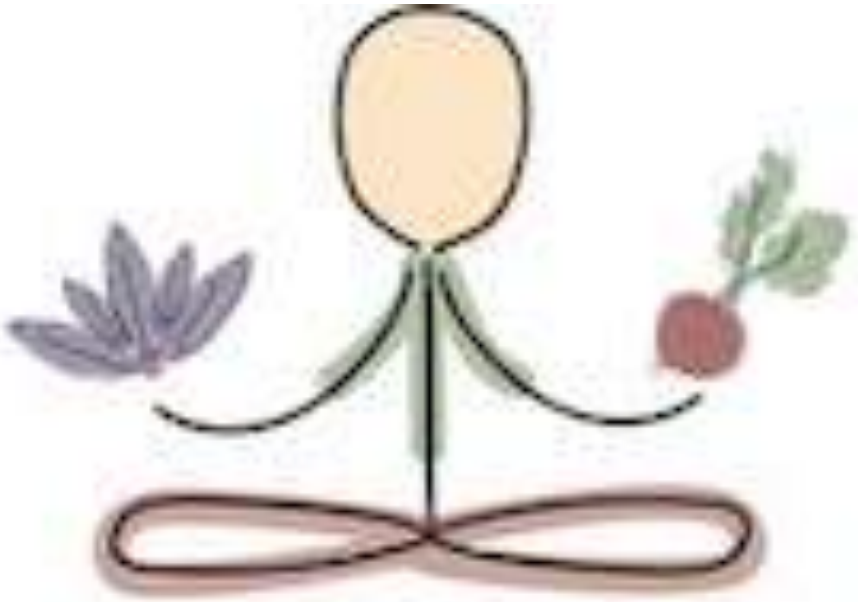


INSPIRE

wellness & nutrition

Mindful Nutrition: Exploring the Gut – Brain Axis

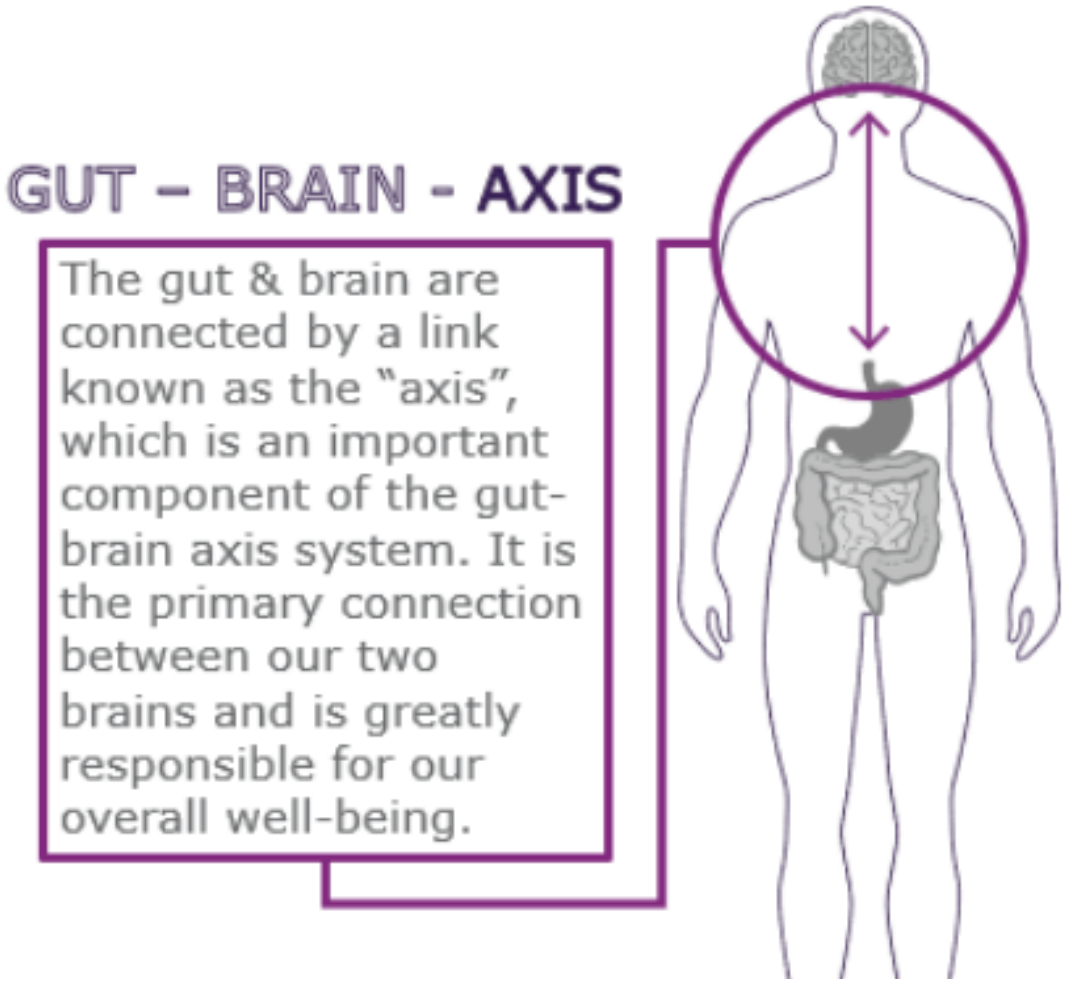
The Gut – Brain Axis

- Have you ever had “butterflies” in your stomach?
- Have you had a “gut feeling” when making a decision?
- These sensations show us the connection between our brain and our gut.
- Recent studies have shown that our brain affects our gut health, and our gut health affects our brain health.

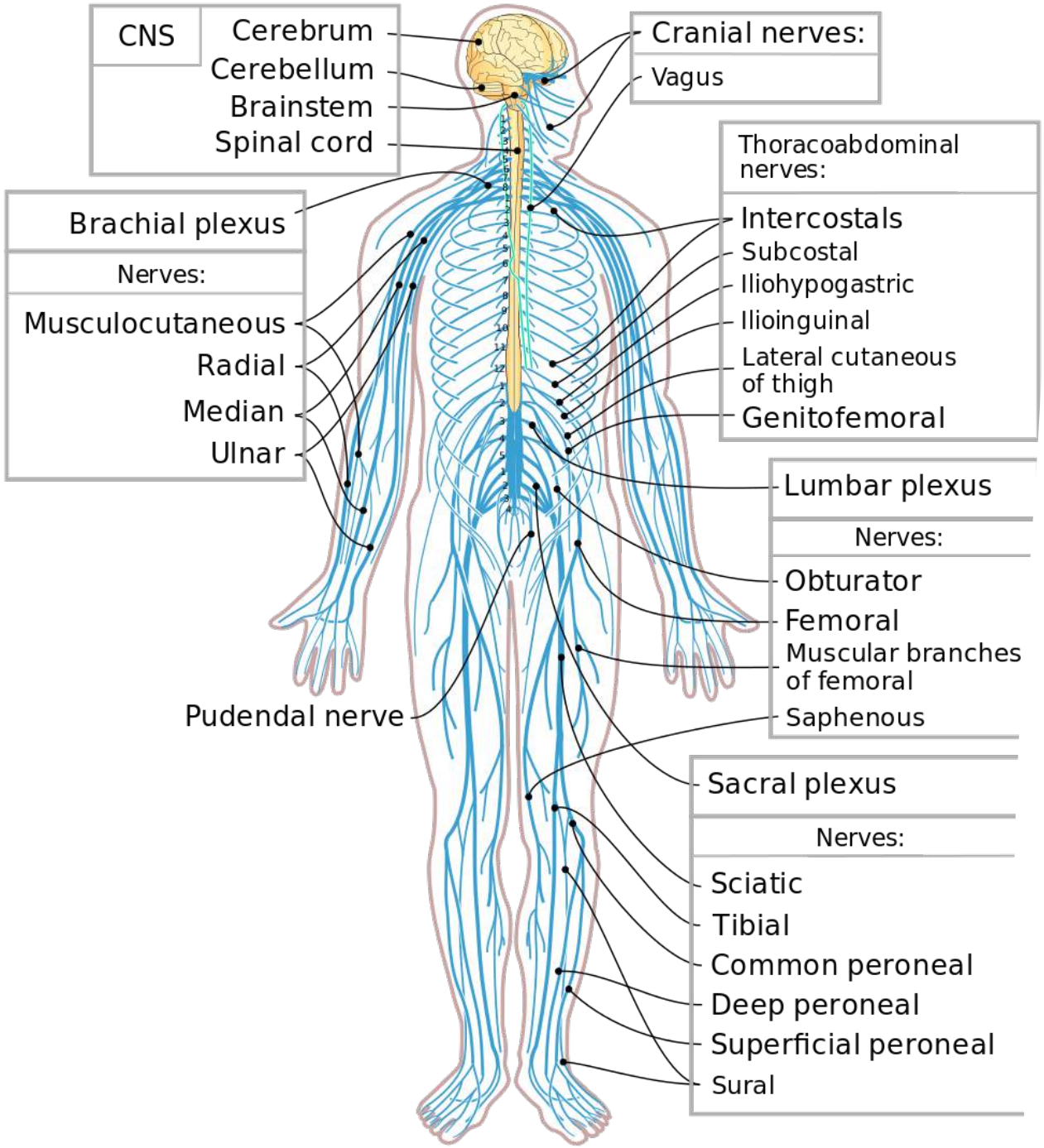
In a 2018 *Cellular and Molecular Gastroenterology and Hepatology* Journal:

- “The past decade has seen a paradigm shift in our understanding of the brain-gut axis. The exponential growth of evidence detailing the bidirectional interactions between the gut microbiome and the brain supports a comprehensive model that integrates the central nervous, gastrointestinal, and immune systems with this newly discovered organ. Data from preclinical and clinical studies have shown remarkable potential for novel treatment targets not only in functional gastrointestinal disorders but in a wide range of psychiatric and neurologic disorders, including Parkinson's disease, autism spectrum disorders, anxiety, and depression, among many others.”

What is the Gut-Brain Axis?



https://wholefoodnanny.com/the-gut-brain-axis/



How are the Brain and Gut Connected?

- Physically
  - Our brain and central nervous system contain 100 billion neurons that tell our bodies how to behave
  - Our gut contains 500 billion neurons that are connected to our brain through nerves in our nervous system
  - The **vagus nerve** – one of the largest nerves – sends signals in both directions

Vagus nerve - the impact of stress

- Stress can inhibit signals through the vagus nerve causing gastrointestinal issues (Sahar et al., 2001).

- People with irritable bowel syndrome and Crohn’s disease have been shown to have reduced vagal tone, a sign of reduced function of the vagus nerve (Pellissier et al., 2014).

How are the Brain and Gut Connected?

- Biochemically
  - Neurotransmitters send instructions from one brain cell to the next and transfer information throughout the brain and body
  - There are 7 main neurotransmitters – Serotonin and GABA are involved in brain – gut communication

Serotonin

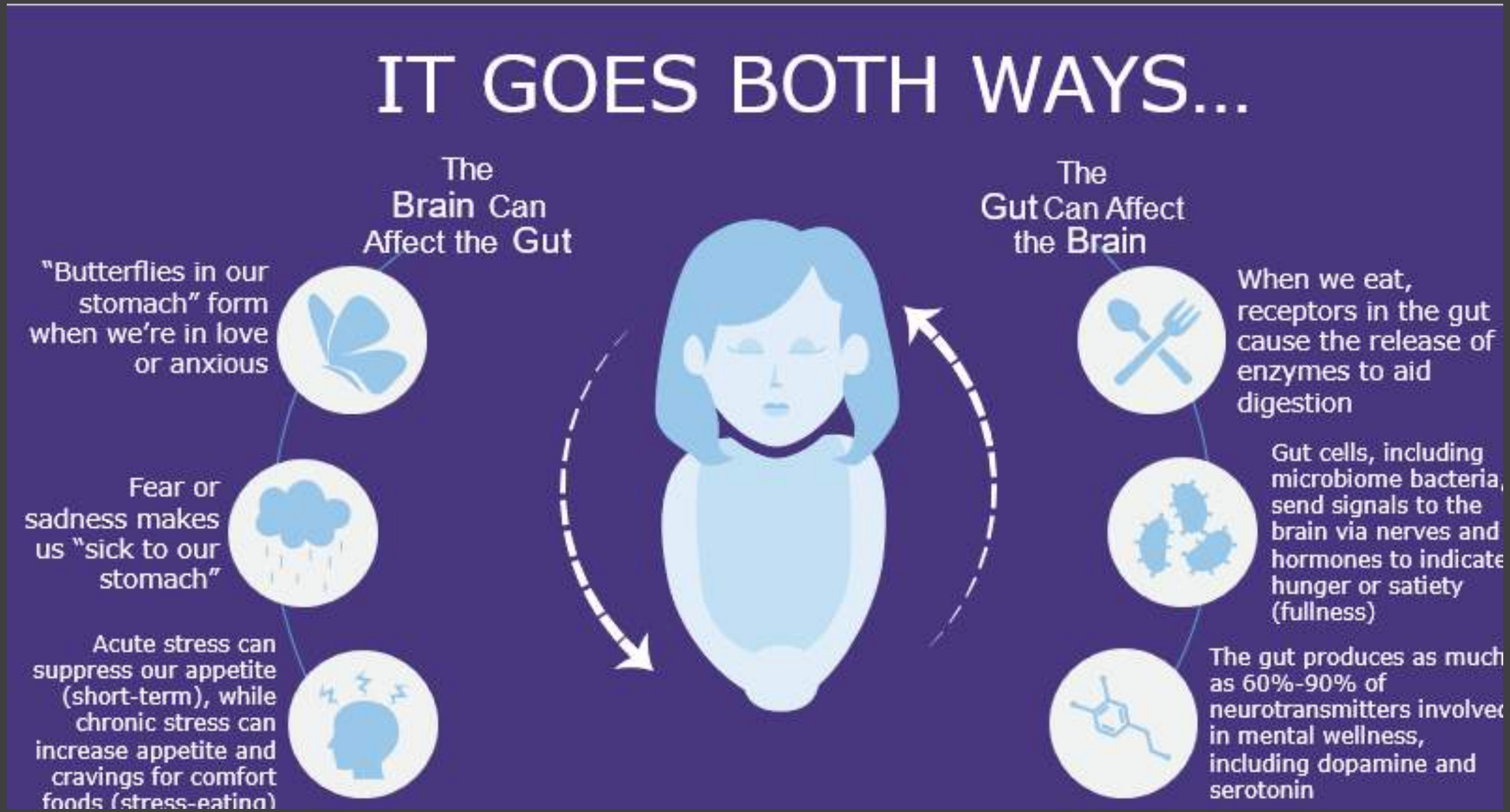
- Over 90% of serotonin is produced in GI tract lining
- The other 5 – 10% is produced in the brain stem
  - In the digestive system:
    - Promotes feeling of satisfaction after eating/keeps appetite in check
    - Helps your body get rid of potentially toxic foods
  - In the brain:
    - Produces feelings of wellbeing and happiness
    - Helps promote restful sleep
- Deficiency is related to:
  - depression, anxiety, insomnia, poor memory, eating disorders, social anxiety, and other psychological symptoms
  - Carbohydrate cravings, weight gain, fatigue, nausea, GI motility issues (IBS and constipation), and other physical symptoms

GABA – gamma-aminobutyric acid

- Main role: to reduce the activity of neurons in the brain and central nervous system
- Calms us down – facilitates sleep, reduces stress, lowers anxiety
- Role in regulating muscle tone
- Produced mainly in the brain
- Recent studies have found that gut microbiota produce GABA (animal study showed probiotics increased GABA)
- Deficiency is related to:
  - Anxiety, chronic stress, depression, memory problems, muscle pain, insomnia, substance abuse disorders

https://www.psychologytoday.com/us/blog/sleep-newzzz/201901/3-amazing-benefits-gaba

IT GOES BOTH WAYS...



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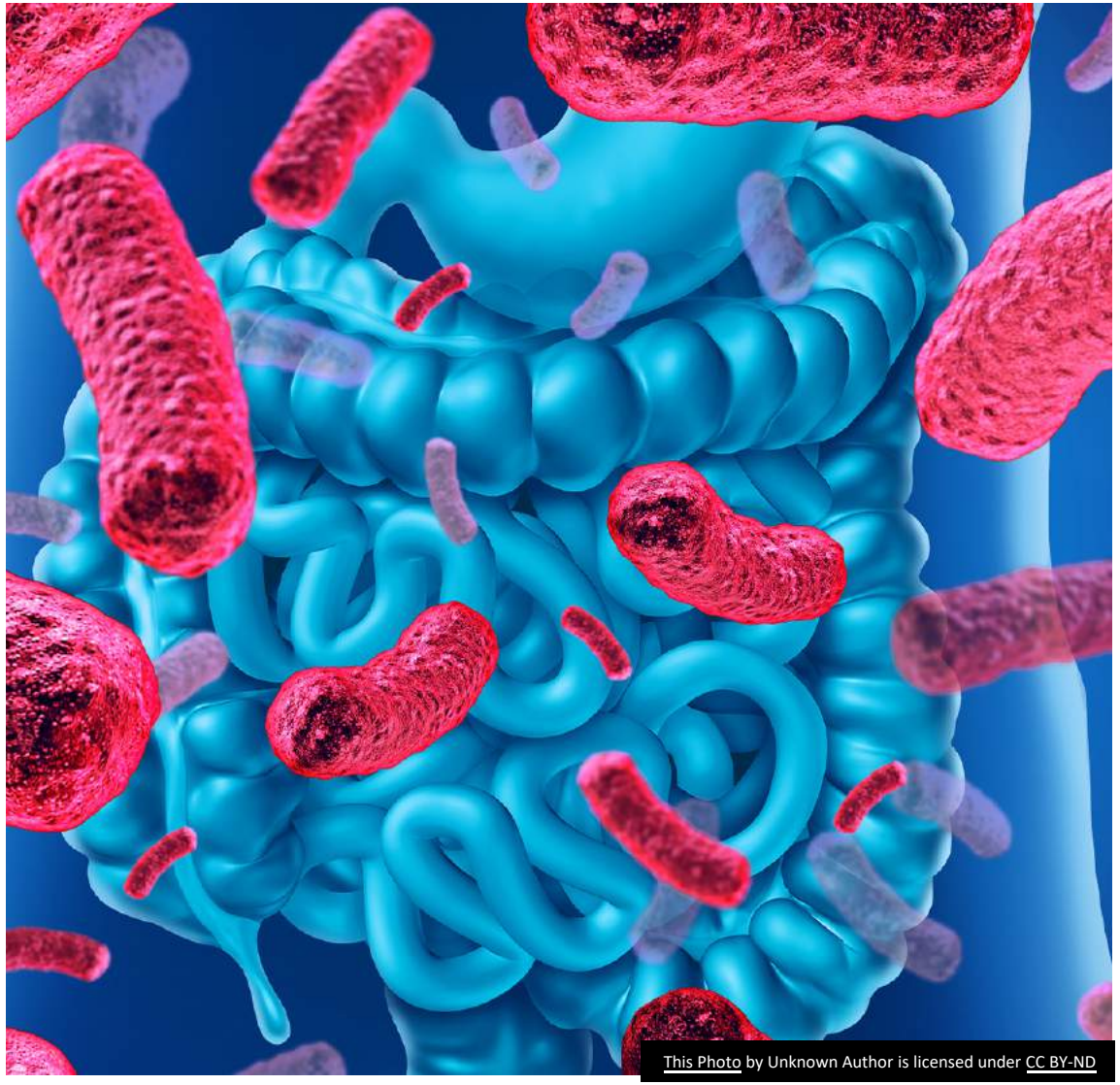
The Microbiome

- According to Merriam-Webster:

- a community of microorganisms (such as bacteria, fungi, and viruses) that inhabit a particular environment and especially the collection of microorganisms living in or on the human body Your body is home to about 100 trillion bacteria and other microbes, collectively known as your **microbiome**

Gut Microbes

- Make Short Chain Fatty Acids – SCFAs – by digesting fiber
- Metabolize bile acids produced by the liver
- Regulate appetite and satiety
- Important in the vagus nerve communication
- Development of blood brain barrier



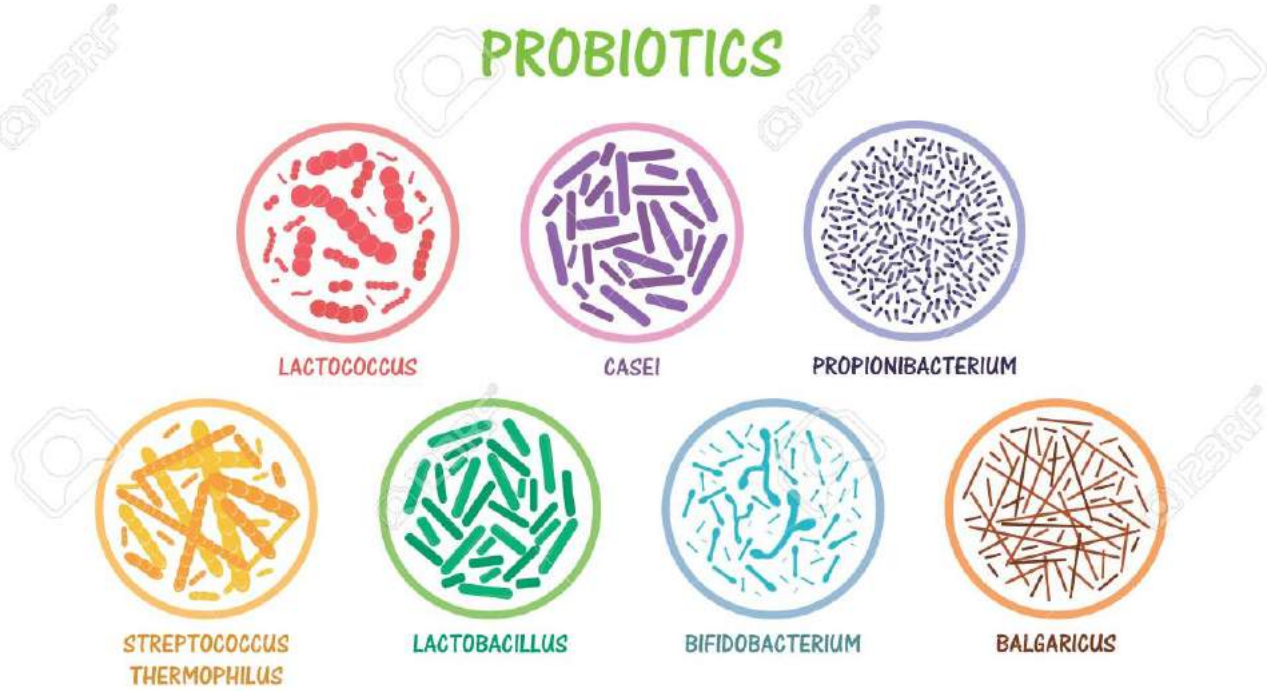
Gut Microbes and Inflammation

- Control what is passed into the body and what is excreted
- Leaky gut – caused by stress, poor diet, overuse of antibiotics, environmental toxins, smoking, alcohol, etc.
- Healthy gut microbes can prevent leaky gut and inflammation
- Inflammation is the “root” of many chronic diseases

Improve gut health = improve brain health

- Probiotics
- Prebiotics

Probiotics



- Live bacteria that can create health benefits – not all probiotics are the same
- 8,000 known strains of gut bacteria – each has an "assigned job" – immune, gut, skin, mood, etc.
- Probiotics can transiently colonize the human gut mucosa in highly individualized patterns, depending on the baseline microbiota, probiotic strain, and gastrointestinal tract region

Probiotic Basics

- Lactobacillus
  - Support digestion and immune system
  - Reduce gut inflammation
- Bifidobacteria
  - Maintain healthy bowel movements
  - Produce short chain fatty acids
  - Keep colon cells functioning
- Saccharomyces
  - Protect gut lining from negative effects of antibiotics
  - Prevent leaky gut syndrome

Probiotic Foods

- Fermented foods – rich sources of live and potentially beneficial microbes
- Yogurt (plain, full-fat), kefir, cheeses, kimchi, kombucha, sauerkraut, miso, pickles, raw apple cider vinegar

Prebiotics

- Compounds in food that feed the activity and growth of gut microbiome
- Fiber that humans cannot digest
- Chicory root, dandelion greens, Jerusalem artichoke, garlic, onions, leeks, asparagus, green bananas, barley, oats, apples, flaxseeds, jicama root, wheat bran, seaweed

Other Foods to Support Gut – Brain Axis

- Omega 3 Fats – found in fatty fish. Can increase good bacteria in the gut and reduce brain disorders
- Fermented Foods – improve microbiome, improve brain health
- High fiber foods – prebiotic fibers that feed good bacteria in gut. Can help reduce stress by producing SCFAs
- Polyphenol rich foods – cocoa, green tea, olive oil, coffee. Increase healthy gut microbes
- Tryptophan rich foods – amino acid converted to serotonin. Turkey, eggs, cheese

Recipe of the Week:
Pumpkin Almond Flour Muffins

- Ingredients:
- Almond flour
- Salt
- Soda
- Cinnamon
- Pumkin pie spice
- Eggs
- Canned pumpkin
- Maple syrup
- Vanilla extract
- Mix-ins: walnuts, dark chocolate chips, pumpkin seeds

Ingredients

Directions:

- Preheat oven to 350, prepare muffin tins
- Combine dry ingredients in bowl – mix until combined
- Combine wet ingredients in separate bowl – whisk together

- Make a well in center of dry ingredients, add wet ingredients

- Mix just until combined. Add in mix-ins of choice.

- Divide batter between muffin cups – about 2 Tbsp in each
- Bake for 20 – 24 minutes, cool 5 minutes in pan, then continue cooling on rack. Enjoy!

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