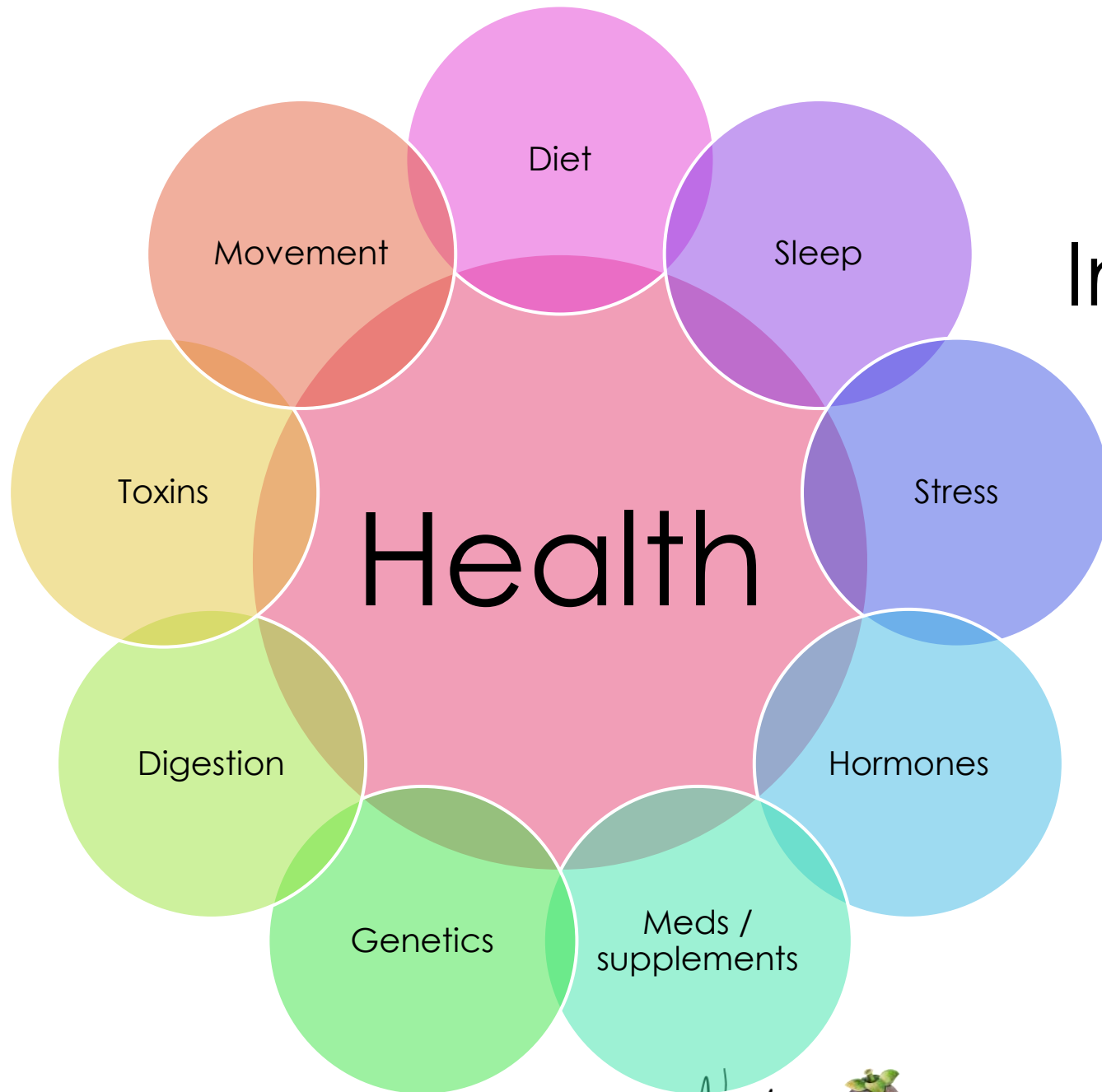




Mitigating Pain via the Microbiome

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Integrative Nutrition

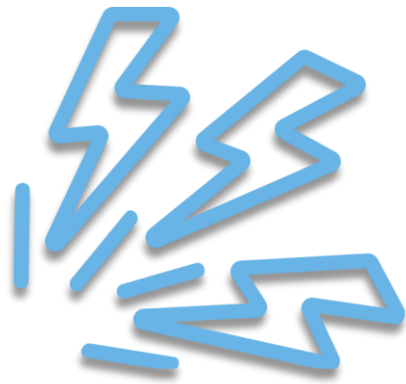
Health is a journey not a destination.



Disclosures

- ▶ Fullscript
- ▶ Nielsen Nutrition
 - ▶ Microbiome Course
 - ▶ Gut Healing and Foundations
 - ▶ Private Practice

Objectives



Part 1:

Microbiome and Pain: the facts



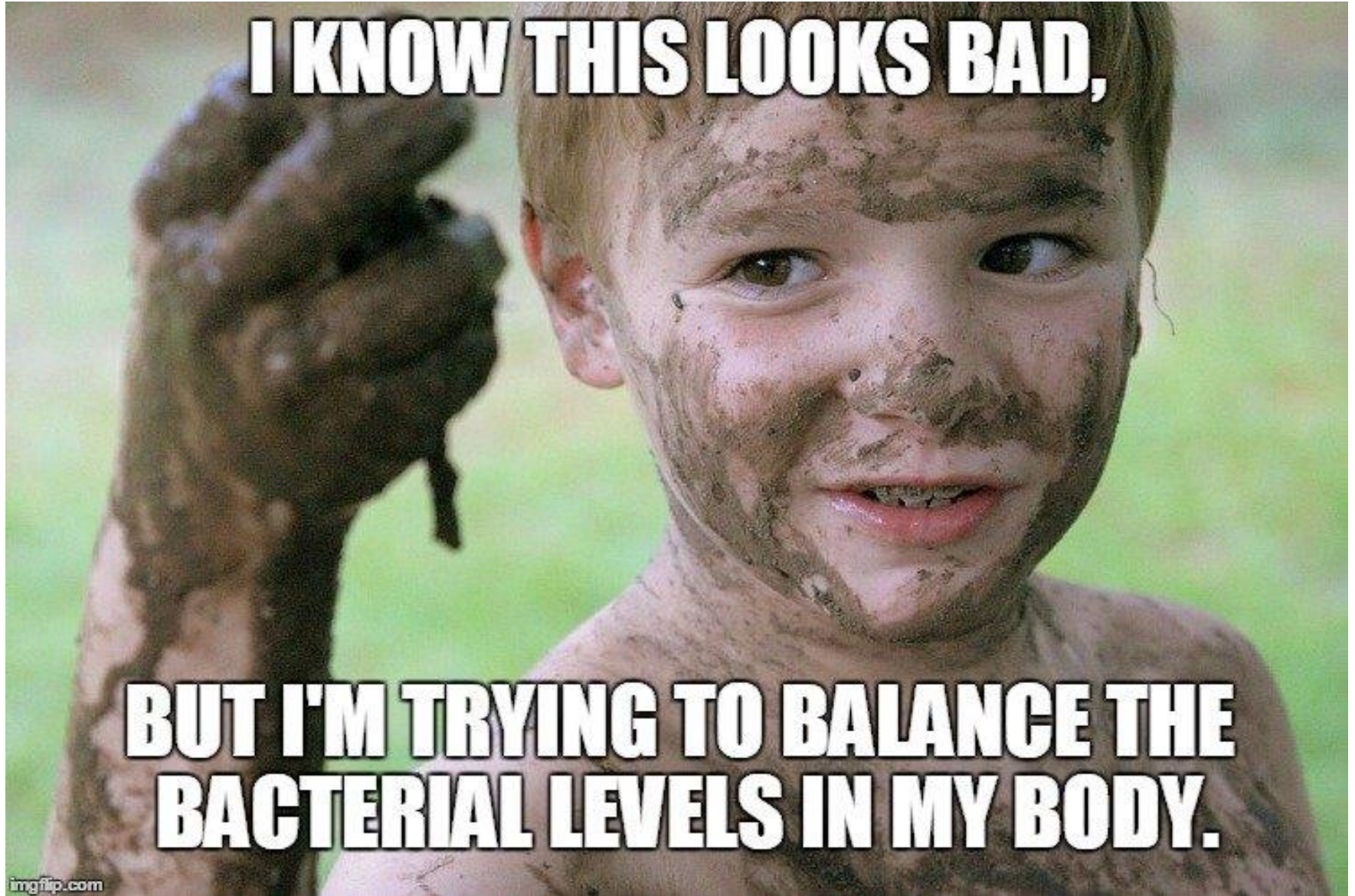
Part 2:

Identifying Dysbiosis: the story



Part 3:

Implementing Strategies: the fix





Part 1: The Microbiome

DEFINITION. CONNECTION TO PAIN. GUT BRAIN.

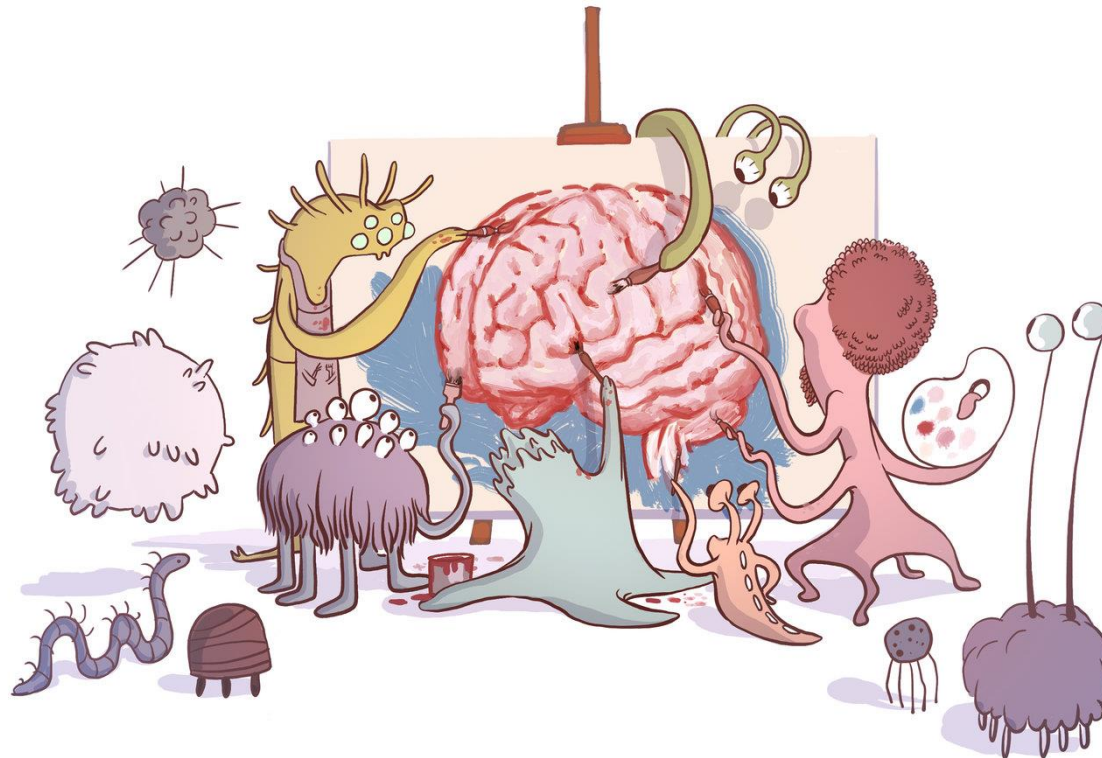
What is the microbiome?

10:1

5lbs

63%

99:1



bacteria

eukaryotes

archaea

fungi

viruses

Balance...

“Properly managing all these different species is called ‘Good HEALTH!’”

Mutual: if two species interact and both benefit

Commensal: when two species interact, and one benefits

Parasitic: one benefits while the other suffers

▶ –Rodney Dietart, PhD

▶ *The Human Super-Organism: How the Microbiome is Revolutionizing the Pursuit of a Healthy Life*

Microbiome and Pain

“Growing evidence shows that GM is a crucial modulator of human physiological homeostasis, playing a not-fully-understood but undoubtedly significant role in systemic inflammation, immunity, circadian rhythm, and regulation of hormone levels; all these aspects of homeostasis have been linked to pain.”

GM has been associated with:

MSK Visceral Inflammation Head-ache Neuro-pathic Chronic Opioid tolerance

Table 2 GM metabolites as possible contributing mechanisms of pain

Hormones (or compounds acting as hormones)			References	
<i>Direct effect from GM</i>	Short chain fatty acids	Butyrate	[69, 82]	
		Propionate	[69, 82]	
	Neurotransmitters	Serotonin	[83]	
		Dopamine	[84, 85]	
		Noradrenaline	[86]	
		Glutamate	[87, 88]	
<i>Indirect effect from GM</i>	Hypothalamic–pituitary–adrenal axis (HPA)	GABA	[87, 88]	
		Cortisol	[89]	
		GI hormones	Leptin	[90–92]
			Ghrelin	[93]
	Vitamins and nutrients			References
D			[94, 95]	
B1-Thiamine			[96]	
B2-Riboflavin				
B3-Nicotinic acid				
B5-Pantothenic acid				
B6-Pyridoxine				
B7-Biotin				
B9-Folic acid				
B12-Cyanocobalamin			[96, 97]	
para-aminobenzoic acid			[96]	
Inositol				
choline				

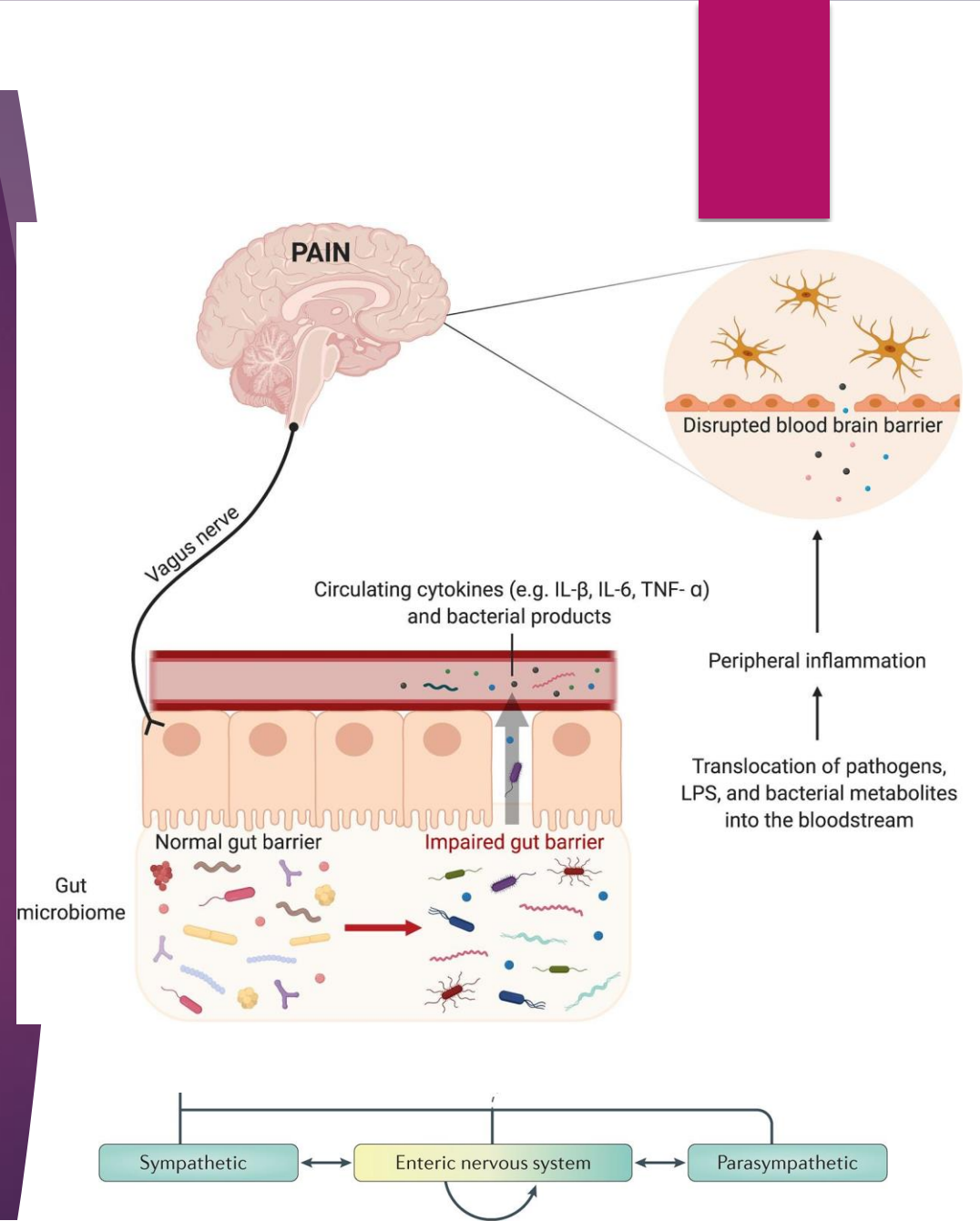
- ▶ SCFA (derived from commensal bacteria) by innate immune cells regulates inflammatory response not only to intestinal injury but also in models of arthritis
- ▶ *Lactobacillus planterum*: highly adaptable species, highly adhesive, increases butyrate (SCFA), reduces inflammation, eats toxins = produce nutrients (b-vitamins, enzymes)

- ▶ Inflammatory cytokines / immune antibodies
 - ▶ Bound together “immune complex”
- ▶ Microbiome can regulate visceral pain (generation / modulation) and studies continue to show microbiome is essential to healthy and normal functioning sensitivity to pain

Gut Brain: ANS

Enteric Nervous System & Vagus Nerve

► “Bidirectional signaling between gut bacteria and the brain via the vagus nerve plays a role in modulating microglial proliferation and activation. Impaired gut barrier function permits leakage of bacterial products into the systemic circulation, causing a peripheral immune response and subsequent microglial activation. Cytokines and immune cells can activate microglia either by directly crossing the intact BBB or through regions of enhanced permeability. Through these routes, microglia are activated and contribute to the production of chronic pain.”



Part 2: the story

HOW MANY SEQUELS ARE IN A TRILOGY?

Dysbiosis

Quantity & Diversity

Genetics

Tight junctions
FUT2
Celiac
NOD2
LCT

Birth / Infancy

Vaginal / Caesarean
Breastfeeding
Formed by age 3
Antibiotics

Geography

Exposure
Access to Nature
Culture
Access to fresh food

Toxin Exposure

Literally too many to mention...

Diet

SAD Diet
Mediterranean
Eating schedule
Food Security
Inflammatory Foods

Lifestyle

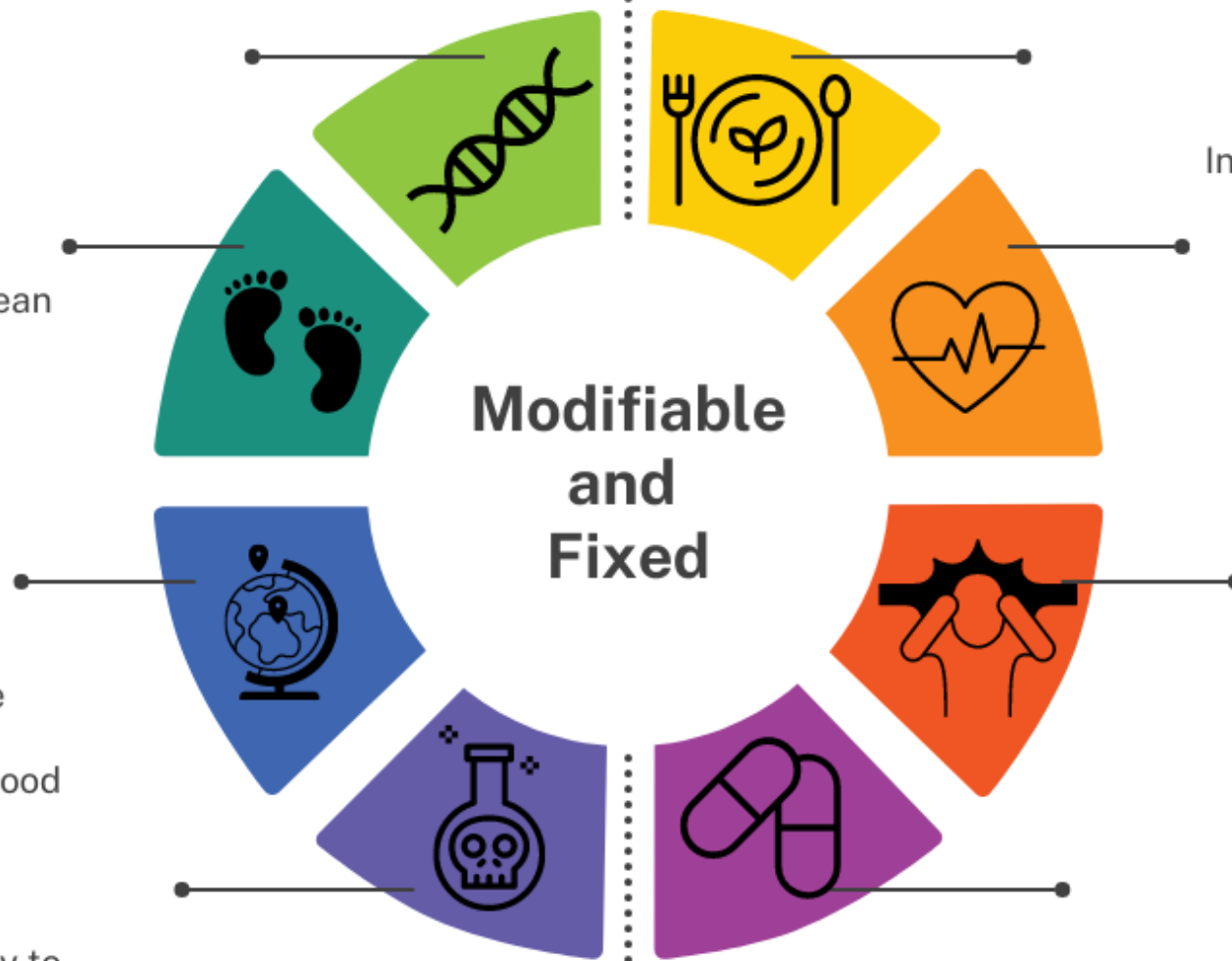
Exercise
Smoking
Alcohol

Trauma

Physical
TBI
Spine injury
Emotional
ACE's

Medications

Antibiotics
PPI
Laxatives
Metformin



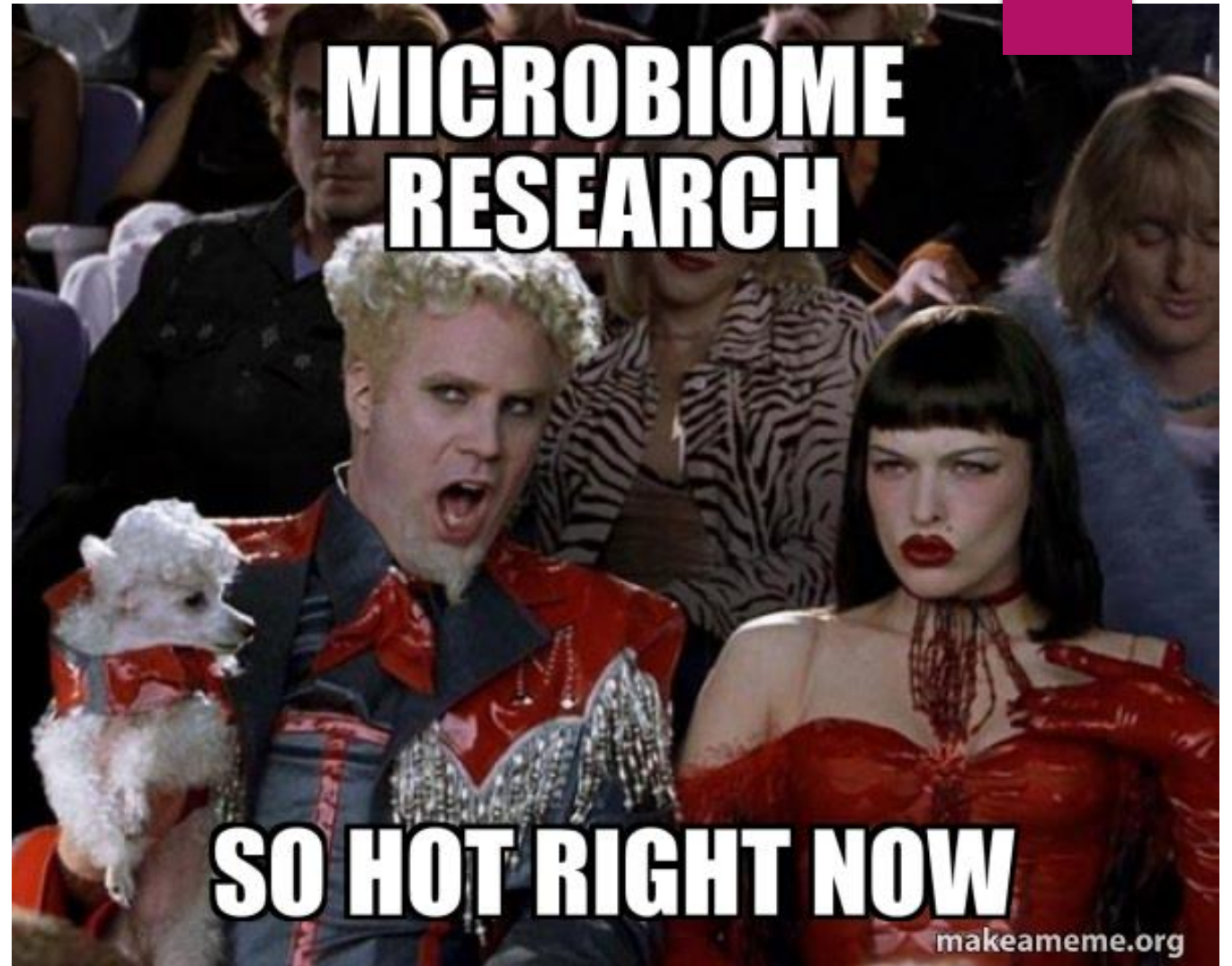
**Modifiable
and
Fixed**

Part 3: what to do...

KEEP IT SIMPLE

Implementing strategies

- ▶ Probiotics
- ▶ Prebiotics
- ▶ Fermented Foods
- ▶ Lifestyle
- ▶ Behavior
- ▶ Stress
- ▶ Vagus Nerve Exercises
- ▶ Nature



Probiotic Supplements:

Common strains

- ▶ Bifidobacterium sp.
 - ▶ infantis
 - ▶ lactis
 - ▶ longum
 - ▶ breve
 - ▶ bifidum
- ▶ S. boulardii (nonhuman)



- ▶ Lactobacillus sp.
 - ▶ reuteri
 - ▶ casei
 - ▶ rhamnosus
 - ▶ planterum
 - ▶ crispatus
 - ▶ acidophilus
 - ▶ plantarum
 - ▶ salivarius
 - ▶ fermentum
- ▶ Streptococcus sp.



Supplements vs Fermented Foods



Food:

- Better diversity
- Most OTC foods pasteurized - lacking live cultures
- Preservation methods destroy vibrancy
- Polyphenol activation, breakdown anti-nutrients, increase nutrition density



Supplements:

- Easy to introduce
- Short term effect (exceptions)
- Strain specific treatments
- Targeted locations
- Can you keep them alive? Lack of quality control...

Not all fermented foods are gross...

Store Bought...

- ▶ Sauerkraut
- ▶ Pickles (Bubbies)
- ▶ Miso
- ▶ Kefir
- ▶ Umeboshi plum vinegar
- ▶ Yogurt
- ▶ Natto
- ▶ Tempeh
- ▶ Kimchi
- ▶ Some cheeses...



...Homemade

- Mayo
- Ketchup
- Carrots
- Most veggies
- Salsa
- Kvass
- Sourdough

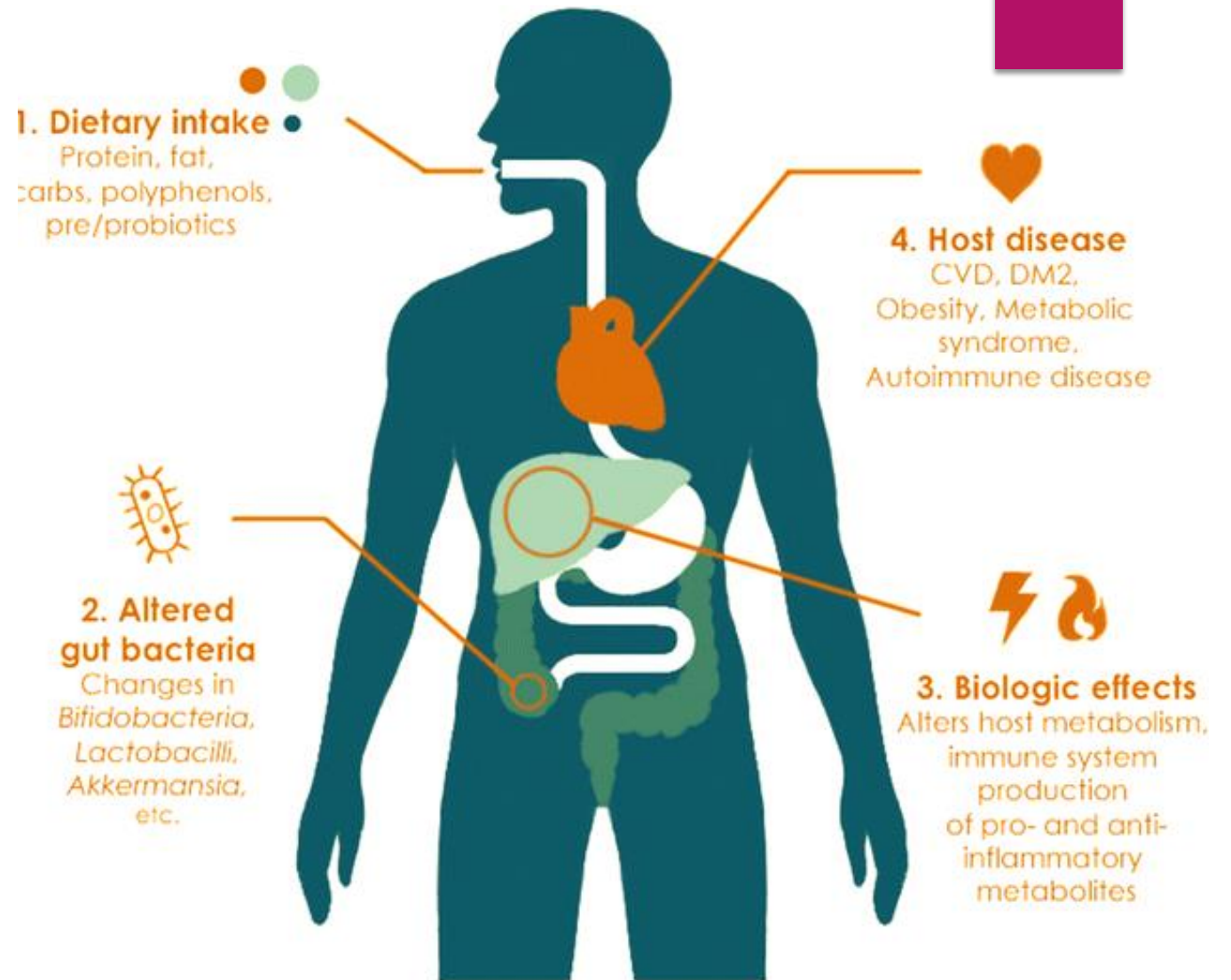
Prebiotics in Food



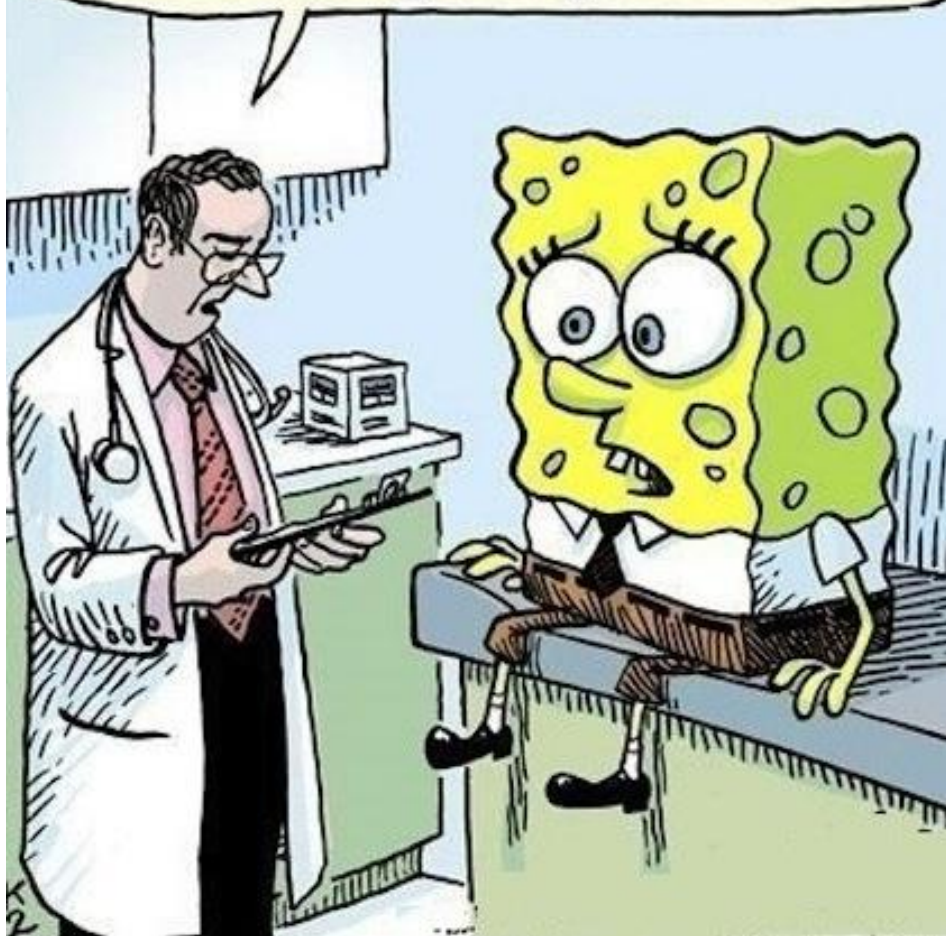
Artichoke	Asparagus	Avocado	Bananas (under ripe)
Burdock root	Chicory	Chinese chives	Eggplant
Dandelion Greens	Fruit	Garlic	Green Tea
Honey	Jerusalem artichokes	Jicama	Leeks
Legumes	Lentils	Onions	Peas
Plaintains	Soybeans	Sugar maple	Yogurt, cottage cheese, kefir

When we increase prebiotics...

- ▶ Improved bowel function
- ▶ Promote Bifidobacteria, Lactobacilli and other beneficial microbes
- ▶ Colon pH
- ▶ Protect against negative effects of bile acids
- ▶ Substrate for SCFA
- ▶ Decreases intestinal permeability
- ▶ Skin health
- ▶ > bone density (+ calcium)
- ▶ Serum cholesterol and triglycerides
- ▶ Used in treatment of atherosclerosis
- ▶ Immune function
- ▶ Neural and cognitive function
- ▶ > insulin sensitivity & glucose regulation (in all and Type 2 DM)
- ▶ > mineral absorption



As I suspected, you're full of bacteria.
We're going to have to throw
you away.



Thank you!

FROM THE BOTTOM OF MY BACTERIA