
The Microbiome

Mood, Metabolism & Immunity

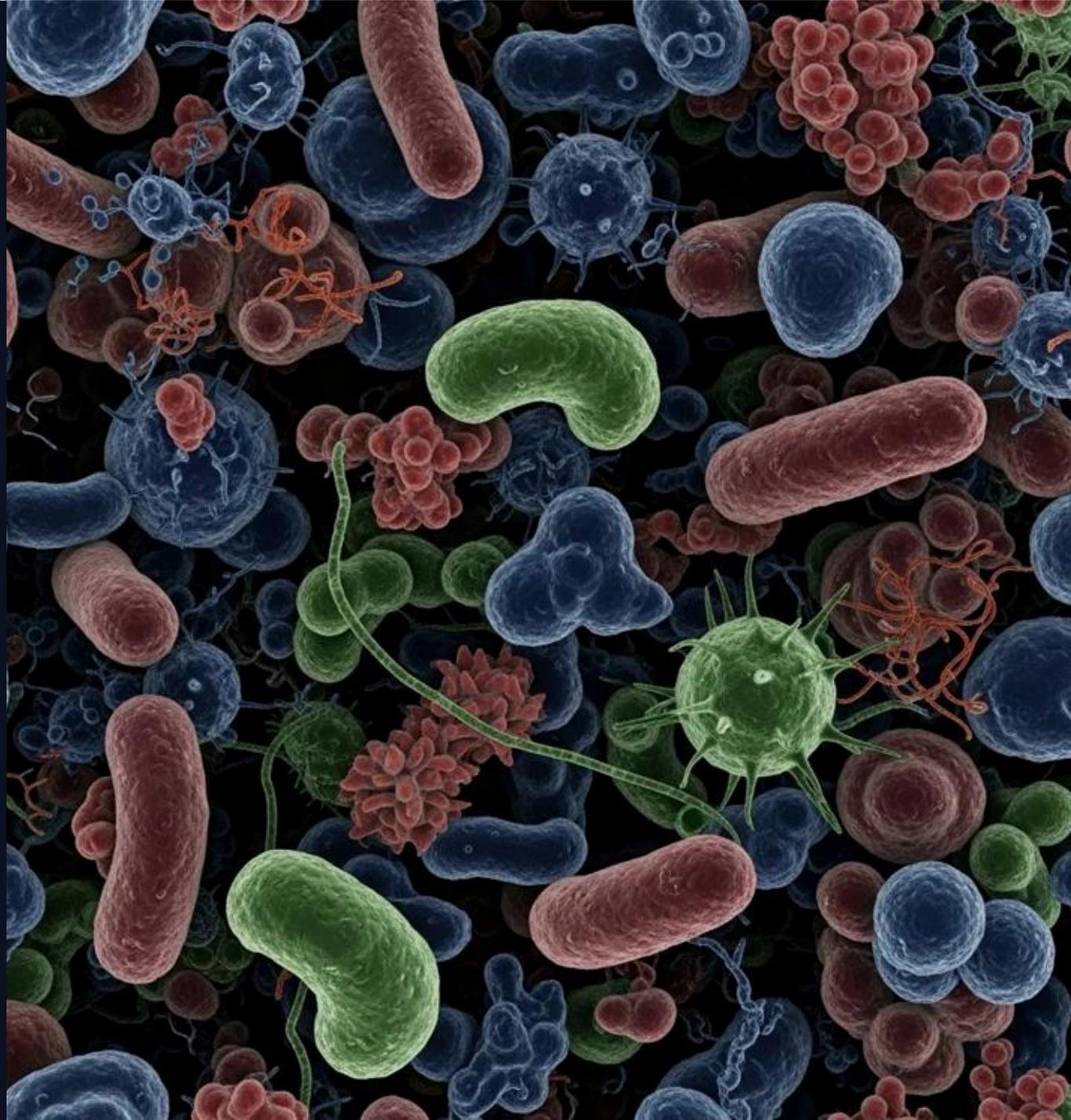
Presented by:

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Port Hope Sports & Rehabilitation Centre

Date

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What Is the Microbiome?

Microbiota

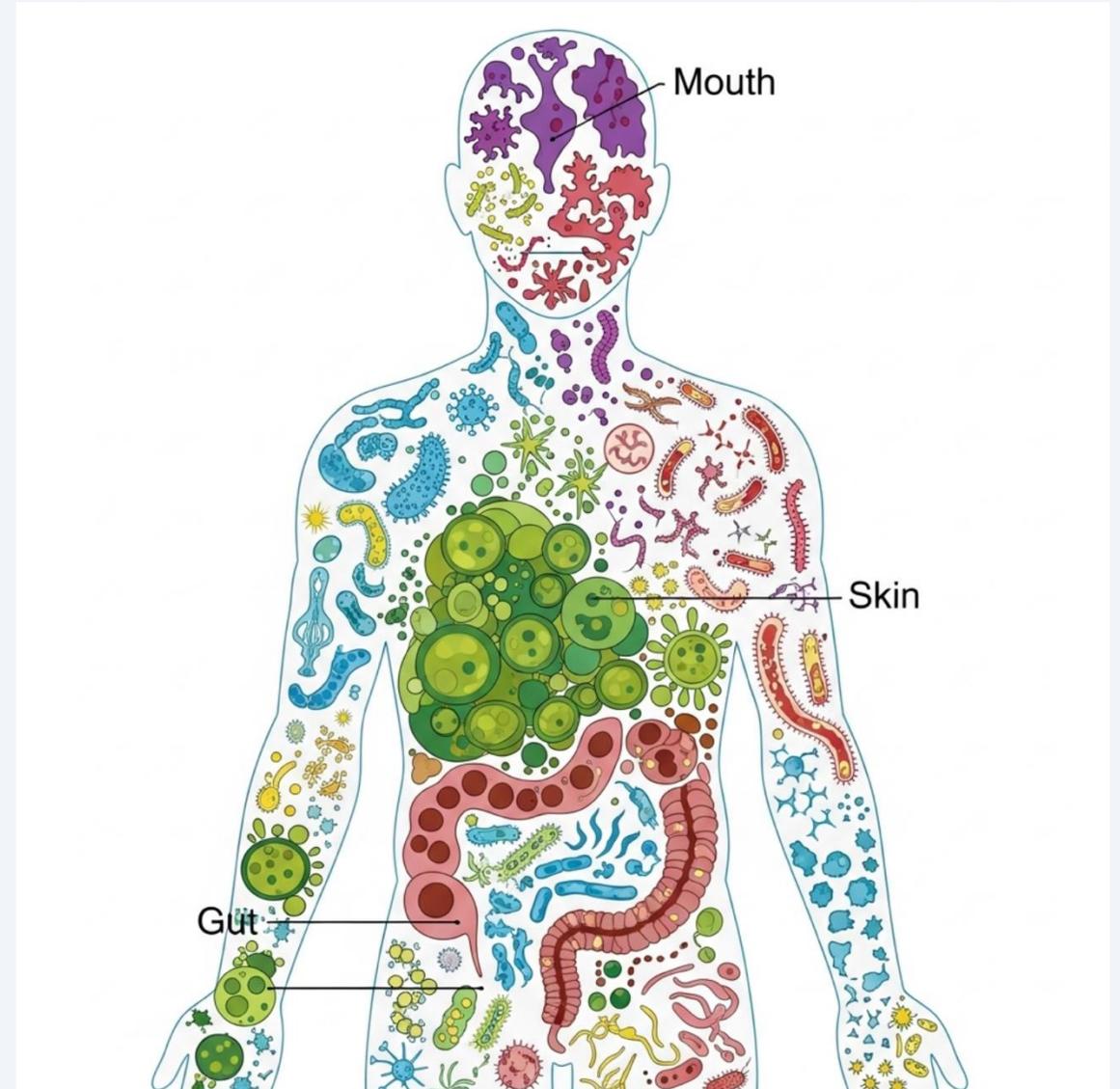
The actual **microbes** (bacteria, fungi, viruses), living in and on us. “The musicians”

Microbiome

The microbes **PLUS** their genetic material, their structural elements + metabolites + environment they create. “The orchestra + entire theater + the music they play.”

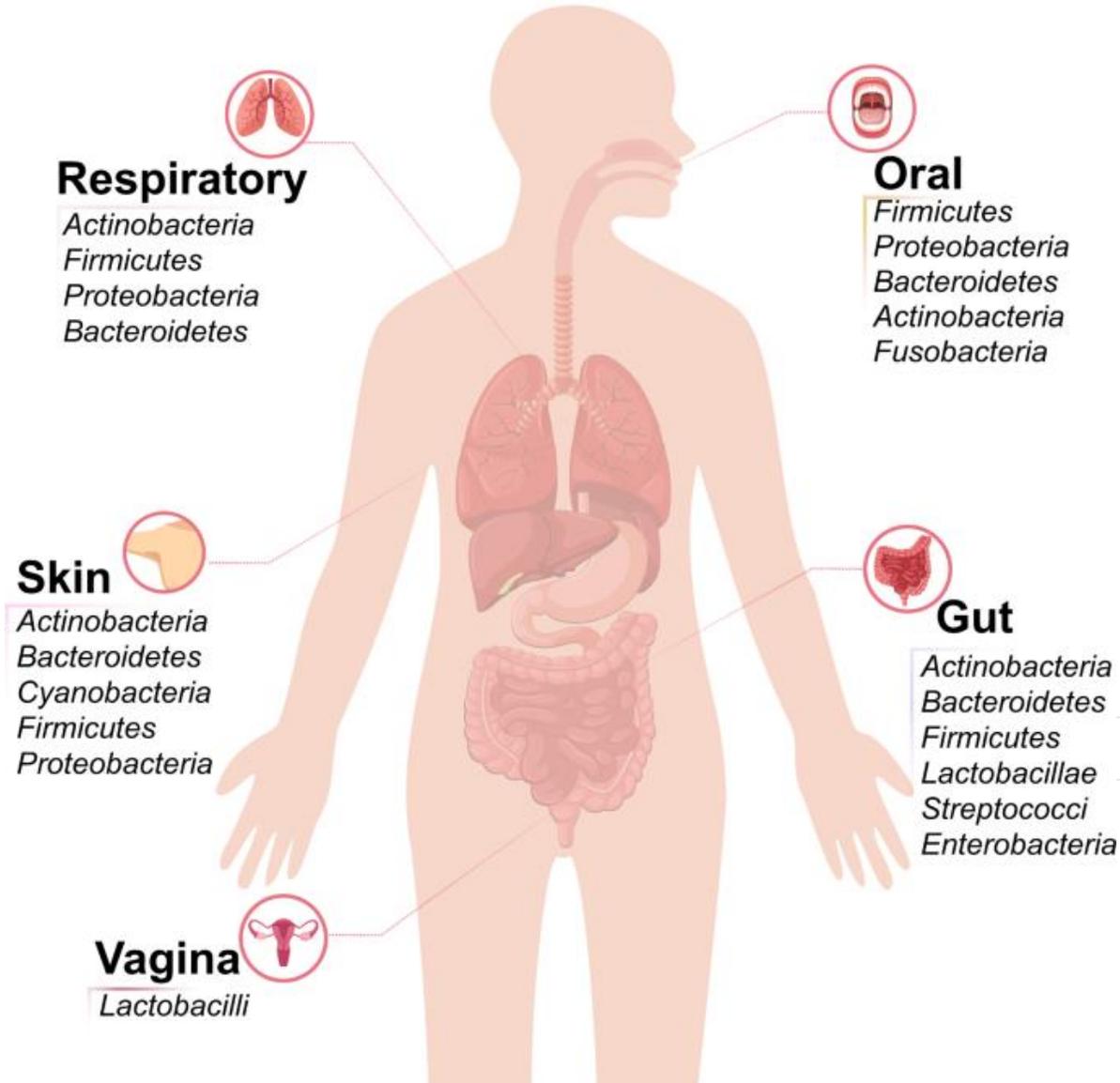
Dysbiosis

A disturbance or imbalance in the microbial community. Linked to inflammation, metabolic issues, and mood disorders.



Microbiome Composition

Microbiota composition in different regions



Three Surprising Facts about the Microbiome



1.3 : 1

Nearly Equal Partners

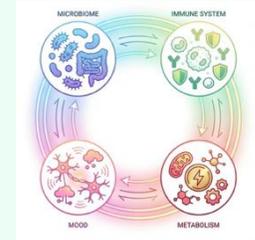
Your body contains roughly equal numbers of microbial and human cells (~38 trillion bacteria vs ~30 trillion human cells).



~200g

Total Biomass

Your gut microbiome weighs about 200 grams but has metabolic activity rivaling many organs



Trillions

Constant Conversations

Your mood, immune system, and metabolism are in constant dialogue with trillions of microbial residents.

“ It is **unique** to you - shaped by your **genetics, diet, and environment**.

”

The Developmental Arc: From Sterile to Stable

How the microbiome evolves from birth through adulthood.



Birth & Seeding

Day 0

- ✓ **Vaginal**
Dominated by *Lactobacillus*. First inoculation.
- ⓘ **C-Section**
Skin flora (*Staphylococcus*). Delayed colonization.

The Blooming

0 – 2 Years

- Breast Milk (HMOs):** Selectively feeds *Bifidobacteria*. Educates immune system.
- Solid Foods (6mo+):** Explosion of diversity. Shift towards *Bacteroidetes* & *Firmicutes*.

Stabilization

3 – 10 Years

By age 3, the microbiome resembles an adult-like profile but remains more plastic.

- 🛡 Immune education continues.
- ⚠ Vulnerable to antibiotics (can cause long-term shifts).

Remodeling

11 – 17 Years

Hormonal surges influence microbial composition.

Key Factors:

- Diet changes
- Stress / Sleep
- Metabolic demand

Mature State

18+ Years

Highly **stable** and resilient ("The Core"). Unique to the individual (like a fingerprint).

- ⚠ Dysbiosis now often driven by chronic lifestyle factors rather than transient events.

What Does Your Gut Microbiome Do ?

Interacts with many of your body systems:

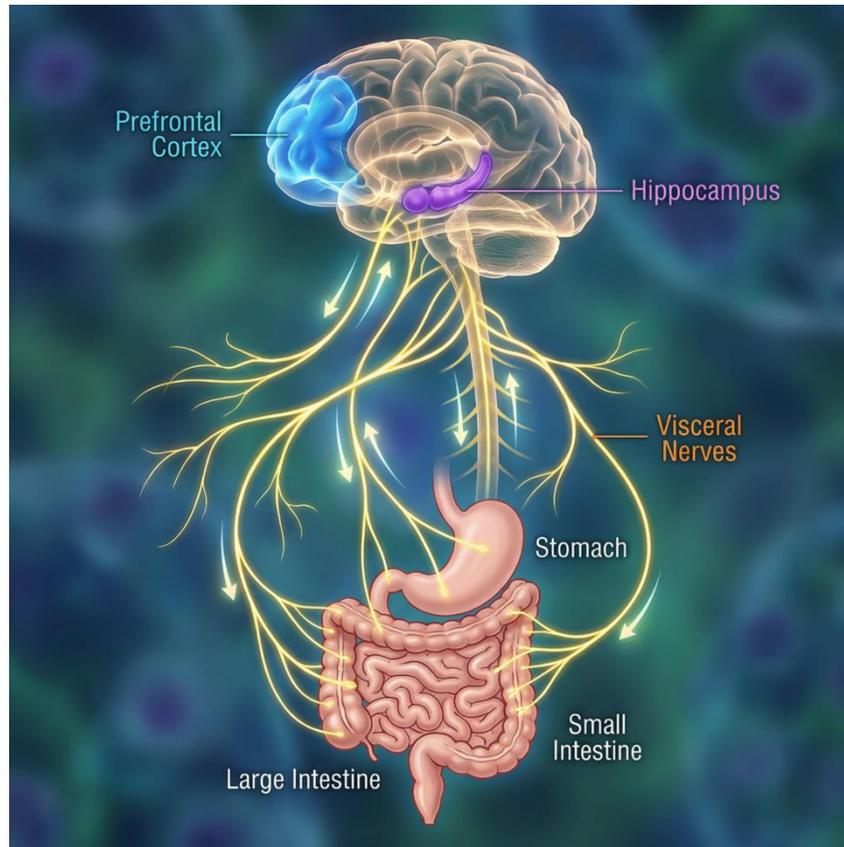
- Digestive
- Immune
- Nervous (Gut-Brain Axis)
- Endocrine (hormones)

Considered a **“functional organ”**.

The microbiome has distinct physiological and pathological states, and its alteration can lead to disease. The microbiome is inherited and undergoes dynamic changes throughout an individual's life, similar to other organs.

The Gut is More Than Digestion

The gut is the command centre for your immune system, nervous system and hormones.



Immune System

70-80% resides in the gut

Home to Peyer's patches and mesenteric lymph nodes. **The gut barrier is the primary educator of the immune system.**

Enteric Nervous System

200-600 Million Neurons

"**Second Brain.**" More neurons than the spinal cord. **>80% are located in the small intestine, controlling motility and sensing.**

Enteric Endocrine System

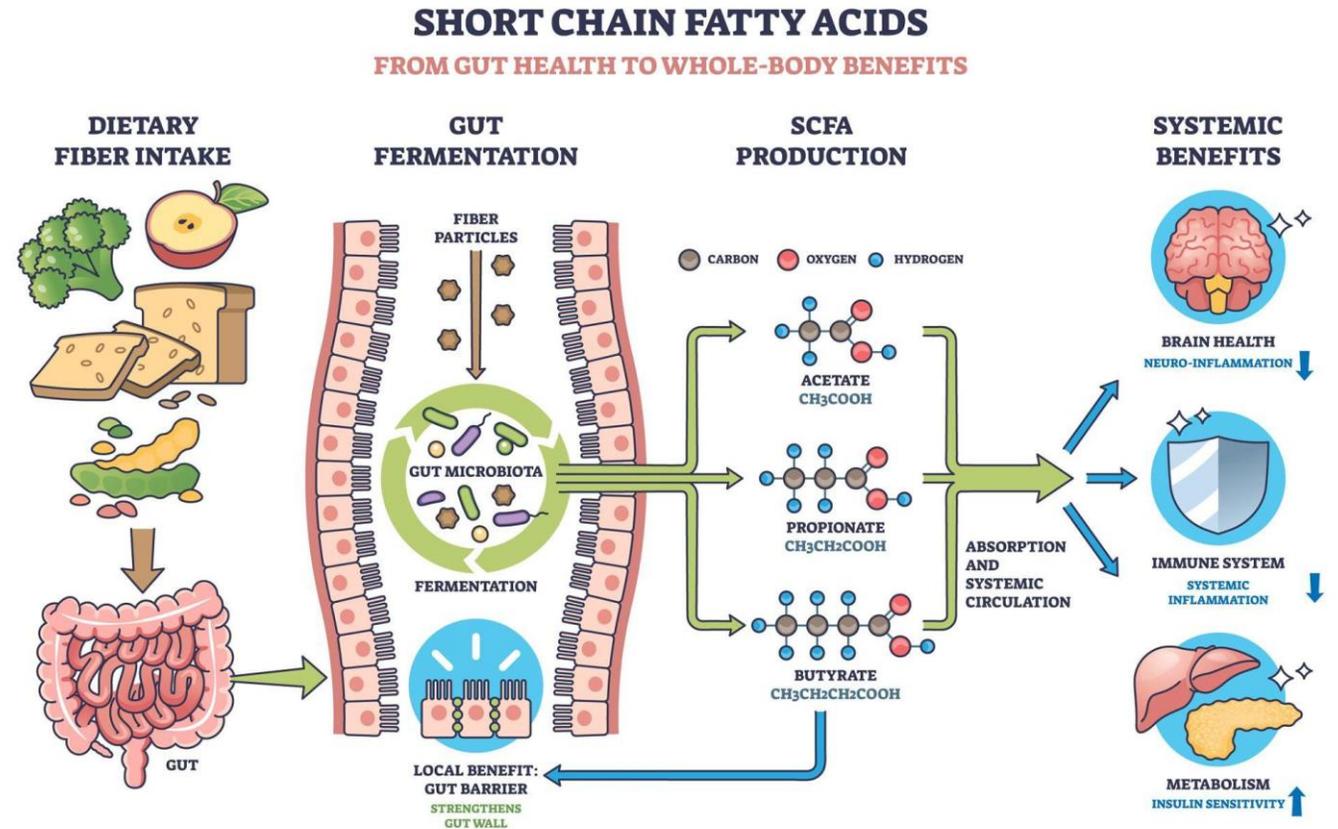
Largest Endocrine Organ

Control center for appetite and metabolism. Over 75% of activity happens in the small intestine (releasing GLP-1, PYY).

Digestive System – Breaking Down What You Can't

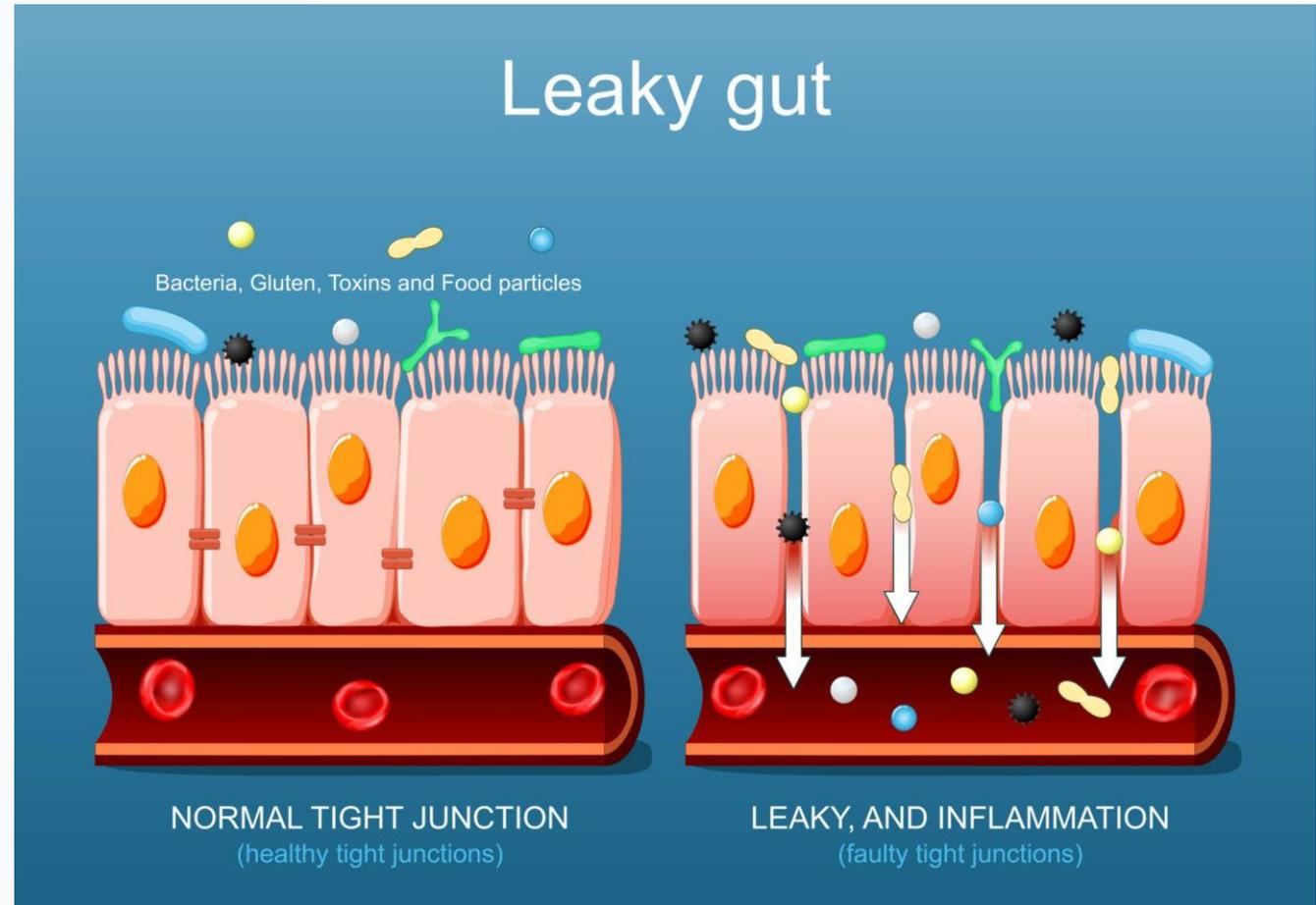
Gut bacteria helps:

- Break down complex carbohydrates
- Digest dietary fiber
- **Produce short-chain fatty acids (SCFAs)**
- **Synthesize vitamins B1, B9, B12 and K**
- Support fat digestion
- Help regulate cholesterol levels



Gut Microbiome & The Immune System

- The Digestive System is the largest immune organ
- **70–80%** of immune cells live in the gut
- Gut microbes **train** your immune system – help to distinguish friendly organisms from harmful ones
- Beneficial bacteria compete with harmful bacteria for nutrients
- **Strengthen** the gut barrier preventing “leaky gut” preventing toxins and bacteria from entering bloodstream



Controlling Inflammation

Gut Microbiome ferments fibre and produces:

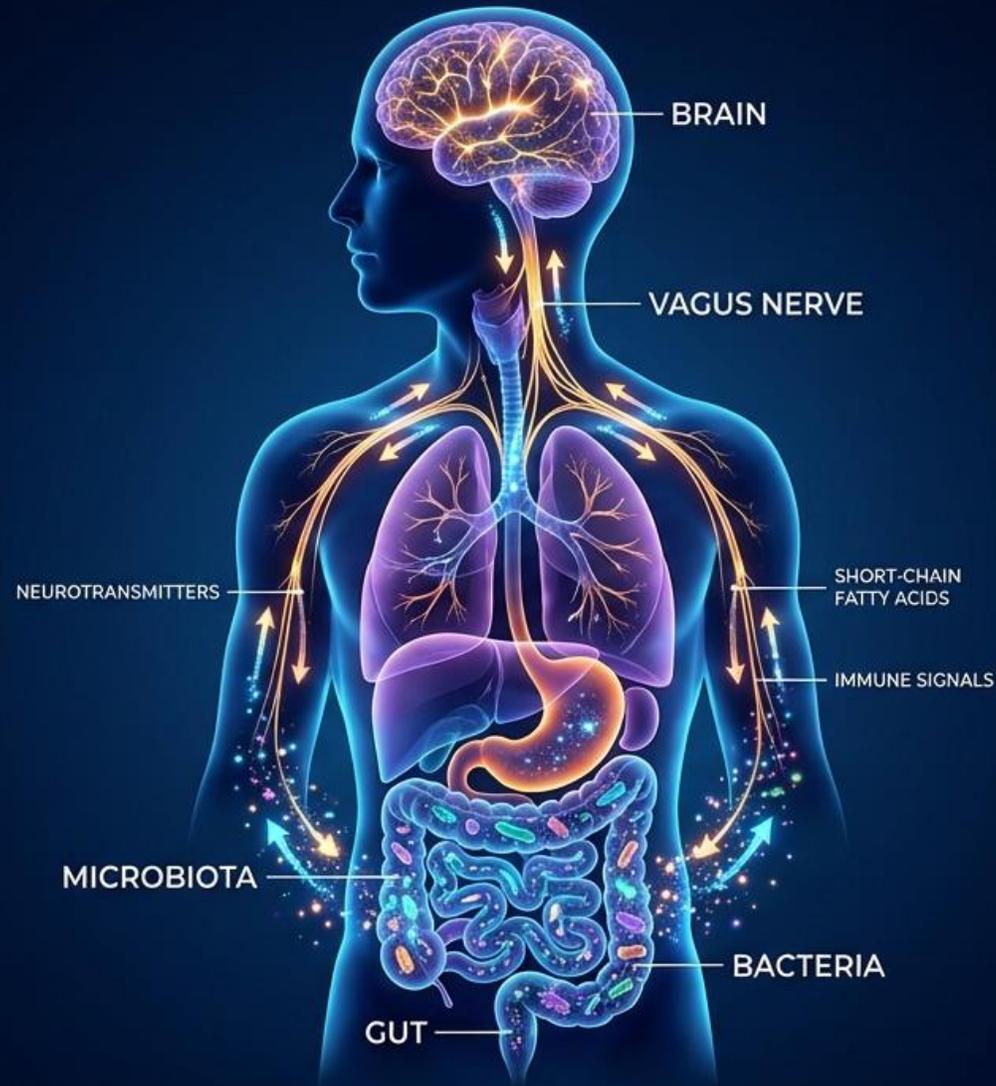
Short Chain Fatty Acids → **Protective Mechanisms**

- Strengthen gut barrier
- Prevent toxins from entering bloodstream and causing inflammation..

Chronic inflammation is linked to:



The Gut is More Than Digestion – Microbiota-Gut-Brain Axis (MGBA)



MICROBIOTA-GUT-BRAIN AXIS

How the Microbiota-Gut-Brain Axis works:

The Vagus Nerve = direct phone line

Microbiome (Gut bacteria) produces brain chemicals

80-90% of serotonin is made in the gut



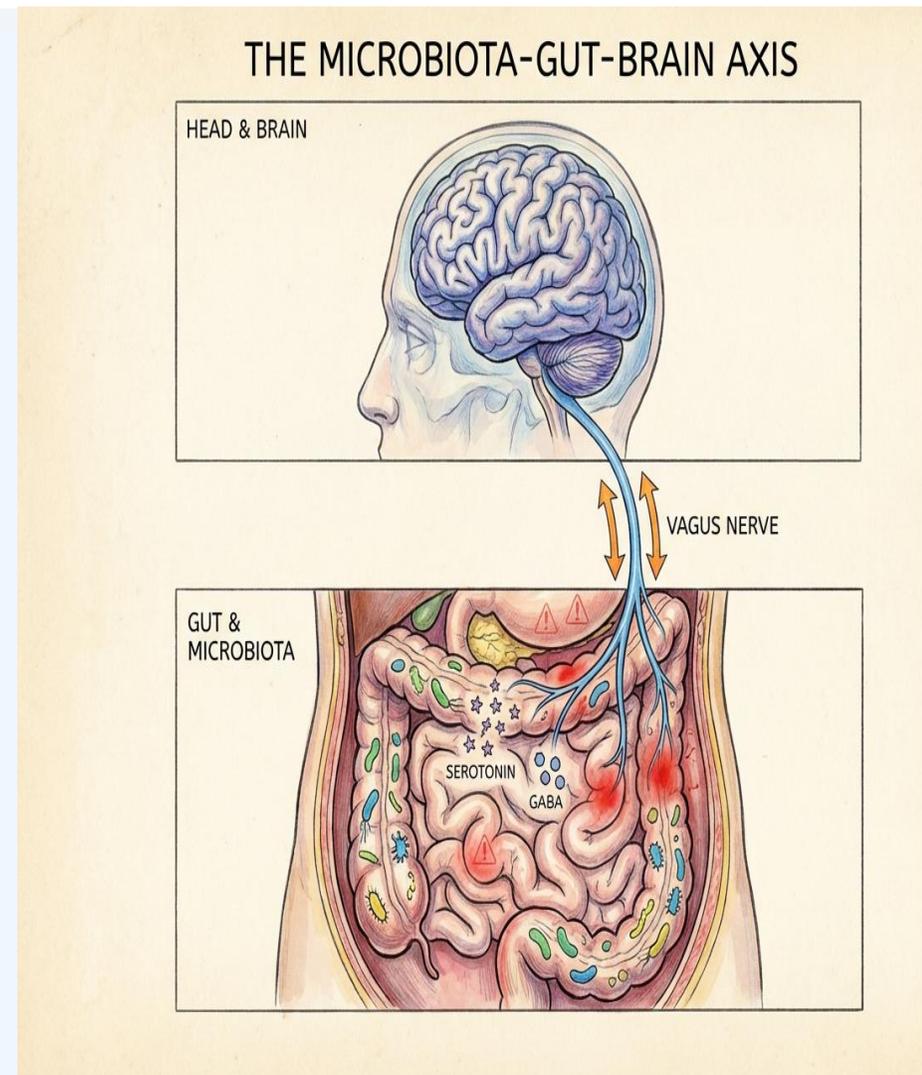
stimulate the vagus nerve and sends message to the brain



The brain then adjusts mood, anxiety level, appetite

Inflammation signals

- If gut microbes are unbalanced "dysbiosis", they irritate the gut lining
- The immune system releases **inflammatory chemicals**.
- Those chemicals reach the brain → fatigue, brain fog, low mood.



The Endocrine System: Hormones & Metabolism

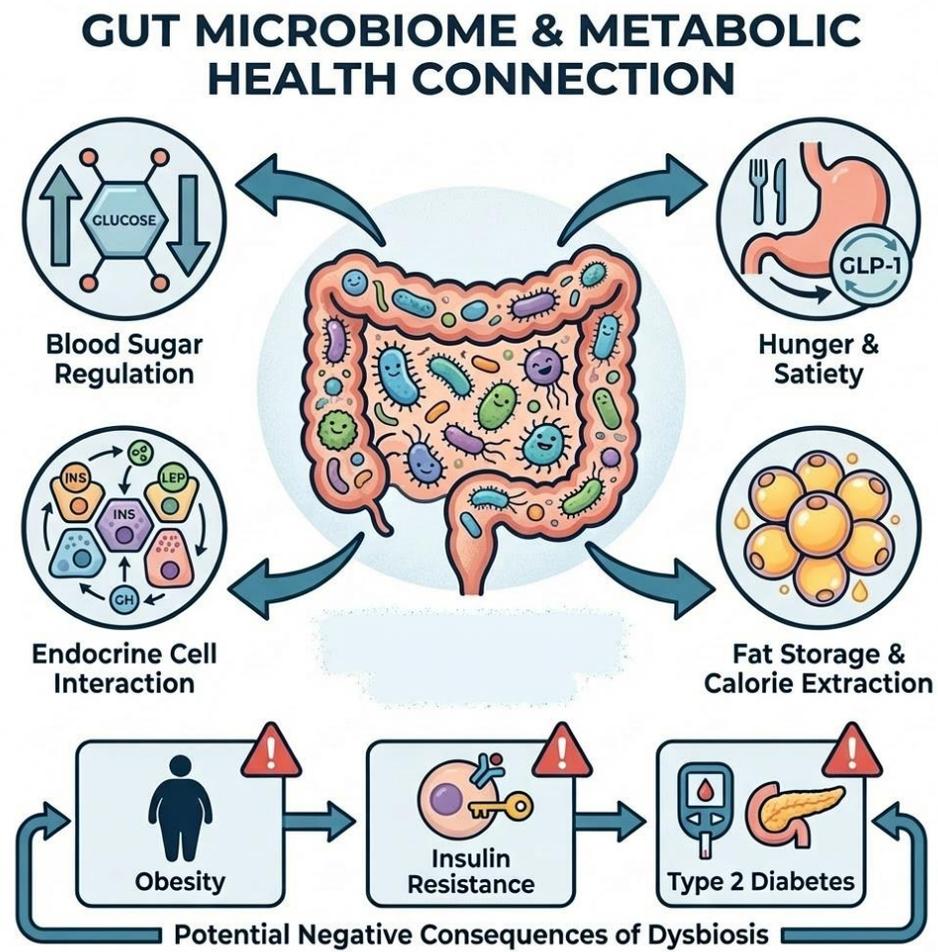
The gut is the largest endocrine organ.

Gut microbiome interact with endocrine cells in the gut lining that influence:

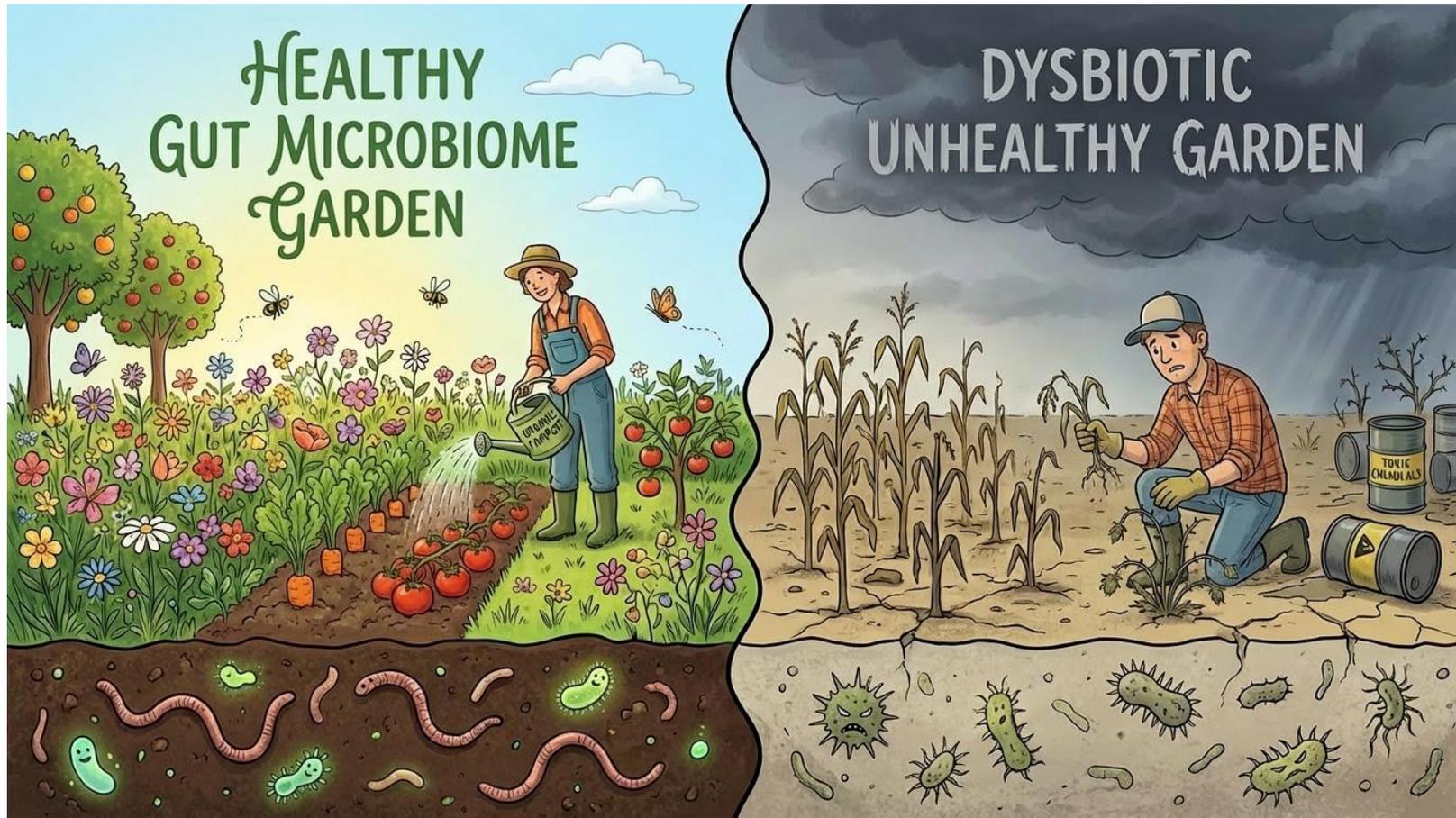
- Blood sugar
- Hunger – they influence satiety hormones
- Satiety – GLP-1
- Fat storage - they extract calories from food

Dysbiosis is linked to:

- Obesity
- Insulin resistance
- Type 2 diabetes



Your Microbiome is like a Garden

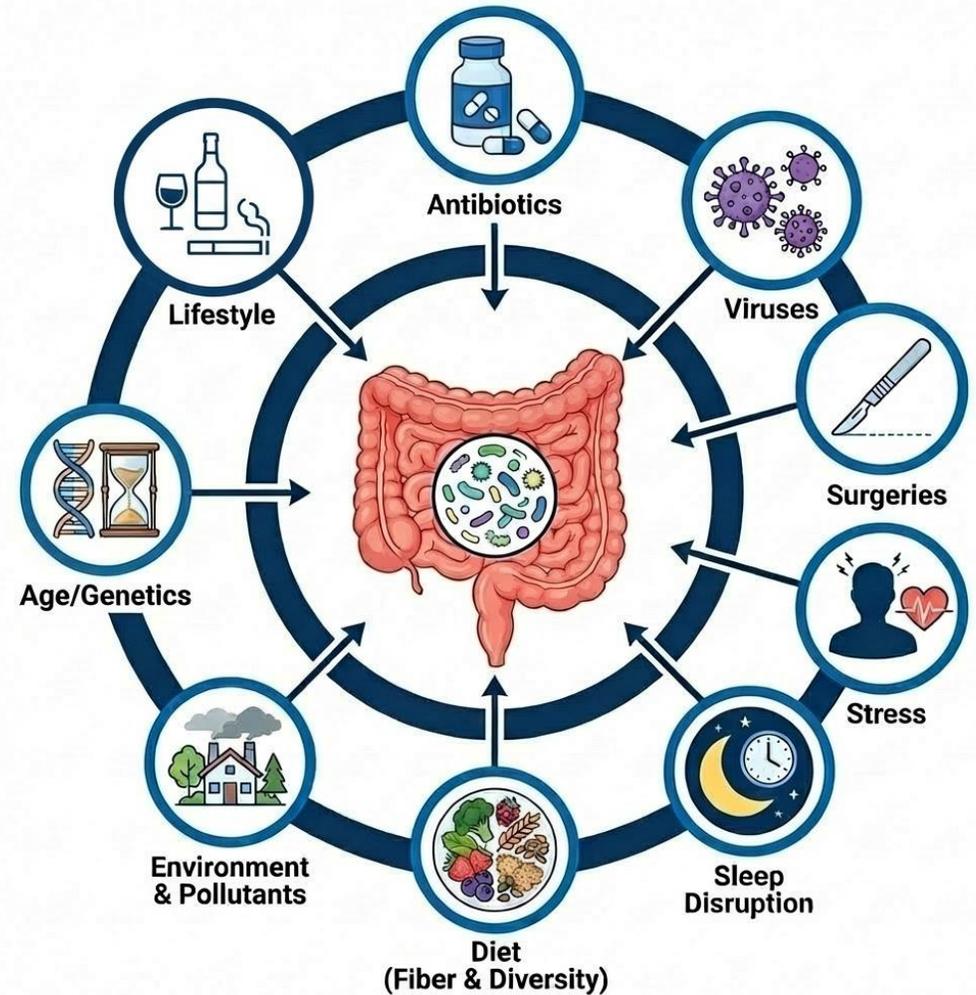


Seeds → microbiota

Fertilizer → fibre, polyphenols

The Microbiome can be disrupted by:

- Medications
- Antibiotics
- Viruses (e.g. SARS-CoV-2, enteric viruses)
- Surgeries
- Stress
- Sleep disruption
- Diet
- Age/Genetics
- Lifestyle



What is the Best Way to Support Your Microbiome

Aim for 30+ different plant food per week: (not servings but plant types)

(Vegetables, fruits, legumes, whole grains, herbs, spices, nuts, seeds)

Increase Prebiotic fiber = feeds the beneficial bacteria

(Oats, beans, lentils, onions, garlic leeks, flaxseed, barley, apples, turnips, asparagus, cooked then cooled potatoes/rice)

Incorporate Fermented foods

(yogurt with live cultures, kefir, sauerkraut, kimchi, miso, tempeh)

Probiotics — in certain situations (they have their time and place)

Important during and after antibiotic treatment, diarrhea, slow motility, if pathogenic bacteria are present.

Mediterranean-style diet:

- vegetables at most meals
- legumes several times/week
- Raw olive oil as main fat
- fish weekly
- fermented foods daily
- whole grains instead of refined

Daily Goals to Feed the Microbiome

Add one from each group every day

Root Vegetables: (*Repair the gut lining*)

Carrots • Beets • Turnips • Parsnips • Onions • Garlic • Sunchokes

Dark Leafy Greens: (*Restores immune bacteria*)

Kale • Swiss chard • Dandelion greens • Arugula • Beet greens • Fresh herbs

Beans & Legumes (*Restores longevity bacteria → Faecalibacterium*)

Lentils • Chickpeas • White beans • Split peas (Tip: Soaking improves tolerance)

Fermented Foods (*Re-seed microbes*)

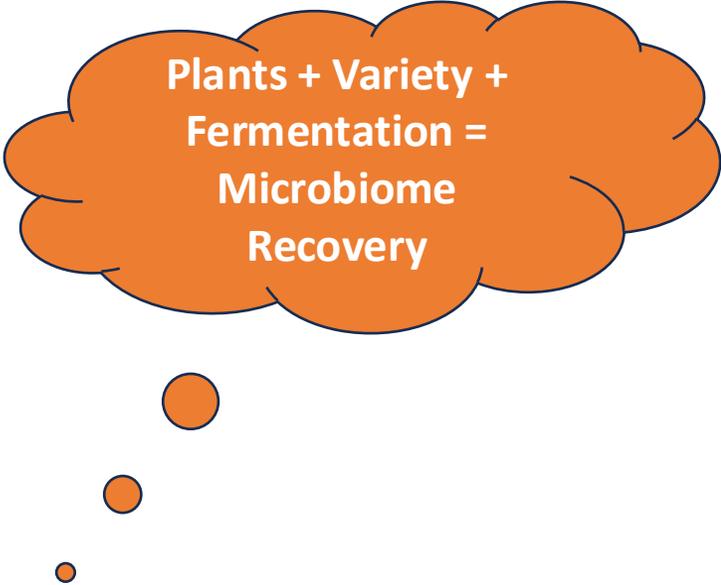
Sauerkraut • Kefir • Yogurt • Kimchi • Fermented pickles (forkful daily)

Colour (*Fertilizer – the darker, more bitter & more colourful → the higher its polyphenol content*)

Berries • Apples • Purple cabbage • Squash • Tomatoes • Peppers

Seeds & Tea (*Stabilize ecosystem*)

Flax • Pumpkin seeds • Walnuts • Green tea • Spices



Plants + Variety +
Fermentation =
Microbiome
Recovery

Diversity Drives Resilience



Organic Garden Diverse Ecosystem Ecosystem



High Resilience

Can withstand shocks and disturbances.



Nutrient Cycling

Efficient resource use across species.



Stability

Pathogens struggle to gain a foothold.

VS



Monoculture Farm Low Diversity



Fragility

One disease can wipe out everything.



Pest Susceptibility

No natural barriers to stop spread.



High Input Needs

Requires external chemicals to survive.



Microbiome Takeaway:

A diverse microbiome is more resilient, metabolically flexible and less inflammatory

Lifestyle Factors that Matter as Much as Food

Factor	Effect
Regular Sleep Schedule	Stabilized Microbiome rhythms
Physical Activity	Increases butyrate-producers
Time Outdoors	Increase Microbial diversity
Chronic Stress	Reduces beneficial species

Takeaways & Next Steps

Cultivate Your Ecosystem

Diversity is Key: Aim for 30 different plants per week. Prioritize fibre and resistant starch to feed your microbes.

-  **Add Fermented Foods:** Kimchi, sauerkraut, kefir, and yogurt introduce transient beneficial bacteria.
-  **Reduce Disruptors:** Limit ultra-processed foods, excess sugar, and unnecessary antibiotic use.
-  **Prioritize Lifestyle:** Sleep, movement, and stress management directly impact microbial composition.



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