Gut Feeling
A talk on gut microbiota alterations and psyche

Peyman Adibi

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Health

Health > Wellness and Prevention

The Brain-Gut Connection

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DISEASES & CONDITIONS

The gut-brain connection

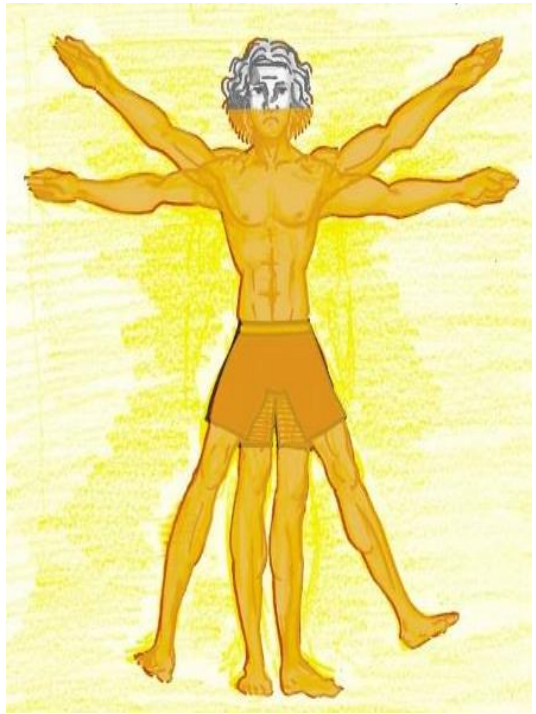
July 18, 2023

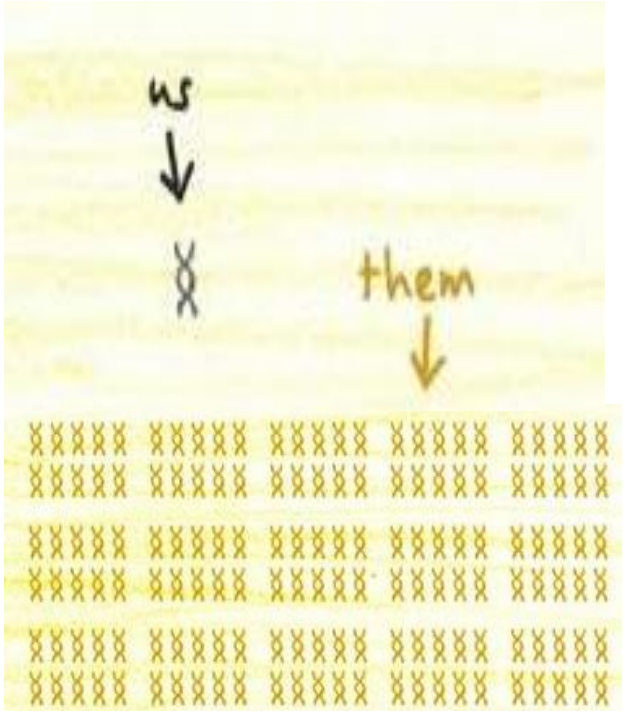
Pay attention to your gut-brain connection – it may contribute to your anxiety and digestion problems

holobionts

- host and microbial genomes of the holobiont collectively referred to as the “**hologenome**”
  - horizontal gene transfer
  - 8% of the human genome is made up of human endogenous retrovirus genes

For **every** HUMAN gene in our body, there are 150 microbial genes

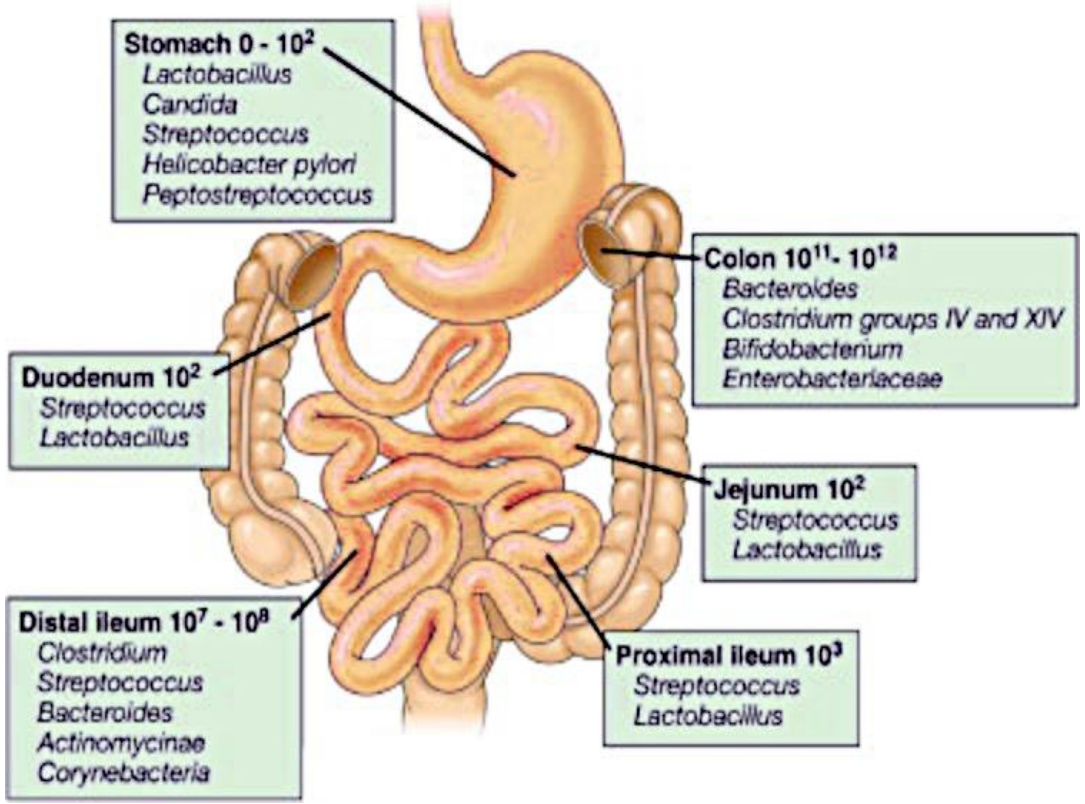


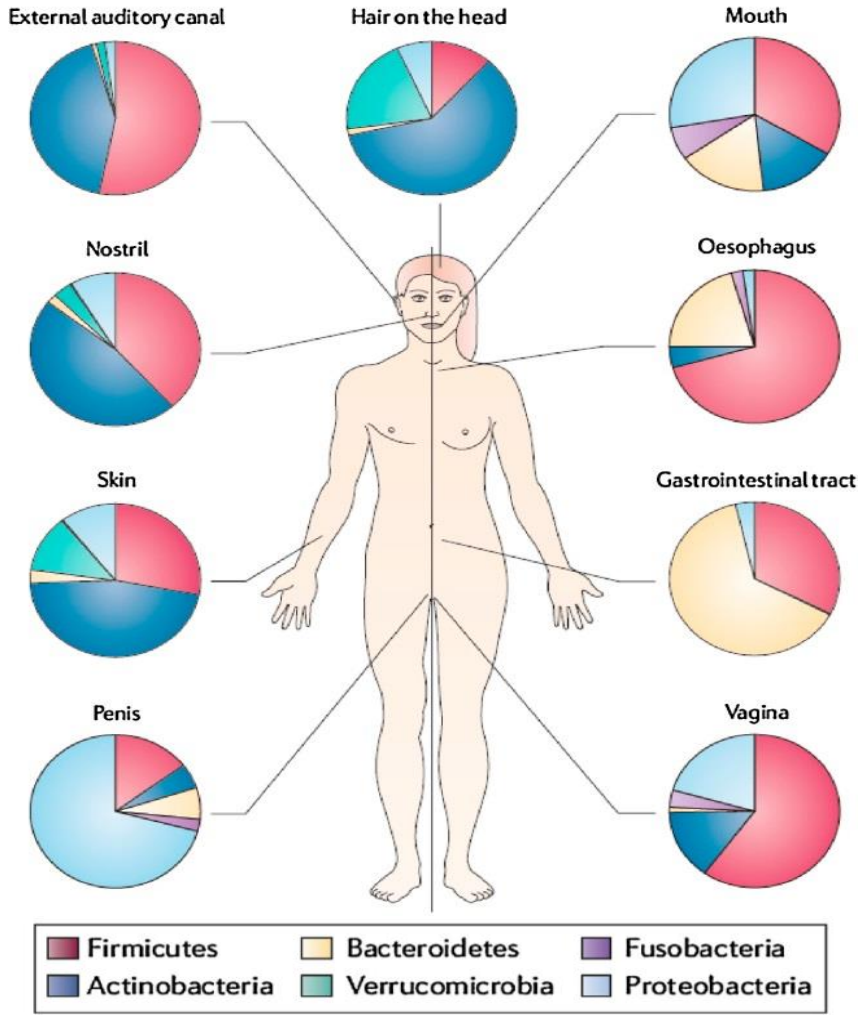


"We are our microbes"

Regarding body cells, we are only **43% Human**

Different body organs is colonized with various *number* and *types* of bacteria





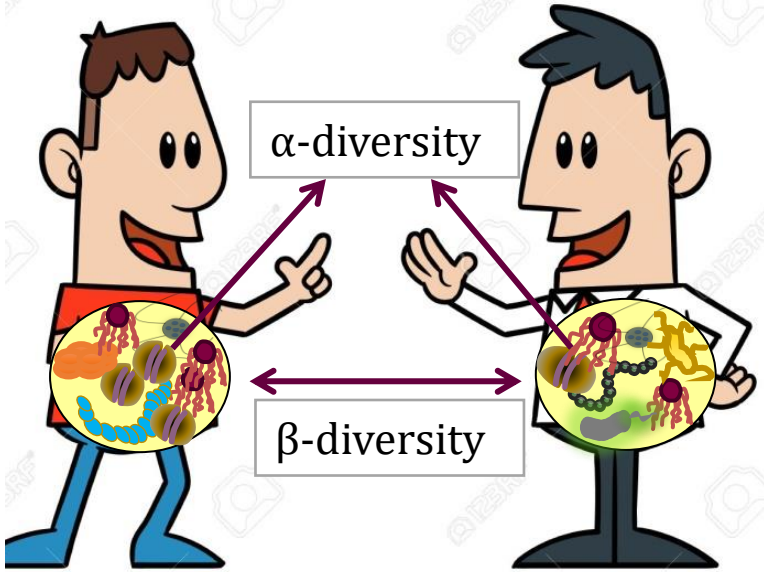
Gut microbiota: previous forgotten organ and present ***New organ***

Diversity

Only 10% Similarity

α-diversity:

How many different bacteria are living inside one person's gut and how evenly they are distributed.



β –diversity

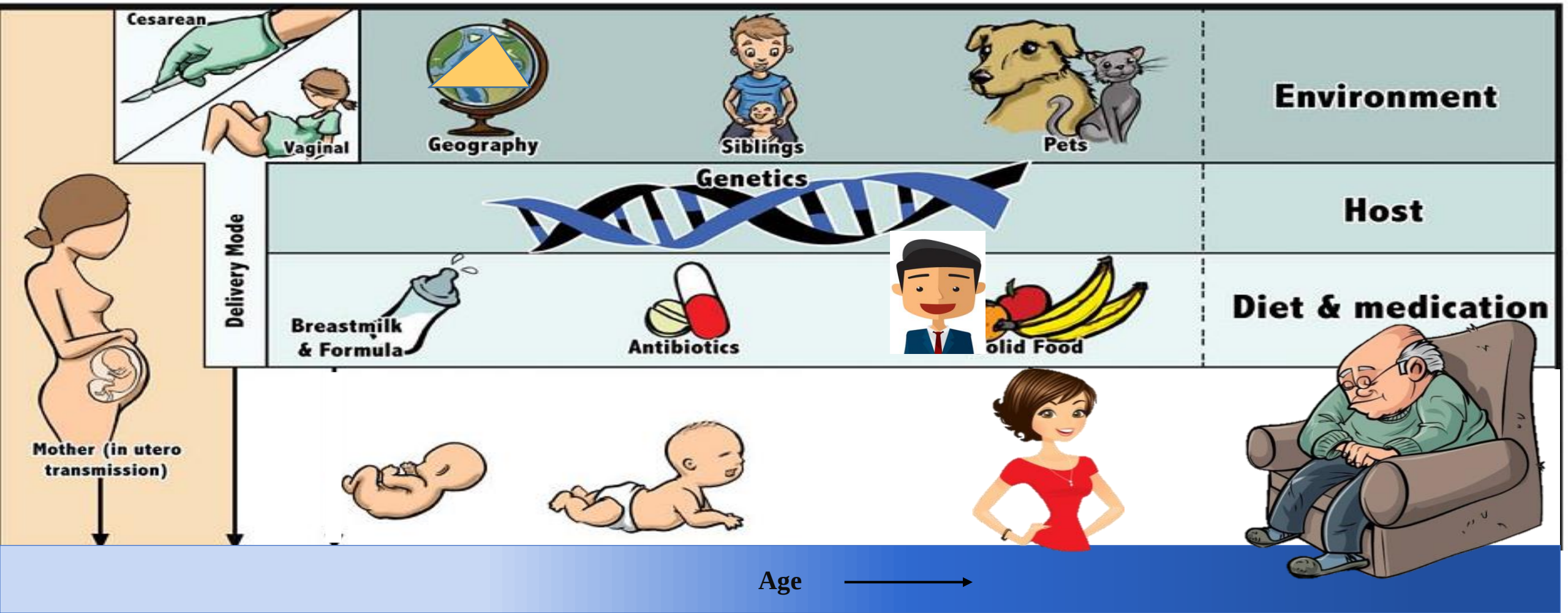
The difference of total microbial composition among different people (qualitatively and quantitatively).

Intrinsic factors:

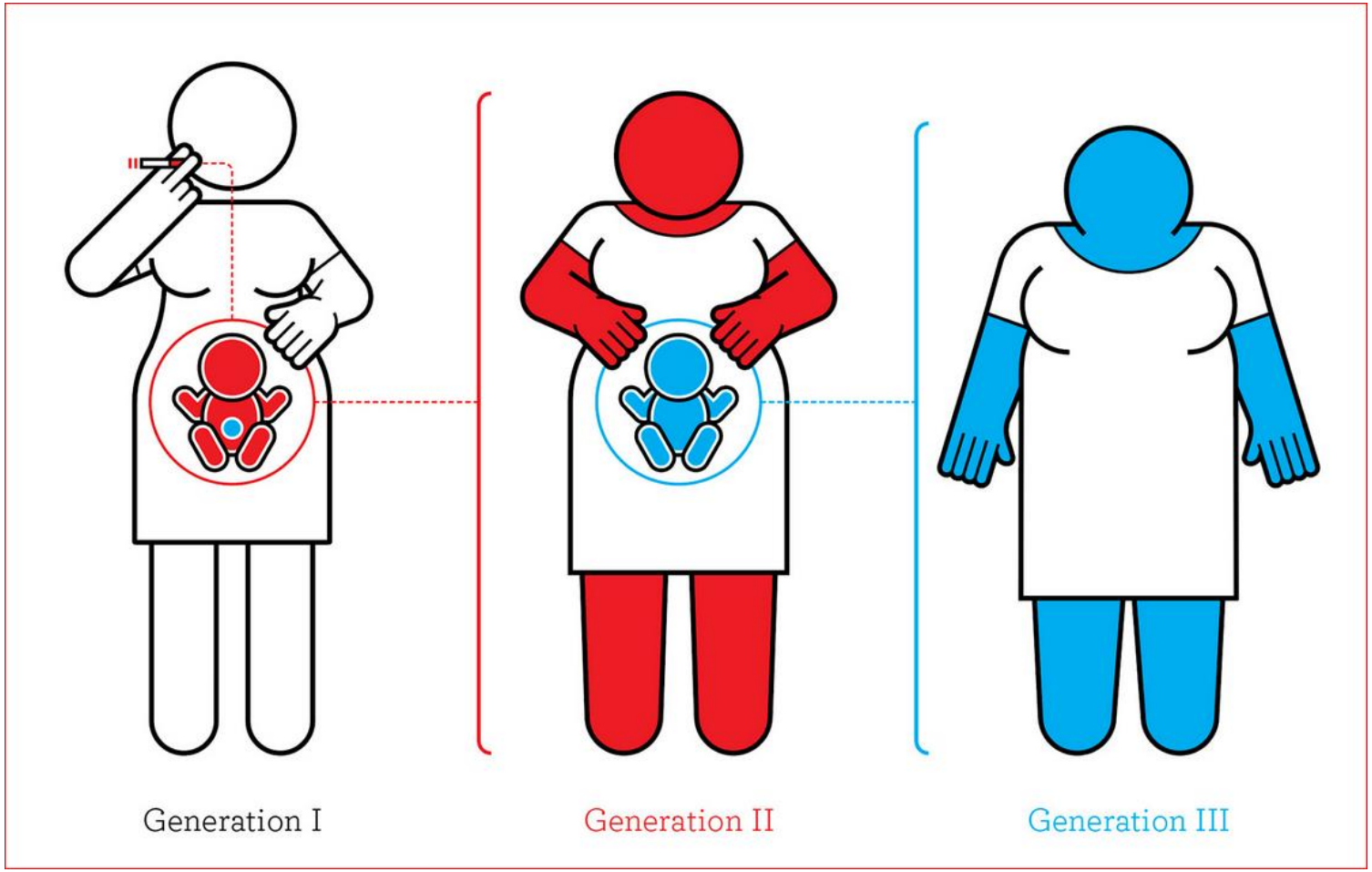
- Genetics
- Gastric acid
- Motility
- Antimicrobial peptide
- Mucus and GI secretions
- Immunity

Extrinsic factors:

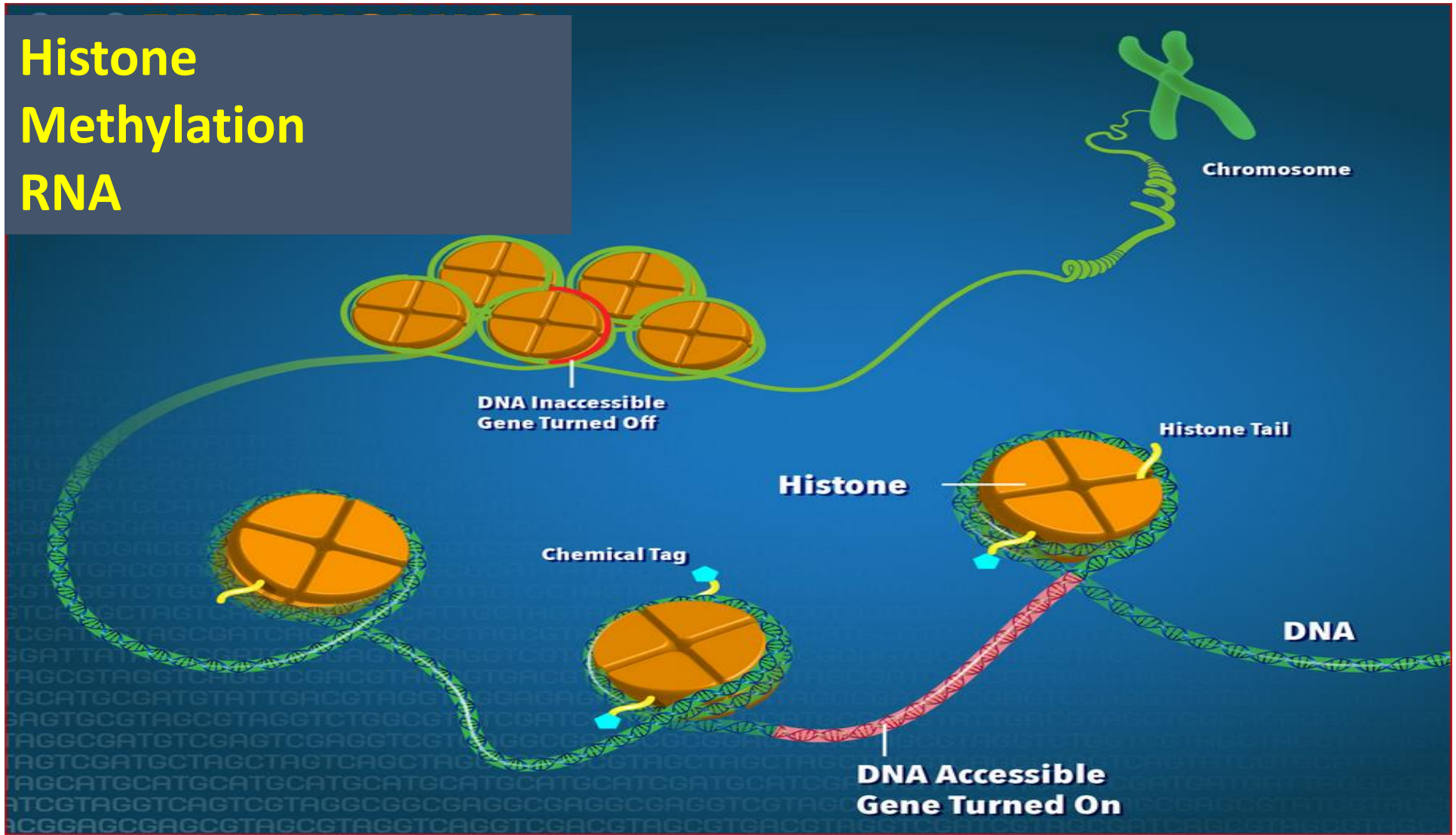
- Diet
- Medications
- Mode of delivery
- Older siblings and pets
- Geography
- Hygene



Epigenomics



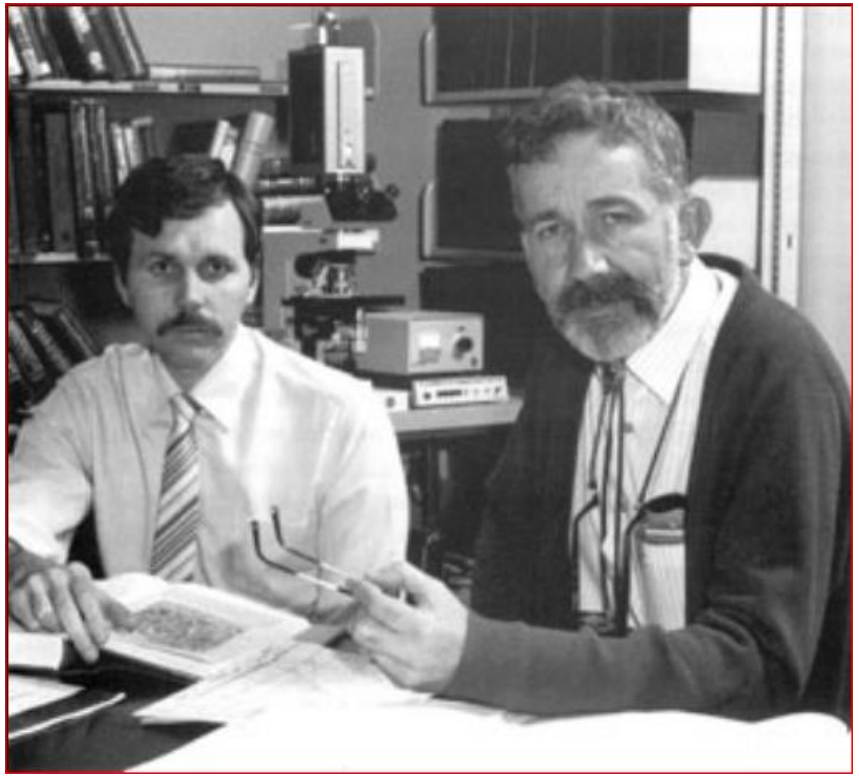
Epigenomics

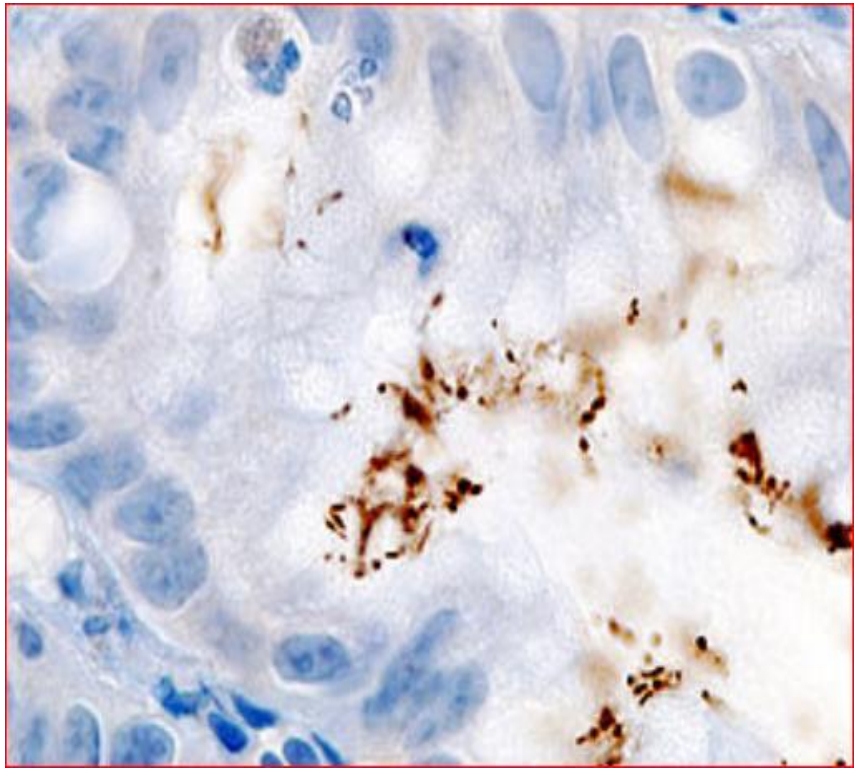


Koch's postulates

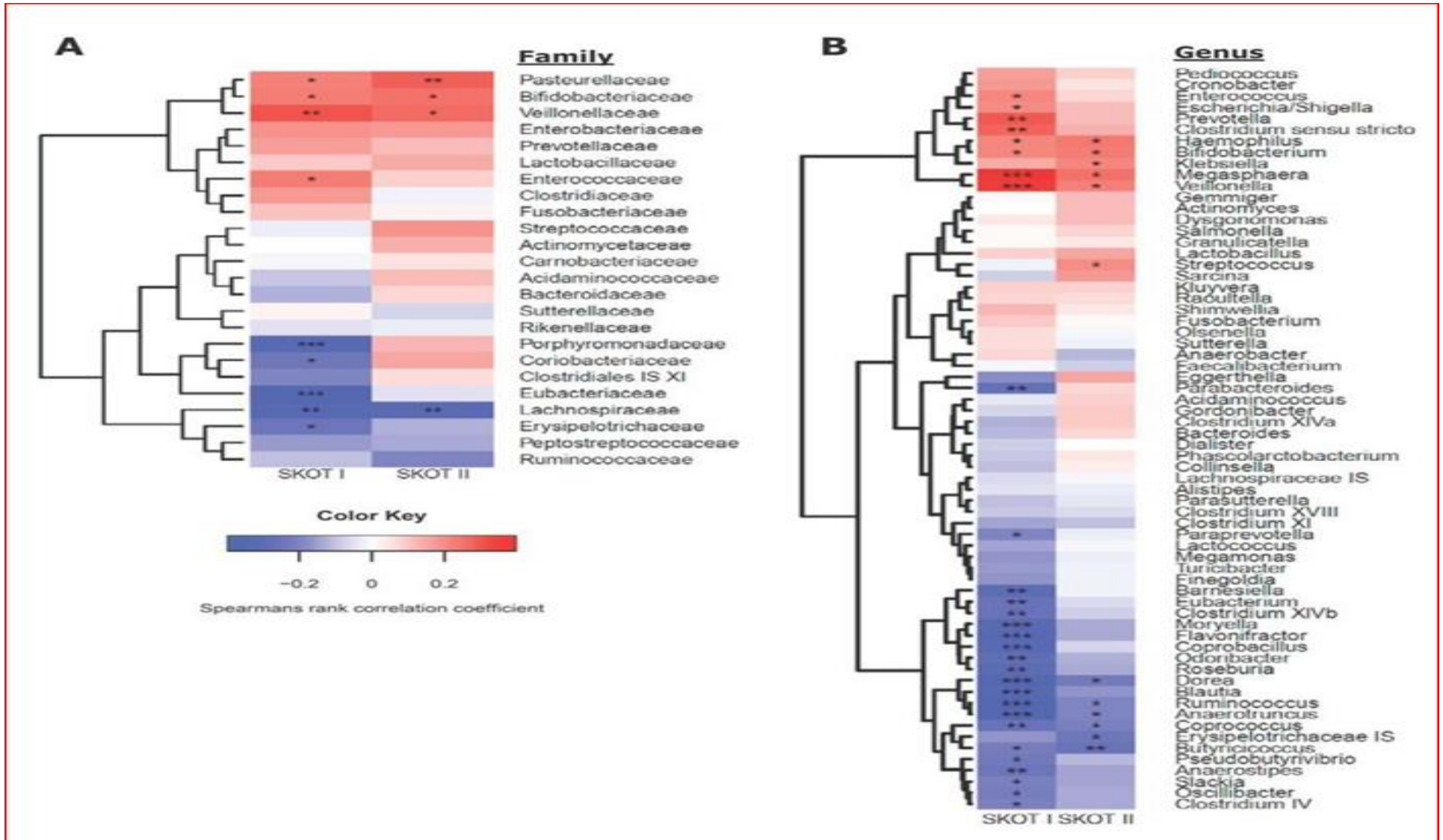
- Microbe in diseased not healthy
- Microbe to be isolated
- Microbe to make disease in healthy
- New diseased must show microbe
-

Marshal & Warren

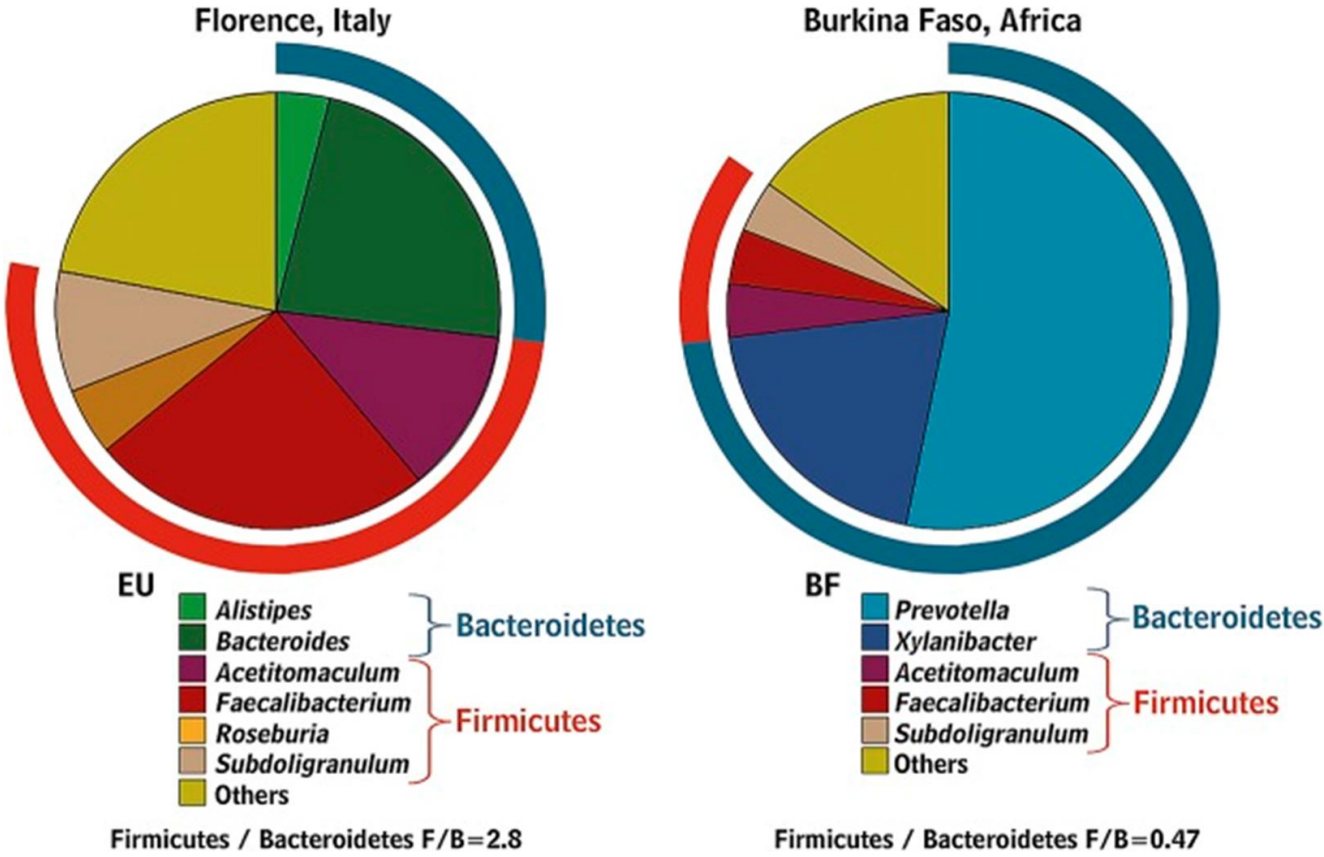




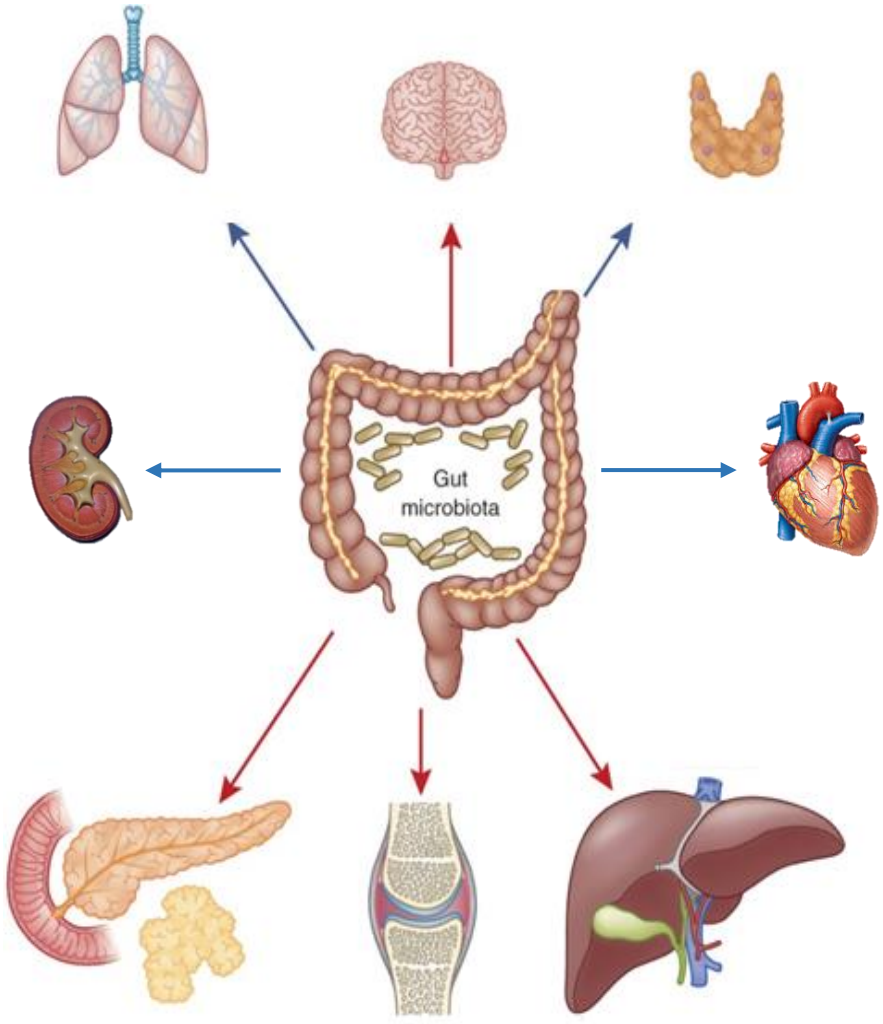
metagenomics



Geographical diversity

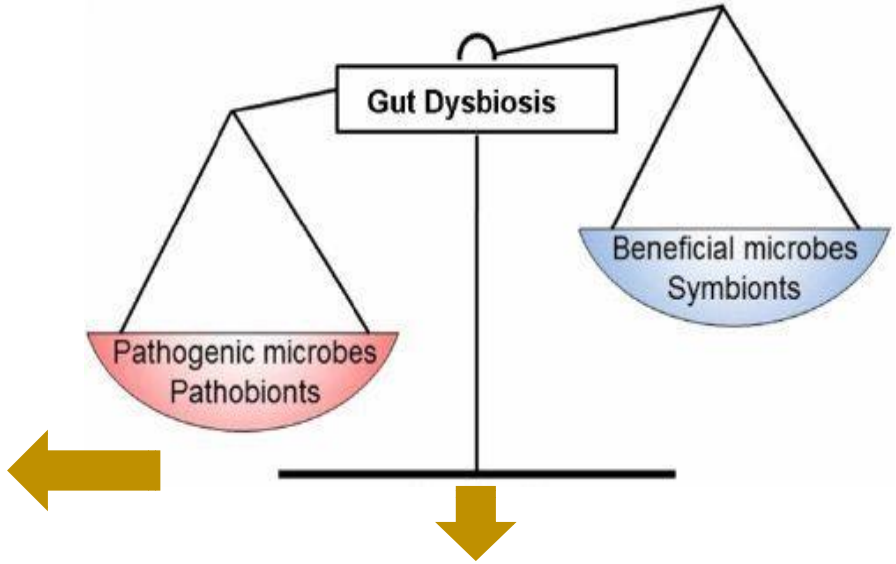


Why *GUT MICROBIOTA* could be considered as an *ORGAN*?



- Regulation of glucose and cholesterol metabolism.
- Promotion of cardiovascular activity.
- Regulation of GI tract's functional structure.
- Regulation of host immune homeostasis.
- Bone homeostasis regulation by osteoclastogenesis.
- Production of different vitamins.
- Detoxification of harmful bioactive compounds.
- Drug metabolism.
- Modulation of endocannabinoid system's activity.

Dysbiosis

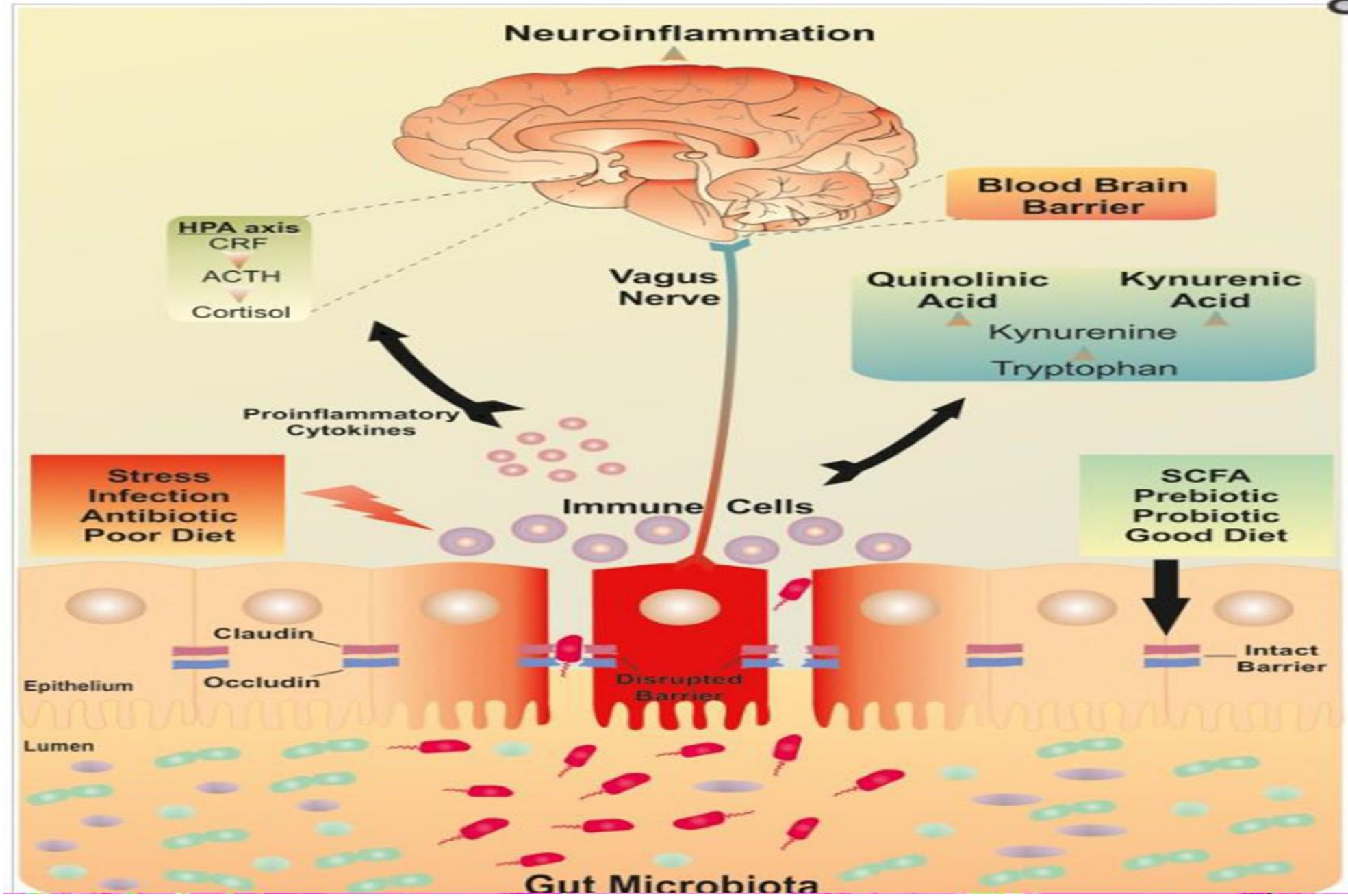


Extra-intestinal diseases

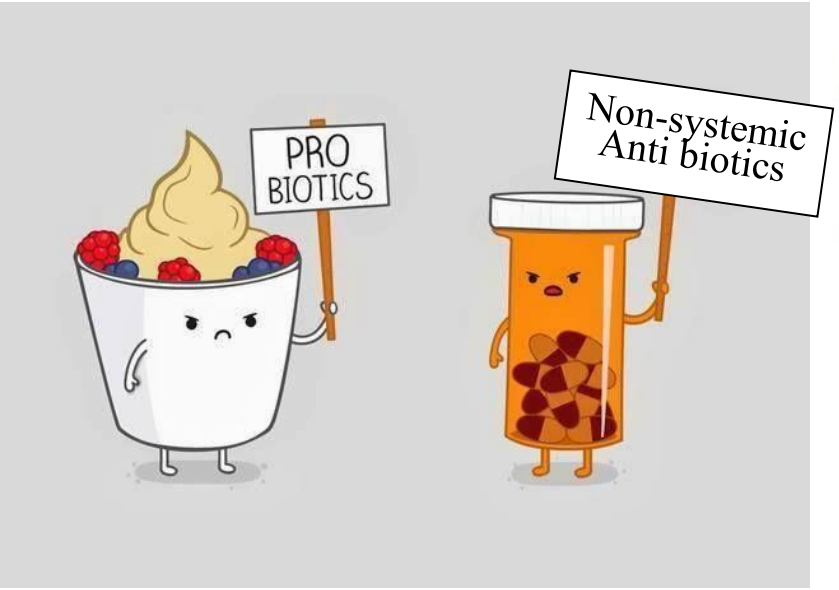
- Asthma/Allergy/Atopic dermatitis
- Ankylosing spondylitis/Psoriasis
- Diabetes/ Obesity/ CVD
- Depression
- MS

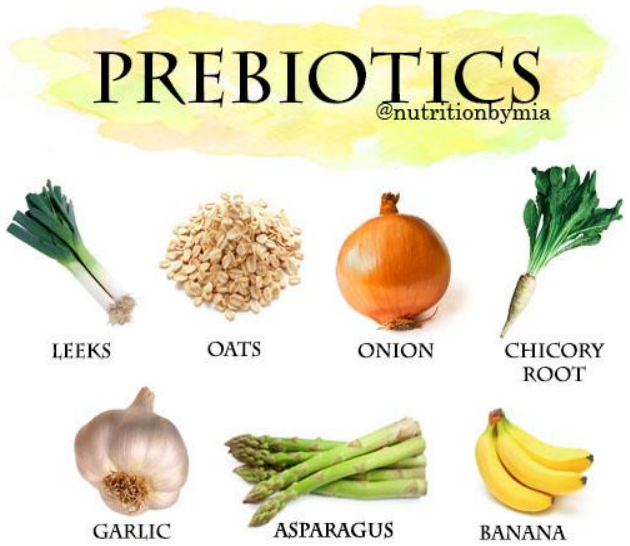
Gastro-intestinal disorders

- NASH/Liver cirrhosis
- Celiac disease
- Cholesterol gallstones
- Colon polyps/cancer
- IBD
- IBS


Neuroinflammation
Blood Brain Barrier
HPA axis
CRF
ACTH
Cortisol
Vagus Nerve
Quinolinic Acid
Kynurenic Acid
Kynurenine
Tryptophan
Proinflammatory Cytokines
Stress
Infection
Antibiotic
Poor Diet
Immune Cells
SCFA
Prebiotic
Probiotic
Good Diet
Claudin
Occludin
Epithelium
Disrupted Barrier
Intact Barrier
Lumen
Gut Microbiota

How to improve gut microbiota



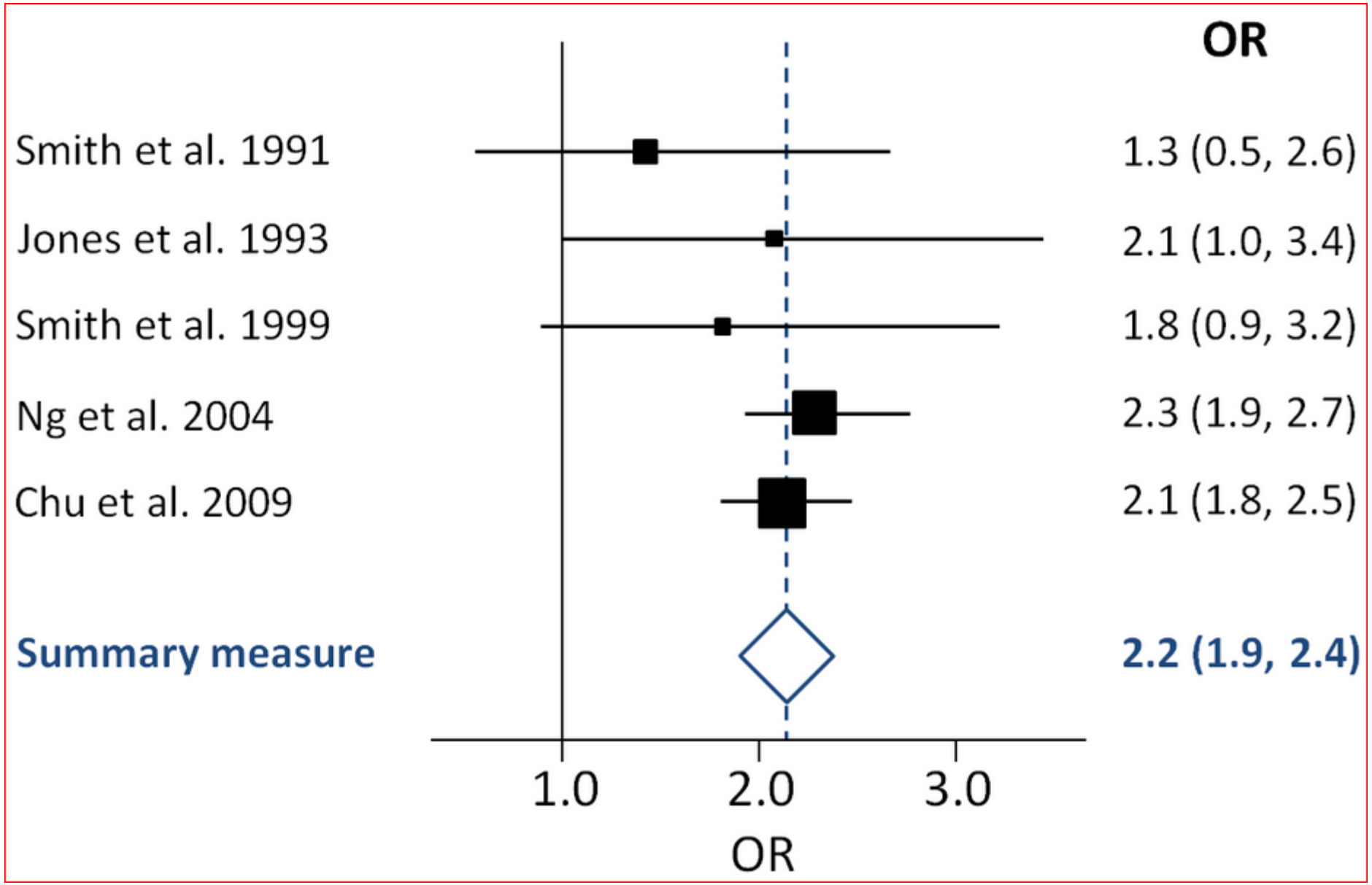


Fecal microbiota transplantation (FMT)

Life style modification

EBM

- A=A
- A+B>A+C
- So, B>C


OR
Smith et al. 1991
1.3 (0.5, 2.6)
Jones et al. 1993
2.1 (1.0, 3.4)
Smith et al. 1999
1.8 (0.9, 3.2)
Ng et al. 2004
2.3 (1.9, 2.7)
Chu et al. 2009
2.1 (1.8, 2.5)
Summary measure
2.2 (1.9, 2.4)
1.0
2.0
3.0
OR

J Affect Disord. 2023 May 15;329:30-41. doi: 10.1016/j.jad.2023.02.086. Epub 2023 Feb 24.

Rifaximin ameliorates depression-like behaviour in chronic unpredictable mild stress rats by regulating intestinal microbiota and hippocampal tryptophan metabolism

Shuyue Cheng [1], Zemeng Zhu [1], Haonan Li [1], Wei Wang [1], Zhijun Jiang [1], Fang Pan [1], Dexiang Liu [2], Roger C M Ho [3], Cyrus S H Ho [4]

Affiliations + expand

PMID: 36842645 DOI: 10.1016/j.jad.2023.02.086

J Neurochem. 2022 Dec;163(5):406-418. doi: 10.1111/jnc.15701. Epub 2022 Oct 13.

Rifaximin protects against circadian rhythm disruption-induced cognitive impairment through preventing gut barrier damage and neuroinflammation

Dongli Meng [1], Mengzhe Yang [1], Lilin Hu [2], Tonglin Liu [3], Huiliang Zhang [1], Xuying Sun [4], Xiaochuan Wang [1], Yu Chen [3], Yu Jin [2], Rong Liu [1 3 5]

Affiliations + expand

PMID: 36189686 DOI: 10.1111/jnc.15701

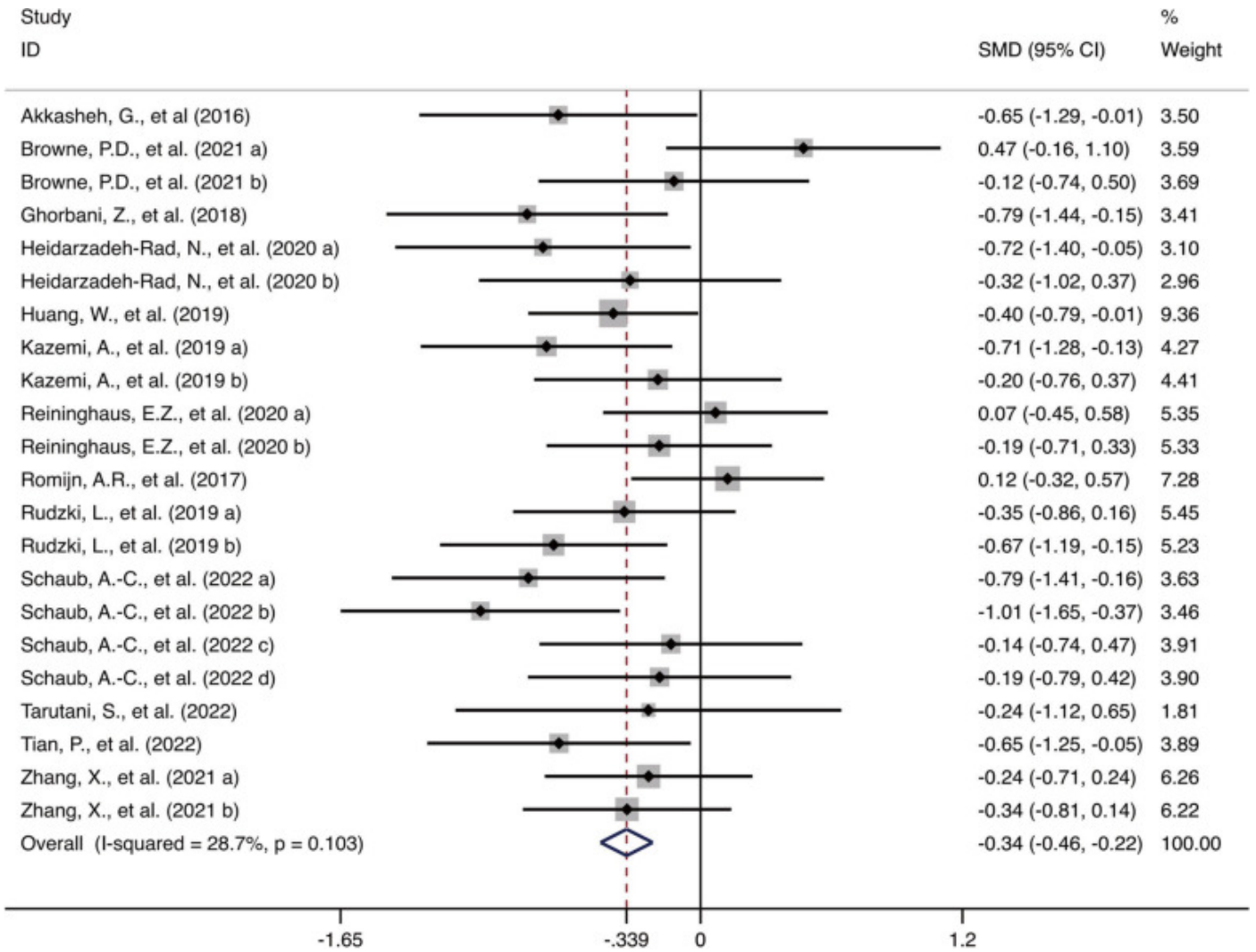
Meta-Analysis > BMC Psychiatry. 2023 Jun 29;23(1):477. doi: 10.1186/s12888-023-04963-x.

Effect of prebiotics, probiotics, synbiotics on depression: results from a meta-analysis

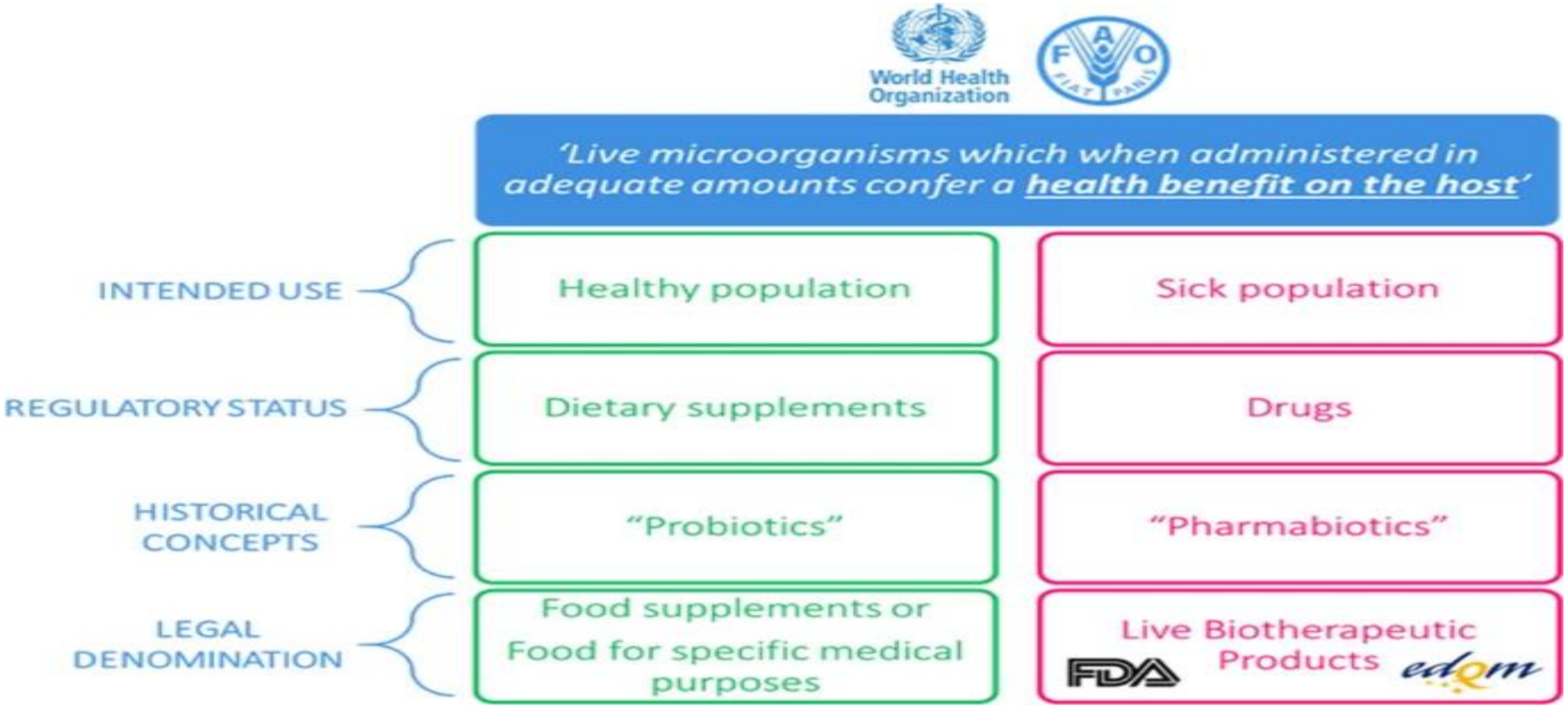
Qin Zhang [1], Bing Chen [2], Jinghui Zhang [3], Jingyi Dong [3], Jianglin Ma [4], Yuyan Zhang [# 5], Kangyu Jin [# 6], Jing Lu [# 7 8]

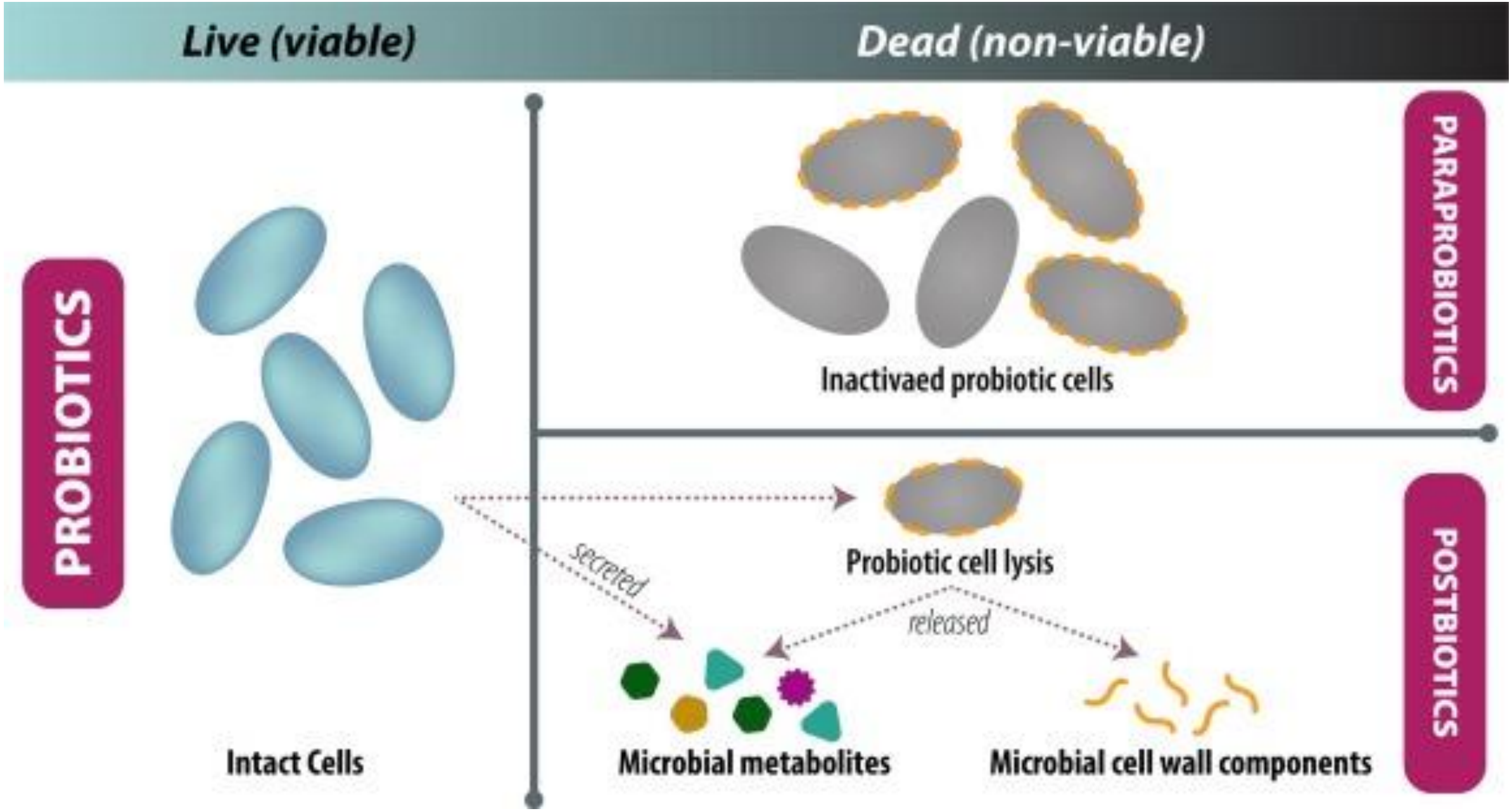
Affiliations + expand

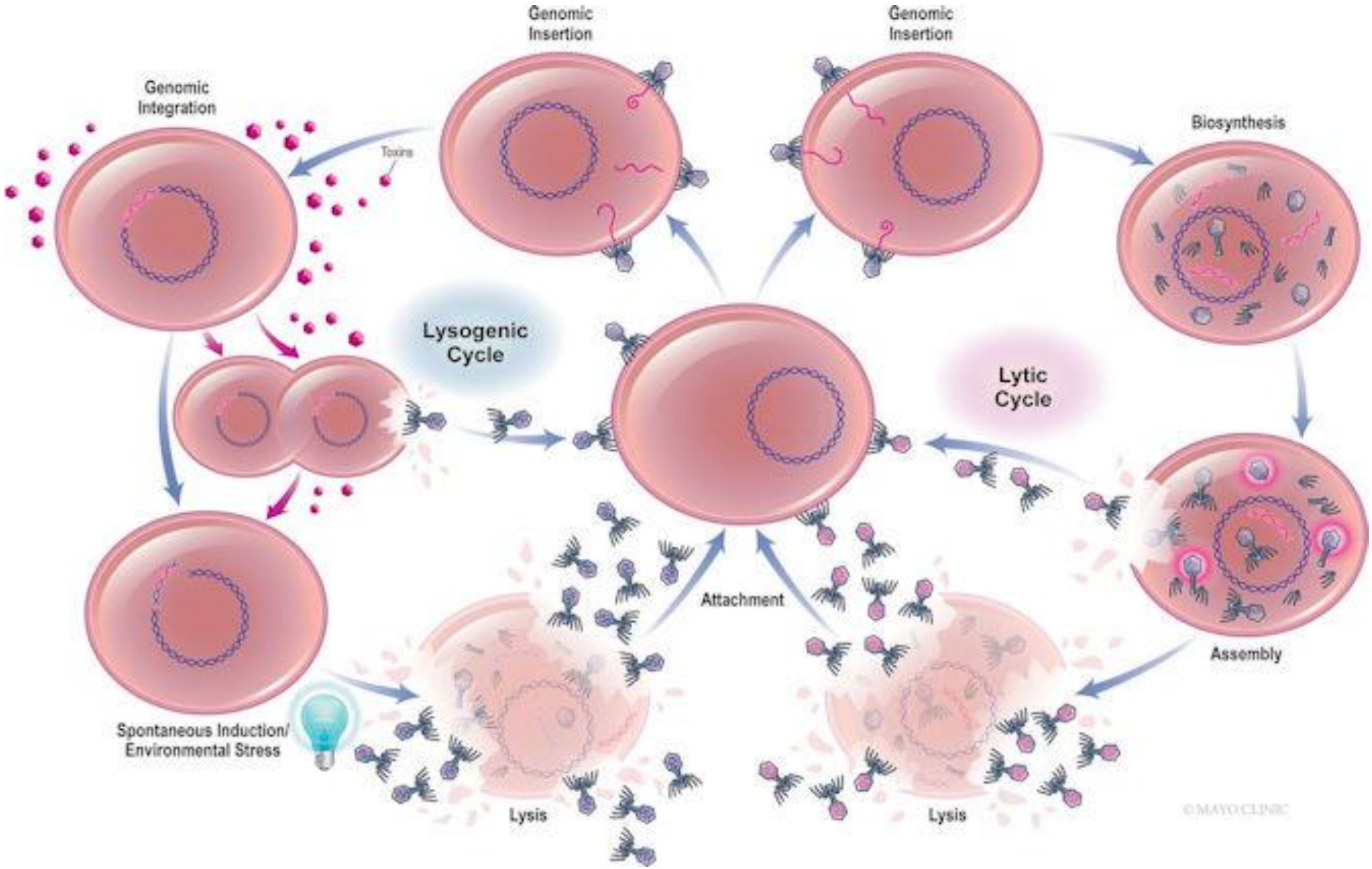
PMID: 37386630 PMCID: PMC10308754 DOI: 10.1186/s12888-023-04963-x



Live biotherapeutic products




Live (viable)
Dead (non-viable)
PROBIOTICS
PARAPROBIOTICS
POSTBIOTICS
Inactivaed probiotic cells
Probiotic cell lysis
secreted
released
Intact Cells
Microbial metabolites
Microbial cell wall components


Genomic Insertion
Genomic Insertion
Genomic Integration
Toxins
Biosynthesis
Lysogenic Cycle
Lytic Cycle
Attachment
Assembly
Spontaneous Induction/ Environmental Stress
Lysis
Lysis
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