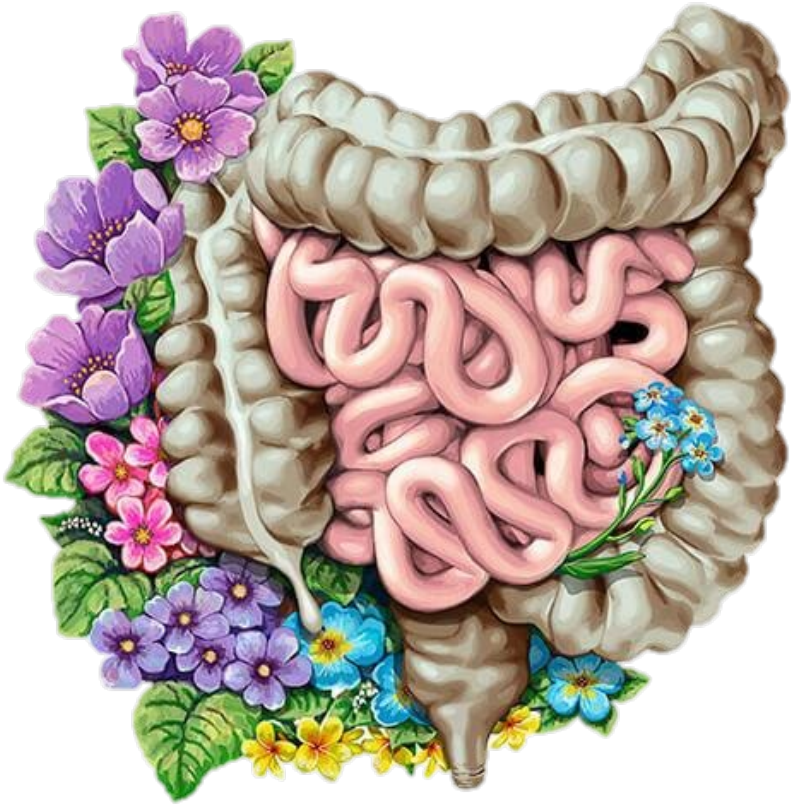
The Good Gut: How to Build and Maintain a Healthy Microbiome

October 1, 2026



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What is the microbiome?

Why does it matter?

How can I build and protect it?

Peery AF, et al. Gastroenterology 2025. 168(5):1000-1024.

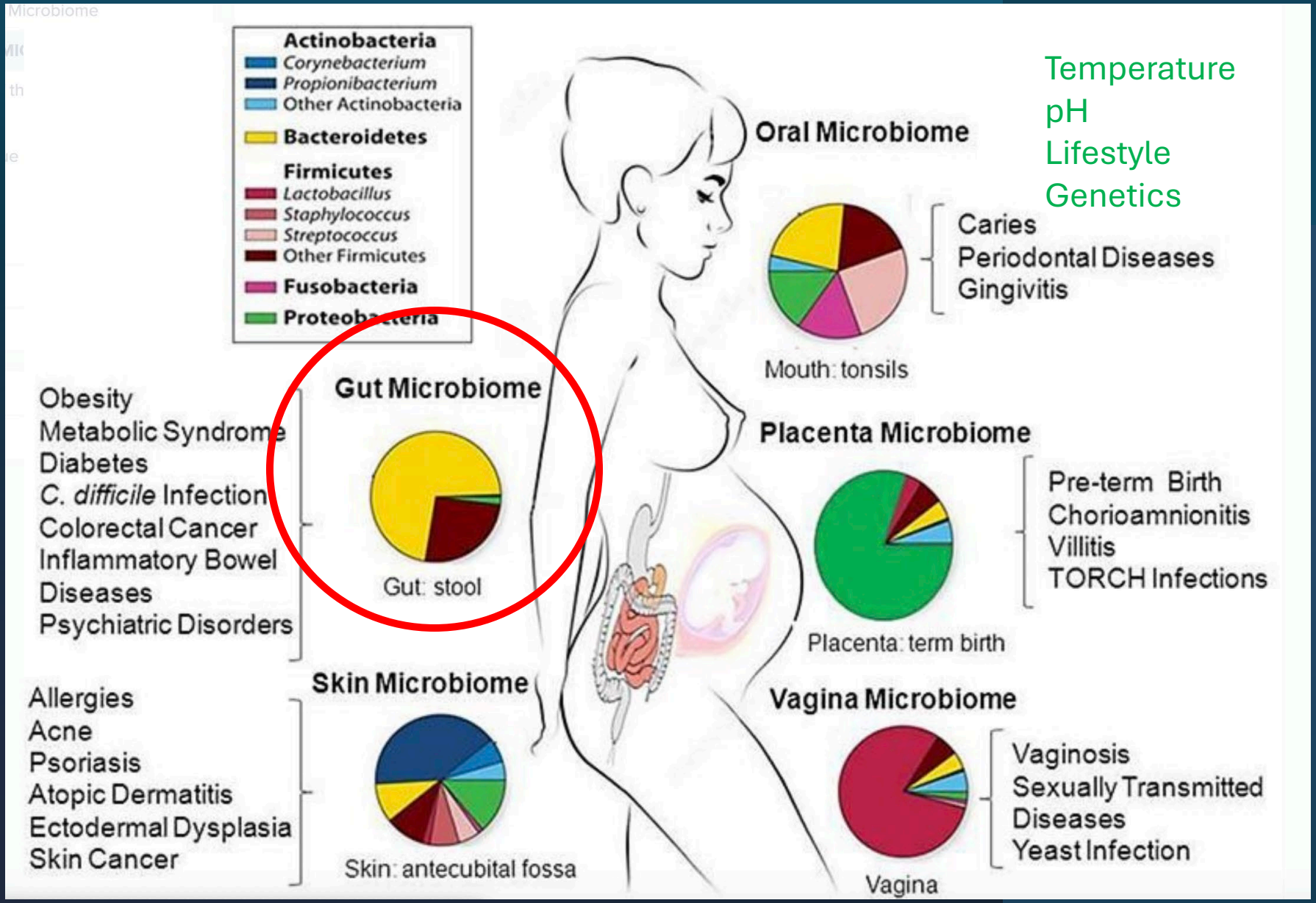
The Gut Microbiome

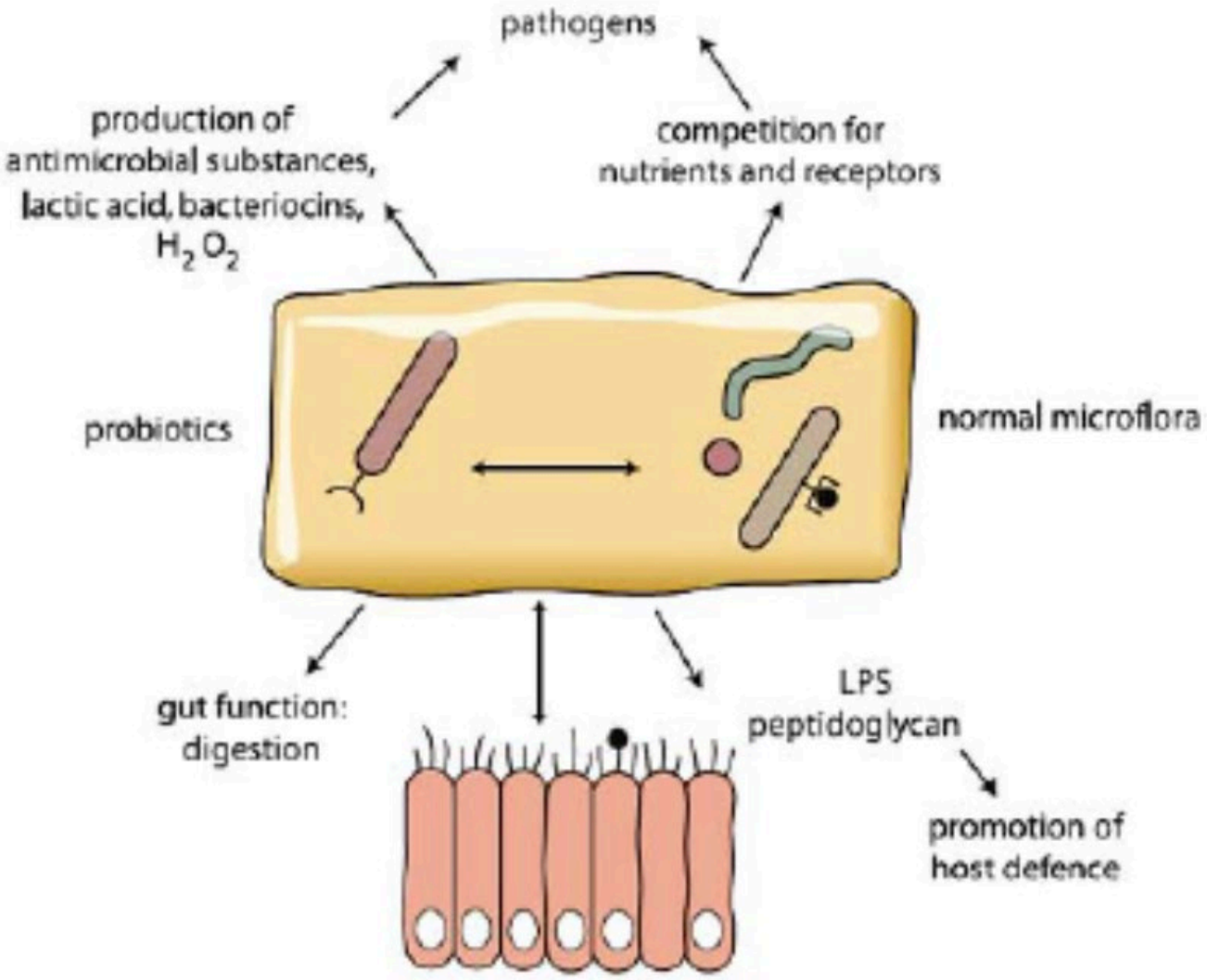
Complex ecosystem of more than 100 trillion microorganisms living deep in your lower intestines - composed of viruses, bacteria, and fungi

Human Microbiome Project

Federally funded NIH research from 2012-2016

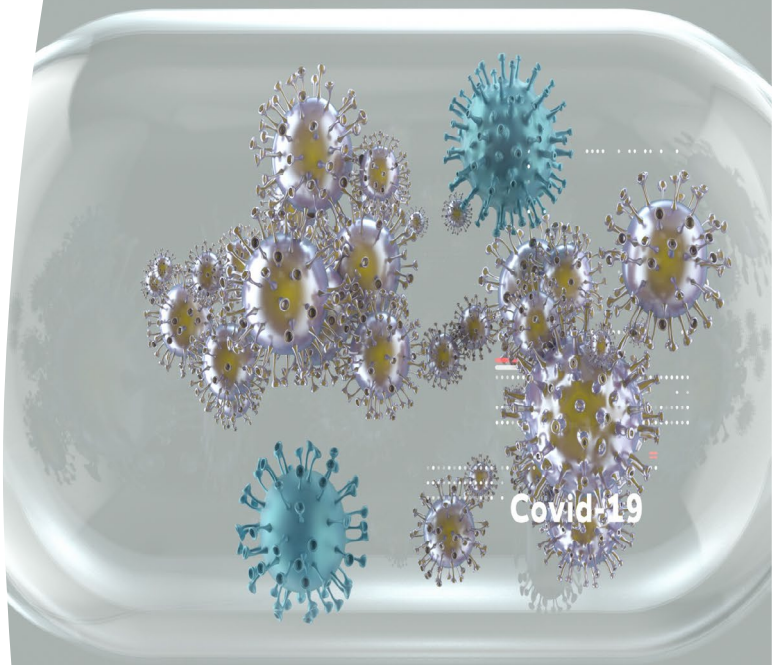
- Phase 1: Understand the microbial communities that live in and on the human body, and their impact on human health and disease
- Phase 2: Investigate the dynamic changes in the microbiome and host under specific conditions


Actinobacteria
Corynebacterium
Propionibacterium
Other Actinobacteria
Bacteroidetes
Firmicutes
Lactobacillus
Staphylococcus
Streptococcus
Other Firmicutes
Fusobacteria
Proteobacteria
Temperature
pH
Lifestyle
Genetics
Oral Microbiome
Caries
Periodontal Diseases
Gingivitis
Mouth: tonsils
Gut Microbiome
Obesity
Metabolic Syndrome
Diabetes
C. difficile Infection
Colorectal Cancer
Inflammatory Bowel Diseases
Psychiatric Disorders
Gut: stool
Placenta Microbiome
Pre-term Birth
Chorioamnionitis
Villitis
TORCH Infections
Placenta: term birth
Skin Microbiome
Allergies
Acne
Psoriasis
Atopic Dermatitis
Ectodermal Dysplasia
Skin Cancer
Skin: antecubital fossa
Vagina Microbiome
Vaginosis
Sexually Transmitted Diseases
Yeast Infection
Vagina


pathogens
production of antimicrobial substances, lactic acid, bacteriocins, H_2O_2
competition for nutrients and receptors
probiotics
normal microflora
gut function: digestion
LPS peptidoglycan
promotion of host defence

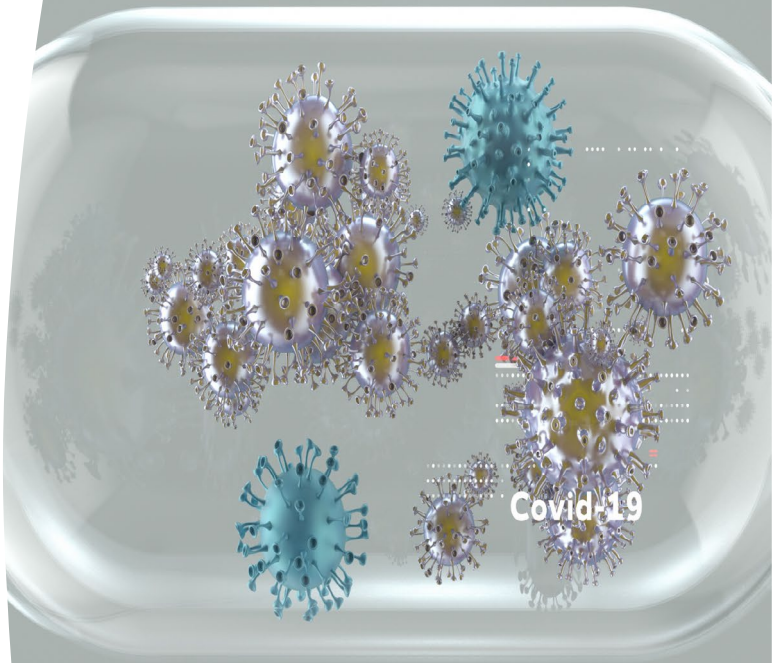
Immunologic benefits

- Activate local macrophages to increase Ag presentation to B lymphocytes, increase IgA
- Modulate cytokines
- Induce tolerance to food antigens



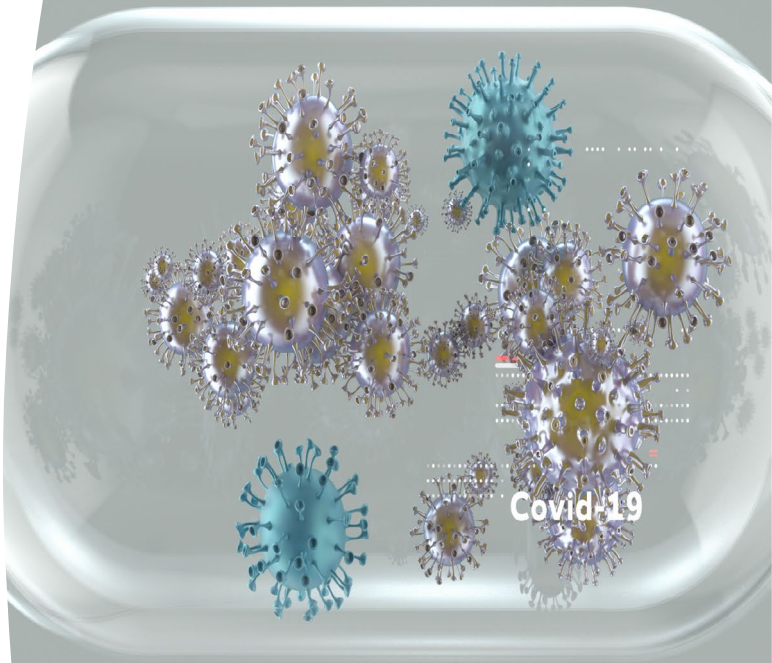
Nonimmunologic benefits

- Digest food and compete for nutrients with pathogens
- Alter local pH – unfavorable to pathogens
- Produce bacteriocins to inhibit pathogens
- Scavenge superoxide radicals



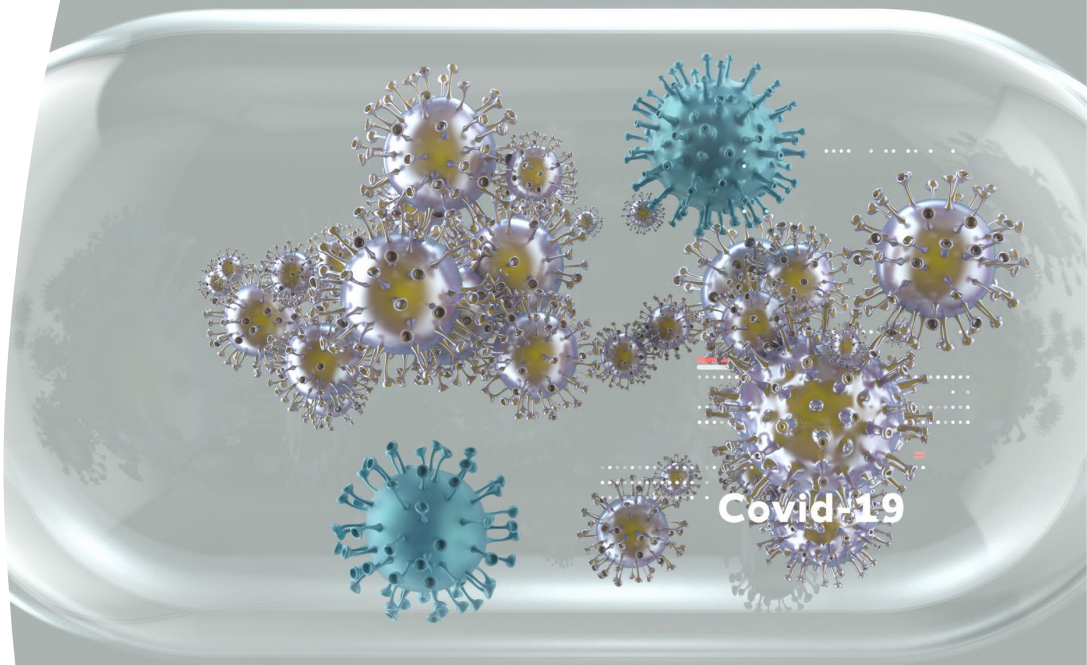
Nonimmunologic benefits

- Stimulate mucin production
- Enhance intestinal barrier function
- Compete for adhesion with pathogens
- Modify pathogen-derived toxins



What do they do?

- Train our immune system
- Break down toxins
- Modulate the nervous system – connection between your gut, your nervous system, and your brain



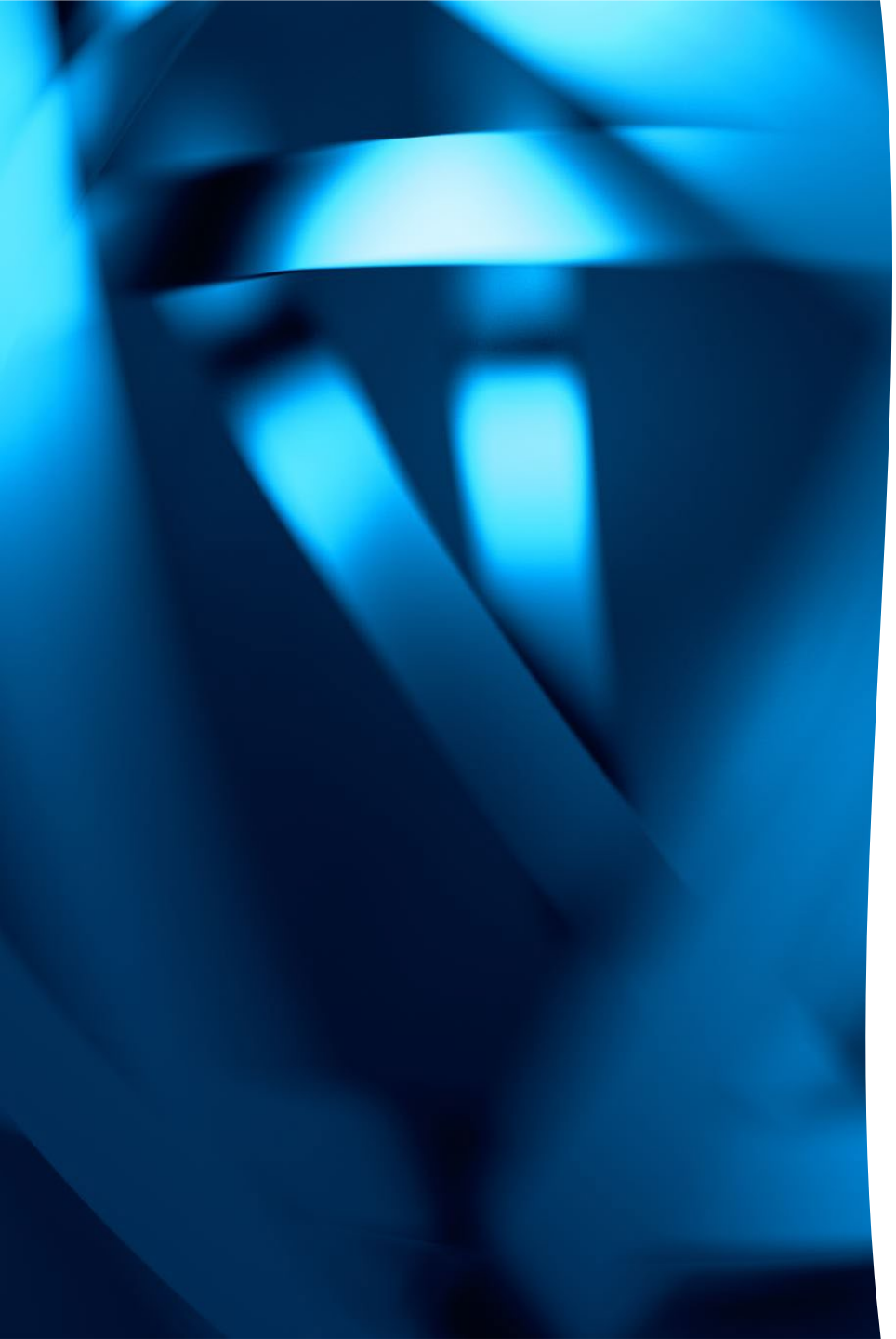
How is it gathered?

Vaginal birth – infant's microbiome is from the mother; rectal, vaginal, oral and skin

Lactobacillus, Prevotella, Sneathia - then Bifidobacteria, Bacteroides, Strep, Enterococcus, and others that mimics the household

C section – mother's skin, oral sources, plus the environment*

Staph, Propionibacteria, Corynebacteria and statistically less Bifido, Bacteroides; then the household



How do we keep it?

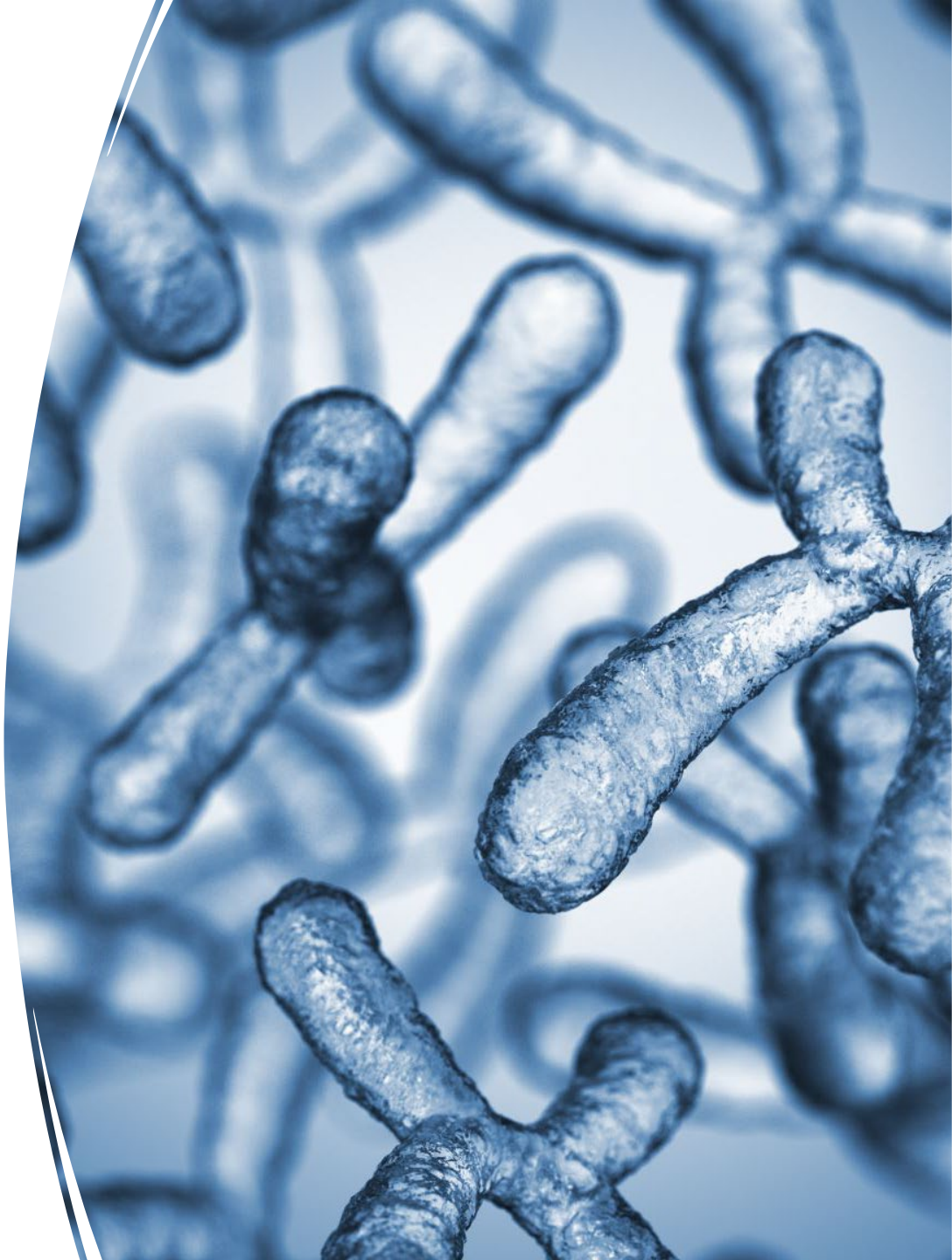
- They must be fed
- Movement helps
- Antibiotic/medication stewardship

Infants

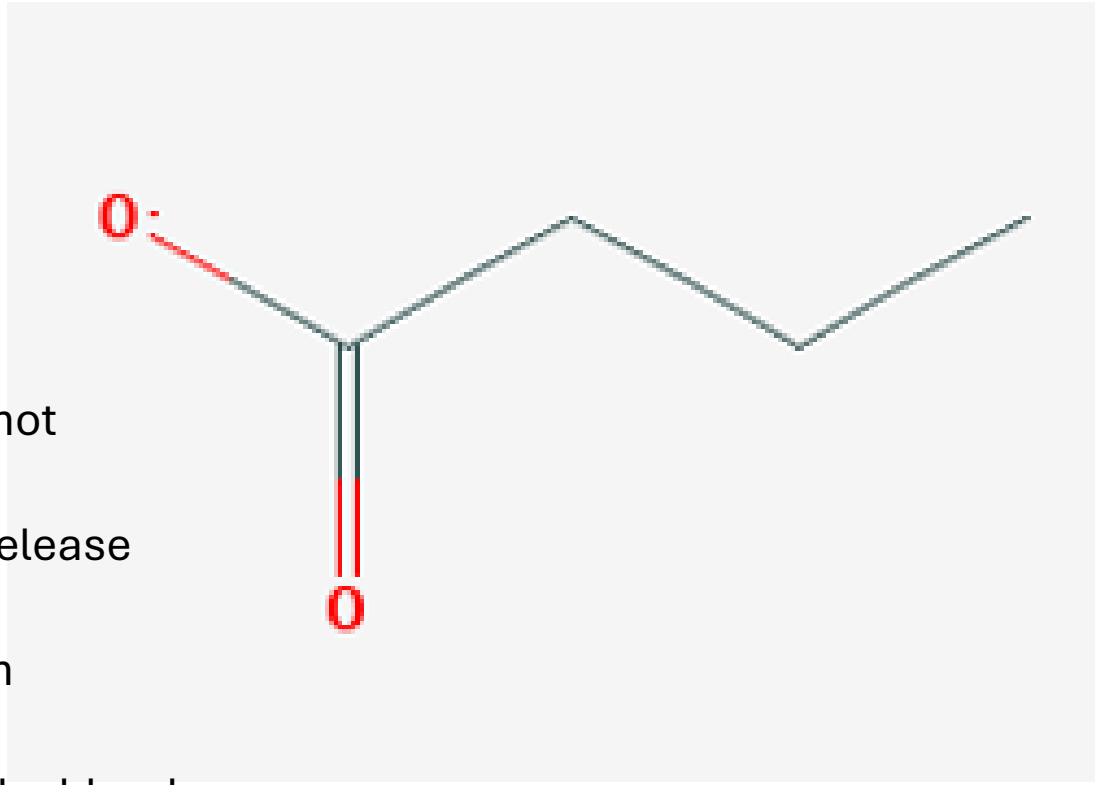
- Breastmilk
  - The ideal source
  - Human milk oligosaccharide (HMO) is a prebiotic that is indigestible to humans and feeds beneficial bacteria (Bacteroides, Bifidobacteria)
  - Streptococcus and Lactobacillus spp. contribute to pH
  - HMO and pH - protective against pathogenic bacteria
- Infant Formula
  - High Bacteroides and Bifidobacteria
  - High density of Streptococcus, Staphylococcus and Clostridium spp.
  - Clostridium – associated with atopy

Children and Adults

- Bacteria break down high fiber oligosaccharides
- Release SCFAs like acetate, propionate, and butyrate



Butyrate



- 70% of energy production for colonocytes
- Without it, the cell lining cannot function
- Trigger local immune cell to release anti-inflammatory cytokines
- Plays a role in glucose/insulin regulation
- Leaves the gut and crosses the blood-brain barrier
  - Associated with the prevention of psychiatric disorders and dementia

Older adults – Inflamm-aging

- Pro-inflammatory state characterized with low-grade (sterile) inflammation, as a physiologic response to life-long antigenic stimuli
- Uncontrolled activation of innate immune response that leads to cytokine release syndrome, tissue damage, and adverse outcomes
- More antibiotic use – hospitalizations, etc.
- Environmental exposure
- Less movement - exercise Is associated with an increase in diversity

Nutritional factors

- Decrease in quality and diversity of diet
- Digestive ability (meds, chronic illness)
- Mouth changes (loss of teeth, decreased saliva, alteration in taste)
- Atrophic gastritis
- Chronic illness
- Depression
- Isolation
- Loss of iADLs

Where do you live?

Patients who stay in hospitals, rehab centers and long-term residences show a marked change in microbiome

- Decrease in SCFAs
- Decreased diversity
- Increase in frailty
- Increase in potential GI pathogens

Medication use

- Antibiotics - lead to dysbiosis
  - Increase in obesity, metabolic syndrome, loss of immune tolerance
  - May lead to autoimmune diseases
- MANY drugs affect the microbiome
  - PPIs
  - Hormones
  - Anti-arrhythmics
  - Contrast media

Clinical implications

Diarrhea treatment and prevention

- Acute diarrhea
- Antibiotic-associated diarrhea
- Prevention of *C. difficile* diarrhea
- Treatment of radiation-induced diarrhea

Bowel issues/ disease

- Pouchitis
- Colic – *L.reuteri* and *B. animalis*
- IBS – good data, gas and bloating
- Necrotizing enterocolitis in preterm neonates
- UC/Crohn's – some data but not great

Autoimmune diseases

- RA – differences in microbiome
- SLE – mouse models
- MS – growing data
- Parkinsons – early data

Cancer

Periodontal disease associated with pancreatic cancer, lung, bladder, oropharyngeal, esophageal, kidney, stomach, liver

H pylori - major cause of Mucosa-associated lymphoid tumors MALT and non-cardia gastric carcinoma

Modulation of immune check point inhibitors by microbial metabolites

Higher diversity of gut microbiota = lower pt mortality after bone marrow transplant

Well then, feed it…

Microbiota Accessible Carbohydrates (MACs)

- Whole grains
- Fruits and vegetables
- Beans
- Dairy and fermented dairy
- Small amounts of pasture-raised meat
- Small amounts of fish

Good food, good fiber

Average American (Standard American Diet – SAD) has 8-10 g daily

Recommended	
Women 25 g	Men 38 g

How do we grow it well?

- Consumption of friendly bacteria, fermented foods that are rich in friendly bacteria
- Foods that selectively feed the friendly bacteria
- Probiotics

Probiotic Foods

- Pickles
- Sauerkraut
- Soy Milk (added probiotics)
- Tempeh
- Yogurt
- Kefir
- Kimchi
- Kombucha Tea
- Milk Products (added probiotics)
- Microalgae
- Miso Soup
- Natto

Add a fruit or vegetable every time you put something in your mouth

Are we too sanitary?

Increase exposures to pets, gardens, dirt in general

Fecal Microbiota Transplantation

- An infusion into the colon, or the delivery through the upper GI tract, of stool from a healthy donor to a recipient with a disease believed to be related to an unhealthy gut microbiome.
- Best data is with *C. difficile* infection
  - Moderate refractory *C. diff* after 1 week or severe after 48 h
  - Better than vancomycin with a 92% cure rate
- Ulcerative colitis – 55% response with 20% remission
- Being considered for obesity, IBS, metabolic steatohepatitis, hepatic encephalopathy, neurological diseases

FMT Donation

- Donors screened for parasitic, viral and other infections
  - No antibiotic use for 6 months
  - No travel to tropical region for 3 months
  - No atopic illness
  - Donor stool from 2 sources
  - Universal donors most commonly used
- 50 g stool donated – diluted in saline – shaken or blenderized – filtered through sterile gauze – stored fresh or frozen

FMT Procedure

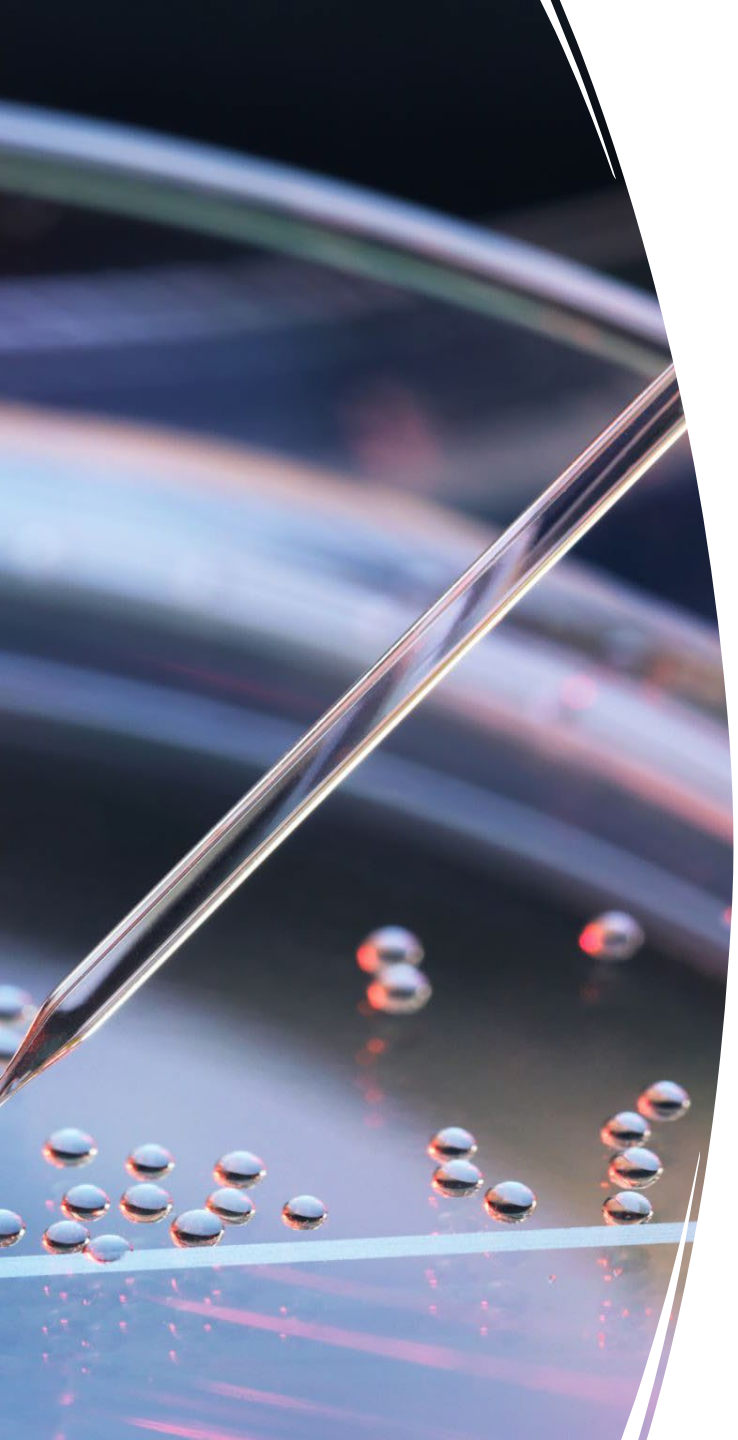
- Antibiotics to treat C. diff 3 days before transplantation
- 50 g diluted to 250-500 mL infusate
- Usually delivered by colonscopy
- Can be delivered by capsule but about 70% cure rate
- Side effects
  - Bloating, post-infectious IBS
  - Loose stools x 48 h
  - No stool testing with firm stool
- 25% failure rate week 1
- Another group 40-60% weeks 2-4

Fecal transplant v. Probiotics

Oral administration of probiotic bacteria rapidly diminishes with only 50% of the original strains present after 3 weeks of administration

FMT is felt to have a long-term influence on the reestablishment of the intestinal microbiota in recipients

Probiotic use needs to be perpetual to reap its benefits whereas FMT generally needs only 1 treatment for Clostridium difficile infection.



Stool sampling

- May not be accurate
  - Some pathogens cling to and invade mucosal epithelium
  - Some are protected by biofilms
  - Intestinal bx may be necessary

Probiotics

1. Decide what strain you need for the condition
2. Determine the dose
3. Choose a pure, tested product
4. Store them appropriately

Gut dysbiosis now linked to poorer outcomes with BMT

- Study at MD Anderson every 5 g of fiber increased survival

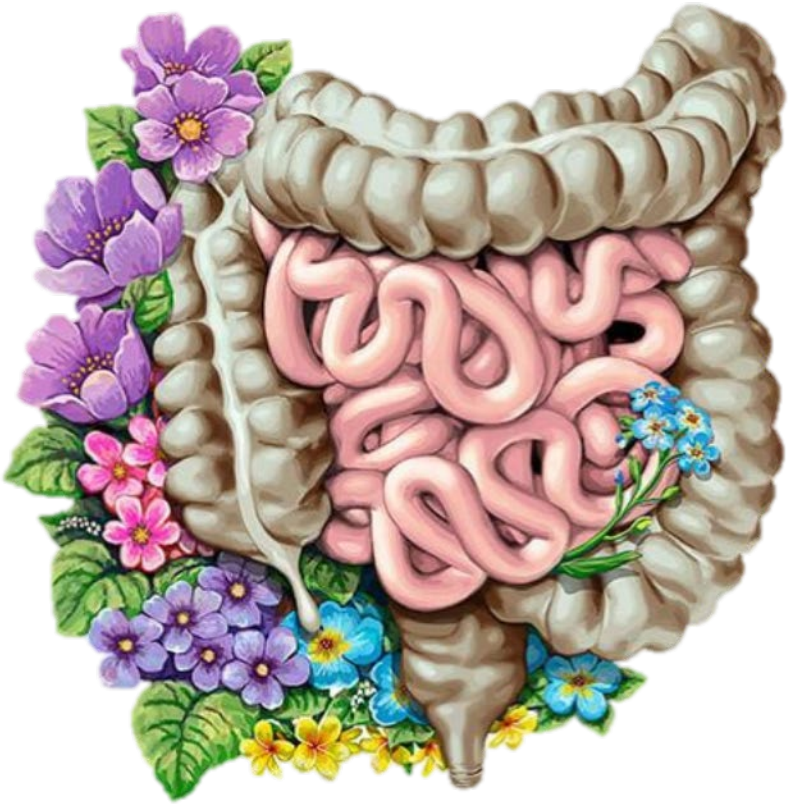
Resources

The Good Gut by Justin and Erica Sonnenberg

www.USprobioticguide.com – independent reviews of probiotics by application

World Gastroenterology Organisation - practice guidelines on probiotics and prebiotics

Thank you



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