Inside Out: Gastroenterology & Hepatology Workshop

Saturday 25 October 2025
Clinical Skills Development Service | RBWH

phn BRISBANE NORTH
An Australian Government Initiative

Queensland Government
Metro North Health

GI health/ microbiome

Dr Vishal Kaushik
Gastroenterologist & Nutrition Clinical Lead | RBWH
Dr Paula Smith-Brown PhD
Accredited Practising Dietician

phn BRISBANE NORTH
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Metro North Health

GI Health / Microbiome

- DR VISHAL KAUSHIK - GASTROENTEROLOGIST

NUTRITION CLINICAL LEAD – RBWH

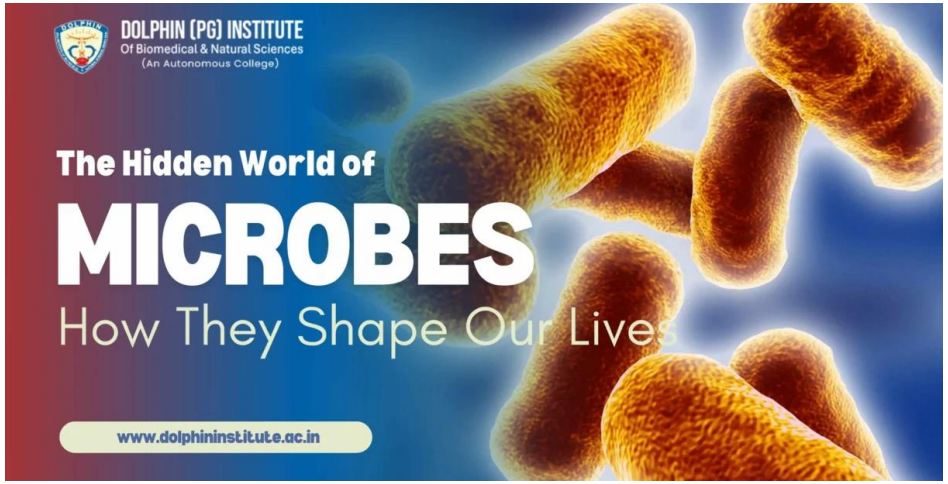
COLONOSCOPY CLINIC AND INTEGRATED GUT HEALTH– PRIVATE

- DR PAULA SMITH-BROWN – PHD, DIETITIAN

COLONOSCOPY CLINIC AND INTEGRATED GUT HEALTH- PRIVATE

Presentation outline

- Short Quiz
- Introduction
- GI Health and role of microbiome
- Dysbiosis and Diseases
- Case studies
- Clinical applications
- Key take away points



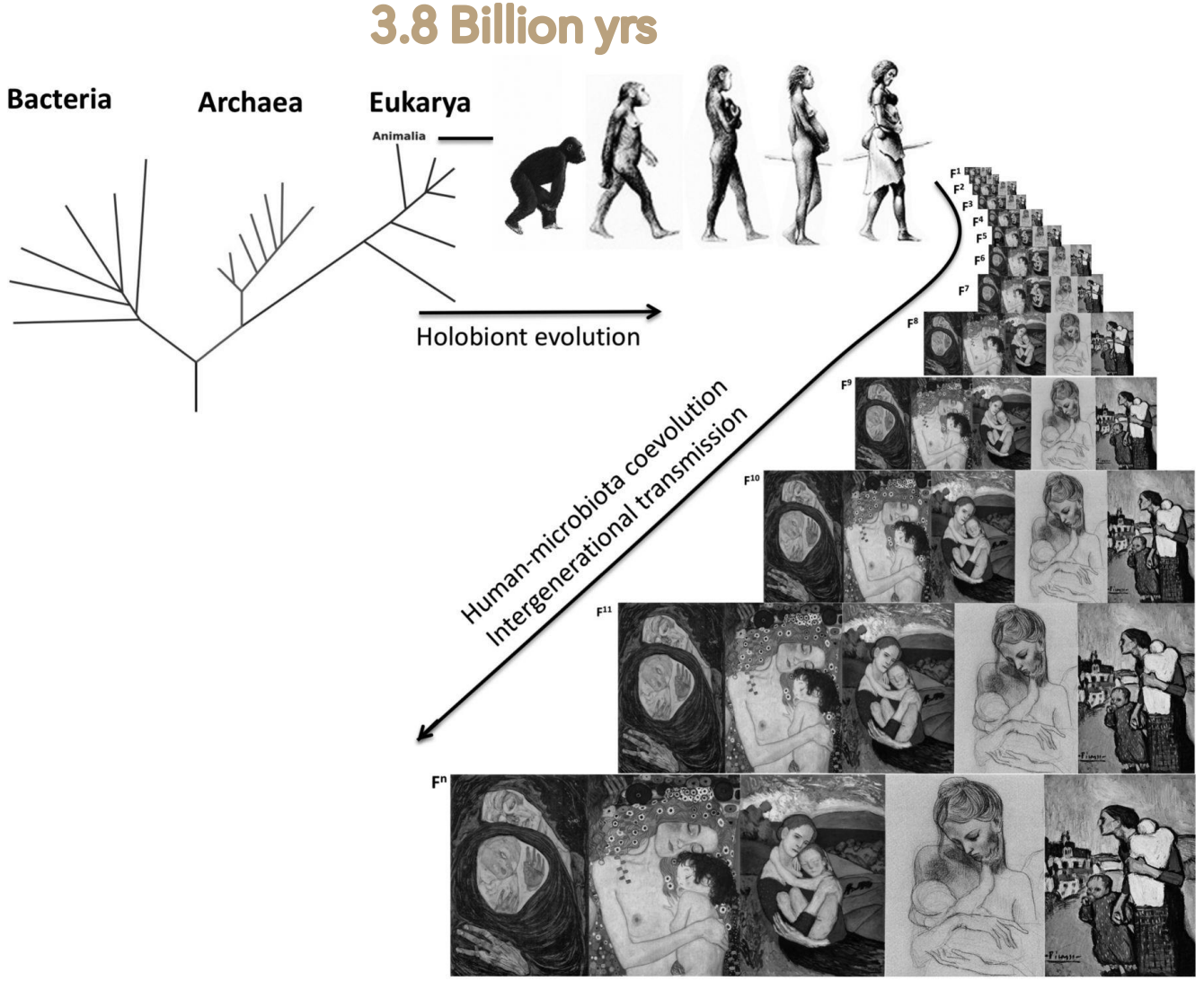
Quiz

- TEST question - GIT is the only organ open to the environment at both ends

- Microbiota are transmitted to foetus/baby during gestation/labour/breastfeeding
- There are trillions of microbiota in GIT, and they never change once acquired
- Microbial dysbiosis is responsible for all diseases
- High GRADE evidence (true effect is close to estimate of the effect) for FMT treatment for all C diff
- There are no microbial based therapies that have Moderate GRADE evidence (true effect is likely close to estimate of the effect, but may be substantially different)

INTRODUCTION

Evolution of the holobiont and vertical transmission through human generations.

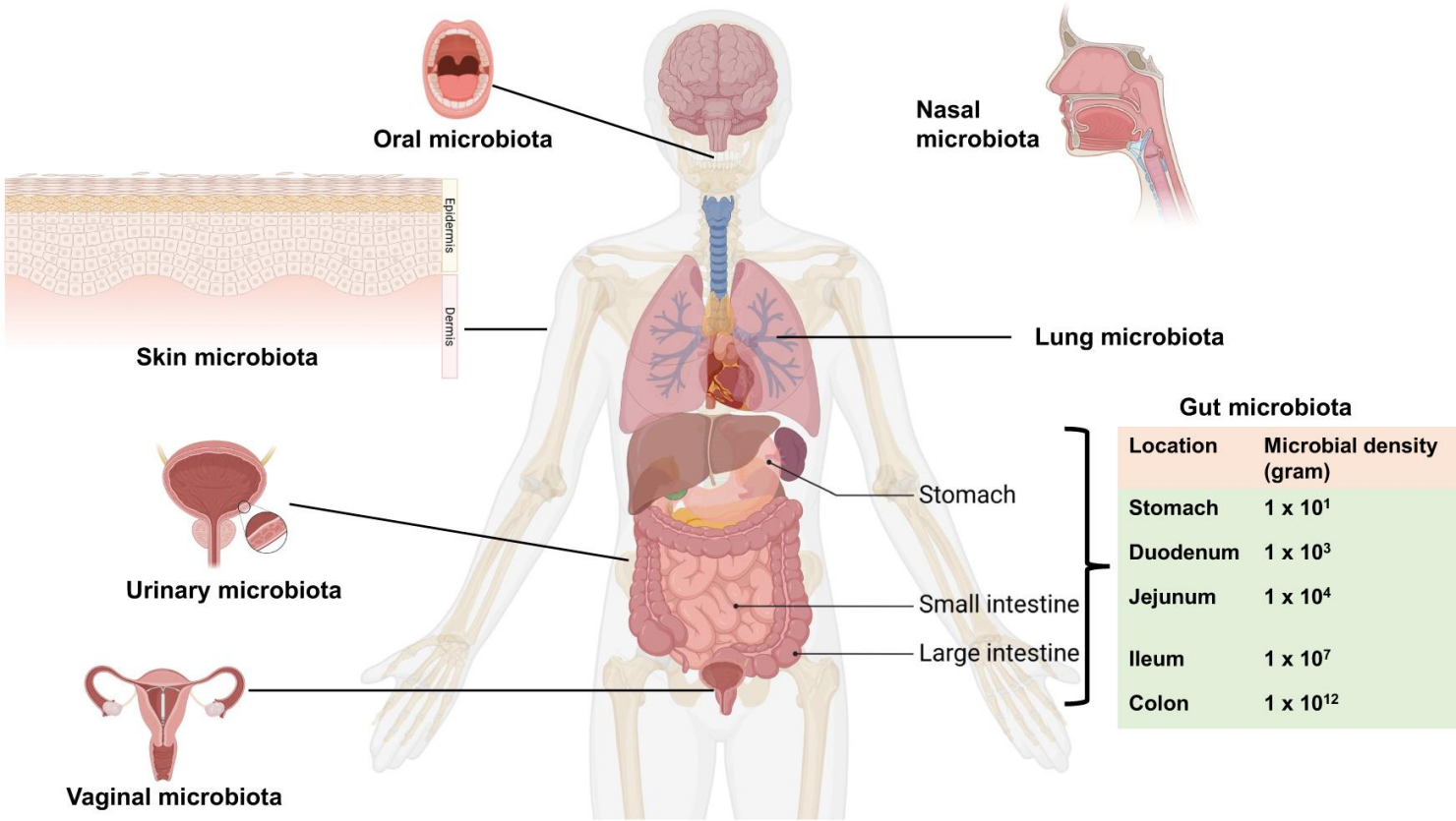


Maria Gloria Dominguez-Bello et al. Gut 2019;68:1108-1114

GUT

INTRODUCTION

- Microbiota
  - Live in and on our body – also present in oral cavity (second largest) and other organs
  - "Hidden organ", "Second Genome", 150 times more genetic information than humans



Gut microbiota

Location	Microbial density (gram)
Stomach	1×10^{1}
Duodenum	1×10^{3}
Jejunum	1×10^{4}
Ileum	1×10^{7}
Colon	1×10^{12}

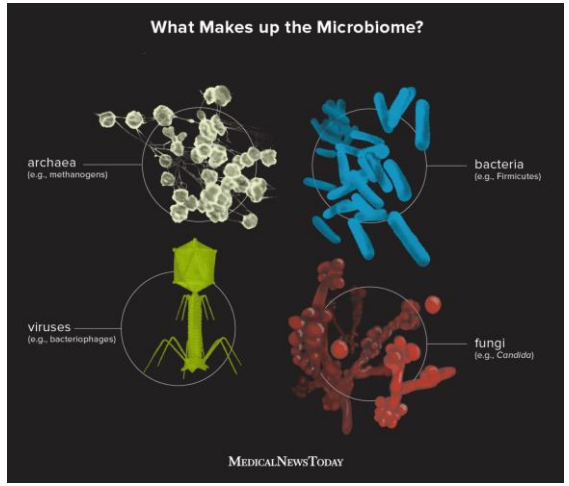
Hashimoto, K. Emerging role of the host microbiome in neuropsychiatric disorders: overview and future directions. *Mol Psychiatry* **28**, 3625–3637 (2023). https://doi.org/10.1038/s41380-023-02287-6

INTRODUCTION

- Microbiota (People)
  - Live in and on our body – also present in oral cavity (second largest) and other organs
  - "Hidden organ", "Second Genome", 150 times more genetic information than humans
- Microbiome (House)
  - Microbiota + Genome + Metabolites + their environment
- Metagenome/Metagenomics
  - Collection of genes/genome – shotgun sequencing DNA analysis of microbiota
- Microbiota and microbiome often used synonymously
- Comprised of bacteria, fungi, viruses, phages and archaea – 100 Trillion

cf to 30-35 trillion cells in human body

- GIT (Street) = Super organism Human (?Suburb)



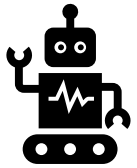
https://www.allucent.com/resources – accessed OCT 2025

Ley, R. E., Turnbaugh, P. J., Klein, S. & Gordon, J. I. Human gut microbes associated with obesity. *Nature* **444**, 1022–1023 (2006).

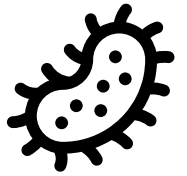
Grice EA, SegreJA. Annu. Rev. Genomics Hum. Genet. 2012. 13:151–70

Berg, G. et al. Microbiome definition re-visited: old concepts and new challenges. *Microbiome* **8**, 103 (2020).

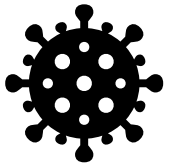
GI Health
Role of Microbiome



- GI Health – according to AI
  - “To optimize gut health, focus on eating a diverse, fiber-rich diet of wholefoods like fruits, vegetables, and legumes, incorporating fermented foods to introduce beneficial bacteria, and staying well-hydrated. Reduce your intake of highly processed foods, sugar, and artificial sweeteners, which can harm beneficial bacteria. Additionally, manage stress, prioritize quality sleep, get regular exercise, limit alcohol and smoking (and vaping), and avoid unnecessary antibiotic use.”



- Function of the Microbiome:
  - Metabolism - ferment food and contribute to vitamin/energy/lipids/AA production
    - Endocrine organ
  - Protection - against pathogenic strains
  - Immunity - contribute to and modulate the GIT innate immunity



Bany Bakar R, Reimann F & Gribble FM (2023) The intestine as an endocrine organ and the role of gut hormones in metabolic regulation. Nat Rev Dis Primers 20, 784–796

Notice

Because of a lapse in government funding, the information on this website may not be up to date, transactions submitted via the website may not be processed, and the agency may not be able to respond to inquiries until appropriations are enacted. The NIH Clinical Center (the research hospital of NIH) is open. For more details about its operating status, please visit cc.nih.gov. Updates regarding government operating status and resumption of normal operations can be found at opm.gov.

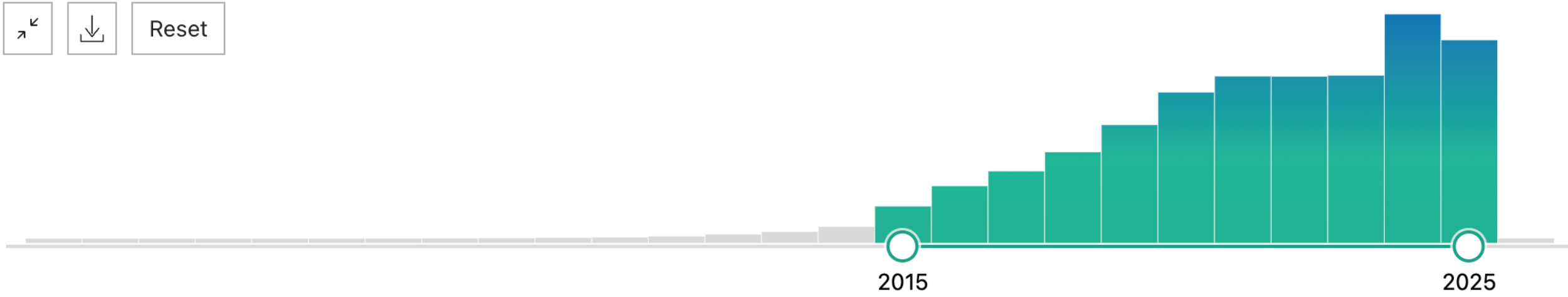
An official website of the United States government

RESULTS BY YEAR

82,281 results

Page 1 of 8,229

Reset



'GUT MICROBIOME' for years 2000-2025 - Pubmed, Oct 2025

TERRAHEALTH
ESSENTIALS

CO-BIOME
By MiCROBA

LIFE DNA

Dietetic
Gut Clinic

Melbourne Functional Medicine

INTEGRATED
GUT HEALTH

PranaThrive
GUT MICROBIOME EXPERTS

THE GUT
Foundation

zoe Science + Nutrition

Natasha Martin
Gold Coast Digestive Health

THE PRACTITIONER COMPANY
BioMedica
NUTRACEUTICALS

Dysbiosis & Diseases

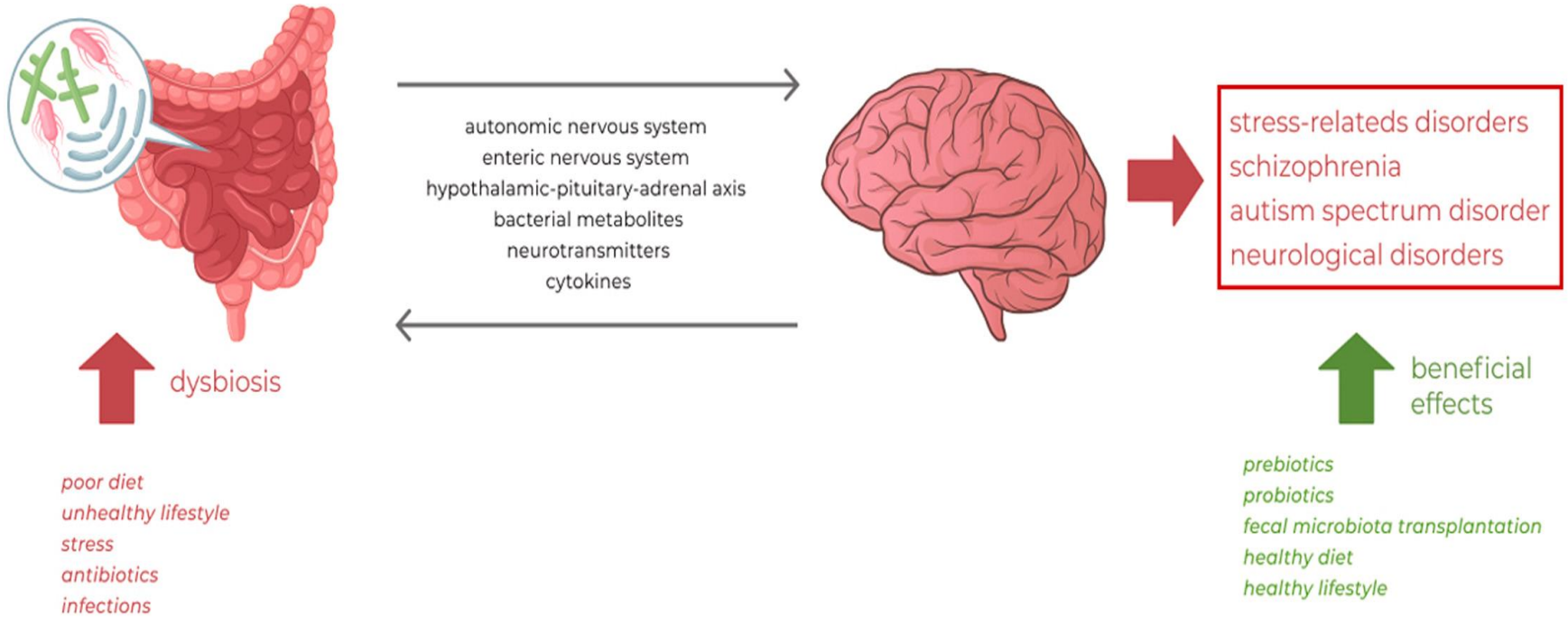
- GIT microbiota comprise of Bacteroidetes and Firmicutes (90%) with remaining 10% made up with Actinobacteria, Proteobacteria and Verrucomicrobia
  - Anaerobic conditions and so mainly in Colon
- Dysbiosis is an imbalance in the microbiota composition that interferes with the microbiota-host interaction.
- Disease associations
  - IBD, DGBI/IBS, MAFLD, obesity, cardiovascular disease, cancer and neurological disorders such as Parkinson's and Alzheimer's disease.
- Causal factors
  - Inadequate diet, smoking, vaping, alcohol, medications, infections, environment etc

De Luca R, Arrè V, Nardone S*, et al*. Gastrointestinal microbiota and inflammasomes interplay in health and disease: a gut feeling. *Gut* Published Online First: 28 May 2025. doi: 10.1136/gutjnl-2025-334938

Shen, Y., et al. (2025), Gut Microbiota Dysbiosis: Pathogenesis, Diseases, Prevention, and Therapy. MedComm, 6: e70168. https://doi.org/10.1002/mco2.70168

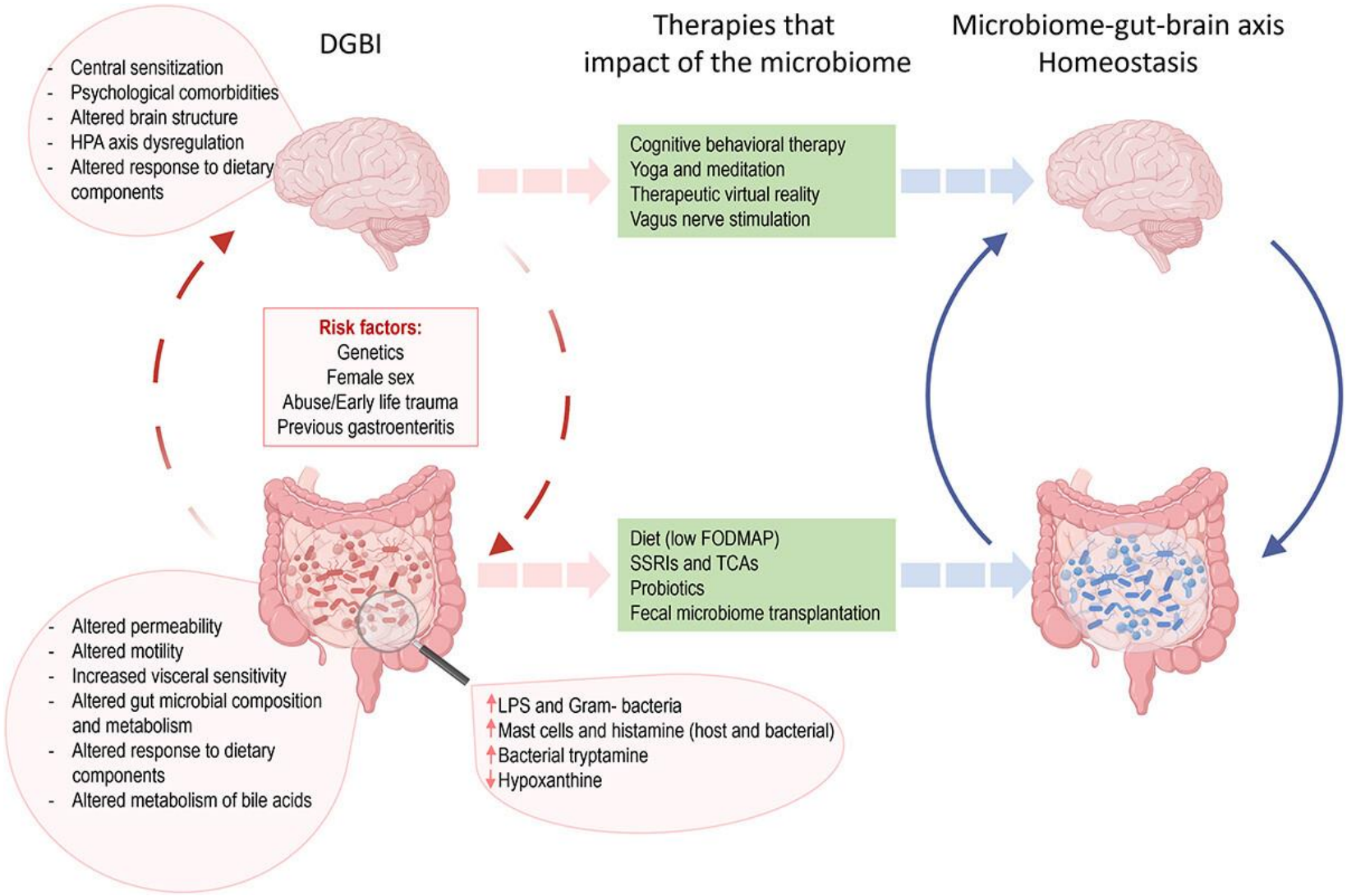
SiddiqueZR et al. Gut-Oral Microbial Dysbiosis: A correlated ecosystem. Adv Gut& Microbiome Res. 2025

Dysbiosis & Diseases
Neurology/ Mental Health



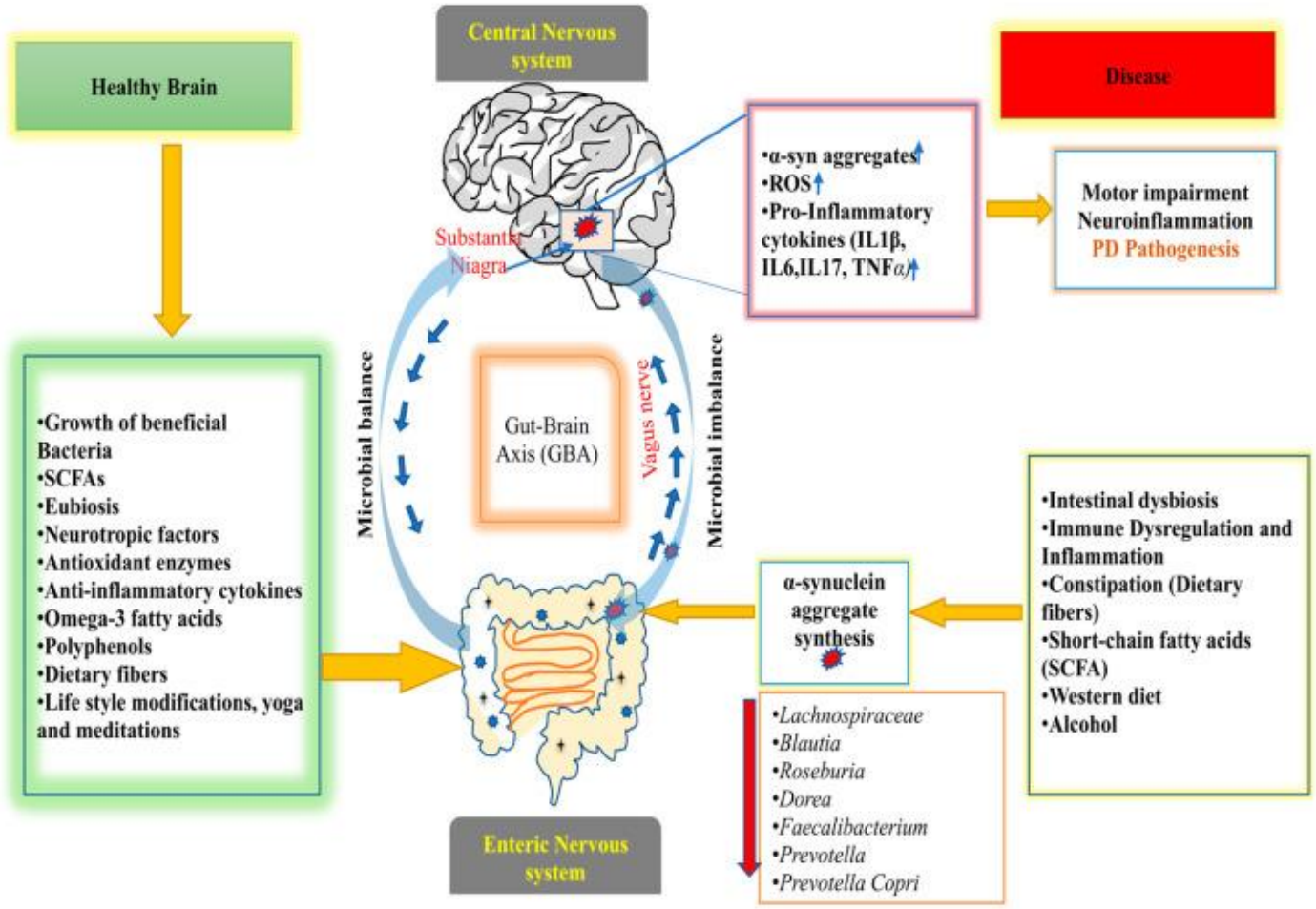
Socala K, Doboszewska U, Szopa A, Serefko A, Wlodarczyk M, Zielinska A, et al. The role of microbiota-gut-brain axis in neuropsychiatric and neurological disorders. Pharmacol Res. 2021;172:105840.

Dysbiosis & Diseases
DBGI-IBS



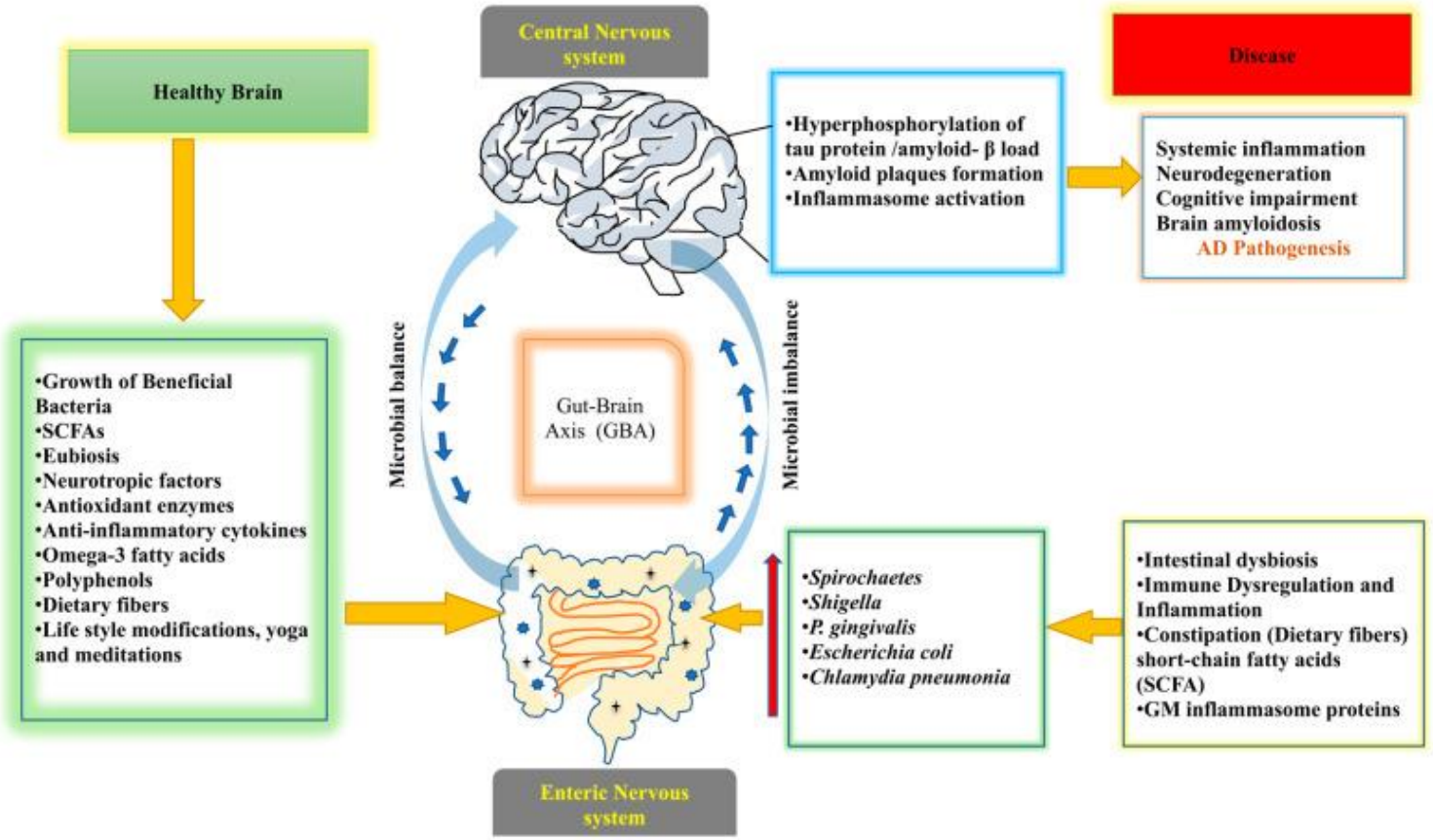
Kraimi, N., Ross, T., Pujo, J., & De Palma, G. (2024). The gut microbiome in disorders of gut–brain interaction. Gut Microbes, 16(1). https://doi.org/10.1080/19490976.2024.2360233

Dysbiosis & Diseases
Neurology/
Mental Health-PD



Depicts the role of GM in the GBA under microbial balance and imbalance conditions for the pathogenesis of PD. Microbial balance leads to a healthy brain (left side). It includes modifying factors such as beneficial bacteria growth, balanced SCFAs, eubiosis, increased neurotropic factors, the synthesis of anti-oxidant enzymes, anti-inflammatory cytokines, omega-3 fatty acids, polyphenols, and dietary fibers, which in turn keep the brain and biological system healthy, as well as lifestyle changes such as physical exercise, yoga, and meditation, in the intestine of the host. A microbial imbalance leads to the pathogenicity of PD (right side). It occurs due to intestinal dysbiosis, immune dysregulation and inflammation, constipation, decreased short-chain fatty acids (SCFA), the western diet, alcohol, etc. In PD, these factors promote the accumulation of α-synuclein, ROS, and pro-inflammatory cytokines (IL1β, IL6, IL17, and TNF-α), which are transported from the gut to the brain via the vagus nerve

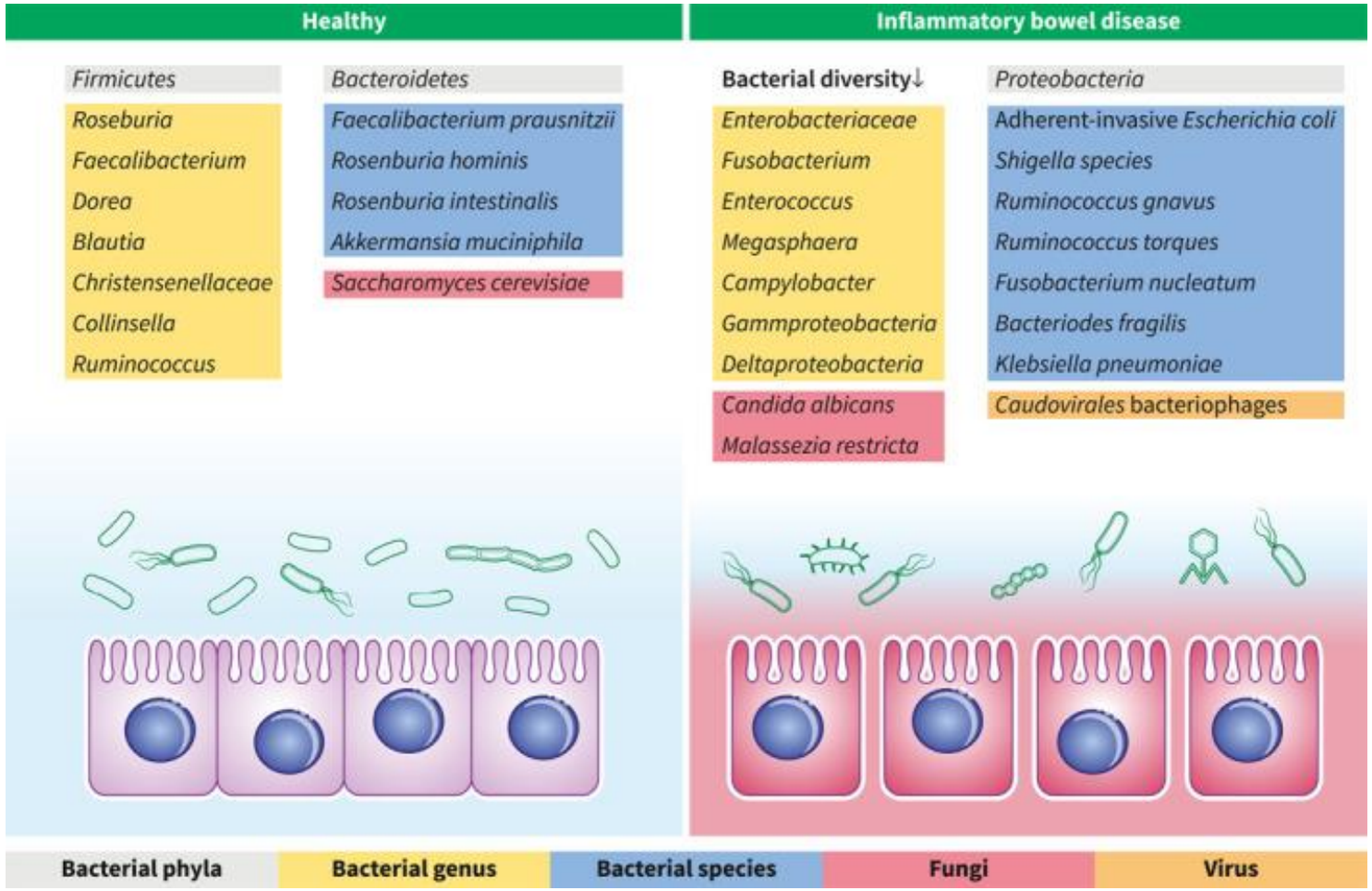
Tiwari P, Dwivedi R, Bansal M, Tripathi M, Dada R. Role of Gut Microbiota in Neurological Disorders and Its Therapeutic Significance. J Clin Med. 2023 Feb 19;12(4):1650. doi: 10.3390/jcm12041650. PMID: 36836185; PMCID: PMC9965848.



Demonstrates the role of GM in AD pathogenesis via GBA in both microbial balance and imbalance conditions. A healthy brain (left side) occurs due to a microbial balance condition in the intestine. It is affected by various factors, including the growth of beneficial bacteria, balanced SCFAs, eubiosis, increased neurotropic factors, anti-oxidant enzyme synthesis, anti-inflammatory cytokines, omega-3 fatty acids, polyphenols, dietary fibers, and lifestyle changes such as yoga and meditation; all of these factors contribute to brain health. A pathogen that causes Alzheimer's disease when there is a microbial imbalance (right side).

Tiwari P, Dwivedi R, Bansal M, Tripathi M, Dada R. Role of Gut Microbiota in Neurological Disorders and Its Therapeutic Significance. J Clin Med. 2023 Feb 19;12(4):1650. doi: 10.3390/jcm12041650. PMID: 36836185; PMCID: PMC9965848.

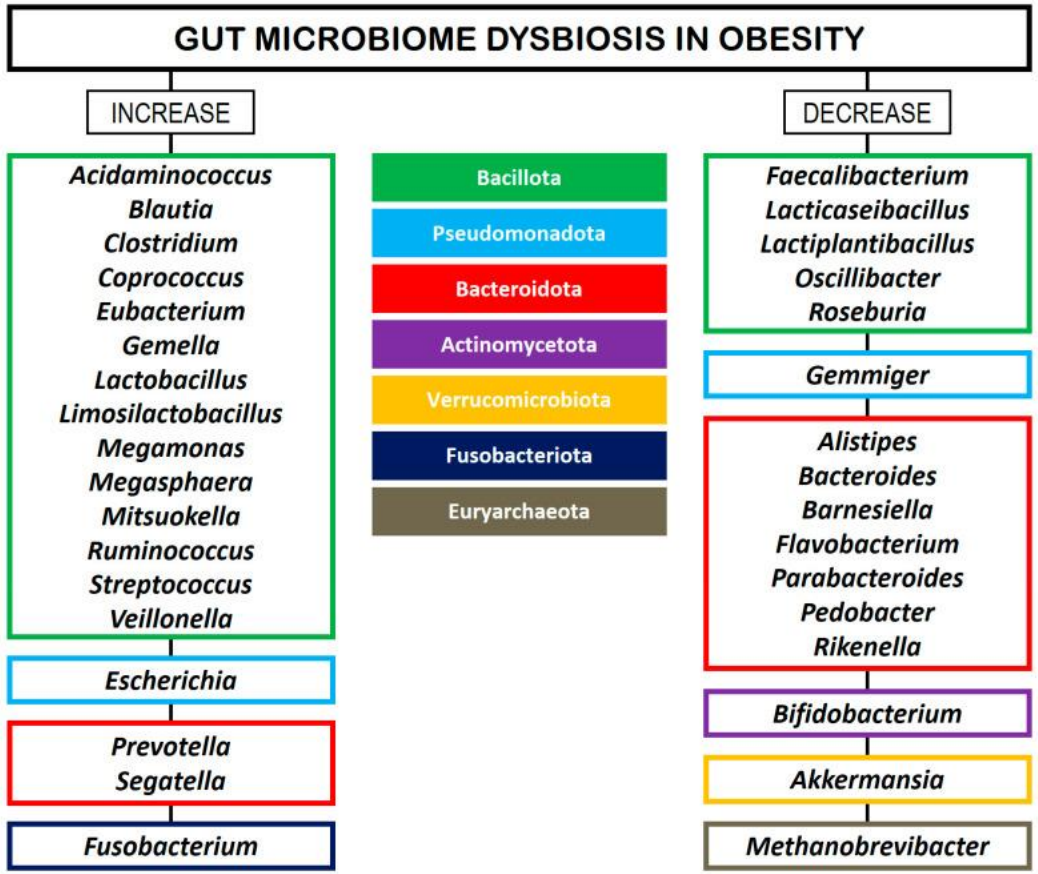
Dysbiosis & Diseases
IBD



Microbial alterations in IBD. The gut microbiome in IBD patients is generally characterized by a decrease in bacterial diversity, decrease in abundance of *Firmicutes* and *Bacteroidetes*, and an increase in *Proteobacteria*.
Altered bacteria at genus and species level, fungi, virus are shown in the figure. IBD, inflammatory bowel disease

Zheng J et al. United European Gastroenterol J. 2022 Dec 3;10(10):1091–1102.

Dysbiosis & Diseases
OBESITY



GM dysbiosis in patients with obesity. The left column shows the major bacterial genera that are increased in abundance relative to controls. The right column shows the major bacterial genera that are decreased in abundance relative to controls. The bacterial phyla are color-coded in the middle column.

Borrego-Ruiz A, Borrego JJ. Biomedicines. 2025 Sep 5;13(9):2173.
doi:10.3390/biomedicines13092173

Dysbiosis & Diseases
OBESITY

- Animal studies – transplanting microbiota from an obese mice to lean mice results in increased adiposity even though they were obesity gene negative

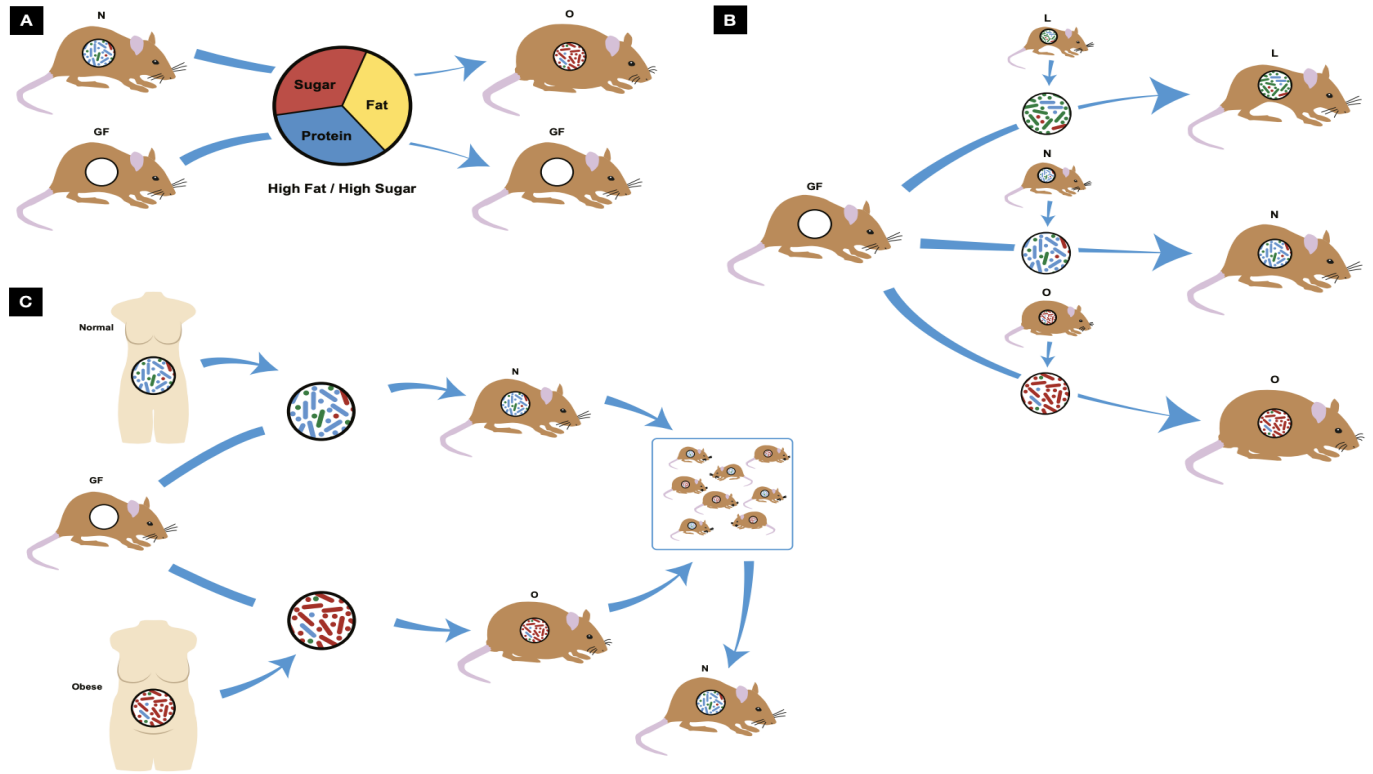


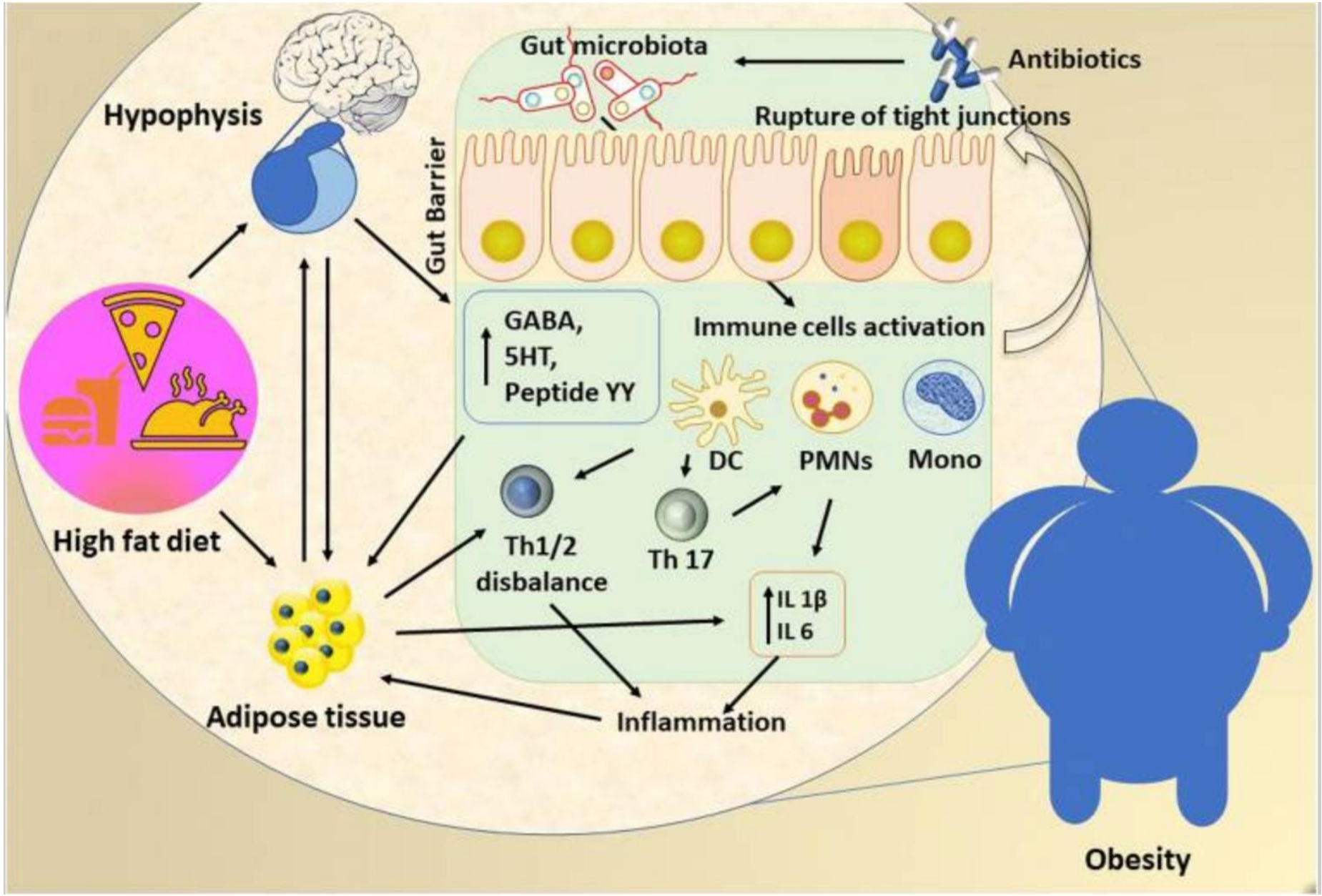
Figure 2. Obesity and the microbiome

A. Germ-free mice are resistant to diet-induced obesity; B. Metabolic phenotype is transmissible via microbiota transplant with lean donors producing lean mice and obese donors producing obese mice; C. Microbiota transplant from identical twins discordant for obesity also transmit metabolic phenotype to germ-free mice, however when co-housed the lean phenotype predominates; GF, germ-free; L, lean N, normal; O, obese

Sidhu M, Poorten DVD. The Gut Microbiome. AFP 46(4); 206-211 (2017).

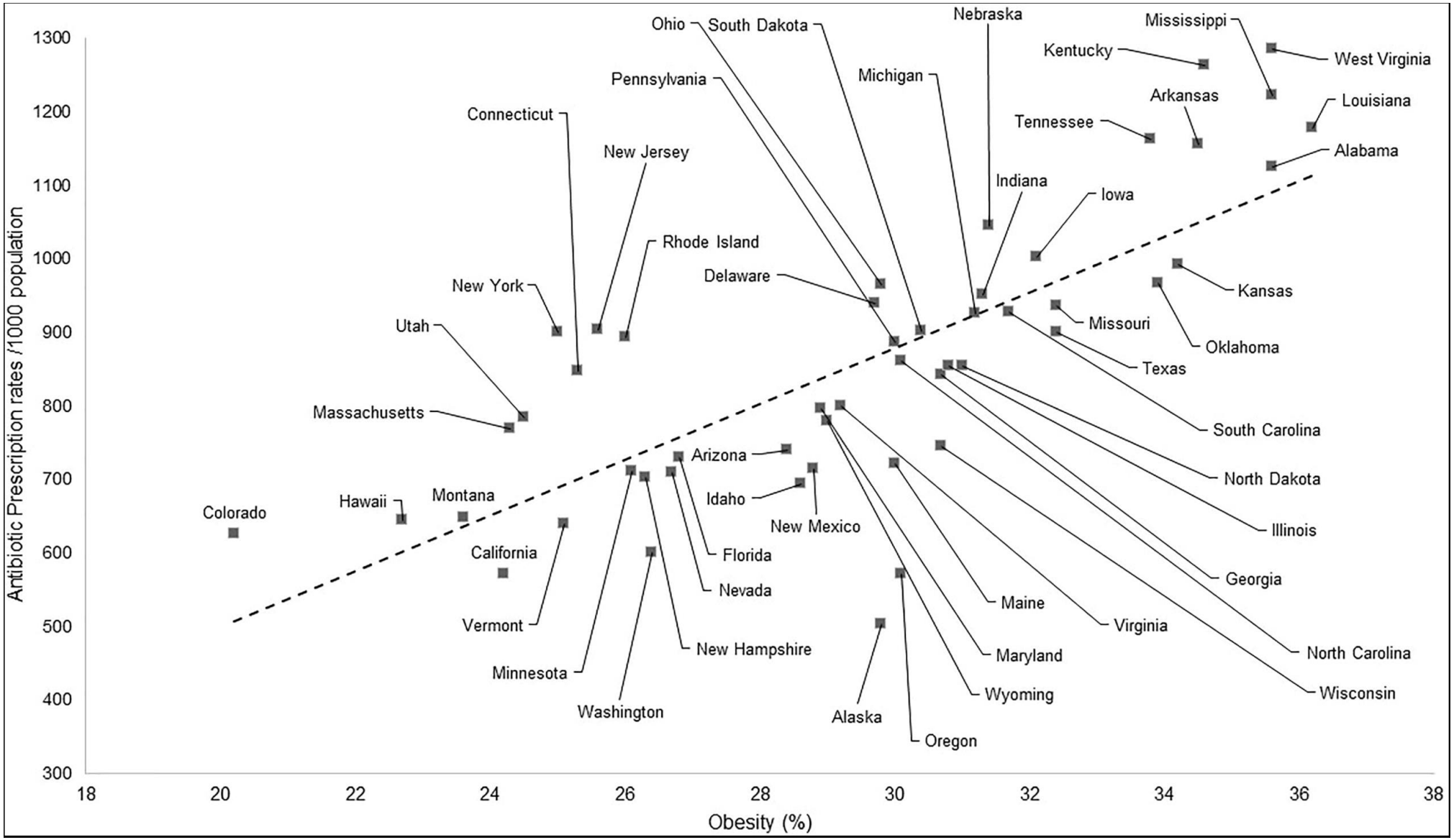
Turnbaugh, P., Ley, R., Mahowald, M. *et al.* An obesity-associated gut microbiome with increased capacity for energy harvest. *Nature* **444**, 1027–1031 (2006). https://doi.org/10.1038/nature05414

Dysbiosis & Diseases
OBESITY



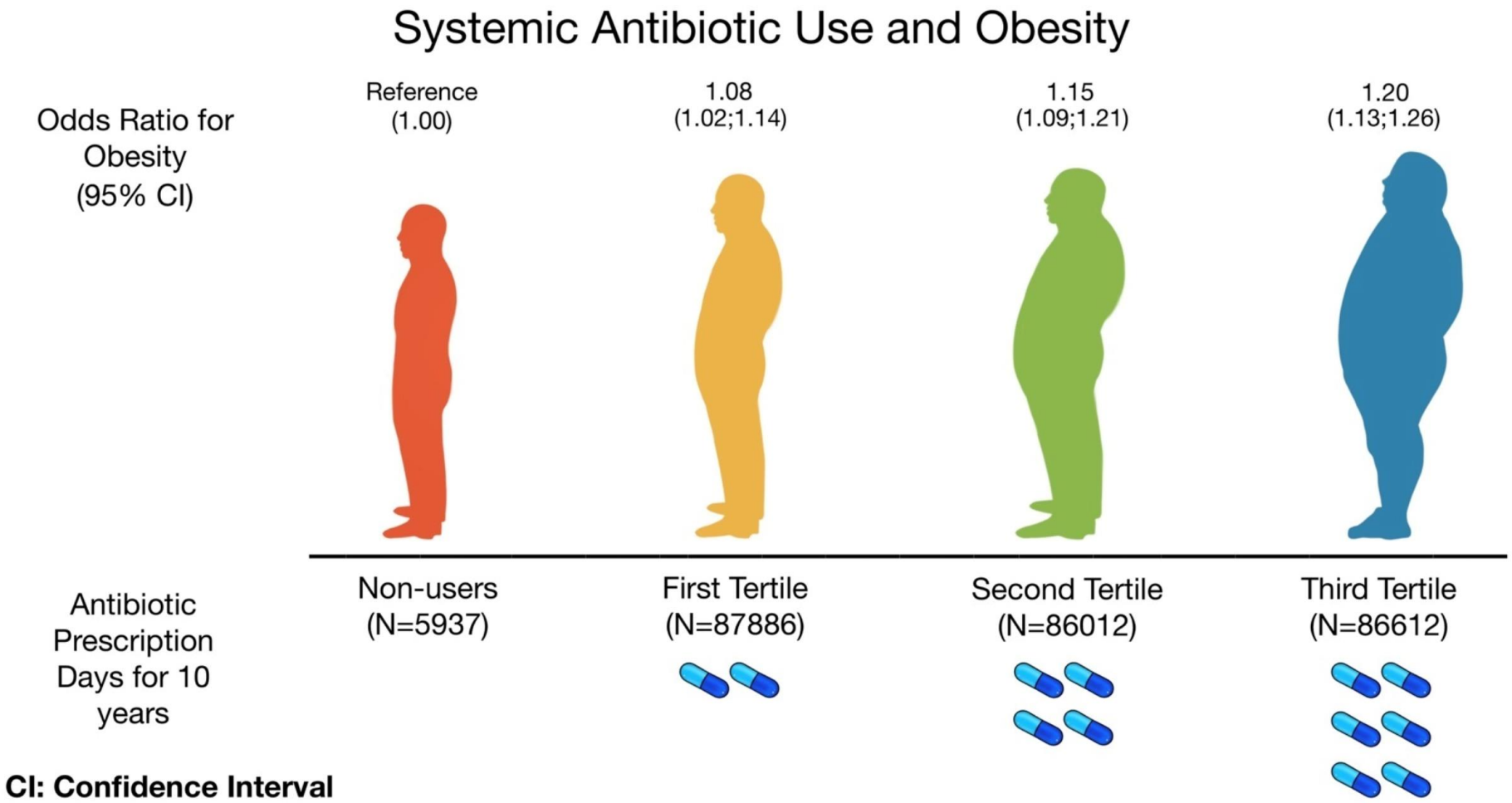
. 2021 May 4;10(3):244–262. doi: 10.1007/s13679-021-00438-w

Dysbiosis & Diseases
OBESITY



Front. Pharmacol., 03 December 2018. Volume 9 - 2018 | https://doi.org/10.3389/fphar.2018.01408

Dysbiosis & Diseases
OBESITY



J. Clin. Med. **2021**, *10*(12),2601; https://doi.org/10.3390/jcm10122601

Clinical applications

Faecal Microbial Transplantation

Australian Government
Department of Health, Disability and Ageing
Therapeutic Goods Administration

- FMT will be regulated as 'Biologicals'
  - "Where a strain(s) of microorganisms, known to be present in stool, are characterised and grown from established isolates with standardised consistency, these may be regulated as medicines, rather than biologicals.
  - FMT products that are regulated as biologicals are prohibited from being advertised to the public under the *Therapeutic Goods Act 1989* (subsection 42DL(11))."

Hou, K., Wu, ZX., Chen, XY. *et al.* Microbiota in health and diseases. *Sig Transduct Target Ther* **7**, 135 (2022). https://doi.org/10.1038/s41392-022-00974-4

Clinical applications

Faecal Microbiota Transplant (Microbiota Restoration Therapy)

- Started in China – 4th Century – FMT by mouth (unrefined) for GI infections
- Strong evidence - *recurrent* or *persistent* C. diff infection, succes 80-95% – use at 48 hrs of failed Abx Rx
- Methods of delivery:
  - Via colonoscopy into colon
  - Via Upper endoscopy into Duodenum
  - Enema
  - Oral Capsule – freeze dried, live microbiota; 2 days after oral Abx and over 3 days
- Compete for nutrients; bacteriocidal/static; Metobolise prim bile acid to sec bile acid that inhibit C diff spore germination and vegetative growth, promotes indigenous microbiota's interaction with the host improving innate immunity
- Mild side effects GI symptoms, fever/rigors – last short time

Australia gives world-first approval for faecal transplants to restore gut health

BiomeBank in Adelaide collects healthy genetic material from the microbiomes of donors to treat potentially deadly bacterial condition

Zhang F, Luo W, Shi Y, Fan Z, Ji G. Should we standardize the 1,700-year-old fecal microbiota transplantation? AJG 2012
Cheng YW, Fischer M. Fecal Microbiota Transplantation. Clin Colon Rectal Surg. 2023 Jan 25;36(2):151-156.
Hou, K., Wu, ZX., Chen, XY. *et al.* Microbiota in health and diseases. *Sig Transduct Target Ther* **7**, 135 (2022).

Clinical applications

FMT - IBD

- IBD is likely due to combination of - diet/microbiome/immunology/genetics/ environment/other factors
- Use of FMT – mainly in UC – one metanalysis of 12 studies, 550 pts; concluded that, evidence in these studies was uncertain in terms of achieving clinical and endoscopic remission, or maintenance of remission
- Trial heterogeneity and variability in results of FMT/microbiome-based therapies/probiotics have not advanced to clinical applications as yet

- Move to Paula's case studies

Imdad A, et al. Fecal transplantation for treatment of inflammatory bowel disease. Cochrane Database Syst Rev. 2023;2023(4):CD012774. Epub 20230425.
Barnes EL, et al. AGA clinical practice guideline on the management of Pouchitis and inflammatory pouch disorders. Gastroenterology. 2024;166(1):59–85

Microbiome Testing

Clinical Indications

- IBD: in remission/smouldering
- Gut symptoms/ DGBI
- Diverticulosis/ Diverticulitis
- Metabolic disease/ MAFLD
- Cancer prevention
- Gut health optimisation

Other considerations

- Diet quality
- Supplement use
- Patient interest/motivation
- Financial capacity

Summary

- Comprehensive assessment of microbiome and gut environment
  - Reveal underlying mechanisms
  - Prevent unnecessary/ counterproductive treatments or supplementation
  - Guided targeted treatment

- Microbiome directed interventions include:
  - Dietary change
  - Probiotics – indication specific evidence-based strain
  - Prebiotics