irritable bowel syndrome." *Journal of Clinical Gastroenterology* 51.1 (2017): e5-e10.

https://www.ingentaconnect.com/content/wk/jcga/2017/00000051/00000001/art00005

Probiotic Pro Bb536

May relieve abdominal pain

In the article **“**"Effect of Bifidobacterium Longum Bb536 plus lactoferrin in the treatment of irritable bowel Syndrome. A double blind clinical trial” published in 2017 in the journal *‘Advanced Research in Gastroenterology & Hepatology’,* it states:

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Biviano, Ivano, et al. "Effect of Bifidobacterium Longum Bb536 plus lactoferrin in the treatment of irritable bowel Syndrome. A double blind clinical trial." *Advanced Research in Gastroenterology & Hepatology* 6.4 (2017): 1-4.

https://pdfs.semanticscholar.org/d0b9/a6aabbb1f8bd3ecce41383e0a82a54f870f7.pdf

In the article “"Effects of Bifidobacterium longum BB536 and Lactobacillus rhamnosus HN001 in IBS patients” in the journal *‘European Journal of Clinical Investigation’* states:

“The novel formulation of *B. longum* BB536 and *L. rhamnosus* HN001 with B6 vitamin improves symptoms and severity of disease, restores intestinal permeability and gut microbiota in IBS patients.”

Bonfrate, Leonilde, et al. "Effects of Bifidobacterium longum BB536 and Lactobacillus rhamnosus HN001 in IBS patients." *European Journal of Clinical Investigation* 50.3 (2020): e13201.

https://onlinelibrary.wiley.com/doi/abs/10.1111/eci.13201

Lactobacillus rhamnosus (L. rhamnosus)

e article “Bacillus spp. spores—a promising treatment option for patients with irritable bowel syndrome” in the journal’*Nutrients’, it states:*

“In this study we compared the effects of treatment with a spore-based probiotic mixture of five *Bacillus* spp. (MegaSporeBiotic)”

“…treatment with MegaSporeBiotic a mixture of spores of five *Bacillus* spp. for medium-term (34 days) (G2)…”

“… our results demonstrate that *Bacillus* spp. spore-based probiotics have the capacity to reduce gut dysbiosis to a similar degree as antibiotic treatment.”

“*Bacillus* spp. are of particular interest to humans due to their tolerance of and ability to survive in environments of gastric acidity or the hostile environment of the intestine.”

“…*Bacillus* spp. have a high biotherapeutic potential for production of antimicrobial peptides, production of additional vitamins (e.g., cobalamin, riboflavin) and for modulating the host microbiota …”

Catinean, Adrian, et al. "Bacillus spp. spores—a promising treatment option for patients with irritable bowel syndrome." *Nutrients* 11.9 (2019): 1968.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C44&q=MegaSporeBiotic+&btnG=

"Bacillus clausii as a treatment of small intestinal bacterial overgrowth" Gabrielli, Maurizio et al. "Bacillus clausii as a treatment of small intestinal bacterial overgrowth." *The American journal of gastroenterology* vol. 104,5 (2009): 1327-8. doi:10.1038/ajg.2009.91

Methane Dominant SIBO: Bifidobacterium lactose HN019

"Of particular interest were the changes in constipation, irregular bowel movements, and flatulence since symptoms were reported with the highest frequency at baseline. For each of these symptoms, the relative decrease in symptom frequency was approximately two-fold greater in the *B. lactis* HNO 19 groups compared to placebo.**"**

"The beneficial effect of daily *B. lactis* HN019 on WGTT is at least equivalent to that of dietary fiber."

"Subjects in the present study suffered from functional gastrointestinal symptoms with constipation, irregular bowel movements, and flatulence as the predominant symptoms. The outcomes of this study suggest that *B. lactis* HN019 supplementation reduces the frequency of many common upper and lower gastrointestinal symptoms."

Waller, Philip A et al. "Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults." *Scandinavian journal of gastroenterology* vol. 46,9 (2011): 1057-64. doi:10.3109/00365521.2011.584895

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3171707/

Lactobacillus Plantarum (Methane Dominant SIBO)

"The addition of the cell-free supernatant of Lactobacillus plantarum 80 (LP80) to ruminal samples during short-term batch experiments (24 h) led to significant

increases in volatile fatty acid (VFA) production (5–30%) and to significant decreases in CH4 production (5–15%), accompanied by H2 accumulation."

Nollet, Lode, et al. "Effect of the addition of Peptostreptococcus productus ATCC 35244 on reductive acetogenesis in the ruminal ecosystem after inhibition of methanogenesis by cell-free supernatant of Lactobacillus plantarum 80." *Animal Feed Science and Technology* 71.1-2 (1998): 49-66.

https://www.sciencedirect.com/science/article/abs/pii/S0377840197001351

"This study investigated the suppression of in vitro rumen methane (CH4) output by the supernatant of Lactobacillus plantarum…"

O'Brien, M., et al. "The impact of Lactobacillus plantarum TUA1490L supernatant on in vitro rumen methanogenesis and fermentation." *Anaerobe* 22 (2013): 137-140.

https://www.sciencedirect.com/science/article/abs/pii/S1075996413000930

Saccharomyces boulardii (Hydrogen Dominant SIBO)

"The SB (Saccharomyces boulardii) and M (metronidazole antibiotic) + SB groups had decreased diarrhea, abdominal pain, and gas/bloating/flatulence, but M remained unchanged. Reductions in expired hydrogen at 45 to 60 min were as follows: M + SB 48% and 44%, M 18% and 20%, and SB 53% and 60% at the first and second months, respectively ($p < 0.01$).

García-Collinot, Grettel et al. "Effectiveness of Saccharomyces boulardii and Metronidazole for Small Intestinal Bacterial Overgrowth in Systemic Sclerosis." *Digestive diseases and sciences* vol. 65,4 (2020): 1134-1143. doi:10.1007/s10620-019-05830-0

https://pubmed.ncbi.nlm.nih.gov/31549334/

“The non-pathogenic yeast *Saccharomyces boulardii* CNCM I-745 has demonstrated its effectiveness as a probiotic in the prevention and treatment of antibiotic-associated, infectious and functional diarrhea.”

“The well-studied probiotic yeast *S. boulardii* plays a crucial role in the preservation and/or restoration of intestinal barrier function in multiple disorders.”

Terciolo, Chloe, Michel Dapoigny, and Frederic Andre. "Beneficial effects of Saccharomyces boulardii CNCM I-745 on clinical disorders associated with intestinal barrier disruption." *Clinical and experimental gastroenterology* 12 (2019): 67.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6375115/

Everard, Amandine, et al. "Saccharomyces boulardii administration changes gut microbiota and reduces hepatic steatosis, low-grade inflammation, and fat mass in obese and type 2 diabetic db/db mice." MBio 5.3 (2014): e01011-14

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Everard%2C+Amandine%2C+et+al.+%22Saccharomyces+boulardii+administration+changes+gut+microbiota+and+reduces+hepatic+steatosis%2C+low-grade+inflammation%2C+and+fat+mass+in+obese+and+type+2+diabetic+db%2Fdb+mice.%22+MBio+5.3+%282014%29%3A+e01011-14&btnG=

Pontier-Bres, Rodolphe, et al. "The Saccharomyces boulardii CNCM I-745 strain shows protective effects against the B. anthracis LT toxin." *Toxins* 7.11 (2015): 4455-4467.

https://www.mdpi.com/2072-6651/7/11/4455

Bifidobacterium

Bifidobacterium are the bacteria of youth! Healthy babies have lots of this strain!

Lau, Amy Sie-Yik, Jin-Zhong Xiao, and Min-Tze Liong. "Bifidobacterium for infants: essence and efficacy." *Beneficial Microorganisms in Medical and Health Applications*. Springer, Cham, 2015. 39-72.

Bifidobacterium lactis HN019
(Prevalent in infants)

Prasad, Jaya, et al. "Detection of viable Bifidobacterium lactis HN019 (DR10™) in stools of children during a synbiotic dietary intervention trial." *International Dairy Journal* 30.2 (2013): 64-67.

https://www.sciencedirect.com/science/article/abs/pii/S095869461200266X

Bifidobacterium lactis HN019

May help boost gut transit time and relieve constipation:

The study “Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults” published in the journal ‘*Scandinavian journal of gastroenterology*’ states:

“To assess the impact of Bifidobacterium lactis HN019 supplementation on whole gut transit time (WGTT) and frequency of functional gastrointestinal (GI) symptoms in adults.”
“Decreases in mean WGTT over the 14-day study period were statistically significant in the high dose group (49±30 to 21±32 h, $p < 0.001$) and the low dose group (60±33 to 41±39 h, $p = 0.01$), but not in the placebo group (43±31 to 44±33 h).”
“Daily B. lactis HN019 supplementation is well tolerated, decreases WGTT in a dose-dependent manner, and reduces the frequency of functional GI symptoms in adults.”

Waller, Philip A., et al. "Dose-response effect of Bifidobacterium lactis HN019 on whole gut transit time and functional gastrointestinal symptoms in adults." *Scandinavian journal of gastroenterology* 46.9 (2011): 1057-1064.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C10&q=Waller+PA%2C+Gopal+PK%2C+Leyer+GJ%2C+et+al.+Dose-response+effect+of+Bifidobacterium+lactis+HN019%E2%84%A2+on+whole+gut+transit+time+and+functional+gastrointestinal+symptoms+in+adults.

+Scandinavian+J+Gastroenterology.+2011%3B46%3A1057-1064&btnG=#d=gs_qabs&t=1672821154412&u=%23p%3DmuudFp0cN4oJ

Ibarra, Alvin, et al. "Effects of 28-day Bifidobacterium animalis subsp. lactis HN019 supplementation on colonic transit time and gastrointestinal symptoms in adults with functional constipation: a double-blind, randomized, placebo-controlled, and dose-ranging trial." *Gut Microbes* 9.3 (2018): 236-251.

https://www.tandfonline.com/doi/full/10.1080/19490976.2017.1412908

Bifidobacterium lactis HN019
May help boost cellular immune activity in healthy elderly subjects.

“Miller, Larry E., Liisa Lehtoranta, and Markus J. Lehtinen. "The effect of Bifidobacterium animalis ssp. lactis HN019 on cellular immune function in healthy elderly subjects: systematic review and meta-analysis." *Nutrients* 9.3 (2017): 191.”

https://www.mdpi.com/2072-6643/9/3/191

“The results demonstrate that dietary consumption of B. lactis HN019 can enhance natural immunity in healthy elderly subjects,”

Arunachalam, K., H. S. Gill, and R. K. Chandra. "Enhancement of natural immune function by dietary consumption of Bifidobacterium lactis (HN019)." *European Journal of Clinical Nutrition* 54.3 (2000): 263-267.

https://www.nature.com/articles/1600938

Grimm, Verena, Christina Westermann, and Christian U. Riedel. "Bifidobacteria-host interactions—an update on colonisation factors." BioMed Research International 2014 (2014).

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https://onlinelibrary.wiley.com/doi/abs/10.1111/eci.13201

Lactobacillus rhamnosus (L. rhamnosus)

Prebiotics:

Ohashi Y, Sumitani K, Tokunaga M, Ishihara N, Okubo T, Fujisawa T. Consumption of partially hydrolysed guar gum stimulates Bifidobacteria and butyrate-producing bacteria in the human large intestine. Benef Microbes. 2015;6(4):451-5. doi: 10.3920/BM2014.0118. Epub 2015 Feb 12. PMID: 25519526.

https://www.ingentaconnect.com/content/wagac/bm/2015/00000006/00000004/art00007

Niv, E et al. “Randomized clinical study: Partially hydrolyzed guar gum (PHGG) versus placebo in the treatment of patients with irritable bowel syndrome.” *Nutrition & metabolism* vol. 13 10. 6 Feb. 2016, doi:10.1186/s12986-016-0070-5

https://pubmed.ncbi.nlm.nih.gov/26855665/

Fiber:

“In total, seven studies analyzed the association between fiber supplementation and the impact on the gut microbiome [**20**,**50**,**51**,**52**,**53**,**54**,**55**]. **Table 4** provides detailed information about the characteristics of the included studies. Dietary supplementation with soluble fiber was related to positive changes in the bacterial composition of the gut microbiota [**20**,**52**,**54**,**55**]. The implementation of psyllium for 7 days in constipated subjects resulted in significant increases in beneficial microorganisms, such as *Faecalibacterium*, *Lachnospira* and *Roseburia*. These are connected with producing SCFAs such as butyrate and increased fecal water absorption [**20**]. Holscher et al. [**54**] demonstrated that adding agave inulin to healthy adult diets improved gut microbiota diversity, including a reduction in *Desulfovibrio* and an increase in *Actinobacteria* and *Bifidobacteria*.”

“In another randomized control trial, the combination of partially hydrolyzed guar gum (PHGG) and inulin for 3 weeks significantly decreased Clostridium sp. [**55**]. Moreover, four authors observed that adding psyllium husk or PHGG to a regular diet may improve IBS symptoms, such as abdominal pain, bloating or gasses, as well as improve stool consistency and frequency [**20**,**51**,**52**,**53**]. Switching from a high-fiber diet to a low-fiber diet (<11 g/1000 cal) in 16 healthy volunteers for 7 days was associated with the development of GI symptoms in every participant of the study. Moreover, SIBO was diagnosed in two subjects after this short-term intervention with a low-fiber diet [**50**].
Similar results were found with other authors [**56**,**57**]. Garg [**57**] concluded that the intake of 25 g of psyllium husk with 500 mL of water for 12 weeks resulted in a major relief of IBS symptoms. However, Oskouie et al. [**56**] presented that IBS was more prevalent in individuals with a low intake of dietary fiber.
Dietary fiber should be considered an essential nutrient for the growth of beneficial microorganisms with prebiotic potential. The included studies support that increasing the intake of fiber, in particular, soluble fiber, may yield satisfactory results in patients with GI symptoms and modulate gut microbiota;…”

Wielgosz-Grochowska, Justyna Paulina, Nicole Domanski, and Małgorzata Ewa Drywień. "Efficacy of an Irritable Bowel Syndrome Diet in the Treatment of Small Intestinal Bacterial Overgrowth: A Narrative Review." *Nutrients* 14.16 (2022): 3382.

https://www.mdpi.com/2072-6643/14/16/3382

Extra Sources:

https://feedmephoebe.com/sibo-probiotics-the-best-brands-treatment/

https://shop.bodyecology.com/products/bifidus-power-blend-powder-probiotic?_pos=1&_sid=2d988f1cf&_ss=r

What Causes Disruption to the Microbiome:

1)Antibiotics
2)GMOs & Glyphosate (Glyphosate also poisons the mitochondria)

Mao, Qixing, et al. "The Ramazzini Institute 13-week pilot study on glyphosate and Roundup administered at human-equivalent dose to Sprague Dawley rats: effects on the microbiome." *Environmental Health* 17.1 (2018): 1-12.

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

3)CAFO meat (non-organic factory farm meat), Toxins, Environmental factors and prescription drugs, GMO Foods can alter the microbiome)

Spreadbury, Ian. "Comparison with ancestral diets suggests dense acellular carbohydrates promote an inflammatory microbiota, and may be the primary dietary cause of leptin resistance and obesity." *Diabetes, metabolic syndrome and obesity: targets and therapy* 5 (2012): 175.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3402009/

4)Low stomach acid

5)Dysbiosis created in childhood: C-section birth, Formula Fed, Mom breastfed but had dis-regulated gut flora

Arboleya, Silvia, et al. "C-section and the neonatal gut microbiome acquisition: consequences for future health." *Annals of Nutrition and Metabolism* 73.3 (2018): 17-23.

https://www.karger.com/Article/FullText/490843

6)Stress

Knowles, Simon R., Elizabeth A. Nelson, and Enzo A. Palombo. "Investigating the role of perceived stress on bacterial flora activity and salivary cortisol secretion: a possible mechanism underlying susceptibility to illness." *Biological psychology* 77.2 (2008): 132-137.

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C44&q=high+cortisol+lower+stomach+acid&btnG=#d=gs_qabs&t=1672825502891&u=%23p%3DY3IKOqf_k0IJ

What is GMO Food and What is Glyphosate?

Glyphosate is Roundup. Glyphosate takes its strength in its ability to **use the plants metabolic route to destroy it** (2).
Because Glyphosate kills everything it can't be used on crops. It will kill whatever plant it is sprayed on. However, GMOs are the answer!
GMOs make it so a farmer can spray his/her fields in the Roundup and watch everything die except their crops. Corn becomes impervious to Glyphosate because it is injected with another living things genes (fish genes) (2).

What's Terrible is that You Can't Rinse The Roundup Off

When the genes are altered in Roundup Ready Corn the plant grows and not only absorbs normal minerals in the soil but it actually absorbs the round up. This is due to the Shikimate Pathway. Normally, glyphosate is absorbed by the plant and then as the plant attempts to absorb the glyphosate for food the glyphosate deteriorates the metabolic pathway called the Shikimate Pathway (2). When the Shikimate Pathway is disabled, the plant dies because it can't absorb food.

However, when a plant has been genetically modified, the Glyphosate no longer destroys that Shikimate. Instead, glyphosate gets absorbed into the plant without killing the plant. So, you cannot effectively wash the glyphosate off your corn. It has become a part of the plant. It is in the corn and a part of its kernel.

Glyphosate's Major Effects On Gut Flora

Although there have been many studies to show that because humans have no Shikimate pathway like plants that Round Up is as harmless as aspirin(2).
The issue is that the bacteria in our gut and intestines do have the Shikimate Pathway (2). They are susceptible to the devastating effects of glyphosate (3).
In fact, there are now studies showing that the good bacteria in a our gut are more susceptible to glyphosate than most parasites, pathogens and yeasts (3).
Essentially, there is excellent research to show that the Acidophilus, Bifidobacterium, Lactobicillus and other health promoting bacteria are highly susceptible to destruction by Glyphosate (Round Up) (3). The pathogenic bacteria survive fine.
Things like Salmonella and Botulism have no problem with glyphosate(3). T

Sources:

(1) Journal of Organic Systems, 9(2), 2014

(2) *Entropy* **2013,** *15***(4), 1416-1463**

(3) Current Microbiology April 2013, Volume 66, Issue 4, pp 350–358

Explain the Generational Breakdown of our Gut Bacteria. Premature birth, Cesarean section delivery, baby formula, Antibiotic use

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All About Gut Bacteria

Gut flora resides on the inner most layer of the intestinal lining, the mucus layer. In a healthy individual, their gut bacteria is dominated by beneficial microbes. In a healthy gut, all these beneficial microbes work together to live in harmony, keep the body balanced, and keep the tight junctions in the intestinal barrier working correctly.

For an individual to be healthy and have strong immune system, these good bacteria must far outnumber the bad. When the gut flora is dominated by healthy microbes, the pathogenic bacteria are outnumbered and kept in check, often remaining neutral.

Balance of Gut Bacteria
Although the study of bacteria in our microbiome and microbiota is still largely in its infancy, there are some Common Core principles that scientific research can agree on for robust digestion and healthy, balances, thriving microbiome.

1. **Common Core Principle #1:** Beneficial Bacteria Are the Majority, Neutral Bacteria are kept in check
2. **Common Core Principle #2:** Diversity of Beneficial Bacteria

In Dr. Natasha Campbell-McBride's book, Gut and Psychology Syndrome, she states:
"A good probiotic should have as many different species of beneficial bacteria as possible. A human gut contains hundreds of different species of bacteria. We should try and get as close to that as we can."
She goes on to say, "Making sure there are strains from different groups of probiotic bacteria is more beneficial than just one group."

The Effect of Diet on the Human Gut Microbiome: A Metagenomic Analysis in Humanized Gnotobiotic Mice. Published inTranslational Medicine 11 Nov 2009: Vol. 1, Issue 6, pp. 6ra14, DOI: 10.1126/scitranslmed.3000322

Structural & functional consequences of chronic psychosocial stress on the microbiome & host. Published in Psychoneuroendocrinology Volume 63, January 2016, Pages 217-227

Enders, Giulia. *Gut: The Inside Story Of Our Body's Most Underrated Organ.* Scribe, 2015. Print.
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(https://www.youtube.com/watch?v=v3j6SmxUzVo&t=748s) [CC BY 4.0 (http://creativecommons.org/licenses/by/4.0)], via Wikimedia Commons

III. Re-inoculation Probiotics - Microbial Matrix
EXPLANATION: Please locate the pathogenic bacteria you found on your test as described in the video and purchase the specific probiotic strains for your specific strains. If the probiotics overlap for whatever reason DO NOT purchase them twice. Simply purchase ONE round for 8 weeks as described in the directions below.

Probiotic Pro Bb536

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Prevotella Copri Probiotic Research:
Quote from:
Guerreiro, Catarina Sousa, et al. "Diet, microbiota, and gut permeability—the unknown
triad in rheumatoid arthritis." Frontiers in Medicine (2018): 349.
“Growing experimental and clinical evidence suggests that a chronic inflammatory response induced by gut dysbiosis can critically contribute to the development of rheumatic diseases, including rheumatoid arthritis (RA)”
“High levels of Prevotella copri and similar species are correlated with low levels of microbiota previously associated with immune regulating properties.”
....
“Human studies revealed that patients with RA display significant differences of the intestinal microbiota and a decreased gut microbial diversity in comparison to healthy controls (3), both related with disease duration and autoantibody levels (3, 12, 13). Patients with RA, particularly erosive patients, carry a distinctive enterotype of gut microbiota characterized by a lower abundance of bacteria belonging to the
family Bifidobacterium and Bacteroides (12, 14, 15) and, at least at early stages of the disease, an abundance of Prevotella copri (14, 16).
“....beneficial strains that contribute to preventing the overgrowth of Prevotella Copri that raise inflammation markers in the body and can contribute to the development of inflammatory conditiontions such as rare: Lactobacillus acidophilus, Lactobacillus casei, and Bifidobacterium bifidum,

Intestinal Permeability (leaky gut) contributing to pathogenic bacteria:
A”part from these nutrients, other food compounds, mostly present at western diets such as fatty acids [specially from high fat diets; (48)], alcohol (11), additives used in food industry (53), gliadin [protein present in wheat and several other cereals; (50, 51)], chitosan (52) or even some food processing methods using different microbial and fungal strains [that promotes eventual horizontal gene exchange; (60)], are known to negatively regulate barrier function via compromising its integrity as they alter TJ

proteins expression and distribution, decrease TER and favor the growth of pathogenic or opportunistic bacteria (9, 61).

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C. Diff Probiotics:
S. Boulardii:
Na, Xi, and Ciaran Kelly. "Probiotics in Clostridium difficile infection." Journal of clinical gastroenterology 45.Suppl (2011): S154.
I quote:
“Multiple mechanisms of action have been described for S. boulardii effects in CDI include reducing intestinal permeability, increasing intestinal sIgA responses, preventing activation of nuclear factor kappa B and mitogen-activated protein kinase signaling pathways, inhibiting production of proinflammatory cytokines such as interleukin-8, and reducing C. difficile toxin effects by protease degradation, and by decreasing toxin receptor binding.”
Lactobacillus rhamnosus
Lactobacillus rhamnosus isolated from the intestinal tract of an healthy human by Drs
Sherwood Gorbach and Barry Goldin in 1983. I quote:
... LGG (a sub strain of lactobacillus rhamnosus) is believed to be capable of surviving gastric acidity and small intestinal bile acids and of colonizing the human digestive tract to exert its probiotic effects.29 LGG has been shown to excrete biosurfactants, organic acids including lactic acid, bacteriocins, and hydrogen peroxide to inhibit colonization and growth of pathogens. LGG has shown beneficial effects in the prevention and treatment of diarrhea of various etiologies in children and in adults.
A study suggested that certain strains can protect against C.Diff: Lactobacillus rhamnosus, L. Plantarum, B. bifidum, B. Longum etc.
Wei, Yanxia, et al. "Protective effects of bifidobacterial strains against toxigenic Clostridium difficile." Frontiers in microbiology 9 (2018): 888.
“ ... Several studies have demonstrated that probiotic strains appear to reduce the incidence of CDI, in which Lactobacillus rhamnosus and Saccharomyces boulardii have

been found to be associated with a significant reduction in antibiotic associated diarrhea. A few studies have showed the inhibition of C. difficile by bifidobacterial strains with different levels of success ..."
...Bacteriophages may treat CDI (C. Diff)

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Depression:

Interestingly enough… science clearly points to the fact that the gut and the brain are actually connected through what's called the Gut-Brain Axis.

Your depression and anxiety are directly linked to your poor gut health and IBS. There was a ground breaking study published in the Nutrition Journal in 2016. In this study they found that patients with Major Depressive Disorder (MDD) significantly decreased their depression through supplementation of a probiotic over just an 8 week period.

Sources:
Sciencedirect.com
ncbi.nlm.nih.gov

1. Immunization with a heat-killed preparation of the environmental bacterium *Mycobacterium vaccae* promotes stress resilience in mice
2. Study linking beneficial bacteria to mental health makes top 10 list for brain research
3. Ingestion of *Lactobacillus* strain regulates emotional behavior and central GABA receptor expression in a mouse via the vagus nerve

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Parkinson's Disease:

The research is revealing a remarkable link between your microbiome composition and Parkinson's Disease.

What Is Parkinson's Disease

Many of us feel like this disease could never touch us. Let's talk about what happens to PD patients. Every day many people wake up with PD and are unable to move. This disease slowly destroys you.
As it begins to worsen a person with PD will have progressively worsening cramps in the muscles. A PD patient may experience this in multiple muscles.

Over time, the patient finally experiences these rhythmic muscle contractions from head to foot. It is absolutely searing pain in every muscle of your body. A truly terrible way to live.

Gut Flora and Parkinson's

In Bonn, Germany a team of researchers embarked on an unprecedented study. They decided that they would take fecal samples of a group of PD patients and compare them to a group of healthy patients.

The reason that fecal samples work so well is that the majority of your poo is made up of dead bacteria. Almost 90% off your fecal matter is made up of the large intestines microbes that are being excreted. Meaning, their job is done.

Once these fecal samples were taken they did a shotgun genome testing. This was a bit different than past studies that have used 16S genome typing.

This shotgun approach allowed a deeper understanding of the diversity of the microbes, pathogens and viruses present.

The Main Differences Between Healthy Patients and PD Patients

What was discovered is that there was a vast difference between microbial composition and the metabolic health of the bacteria between the two groups. To put it in simpler terms, the sick patients had poorly functioning microbes with a lower microbial diversity.

The conclusions made by the researchers is that gut flora composition in those with PD effects the gut wall lining, possibly causing Leaky Gut and a low diversity of gut flora dramatically impacts the immune system function of those that are sick.

WHAT COULD THIS MEAN?

We now know that stress levels or mental conditions effect gut bacteria. And Studies have now revealed that if someone has a certain brain condition or disease that, on the whole, they have a lack of good bacteria within their gut. This confirms, without a shadow of a doubt, that your gut bacteria actually impact your mental health and overall heath. That it's a two way street between your gut bacteria and your brain and psychology.

The Enteric Nervous System connects directly to the Central Nervous System through a nerve called the Vagus. These two Nervous Systems are interwoven to the point that they symbiotically effect one another.

Gut-Heart Axis

There was a recent study done in April of 2017 in Bonn, Germany researchers where researchers found striking evidence that heart failure and a depletion of intestinal bacteria are directly related.

The Study at a Glance

This was not a study performed on mice. The German Centre For Cardiovascular Disease performed remarkable research on human beings. They took a control group that was healthy and collected stool samples.
Then, they took the stool of those deceased from heart failure. These stool samples were studied carefully for their bacterial composition. As they studied the stool they found that the patients with heart failure had an extremely low amount of gut bacteria.
The results were not slight and thus revealed a substantial difference between healthy subjects and those who had died from heart failure. However, how do we know that the study was foolproof?
These German scientists were incredible in their research. The control group and the test group both were from the same region, reasonably similar diets (standard European diet), similar medications, and had no diseases that would effect the Gut Flora.
Also, they were matched in their Body Mass Index, age and gender. With all of them in the same area there was nothing environmentally that could have dramatically impacted the gut flora. Also, none of the Heart Failure or control groups had had antibiotic treatments in the previous three months or probiotic treatments.
This means that this study was about as good as it gets when it comes to information gathering. To find that the gut composition was so different between the two groups is striking evidence as to the importance of a healthy gut.

How Gut Bacteria Effect The Heart

It's been long studied that Heart Failure is directly related to gut bacterial composition. This study only confirms the dozens of studies before it.
However, there is something fascinating about this correlation.
One of the striking truths from this body of research is that patients with Heart Failure more times than not have Gut Permeability (1). Much of the research points to not only a low diversity of gut flora but gut wall permeability.

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3. Stephan C Bischoff; Giovanni Barbara; Wim Buurman; Theo Ockhuizen; Jörg-Dieter Schulzke; Matteo Serino; Herbert Tilg; Alastair Watson; Jerry M Wells. "Intestinal Permeability – A New Target for Disease Prevention and Therapy.BMC Gastroenterol. 2014;14(189).
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Image 2: By The Noakes Foundation and associates (https://www.youtube.com/watch?v=v3j6SmxUzVo&t=748s) [CC BY 4.0 (http://creativecommons.org/licenses/by/4.0)], via Wikimedia Commons

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Alzheimer's Disease:

A recent study conducted by Research Scientists from Lund University in Sweden revealed that the gut has a much greater impact on us than digestion alone.

To understand the powerful statement made by the findings of this study let us dig into the research. These scientists are setting out to find the cure for Alzheimer's.
After the accomplishment of this study, these Swedish Scientistes have joined others from Germany and Belgium with a $50 mil EU grant to test medications and cures. Based on the causal evidence of this study they feel confident, as do many others, that they will succeed. Before we get into it, let's examine what Alzheimer's actually does to the brain.

What Causes Alzheimer's

The main biomarker in Alzheimer's patients is beta-amyloid plaque. This plaque causes degeneration in the patients brain by blocking pathways. As the plaque grows the connectivity of the brain lessens and results in Alzheimer's. See the photo below.

So, these scientists had mice that were considered ridden with Alzheimer's or Beta-Amyloid Plaque within the tissues of the brain. These were mice that were 8 months to 1 and a half years in age.
Then they took completely healthy mice without Beta-Amyloid plaque. These mice being at 8 months of age or less. Both groups of mice were raised with the same diet and caloric intake. With this launching point they began to do something fairly irregular.

The Gut and Alzheimer's

At this point within the study the scientists began evaluating the stool of the Alzheimer mice. They found a completely different microbiota than that of younger species.

The mice with Alzheimer's, although on the same diet, had a radically different bacterial composition in their gut. Then the scientists took it a step further. They implanted the bacteria of Alzheimer's ridden mice into 4 month old healthy specimens. There was a control group on the same diet but no implants. The group that was implanted had a 135% increase of Beta-Amyloid plaque in comparison to the control group.
A 135% increase is significant. To see such a marked difference in such a young mouse by implantation of bacteria from a sick old mouse is profound.
https://www.nature.com/articles/srep41802

MS & the Gut

In a recent study released on August the 8th of 2017 a leading team of researchers at the Mayo Clinic made yet another breakthrough in how the Microbiota, our microbial bacteria, impact our health. This time, it shone a light on MS - Multiple Sclerosis .

The Basis of the Study

What they did in the study was take a mouse that exhibited the symptoms of MS. MS is when a patient has the Myelin Sheath that encases pathways in the brain destroyed. The basic cause of the disease is major toxicity and inflammation in the body.
These mice were then injected with healthy microbes from human subjects. These microbes were of a certain variety called P. Histicola. There were several other bacteria injected in different test subjects to prove the efficacy of the healthy microbe, P. Histicola.
The researchers found that when the mice were injected with P. Histicola that 75% of the mice were healed of their MS. With E. Coli and other bacterial injections the mice had a 0% success rate.

Leaky Gut and MS

One of the most profound discoveries of this study is that MS is not an Autoimmune disorder. What the scientists found is that inflammation is the culprit. They went as far as to blame many of our modern day disorders on inflammation.
The reason that many of us experience such intense inflammation is because of a, now, well known disorder called leaky gut. Leaky gut is when your gut wall has been permeated or leaks into your blood stream. When this happens food particulates that are meant to be eliminated as waste find their way into your body.

Incredibly enough, the injection of this healthy bacteria into mice with MS healed their Leaky Gut. The truth is that every mouse with MS had severe to moderate Leaky Gut or Gut Permeability.
The power in this finding is so profound! It means that if we can repair a leaky gut, we might be able to recover from MS.

Story Source:

Materials provided by **Mayo Clinic**. *Note: Content may be edited for style and length.*

Journal Reference:

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ADHD

We all know someone who has been diagnosed ADHD or has a child who has ADHD. Maybe you yourself have ADHD and have been on and off drugs for most of your life. Yet the cause of the terrible disorder has been largely unknown and what is known is a bit fatalistic.
However, I am excited to share some fascinating research on this widely prevalent topic that isn't at all fatalistic. In fact, it's liberating and empowering. You will learn surprising factors that contribute to this condition as well as how ADHD relates to gut health.

I. ADHD Is On the Rise

A.D.H.D (Attention-Deficit Hyperactivity Disorder), is one of the most common neurobehavioral disorders in children. It is often characterized by hyperactivity, impulsive behavior and inability to focus attention. (1)
Americans are the highest consumers of ADHD drugs, consuming 85 percent of the ADHD medications used world-wide. (2)
Recent statistics show that 11 percent of children in the United States ages 4-7 (6.4 million children) have been diagnosed with ADHD. The number of children diagnosed continues to rise as studies show an 18 percent increase from 2008 to 2012. (2,3)
What's even scarier is that more and more younger children, even toddlers ages 2-3, are now diagnosed with ADHD and are being medicated. Statistics show a 50 percent increase in young children being diagnosed from 2007 - 2008 alone. (3,4)

What may surprise you is that the numbers of adults being diagnosed are now rising even faster than children, having increased 18.9 percent to 53.4 percent from 2008 - 2012. (2)

And we ALL know what typically happens after a diagnosis. Medications are administered to 'treat' the symptoms of ADHD. The most common drugs used are Ritalin and Adderall. The problem with prescribing drugs for this neurobehavioral disorder is that drugs are used only to treat the symptoms and not the root cause.

Furthermore, these drugs are VERY risky and potentially dangerous for children as there isn't much scientific data on what these drugs can do to a developing/ growing mind.

Even non-stimulant drugs, alternatives such as Atomoxetine (Strattera) are not much better as they have their own array of unpleasant side effects such as insomnia, dry mouth, cough, decreased appetite, upset stomach, nausea or vomiting, dizziness, drowsiness etc. (5)

To make matters worse, research shows that Atomoxetine has the ability to not only ignite the expression of 114 genes and but silence 11 other genes. (6)

II. What Factors Contribute to Causing ADHD?

1. Birth by C-Section

As much as Cesarean birth can be a life saving procedure it is often done unnecessarily in our current society. The major issue with C-Section birth is that the child doesn't pass through the mother's birth canal. The birth canal is the babies first introduction to bacteria. Before that point, in the womb, the child is in a completely sterile environment. After the child exits the womb the mother's birth canal supplies the child with the majority of their initial bacteria (7).

A 2014 study from The Journal of Child Psychology and Psychiatry states that a child born via C-section has triple the risk of developing ADHD than those born vaginally. (8)

2. Too Little of Absence of Breast Milk

There are countless studies that show the incredible benefits of breastfeeding in a child's first year or two of life. In this specific study from the The American Journal of Clinical Nutrition, Dr. Laura J. Stevens showed that children who were breastfed were considerablely less likely to develop ADHD than those were breastfed for a very short time if at all. She explains how the length of the breastfeeding period also influences the risk of developing this disease. (9)

3. Frequent Ear Infections and Antibiotic Usage

In the same study mentioned above, Dr. Laura J. Stevens from Purdue University also explained how children who battle frequent ear infections and are constantly on and off antibiotics are more susceptible to developing ADHD. (9)

4. Inflammation

Interestingly enough, ADHD and Depression have much in common. They are both rooted in inflammation and are often treated with anti-depressant drugs

instead of diet and lifestyle changes. Inflammation is the root of most all diseases. When chronic inflammation is present in the body, further investigation of the root cause should be done rather than popping a few pills. (11)

5. Constipation

Another common factor that is found with children suffering from ADHD is constipation. This is no surprise and many children and adults alike experience a range of digestive diseases.

2013 Journal *Pediatrics* study shows that children with ADHD were more likely to have constipation than children who didn't suffer from ADHD. (11)

6. Gluten Sensitivity

Another common symptom often found in individuals with ADHD is Gluten Sensitivity. German researchers published a study that proved that children and adults with ADHD showed significant improvement in mood and behavior when a gluten-free diet was administered. (12)

7. GABA Deficiency

If a child's gut is imbalanced, not only will the intestinal barrier most often be permeable, but the gut will be unable to produce important brain chemicals which are needed for the brain to function properly.

One of the most vital brain chemicals we all need to function optimally is the neurotransmitter GABA. Research shows that individuals with ADHD often are deficient in GABA. Some experts speculate that a GABA deficiency may even be the cause of ADHD. (13)

8. Food Intolerances/Allergies

Many research studies are showing the powerful impact that diet has on ADHD. Food Intolerances/Sensitivities and Allergies to common Allergen foods are often present in Individual with ADHD. (14)

It is not surprising that many ADHD patients have shown incredible improvement in behavior and ADHD symptoms by following an elimination diet. (14)

III. What Does Gut Health Have to Do With ADHD?

In looking over the 8 factors that are discussed in the previous section, half of the factors have to do with birth and early childhood factors such as C-section births, chronic health issues such as ear infections and over-usage of antibiotics.

All these factors contribute to gut dysbiosis which is when the gut flora is out of balance. This is when pathogenic bacteria, viruses, fungi and even parasites far outnumber the beneficial, healthy gut microbes in the gut. An unbalanced gut will then lead to Intestinal Permeability, a.k.a. a Leaky Gut. Leaky Gut causes then causes the gut to be in a constant state of low-grade inflammation which negatively affects the brain. (15)

If an individual's gut is imbalanced, not only will the intestinal barrier be compromised and permeable, but the gut will be unable to produce important

brain chemicals and neurotransmitters NEEDED for the brain to function properly (such as GABA, Serotonin, Tryptophan, Glutamate etc.)

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Cognitive Performance and Your Gut

Haven't you been given the advice to "go with you gut"? Have you ever felt the "butterflies" in your stomach before an interview or an important event? Well, these phrases may not be as fleeting a previously thought.
Folks at Johns Hopkins Medicine, Columbia Universtiy Medical Center and other prestigious research institutes around the world are confirming these truths(1). Bleeding edge research into Neurogastroenterology, the gut brain connection for short, suggests that our gut health has a direct influence upon our ability to think(2).

The Central Nervous System and The Gut

We all know of the Central Nervous System. It's power over our organs and connection back to the brain are remarkable. Even 3rd graders have profound respect for this complicated nerve system.

Yet, most have not heard of the Enteric Nervous System. Michael Gershon revealed to the world in the late 1990's that the Enteric Nervous System has more neurons in it and is seemingly more complex than our Central Nervous System. Then, that this ENS links directly to our Central Nervous System.

The great connection is fascinating. Gershon being the individual that coined the phrase "The Second Brain" in his 1998 book by the same name. Gershon is the Chairman of the board of Anatomy and Cell Biology at New York Presbyterian Health in NYC.

Here is a photo of one of the main nerves of the ENS and how it connects to the CNS.

The Gut Brain Connection

This powerful anatomical link between the gut and the brain shifts our focus to improving our gut health. If there is this great connection between the two we need to focus on having a healthy microbiome.

Our Enteric Nervous System effects much more than how you digest. There are many studies linking depression and the brain to your gut health(3). Suggesting that depression treatment naturally may be possible.

The Gut Brain Connection Evolution

We've seen the research reveal more to us over the past 15-30 years than the thousands of years before it. There have been studies at Johns Hopkins University by Dr Jay Pasricha and his team of Neurogastroenterologists that are groundbreaking.

In the mid to late 2010's these researchers were paving the way. They found that the condition of the gut effects our mood(1). There are scientists around the world today that are revealing a link between our gut flora and our ability to cope with stress, depression and anxiety(3).

Researchers in the past thought that our mental health had a direct impact on our gut health. However, it is a two way street. Our brains ability to perform mental tasks may be directly correlated with the state of our Gut through the ENS and CNS connection.

Studies On Cognitive Ability and The Gut

In this recent study, from late 2015, researchers discovered something quite remarkable. They took mice and altered their diets. There were two groups of mice. One which had a diet that would alter their gut flora negatively and one that would alter their gut flora positively. A control group was present.

They had the mice run a certain set of tasks like water mazes and cognitive functions in which memorization was required. After the mice were on these diets for 2 weeks they then had them run cognitive tests again of similar nature. After two weeks they found a direct impact on the Mice's ability to remember and perform cognitive exercises to their gut health. The findings suggest that diet and gut bacteria effects brain and cognitive function.

Resources:
(1) John Hopkins Medicine
(2) Neuroscience, Volume 300, 6 August 2015, Pages 128–140
(3) PNAS, vol. 113 no. 2, Stefan O. Reber, E3130–E3139

Fiber:

Need for a healthy Microbiome

“Dietary fibers are largely metabolized by gut bacteria.”
“Soluble fibers can be further processed by bacteria into SCFAs as metabolites [52] although some of them are not fermentable including psyllium and gums. Different types of bacteria produce different types of SCFAs [53,54,55,56,57].”

“The most abundant SCFAs in the human colon are acetate, propionate, and butyrate …”

Usuda, Haruki, Takayuki Okamoto, and Koichiro Wada. "Leaky gut: Effect of dietary fiber and fats on microbiome and intestinal barrier." *International Journal of Molecular Sciences* 22.14 (2021): 7613.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8305009/

As Naomi Whittle explains in her book “High Fiber Keto”:

“Fiber is needed for certain beneficial bacteria to produce byuterate (a short chain fatty acid) that helps lower inflammation, keep your heart healthy, keep insulin levels balanced, regulates appetite, and supports your body’s mitochondrial health.

Whittel, Naomi. *High Fiber Keto: A 22-Day Science-Based Plan to Fix Your Metabolism, Lose Weight & Balance Your Hormones*. Hay House, Inc, 2020: pg.47-60.

“Butyrate is a well-documented beneficial factor for maintaining colonocyte health by providing energy to intestinal epithelial cells, which likely contributes to intestinal epithelial integrity [64]. Butyrate suppresses cytokine-induced barrier dysfunction by modifying claudin-2 levels in vitro [65].”

Usuda, Haruki, Takayuki Okamoto, and Koichiro Wada. "Leaky gut: Effect of dietary fiber and fats on microbiome and intestinal barrier." *International Journal of Molecular Sciences* 22.14 (2021): 7613.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8305009/

Soluble (psyllium, flax, avocados,
Insoluble (flax, greens, avocados,

“In total, seven studies analyzed the association between fiber supplementation and the impact on the gut microbiome [**20**,**50**,**51**,**52**,**53**,**54**,**55**]. **Table 4** provides detailed information about the characteristics of the included studies. Dietary supplementation with soluble fiber was related to positive changes in the bacterial composition of the gut microbiota [**20**,**52**,**54**,**55**]. The implementation of psyllium for 7 days in constipated subjects resulted in significant increases in beneficial microorganisms, such as *Faecalibacterium*, *Lachnospira* and *Roseburia*. These are connected with producing SCFAs such as butyrate and increased fecal water absorption [**20**]. Holscher et al. [**54**] demonstrated that adding agave inulin to healthy adult diets improved gut microbiota diversity, including a reduction in *Desulfovibrio* and an increase in *Actinobacteria* and *Bifidobacteria*.”

“In another randomized control trial, the combination of partially hydrolyzed guar gum (PHGG) and inulin for 3 weeks significantly decreased Clostridium sp. [**55**]. Moreover, four authors observed that adding psyllium husk or PHGG to a regular diet may improve IBS symptoms, such as abdominal pain, bloating or gasses, as well as improve stool consistency and frequency [**20**,**51**,**52**,**53**]. Switching

from a high-fiber diet to a low-fiber diet (<11 g/1000 cal) in 16 healthy volunteers for 7 days was associated with the development of GI symptoms in every participant of the study. Moreover, SIBO was diagnosed in two subjects after this short-term intervention with a low-fiber diet [**50**].
Similar results were found with other authors [**56**,**57**]. Garg [**57**] concluded that the intake of 25 g of psyllium husk with 500 mL of water for 12 weeks resulted in a major relief of IBS symptoms. However, Oskouie et al. [**56**] presented that IBS was more prevalent in individuals with a low intake of dietary fiber.
Dietary fiber should be considered an essential nutrient for the growth of beneficial microorganisms with prebiotic potential. The included studies support that increasing the intake of fiber, in particular, soluble fiber, may yield satisfactory results in patients with GI symptoms and modulate gut microbiota;…"

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