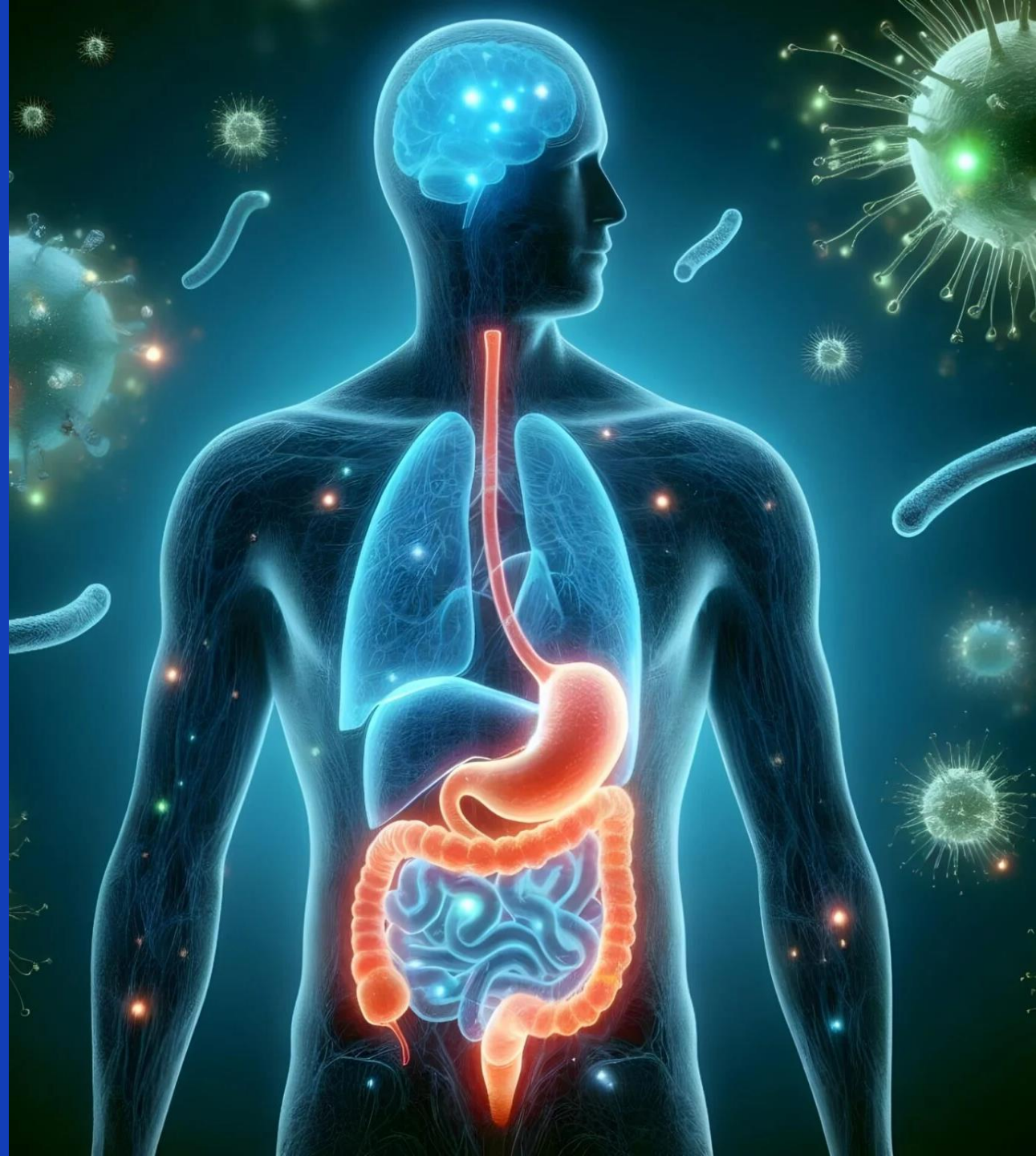
Long-covid, post-acute infectious syndromes (PAIS) and the microbiome

There is sufficient reason to treat

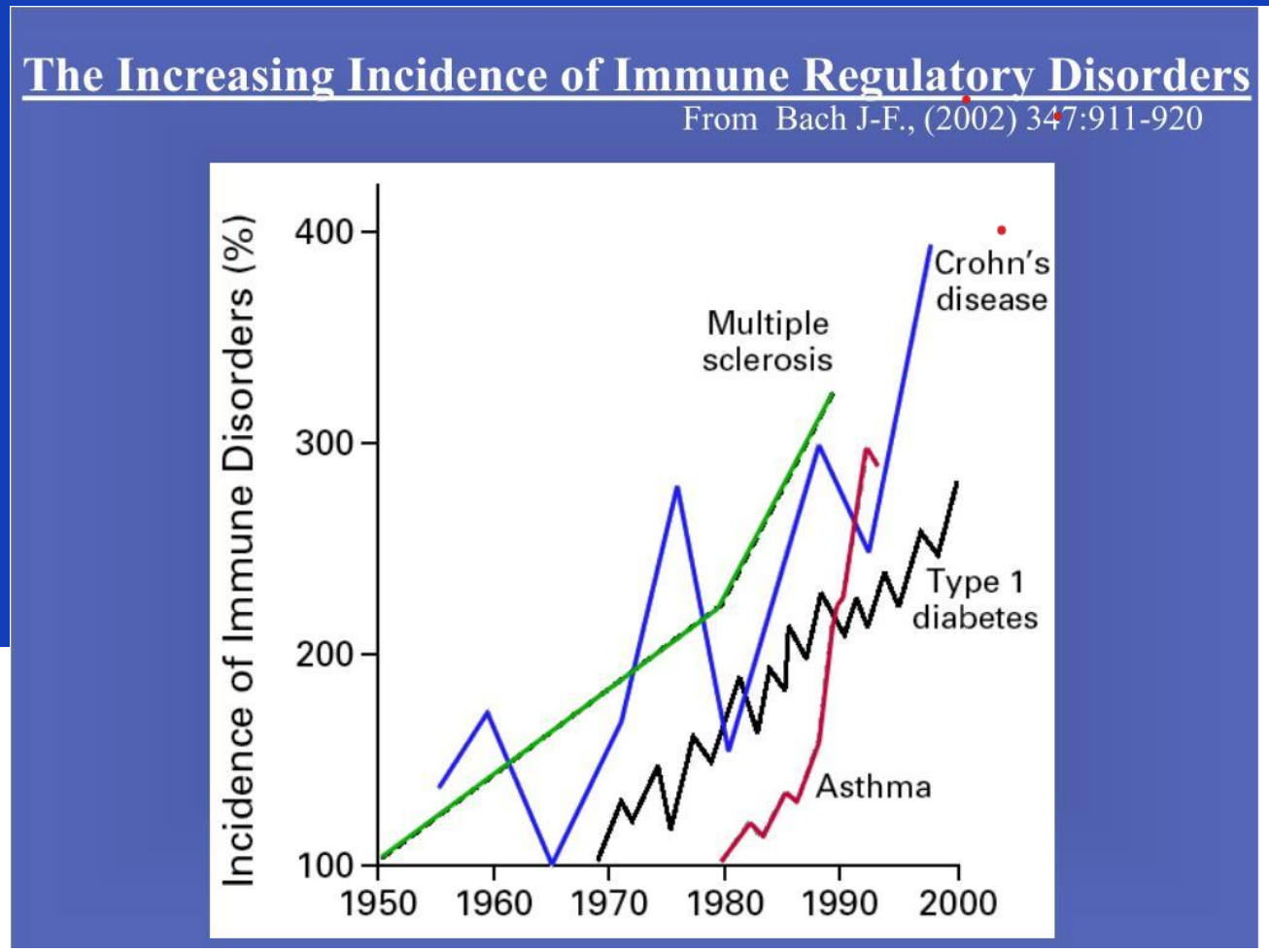
Roy Montijn (TNO)
Dennis Zeilstra, Karin Pijper, Wim de Jong (Microbiome Center)
10 December 2025

Gut microbe-host interactions in Long-COVID

Roy Montijn



History of Chronic Diseases



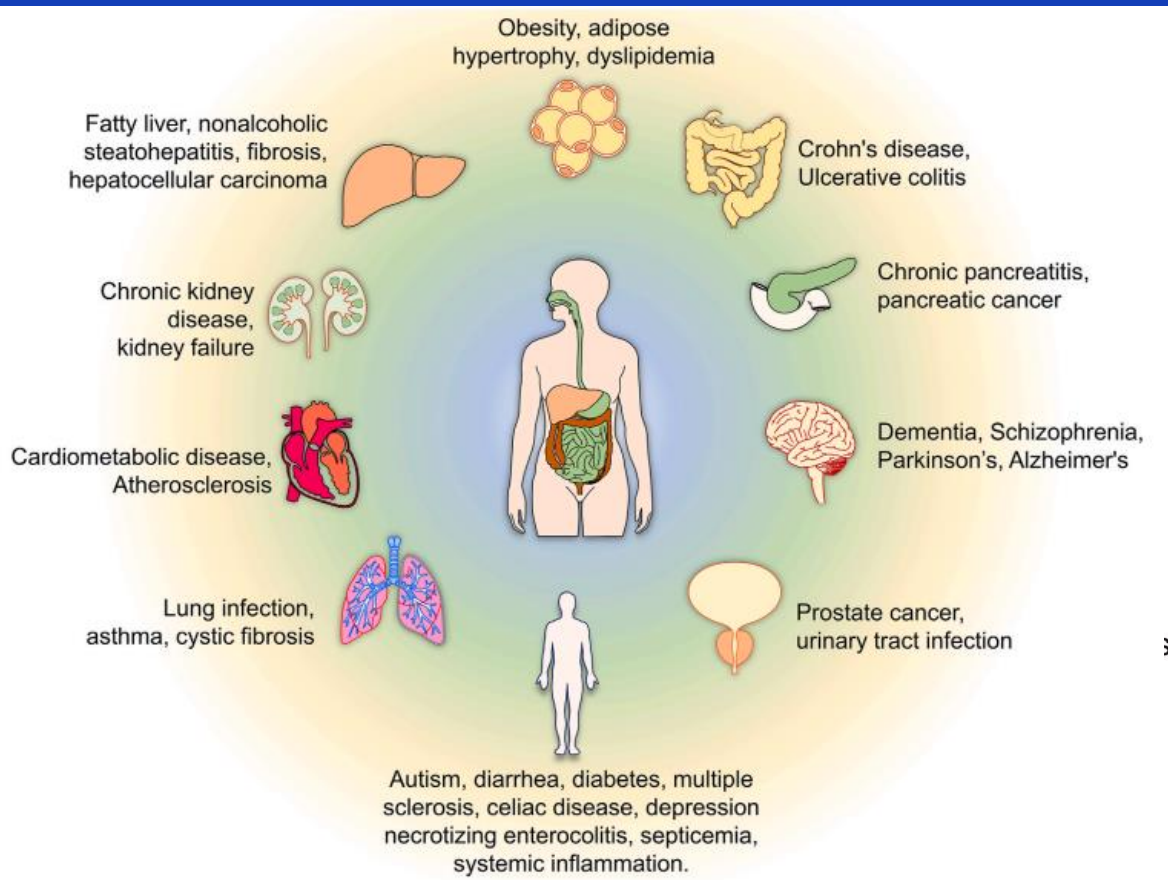


Fig. 1. Human chronic diseases with direct or indirect intestinal etiology.

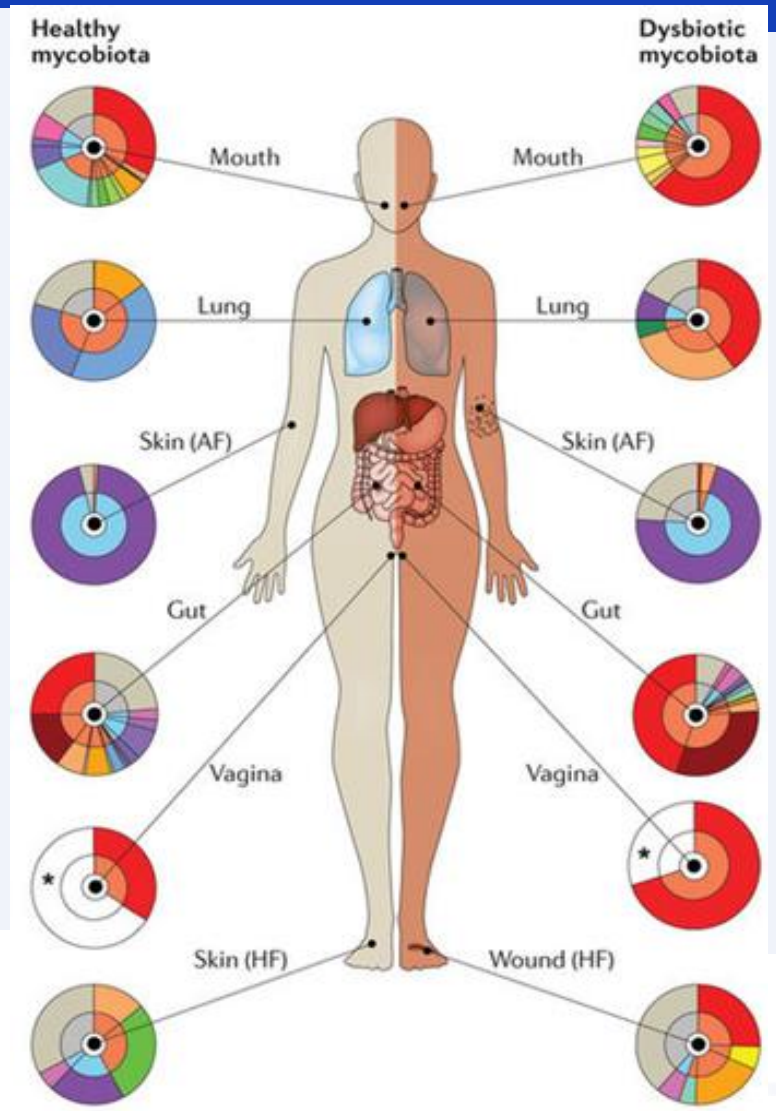
Bach JF. The effect of infections on susceptibility to autoimmune diseases and allergic conditions.*N Engl J Med*. 2002

Microbiome dysbiosis

Healthy Microbiome vs Dysbiosis

A healthy microbiome is balanced and self-regulating:

- High diversity of healthy bacteria
- Many important functions present
- Interaction with organs
- Good alignment with the immune system
- Ability to control pathogenic microorganisms

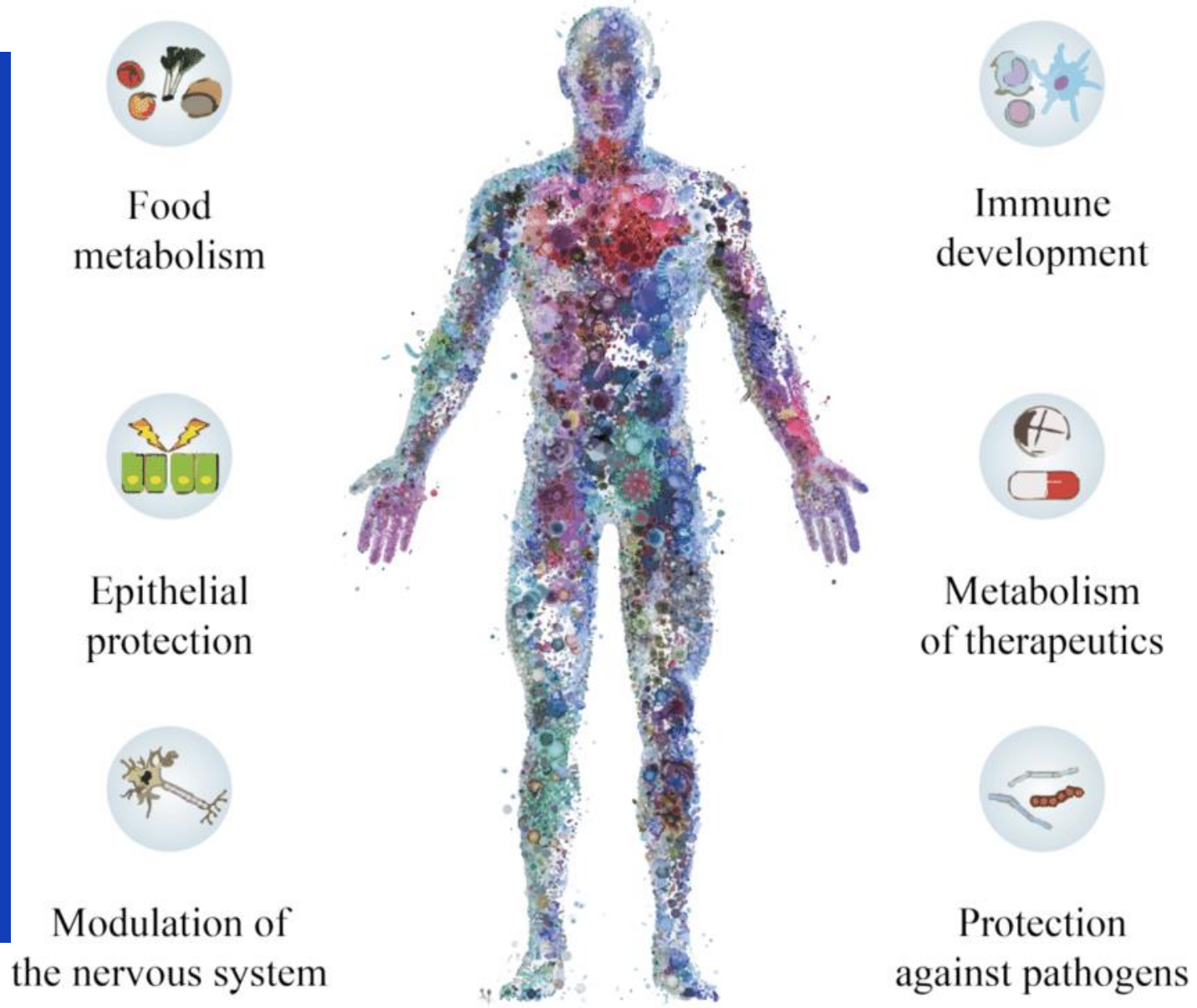


Dysbiosis is a disruption of the balance of the composition and function of the microbiome, characterized by:

- Fewer types of healthy bacteria, leading to loss of healthy functions
- Disturbed immune responses
- Disrupted interactions with organs
- Overgrowth of pathogenic microorganisms
- Association with chronic diseases

Functions of the Microbiome

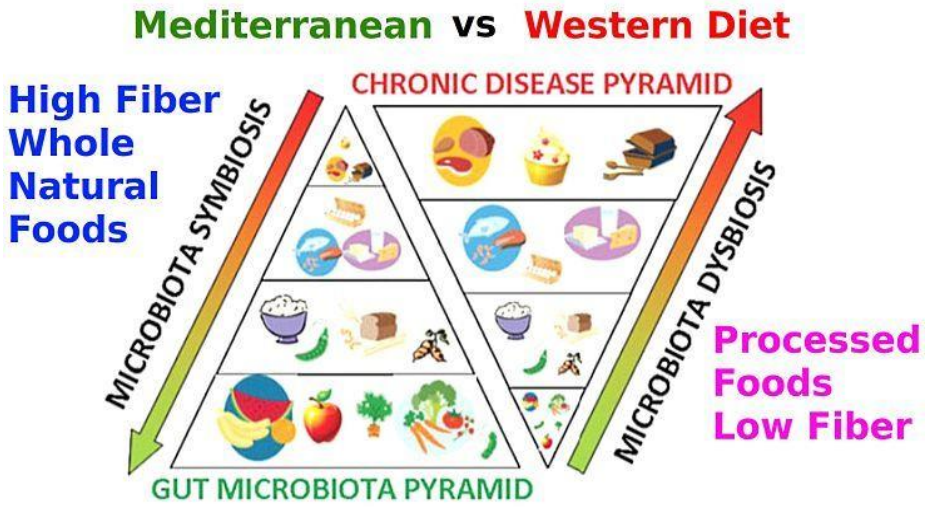
- **Food metabolism** (SCFA, vitamins, neurotransmitters)
- **Protective functions** (bacteriocins, competition)
- **Development of structural functions** (villi, crypts, tight junctions)
- **Immune-modulating functions**



Causes of Dysbiosis

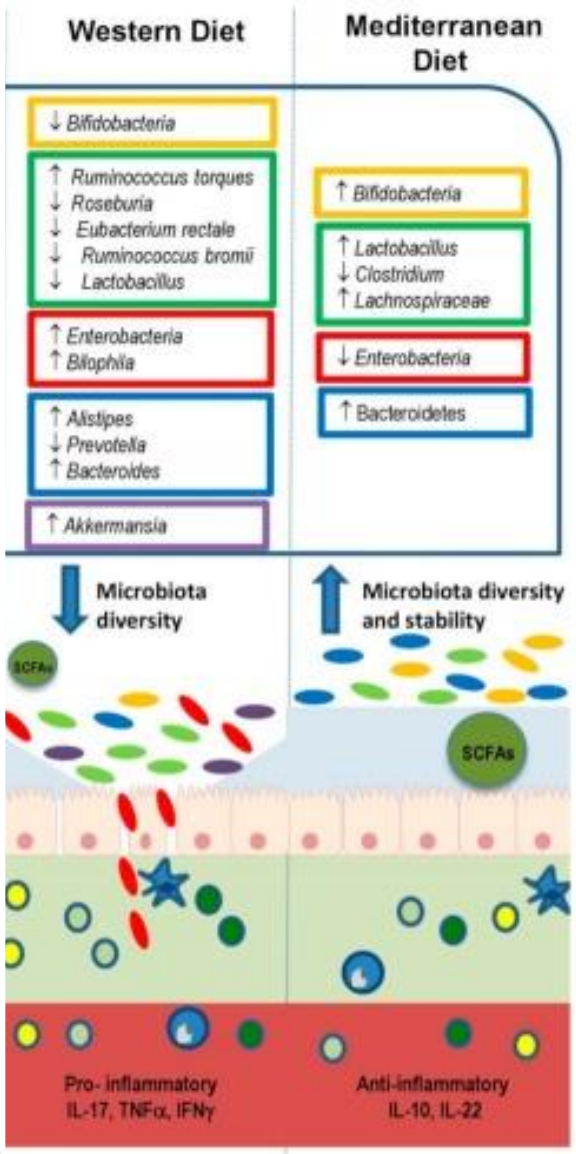
Lifestyle

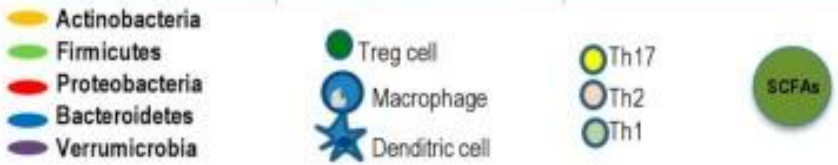
Diet



Environmental Exposures

Effects of Different Types of Nutrition on Gut Microbiota, Mucus Layer, and Immune Cells





* Fecal variations microbiota of healthy adults following GFD over one month

Rinninella E, *et al*. Nutritional components and dietary habits: keys for a healthy gut microbiota composition. Nutrients. 2019

Gut-Organ Axis

beneficial gut metabolites:

- Short-chain fatty acids (SCFAs): Acetate, Propionate, Butyrate
- Amino acid-derived metabolites: Indoles, phenols, amines, branched fatty acids
- Lipid-derived metabolites: Glycerol derivatives, choline metabolites (e.g., TMAO)
- Vitamins and cofactors: B vitamins (e.g., B12, biotin, folic acid)
- Polyphenol metabolites (e.g. desaminotyrosine)
- Gas metabolites: Hydrogen, methane, hydrogen sulfide
- Neuroactive substances: GABA, Serotonin precursors, tryptamine
- Secondary bile acids

Alagiakrishnan K, et al. Nutr. 2024

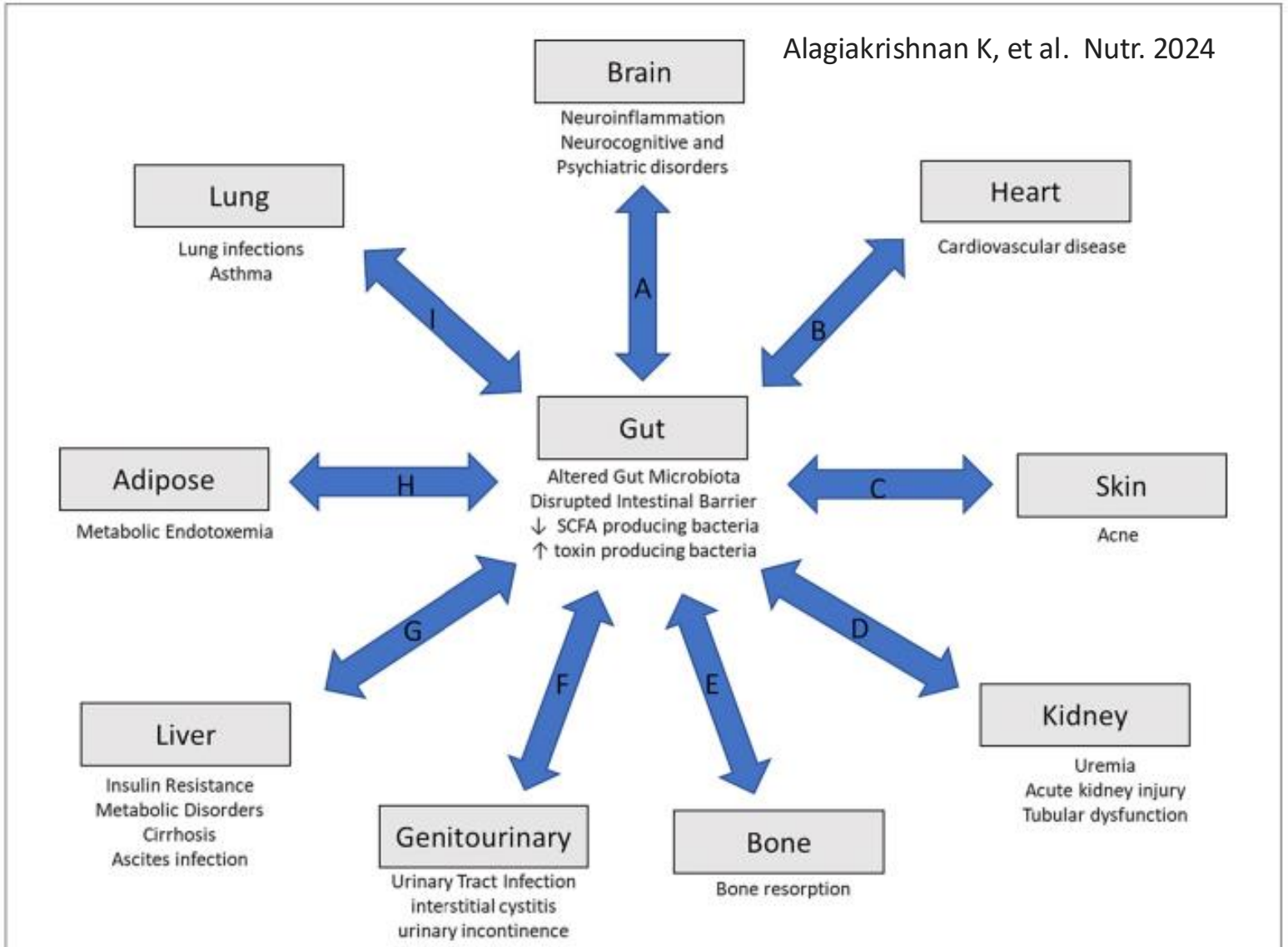
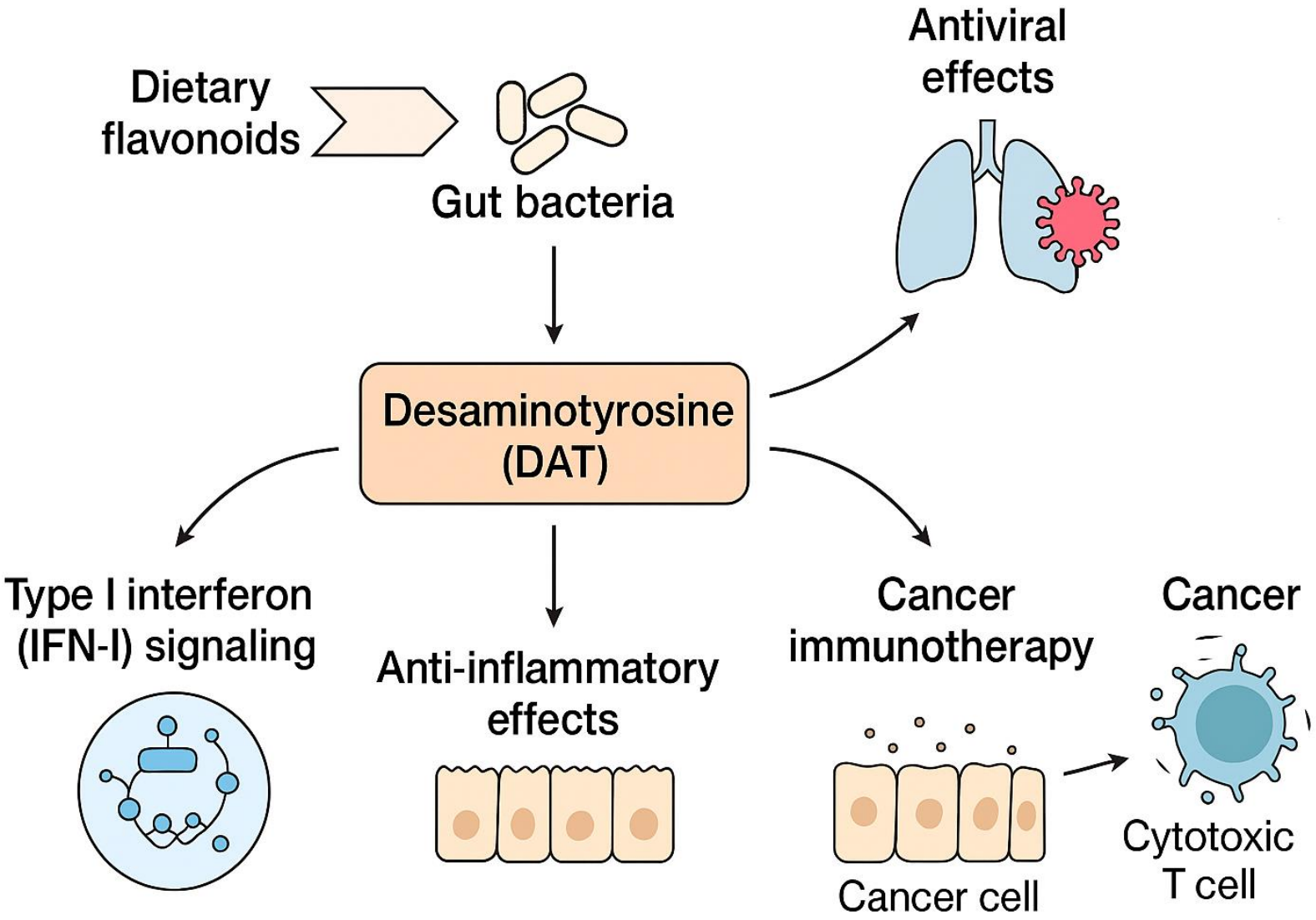
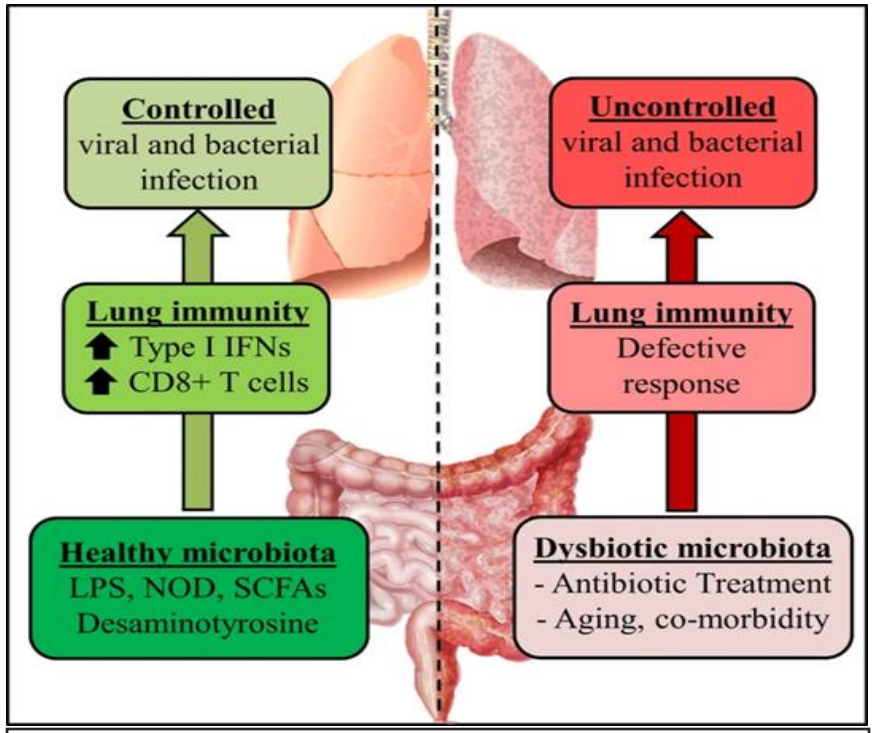


FIGURE 1
Overview of the gut-organ axis. Disruptions in the gut microbiome can lead to a decrease number of short-chain fatty acid producing bacteria and increased toxin producing bacteria. Along with this, there may be disruptions in the intestinal barriers leading to bacterial translocation that may influence systemic inflammation. (A) The gut-brain axis, (B) gut-heart axis, (C) gut-skin axis, (D) gut-kidney axis, (E) gut-bone, (F) gut-genitourinary axis, (G) gut-liver axis, (H) gut-adipose, and (I) gut-lung axis.

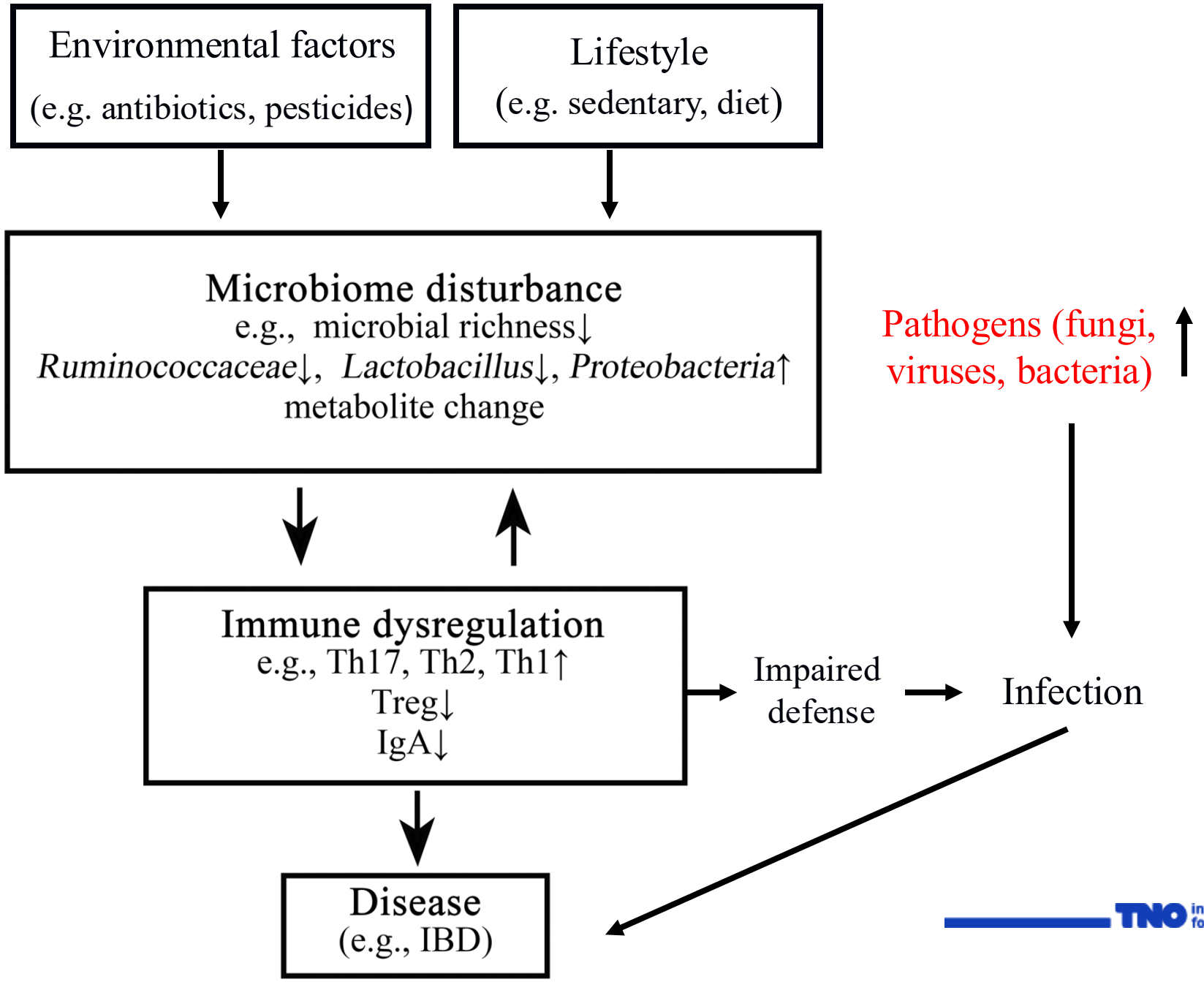
The Gut-Lung Axis



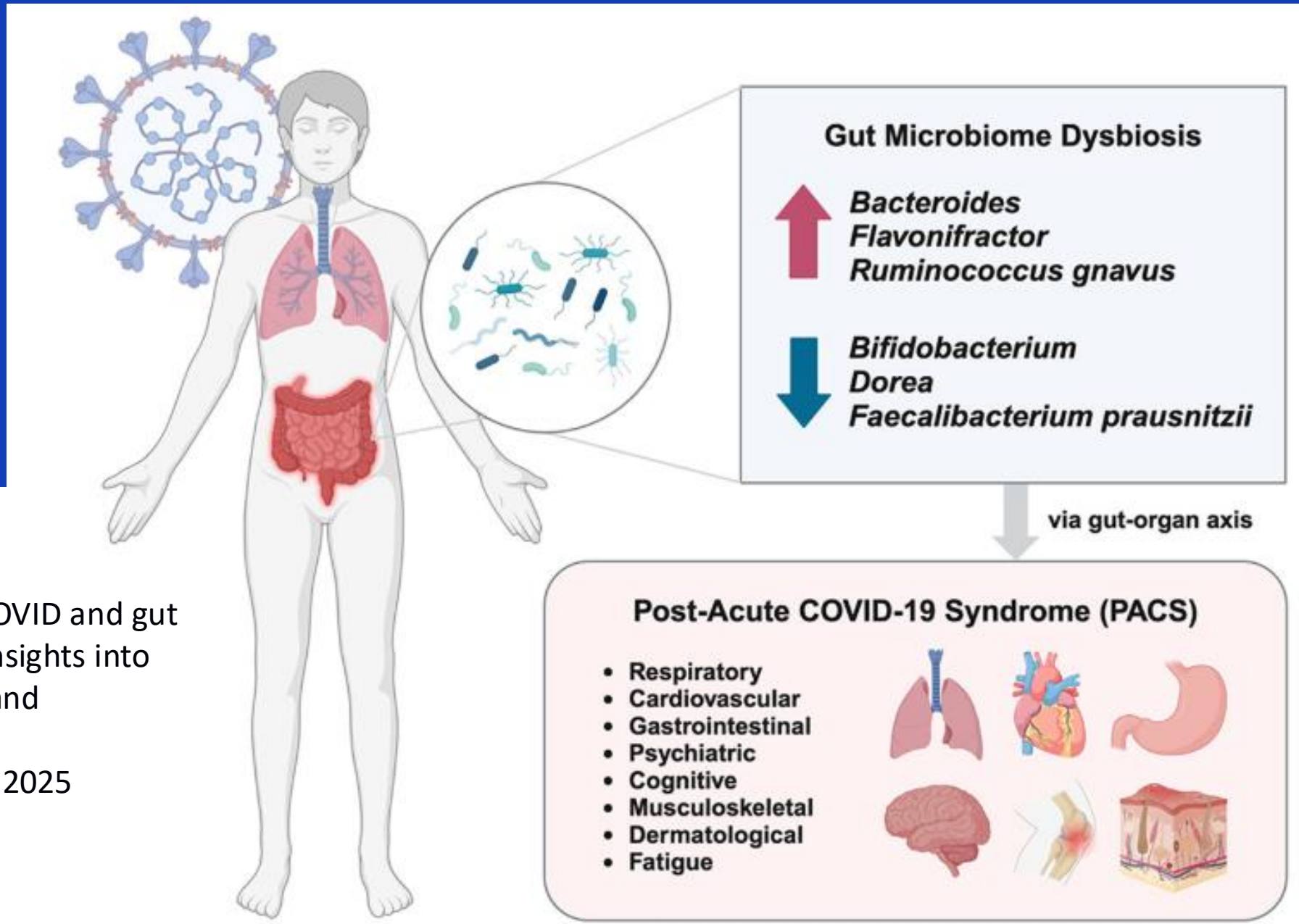


Göttert S, *et al*. Nat Commun. (2025)
Sencio *et al*. Mucosal Immunol (2021)
Steed *et al*. Science (2017)
Rosshart *et al*. Cell (2017)
Ichinohe *et al*. PNAS (2011)

Dysbiosis and Chronic Diseases



Long-Covid and Dysbiosis



Lau RI, et al. COVID and gut microbiome: insights into pathogenesis and therapeutics.
Gut Microbes. 2025

TNO innovation for life

Gut microbe–host interactions in post-COVID syndrome: a debilitating or restorative partnership?

Torsten P. M. Scheithauer , Roy C. Montijn, and Arnout Mieremet. ***Gut Microbes***. September 2024

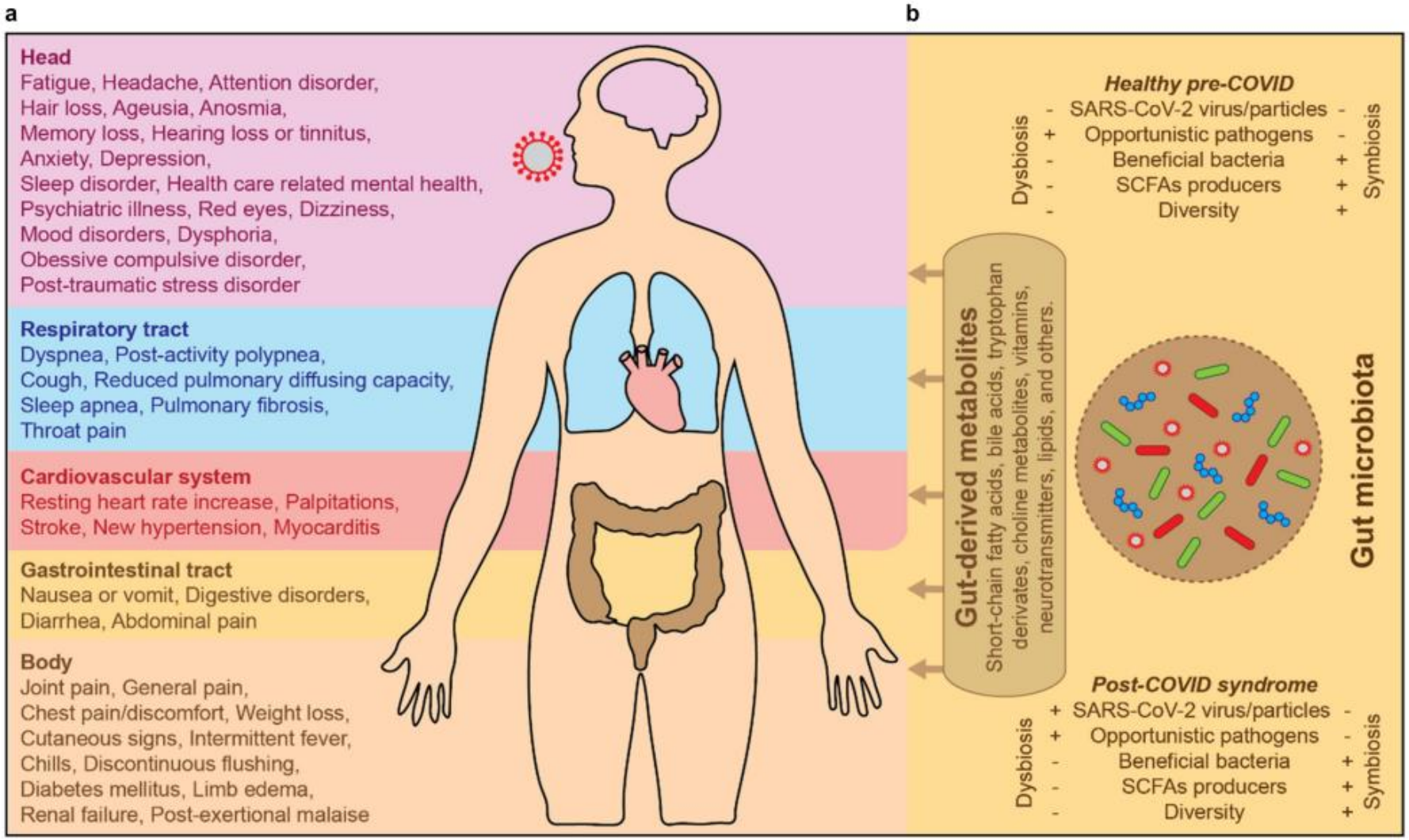
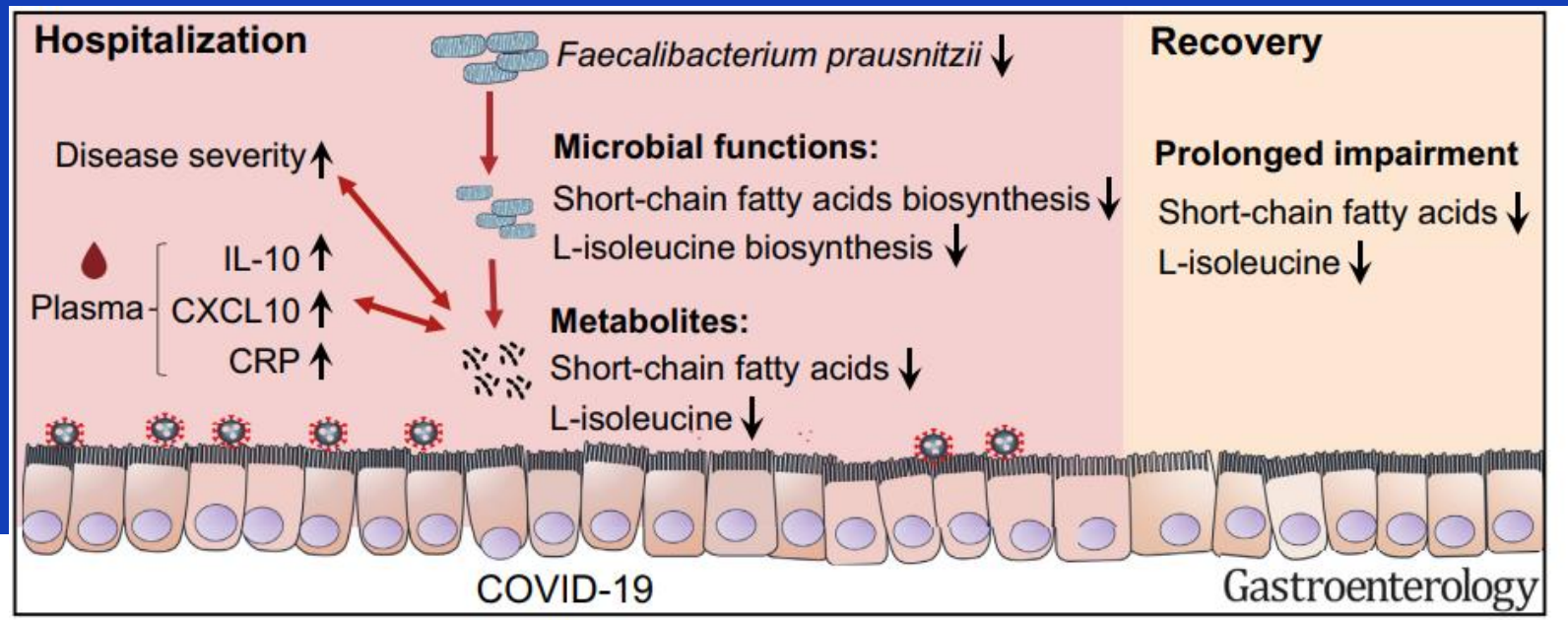
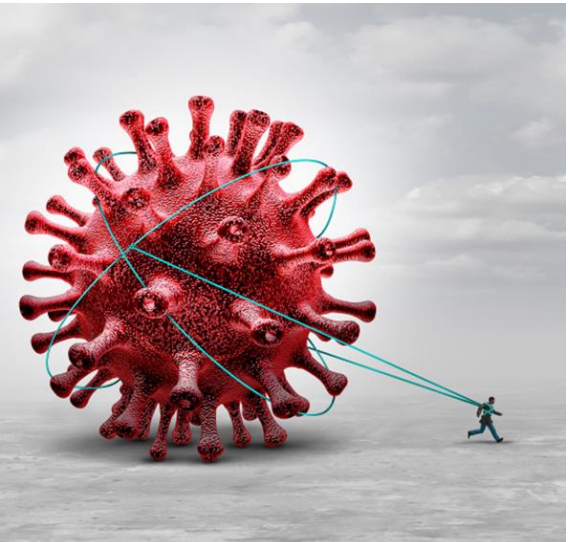


Figure 1. The gut microbiota and symptoms of the post-covid syndrome.

Production of SCFA and L-Isoleucine is low in Long-Covid





Prolonged Impairment of Short-Chain Fatty Acid and L-Isoleucine Biosynthesis in Gut Microbiome in Patients With COVID-19.
Fen Zhang et al., **Gastroenterology** 2022

Health Benefits of Butyrate

1. **Digestive System Health**:
   - It serves as the **primary energy source** for the cells lining your colon, meeting approximately **70% of their energy needs**
   - supporting the gut barrier function
2. **Immune System Support**:
   - Butyrate signals to your immune system that the gut bacteria are within the desirabl range.
   - When butyrate levels are low due to inadequate fiber intake, the body may trigger a inflammatory reaction
3. **Reducing Inflammation**:
   - Butyrate has been described as a **potent pro-resolution molecule**. It helps regulate inflammation in the gut and beyond.
4. **Cognitive Function and Insulin Resistance**:
   - butyrate contribute to better cognitive function and lower rates of insulin resistance

ion

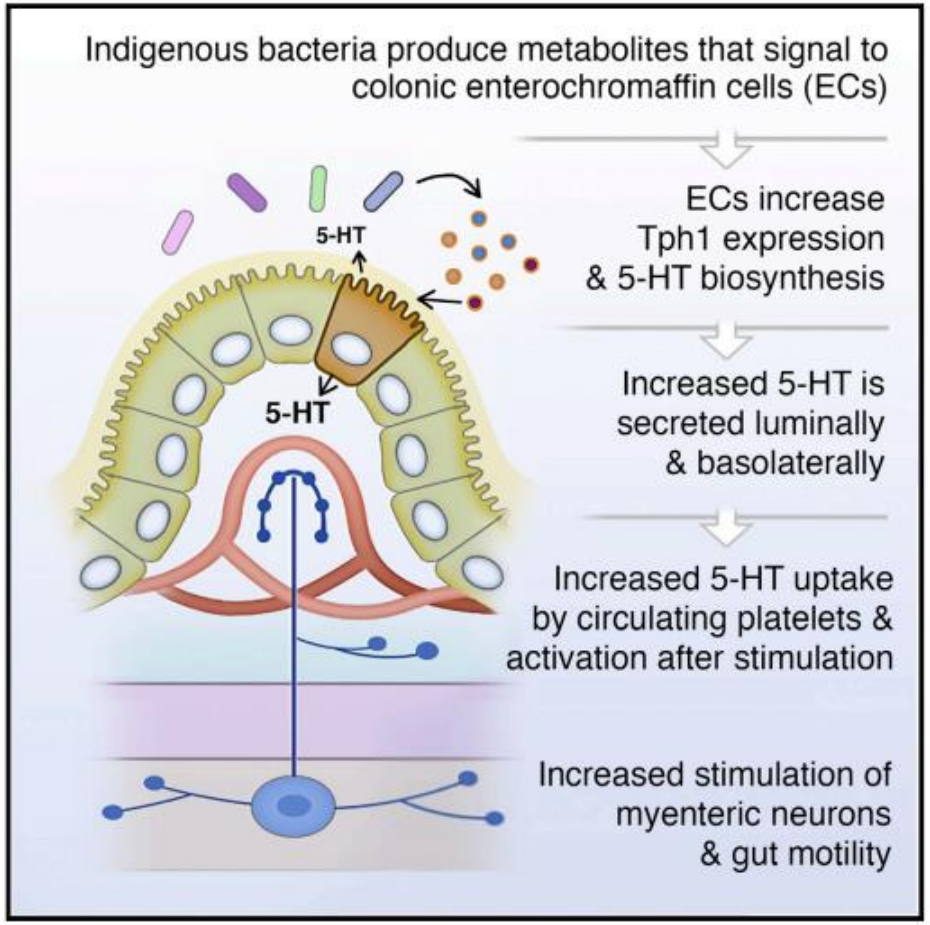
The gut microbiome bacteria regulate serotonin (5-HT) levels

- Indigenous Bacteria from the Gut Microbiota Regulate Host Serotonin Biosynthesis.

  Jessica M Yano *et al*. April 9, 2015 **Cell**

- Serotonin reduction in post-acute sequelae of viral infection.

  Wong *et al*., **Cell** October 26, 2023



Highlights

- Gut microbes regulate levels of 5-HT in the colon and blood
- Spore-forming bacteria modulate metabolites that promote colon 5-HT biosynthesis
- Microbiota-dependent changes in 5-HT impact GI motility and hemostasis
- Altering the microbiota could improve 5-HT-related disease symptoms

Serotonin; a hormone and a neurotransmitter

1. Mood Regulation
2. Sleep
3. Digestive System
    - Most of the body's serotonin resides in the digestive system.
    - It affects bowel function and controls bowel movements.
4. Blood Clotting:
    - Blood platelets use serotonin to aid in wound healing.
    - It encourages blood clot formation and narrows tiny arteries.
5. Appetite regulation.
6. Bone Health
7. Sex Drive
8. Learning and Memory
9. Cognition

Healthy Levels of Butyrate and Serotonin

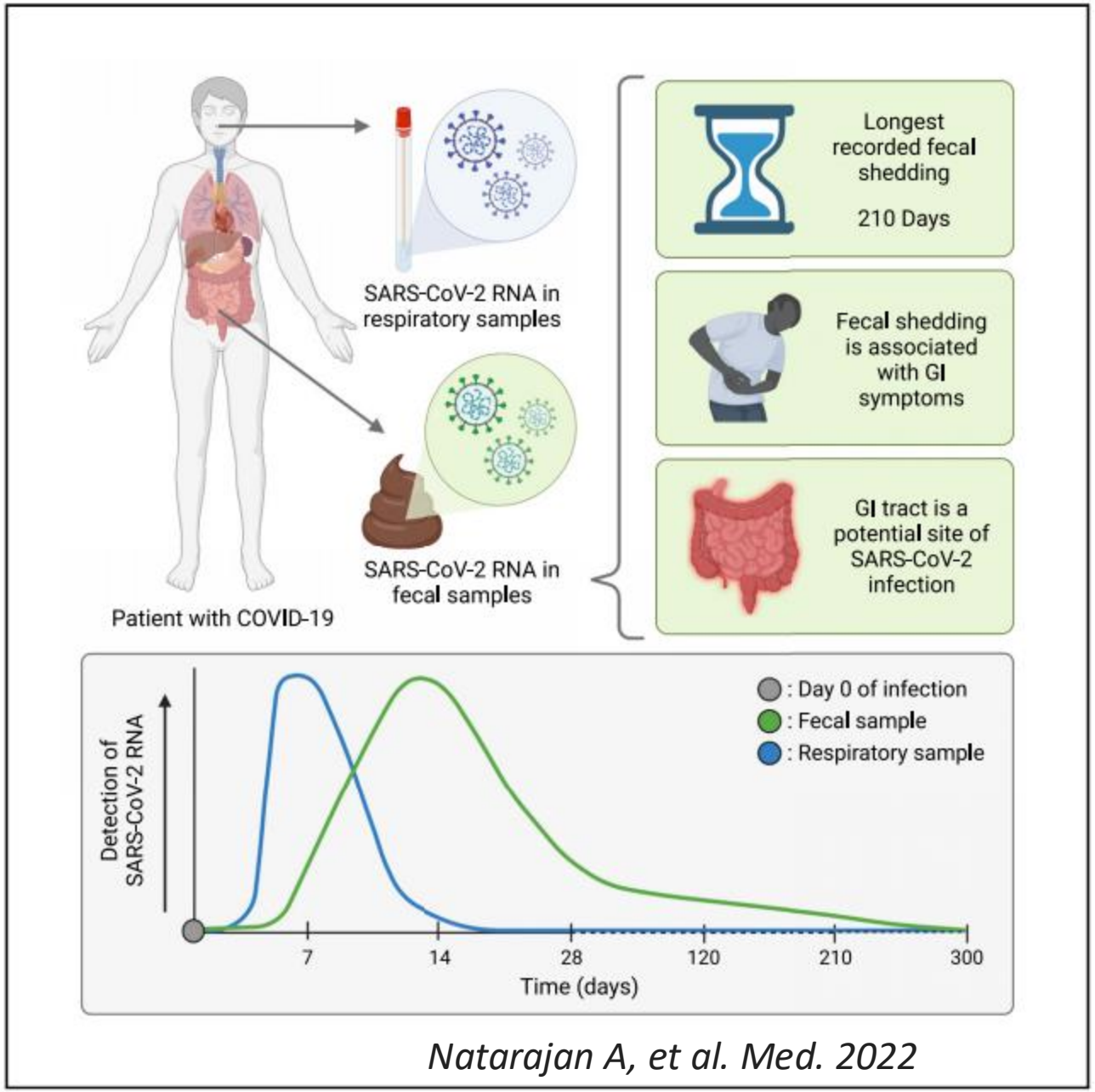
BENEFIT	EFFECT
Gut Health	Improved integrity and reduced inflammation
Immune System	Strengthened and anti-inflammatory response
Metabolic Regulation	Cholesterol control, blood sugar stabilization
Mental Health	Better mood, sleep regulation, cognitive support
Weight Control	Appetite regulation and weight management

Symptoms Linked to Dysbiosis and Low Butyrate and Serotonin levels

SYMPTOMS	POSSIBLE CAUSE
Fatigue	Low energy substrate availability
Concentration Problems	Reduced serotonin affecting cognitive function
PEM	Metabolic imbalance and inflammation
Muscle Pain & Weakness	Inflammatory response and poor nutrient absorption
Sleep Problems	Serotonin dysregulation
GI Complaints	Compromised gut barrier and dysbiosis

SARS-CoV-2 can persist in the gastrointestinal tract

- Gastrointestinal symptoms (like diarrhea) in some COVID-19 patients.
- Prolonged fecal shedding of viral RNA, suggesting the virus remains active or detectable in the gut for an extended period.
- This implies the gut could act as a reservoir for infection, which may influence transmission, disease severity, and long-term effects.



Natarajan A, et al. Med. 2022

Neurath, et al. (2021). **Gut**
Nagai, M., et al. (2023). **Nature Communications**
El-Khoury, et al. (2025). **Frontiers in Microbiology**

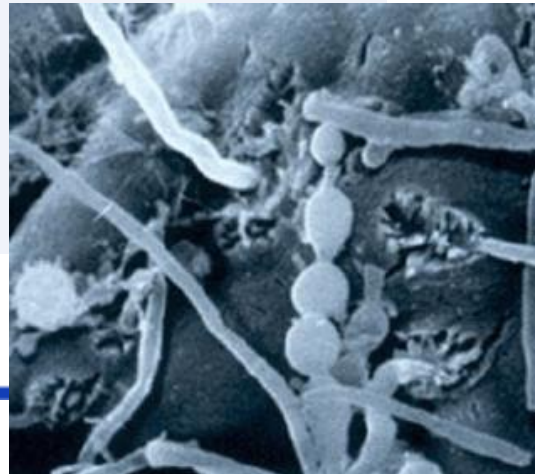
Intestinal *Candida albicans levels* are high in Long-Covid

Candida makes a lasting impression in COVID-19 Lagree K & Chen P. Nat Immunol. 2023 Nov

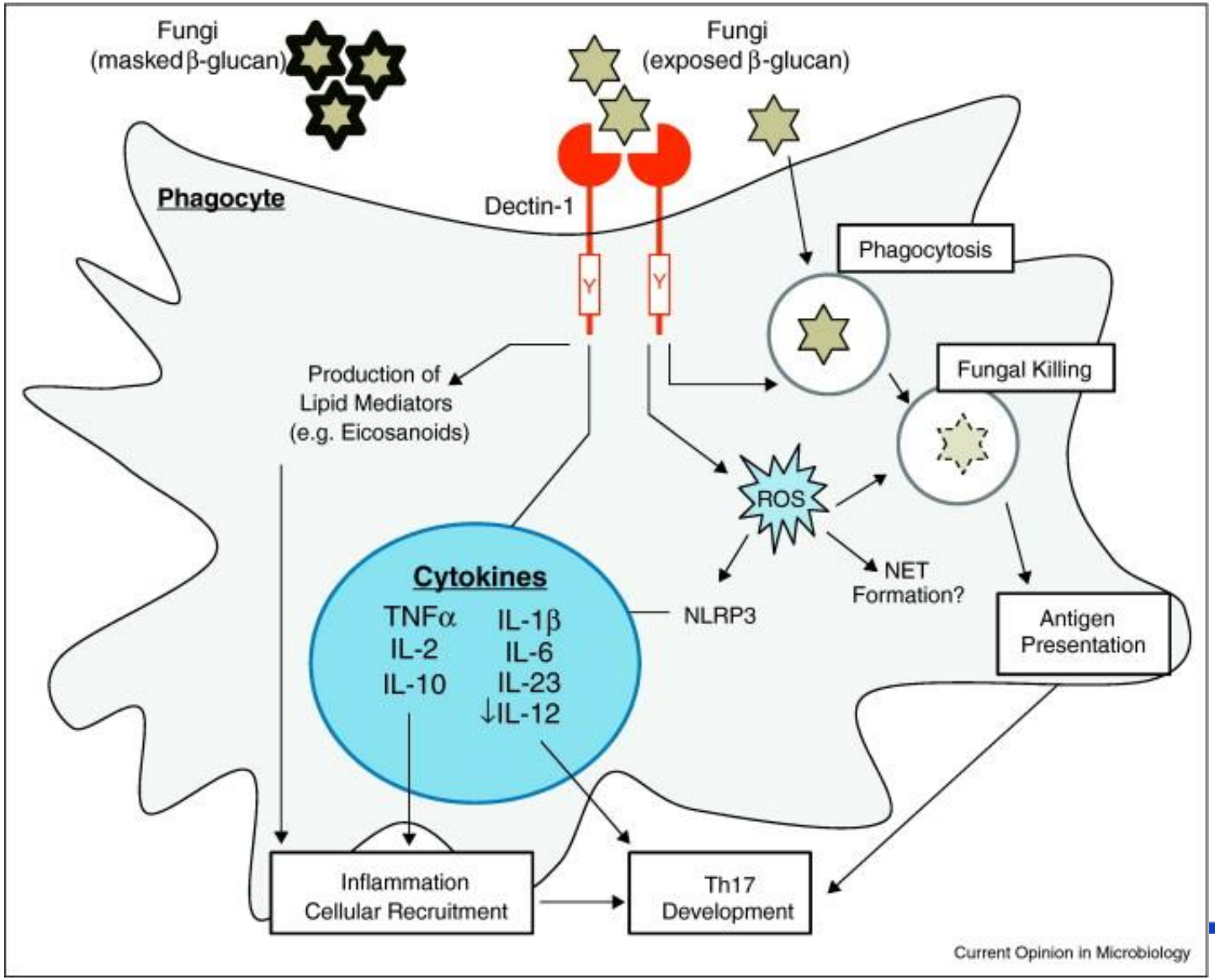
Severe COVID-19 is marked by excessive inflammation that can persist after infection. The commensal yeast *Candida albicans* is now implicated in the acute and chronic immunopathology of COVID-19

Fungal microbiota sustains lasting immune activation of neutrophils and their progenitors in severe COVID-19. Kusakabe T, **et al.** Nat Immunol. 2023 Nov

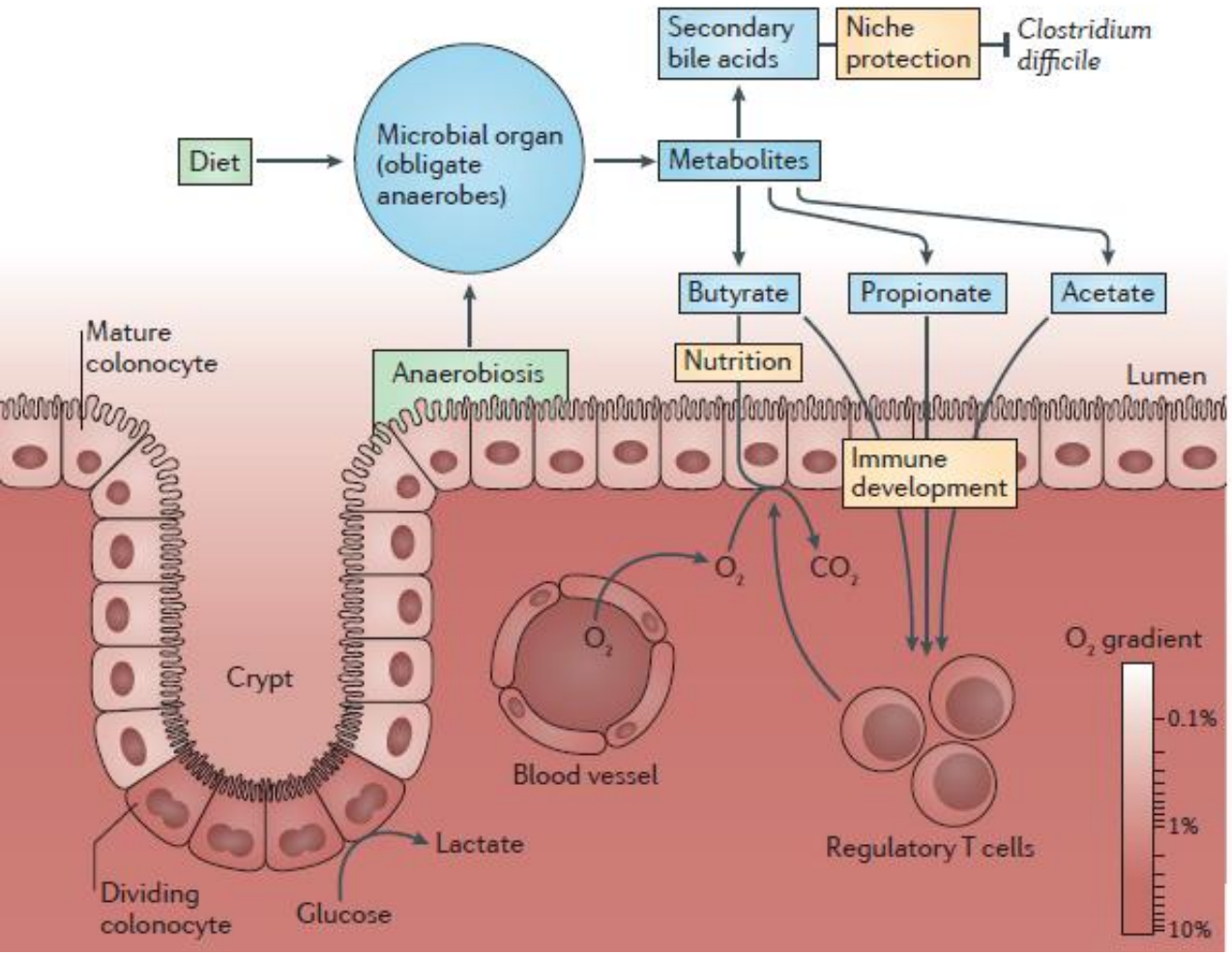
Gut fungal pathobionts contribute to immune activation during inflammatory diseases, offering potential **mycobiota-immune therapeutic strategies** for sCOVID-19 with prolonged symptoms.



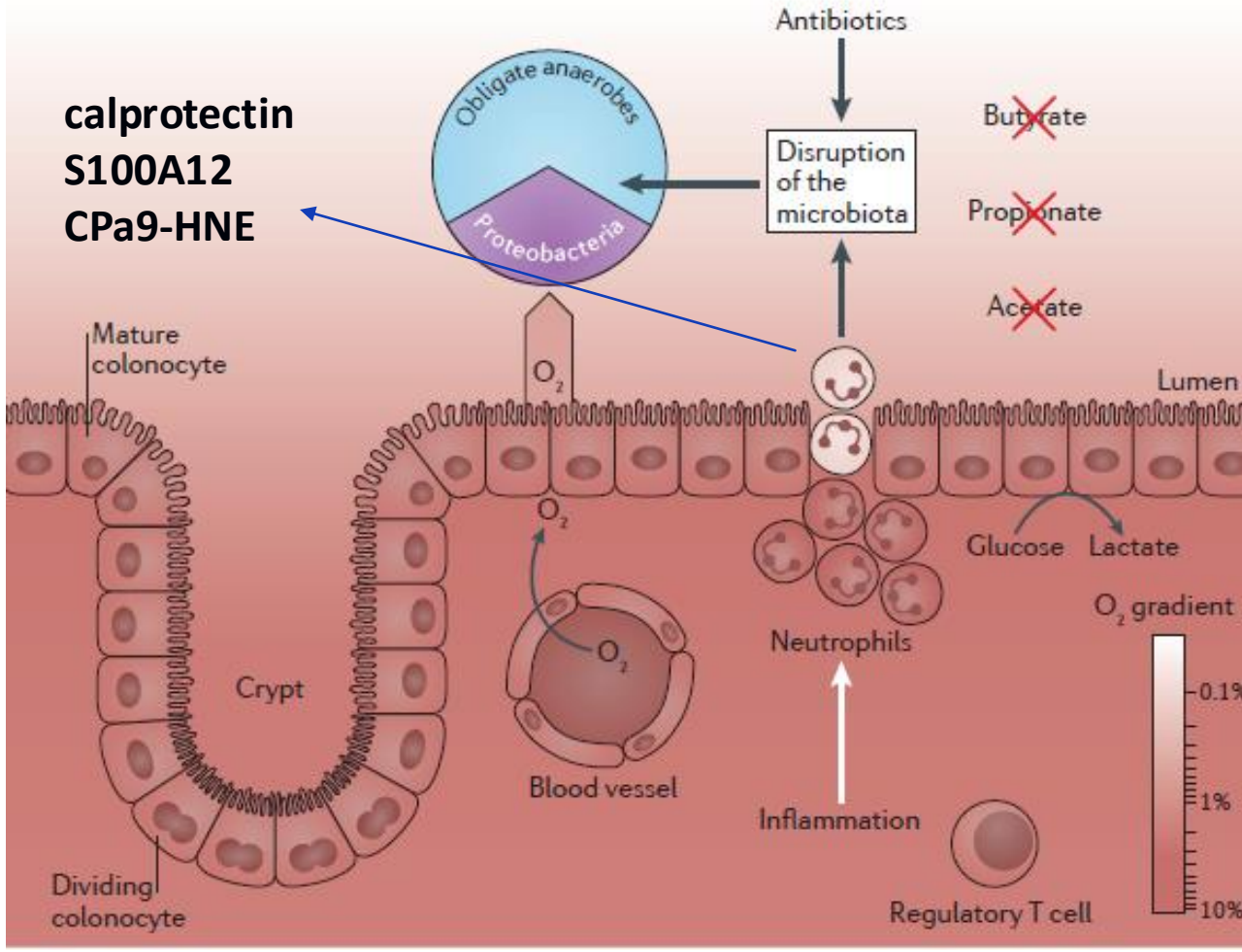
Macrophage recognition of fungal infections



HOMEOSTASIS



DYSBIOSIS



Nature Reviews Microbiol 16: 103-110, 2018

Loss of anaerobiosis and mucus in dysbiosis and invasion of *Candida* albicans

UPF
Emulgators,
NSAID's

-Normal microbiota
- Intact mucus and TJs

-Dysbiosis
- Loss of mucus and TJs
-Bacterial adherence
- Activation of inflammatory pathways *(NFkB, STAT3)*

- Bacterial translocation
- DNA damage *(ROS, genotoxins, secondary bile)*

TNO innovation for life

Candida hyphal growth = pathogenicity

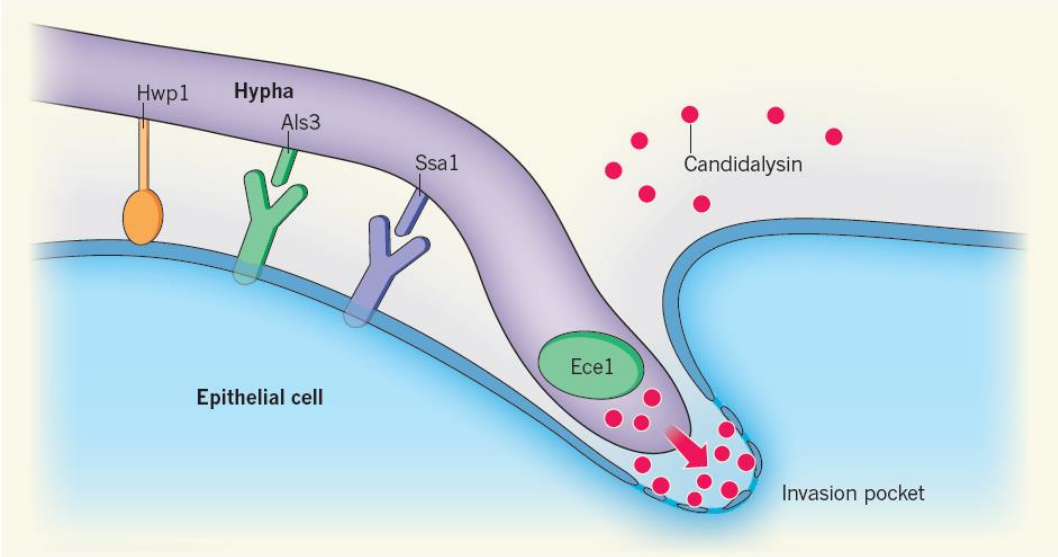
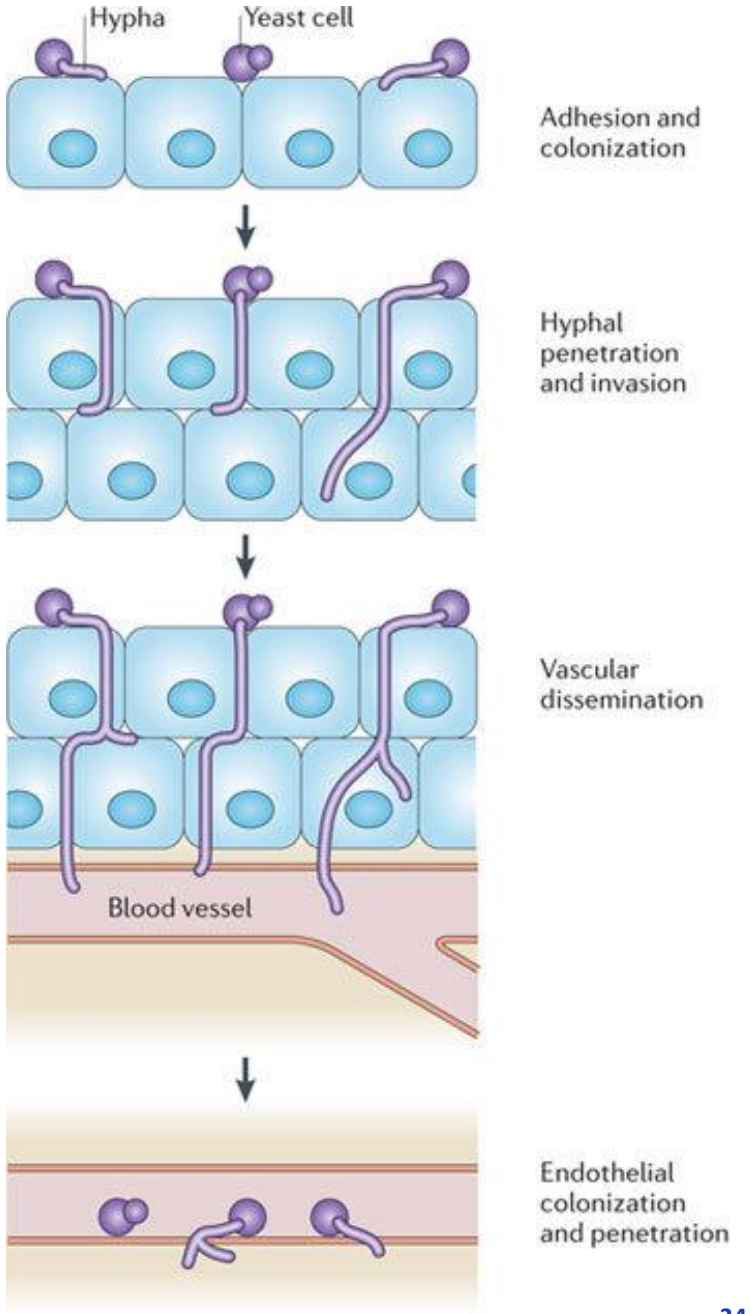
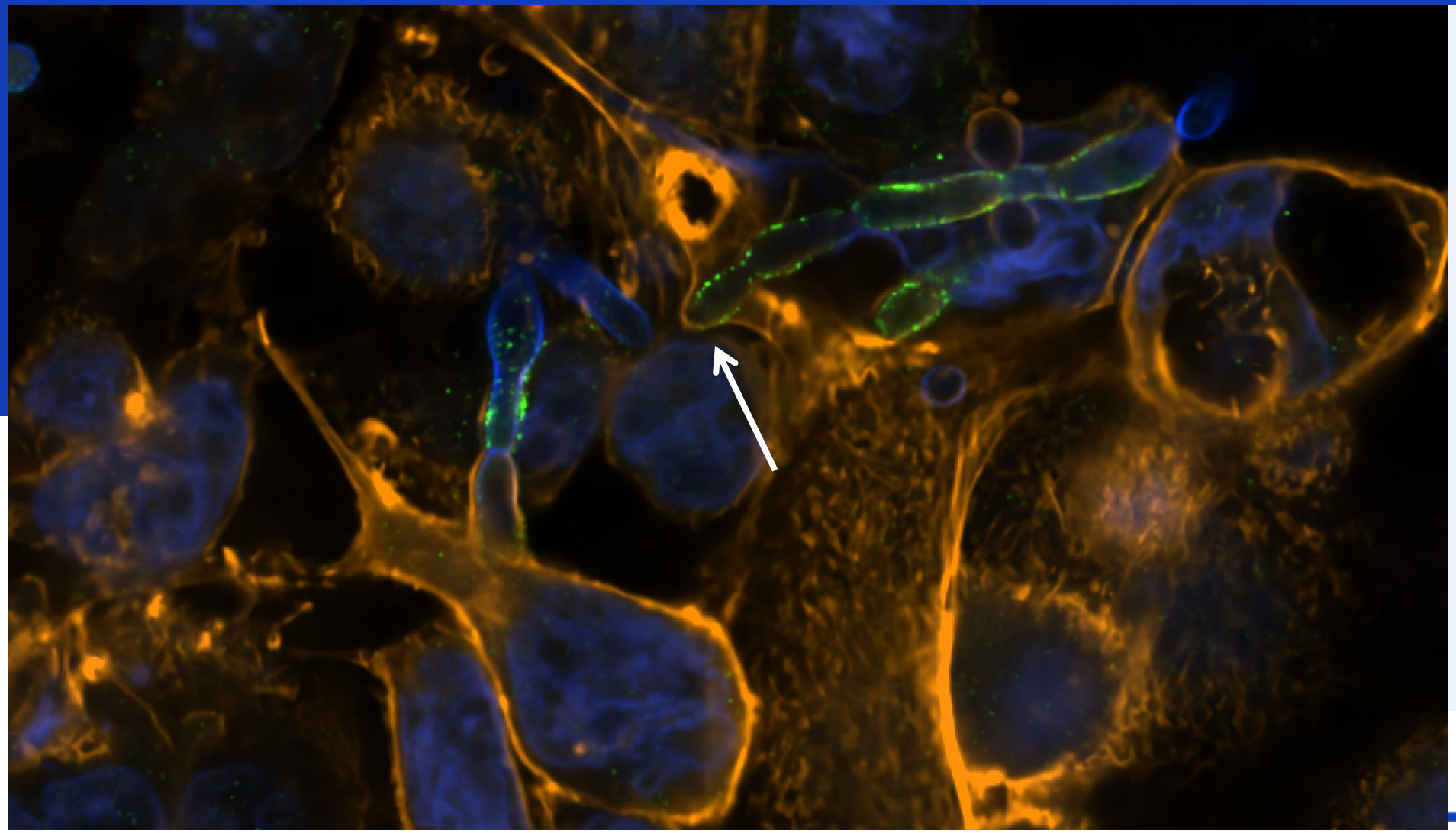


Figure 1 | A toxic relationship. The pathogenic fungus *Candida albicans* infects its host by forming filamentous structures called hyphae. Proteins on the hyphal surface — the adhesin Hwp1, the invasin Als3 and its partner Ssa1 — make contact with the host cell directly or through receptor proteins to promote adhesion and engulfment of the hypha by the host. Moyes *et al.*[2] report that the protein Ece1 is secreted from the hypha as eight short peptides. One of these, Candidalysin, acts as a toxin that accumulates in the invasion pocket and attacks the host-cell membrane, leading to membrane permeabilization and the induction of host defences.



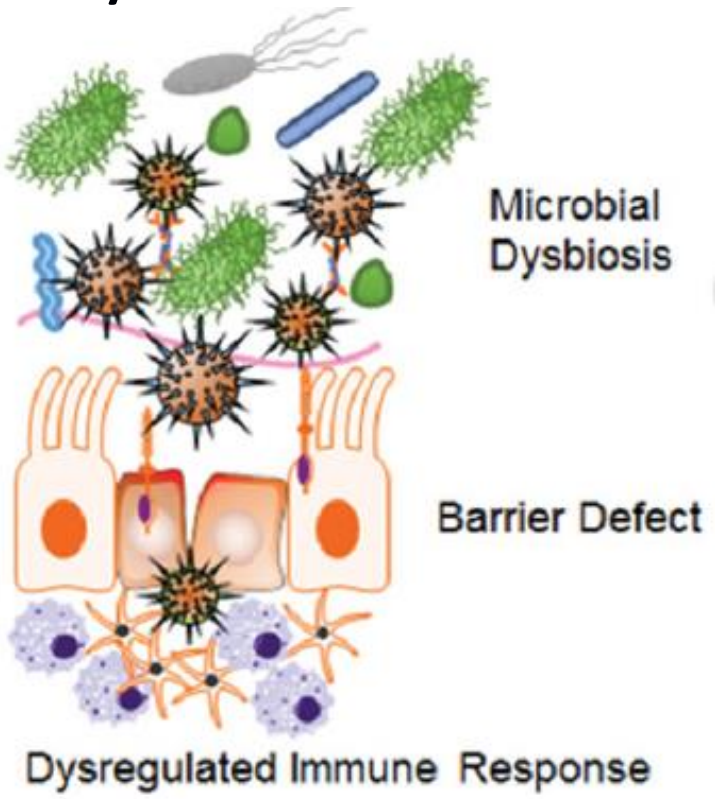
Dysbiosis: invasion of intestinal cells by *Candida*



Candida albicans germination tubes secreting candidalysin on intestinal cells. Stained by candidalysin Immunofluorescence (Alexafluor 488 green) Phalloidin (yellow), Calcofluor white (blue) and DAPI (purple-blue). The white arrow indicate an invasion pocket. (photo: TNO & Nikon Europe)

Microbiome Restoration for Treatment Chronic Diseases

Long-Covid Dysbiosis



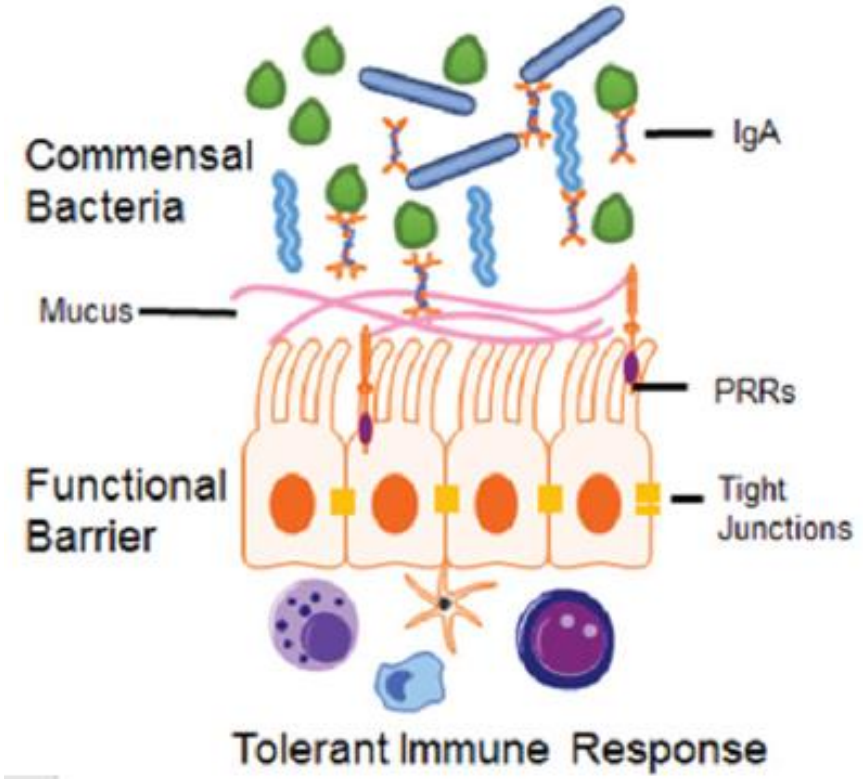
Low production of SCFA & Serotonin

High levels of Pathogens

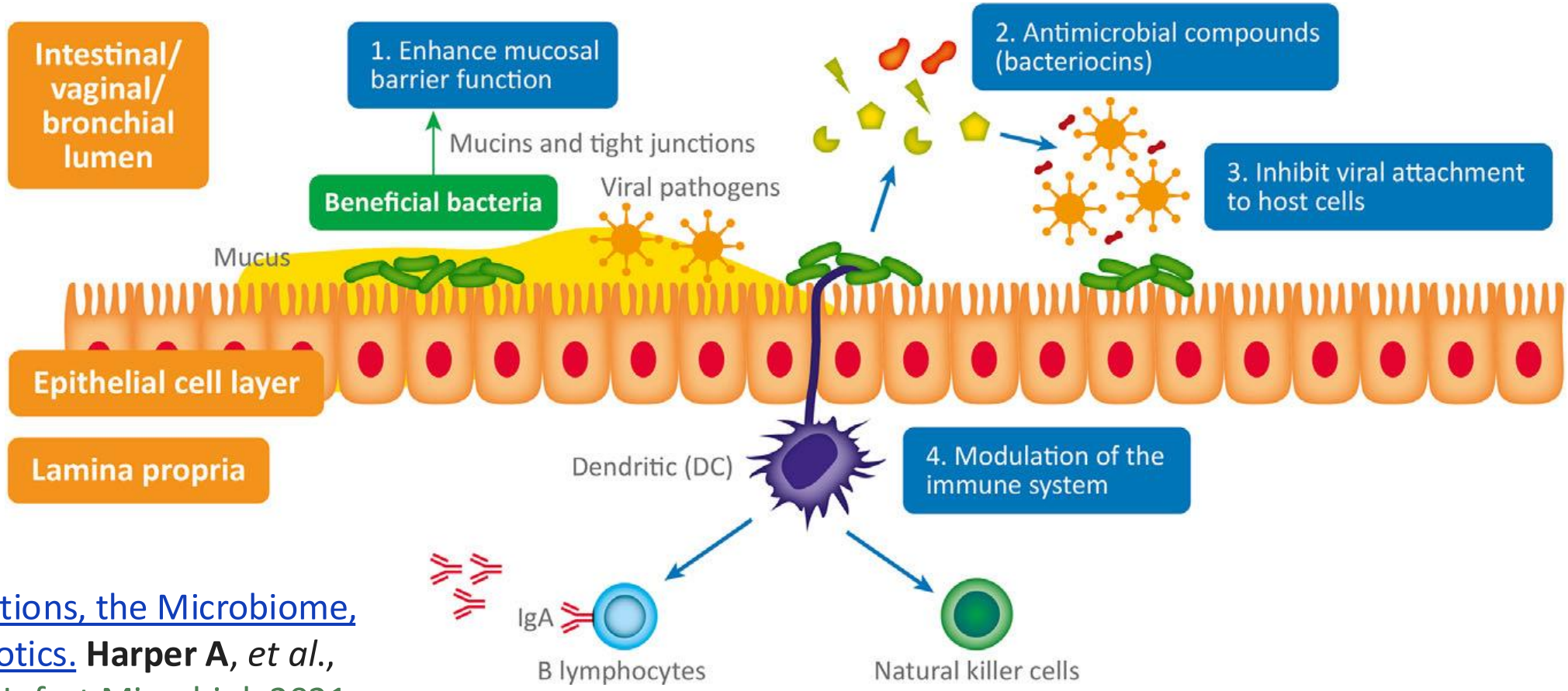
Probiotic

Prebiotics

Gut Homeostasis



Anti-viral Activities of Probiotics



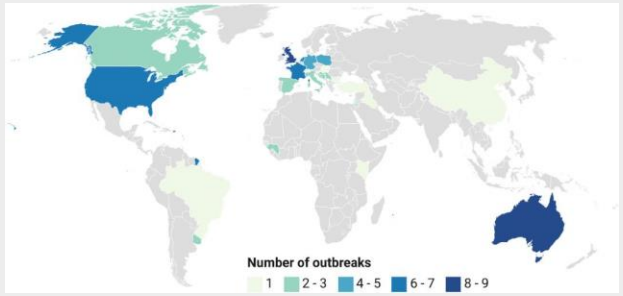
Viral Infections, the Microbiome, and Probiotics. **Harper A**, *et al.*, Front Cell Infect Microbiol. 2021

Pilot project QFS

What are Q fever and QVS again?

Q-fever

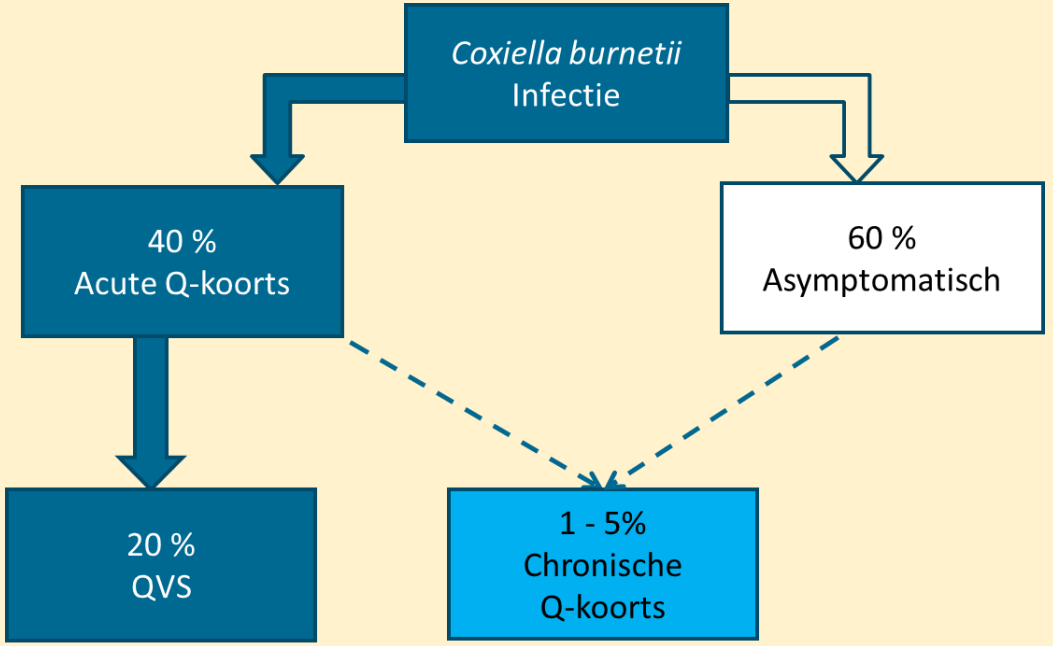
- Zoönosis: bacteria *Coxiella burnetii* (Cb)
- Widespread worldwide
- Large animal reservoir:
  - Small ruminants
  - Wild, domestic, farm animals, birds, ticks
- 2007-2010: Largest epidemic ever: in NL
  - 50,000 to 100,000 infections



Tan eeta al. A systematic review of global Q fever outbreaks. One Health 2024. https://doi.org/10.1016/j.onehlt.2023.100667.

Q-fever vfatigue syndrome (QFS)

- Follows after infection
- No more live bacteria detectable
  - Different from chronic Q fever

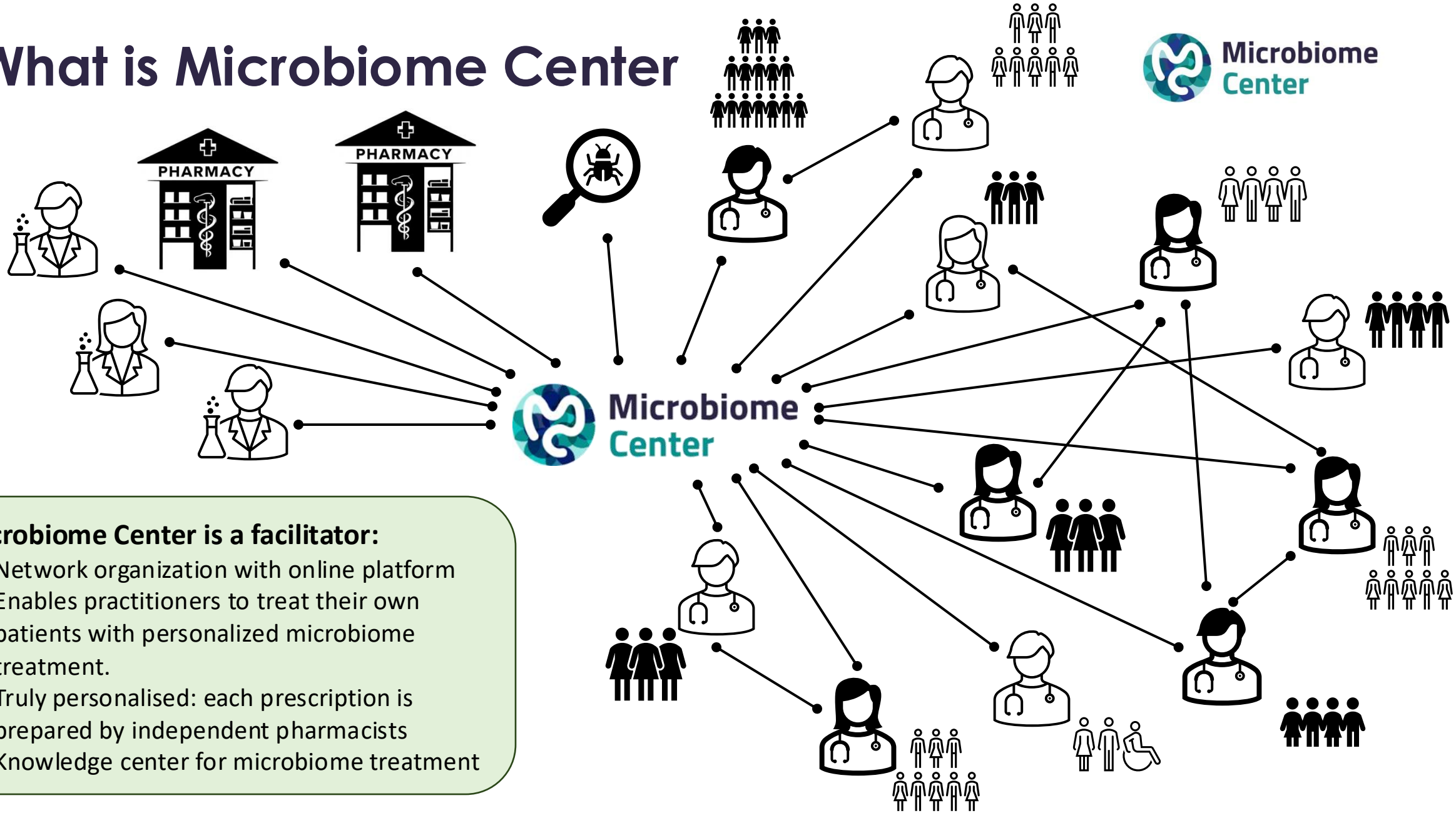


QVS – typical symptoms

Stemerdink et al., Vier jaar QVS database onderzoek. Erasmus MC en Q-support. 24 november 2025

Raijmakers RPH, Roerink ME, Jansen AFM, et al. Multi-omics examination of Q fever fatigue syndrome identifies similarities with chronic fatigue syndrome. J Transl Med 2020; 18: 448.

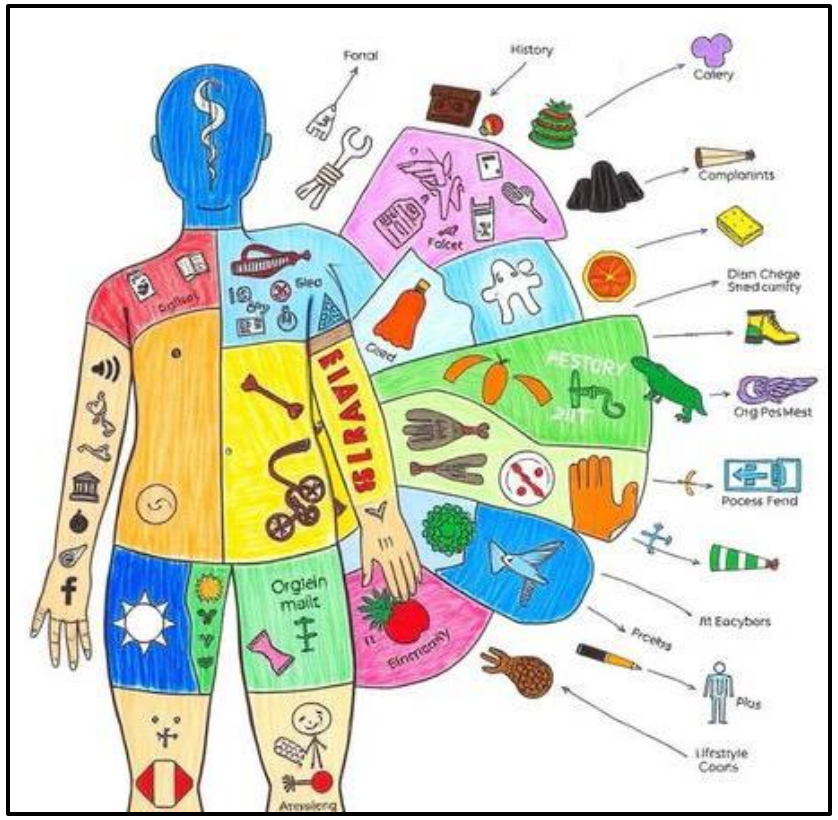
What is Microbiome Center



Microbiome Center is a facilitator:

- Network organization with online platform
- Enables practitioners to treat their own patients with personalized microbiome treatment.
- Truly personalised: each prescription is prepared by independent pharmacists
- Knowledge center for microbiome treatment

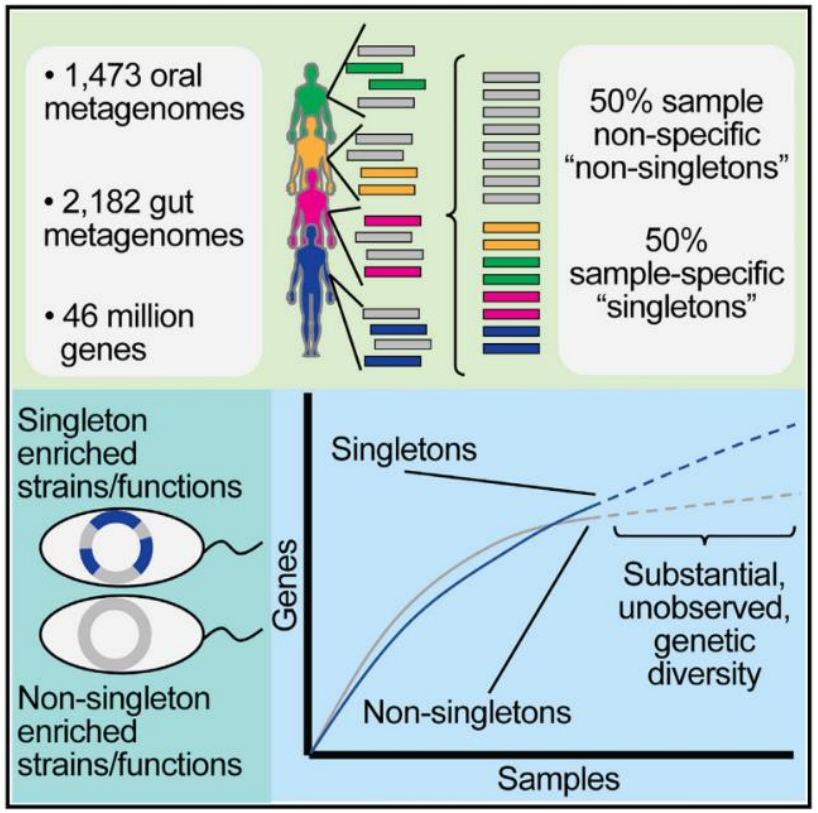
Why personalized?



deepai.org

Every person is unique in:

- Pattern of complaints
- Medical background
- Microbiome
- Diet
- Lifestyle
- Movement
- Stress
- Sleep patterns
- History
- Etc.



Tierney BT, Yang Z, Luber JM, et al. The Landscape of Genetic Content in the Gut and Oral Human Microbiome. Cell Host & Microbe 2019; 26: 283-295.e8.

Pilot project
Set-up and results

Project design

In 2024 Q-support invites patients with QFS and GI complaints for the project

Between September 2024 and August 2025, 85 patients received reimbursement from Q-support

Received fecal analysis

Doctor visit with anamnesis.

Start lifestyle treatment with MyOwnBlend

Follow lifestyle with MyOwnBlend for 2-3 months. One doctor's visit. Questionairre every 3 weeks.

Final doctor's visit. Standard service call from Microbiome Center about effects of the treatment

On average these patients have been ill for 16 years

Data retrospectively analyzed:

- Indications during anamnesis
- Course of complaints
- Electronic patient dossier

Common complains reported by QFS patients before start of treatment

Common complains reported by 82 patients

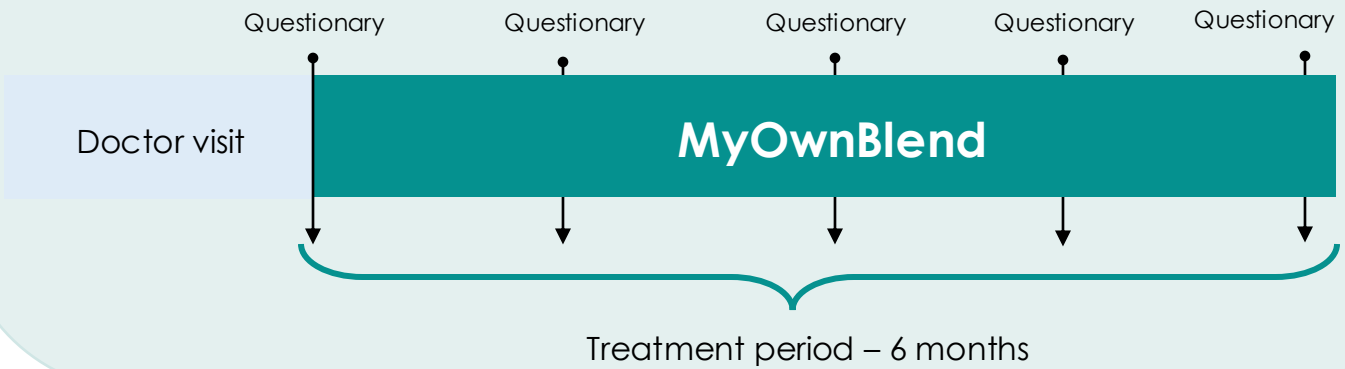
N	Indication score > 0
77	Low levels of butyrate
74	Fatigue
68	Intestinal permeability
51	Bloating
50	Sad mood
45	IBS
44	Lactose intolerance
40	Pathogenic bacteria overgrowth
39	Diarrhea
34	Inflammation
33	Allergic conditions
29	Constipation
20	Yeast overgrowth

Evaluation of Patients' Improvement Over time

Online scoring over time data analyzed for 69 QFS patients

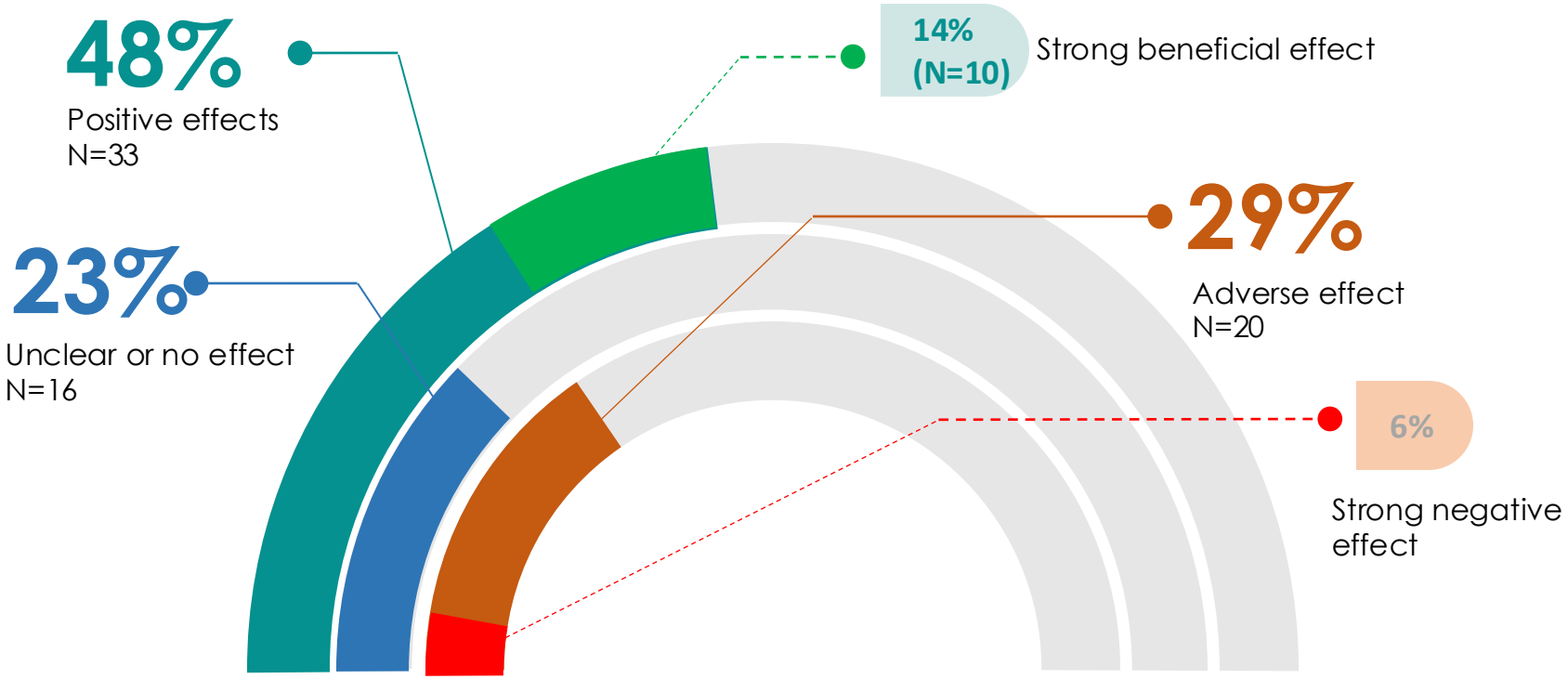
Questions that patients can answer multiple times to monitor their progress:

- **"How have you been (in the past week/weeks)?"**
  Scale 0–10
- **"Have you used your MyOwnBlend in the past week/weeks?"**
  Not/Hardly – Occasionally – Yes/Mostly
- **Standard medical complaints:**
  Constipation, diarrhea, bloating, flatulence, abdominal pain, cognition, low mood, stress, anxiety/tension, fatigue, sleep quality, vaginal complaints, acne
- **Any other personal complaints?**



Overall well-being over time

Results based on 69 participants with QFS
Results based on the question: "How have you been doing (in the past week/weeks)?"



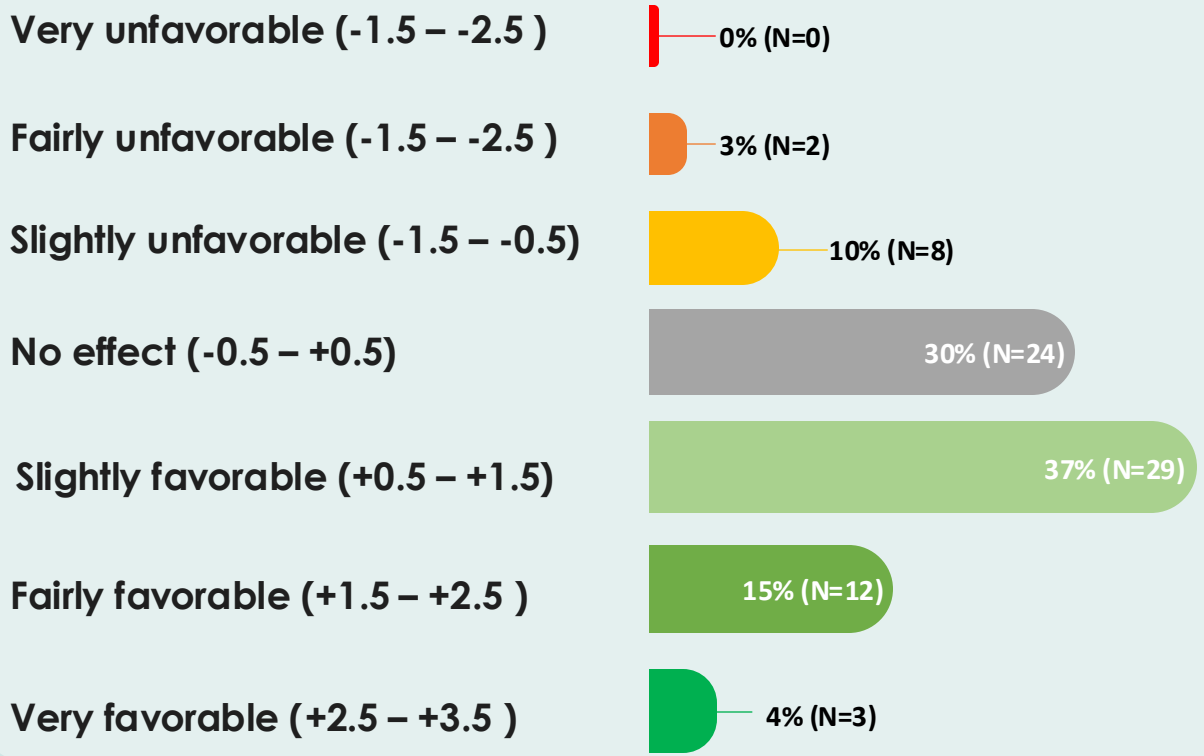
Overall effect on medical complaints

Results based on 79 participants with QFS

Focus on standard medical complaints

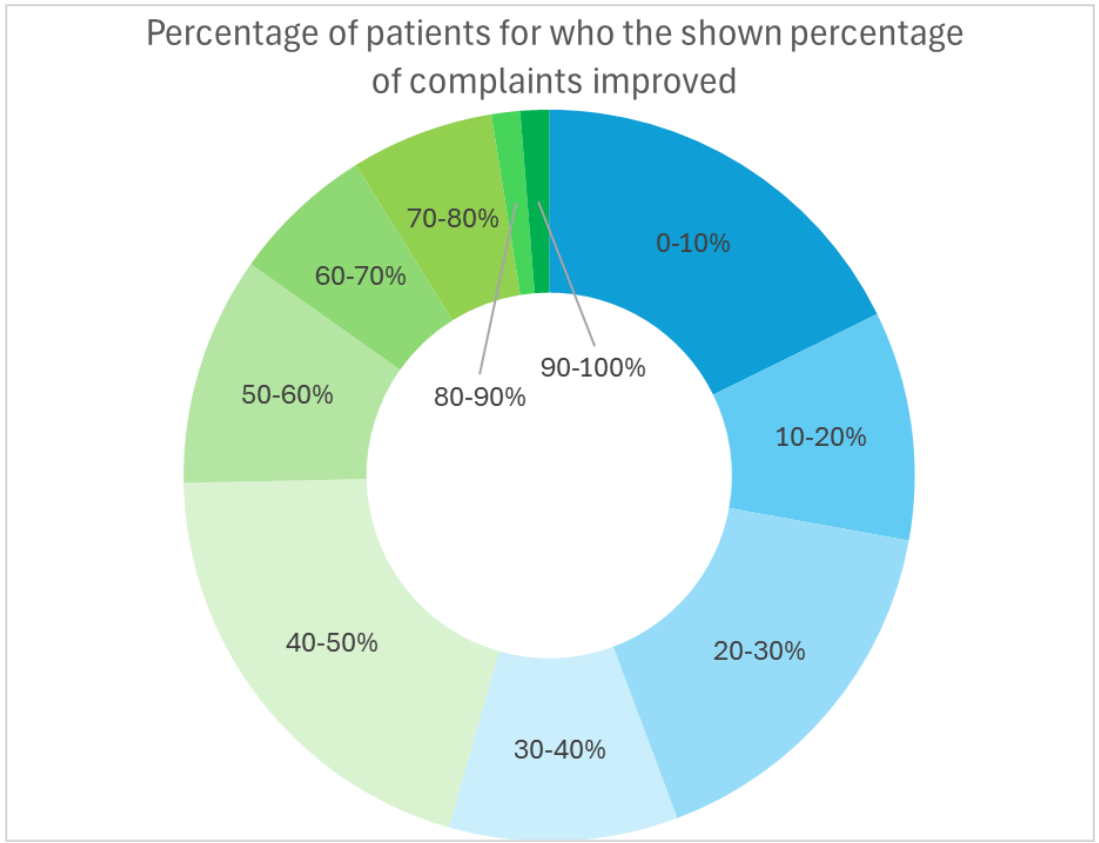
(constipation, diarrhea, bloating, flatulence, abdominal pain, cognition, low mood, stress, anxiety/tension, fatigue, sleep quality, vaginal complaints, acne)

The combined effect on all complaints is categorized as a score from -4 (strongly negative) to +4 (strongly positive)

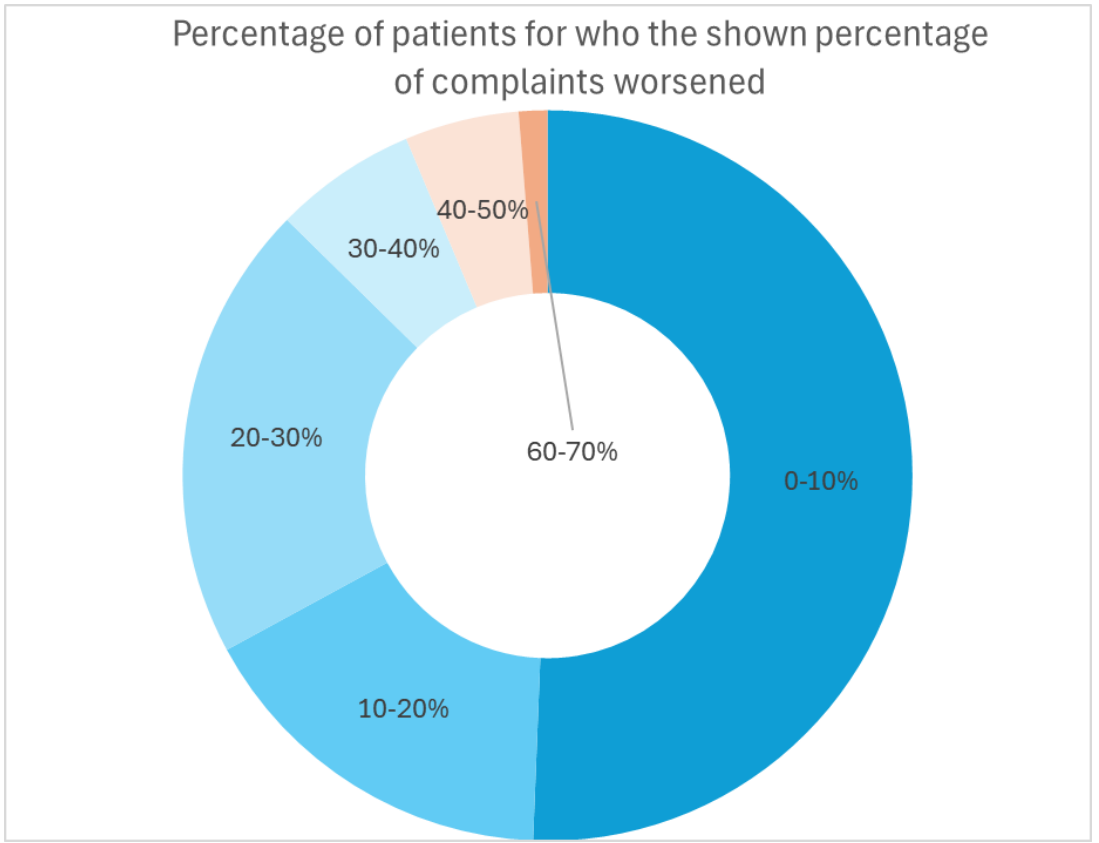


Overall effect on medical complaints

In almost half of the participants (36/79), more than 40% of their symptoms improved



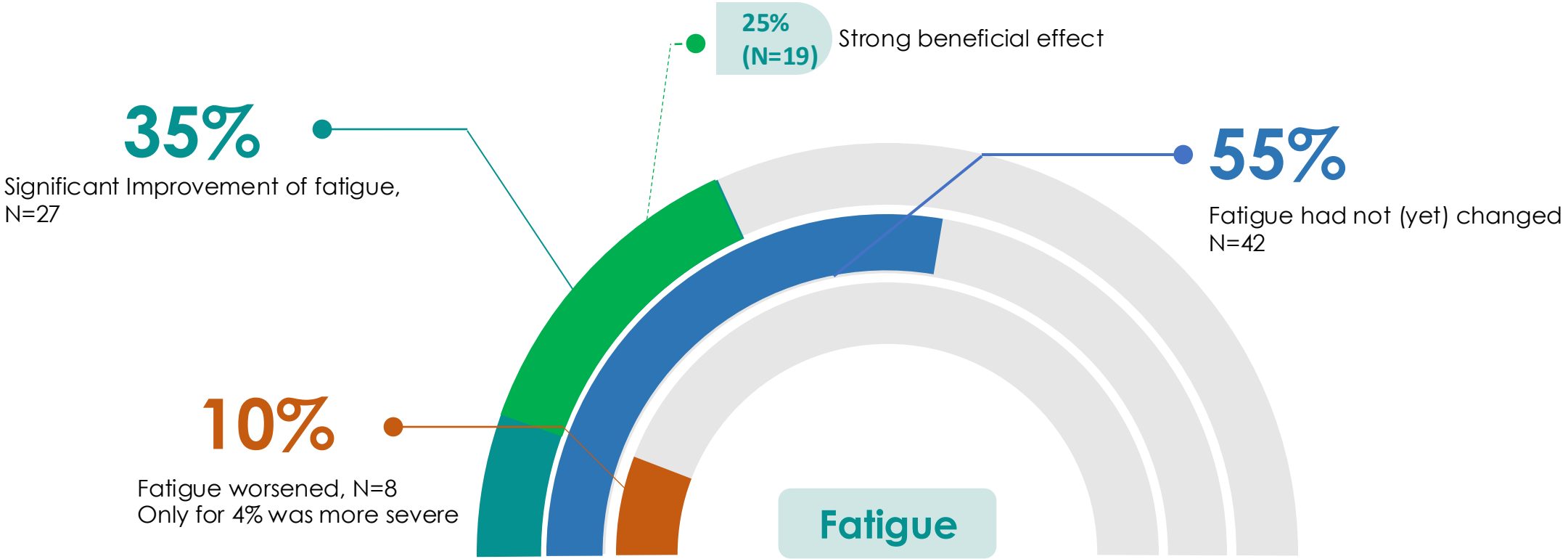
In more than half of the participants (40/79), less than 10% of their symptoms worsened



Improvement of fatigue

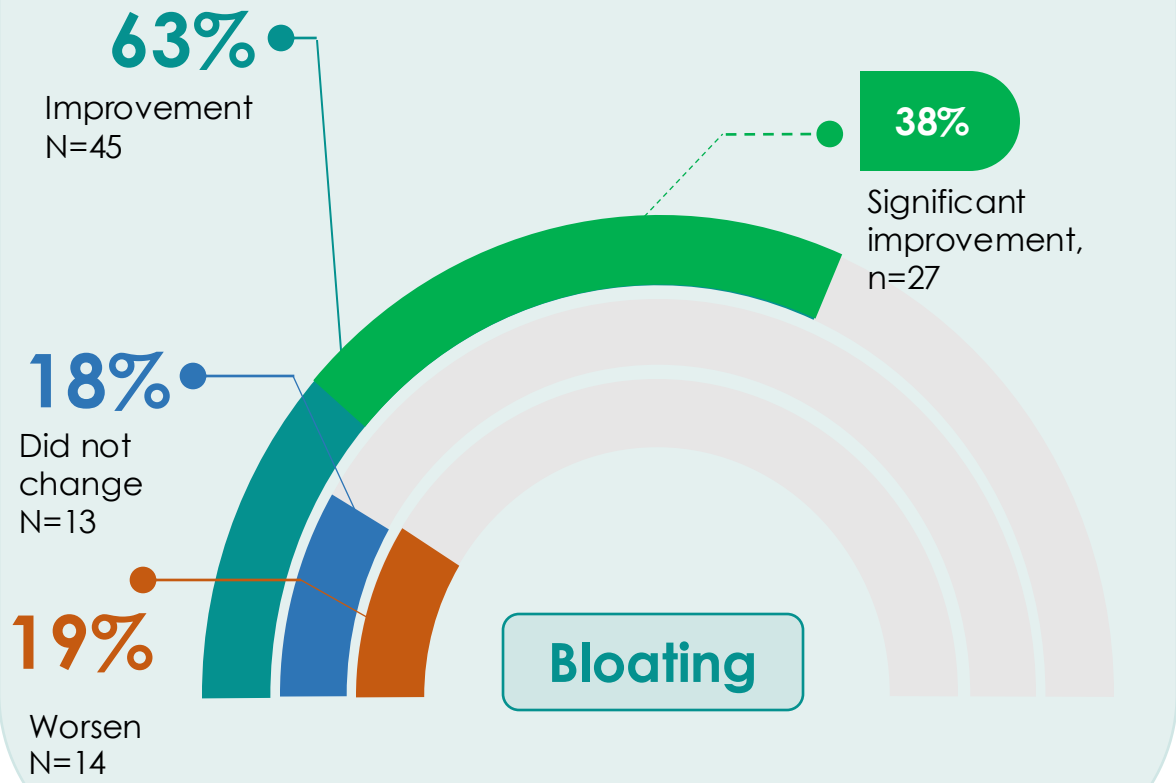
Fatigue is the most commonly reported complaint by 74 out of 82 QFS participants

For 77 patients the score tracking data allows conclusions

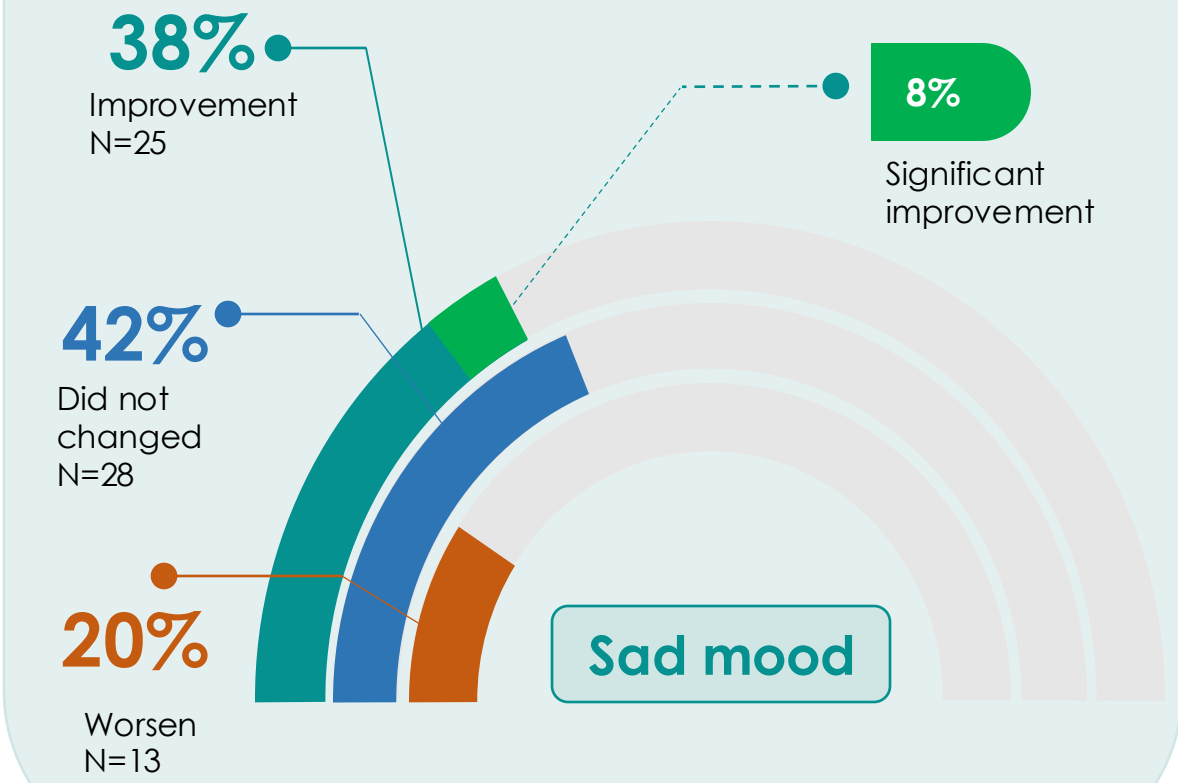


Improvement of other common complains

51 out of 82 of the QFS participants suffered from bloating before start
(n=72 score tracking)



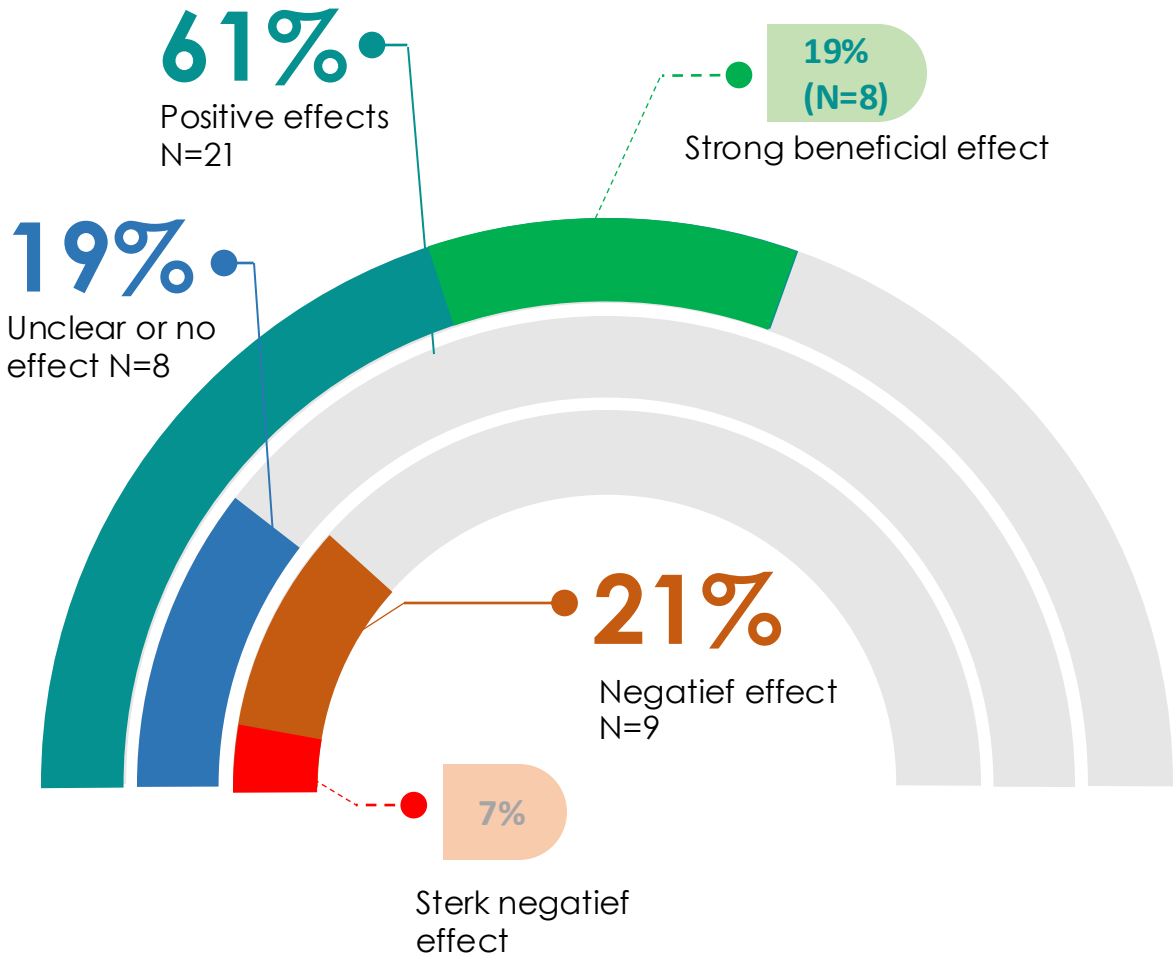
50 out of 82 of the QFS participants suffered from sad mood before start
(n=66 score tracking)



Other PAIS results

- In literature, other Post-Acute Infectious Syndromes (PAIS) are also related to dysbiosis
- PAIS examples:
  - ME/CFS
  - QFS
  - Post-Covid
  - Post-Pfeiffer

- An initial analysis of 43 patients in which Post-Covid is listed showed that more than 60% improved



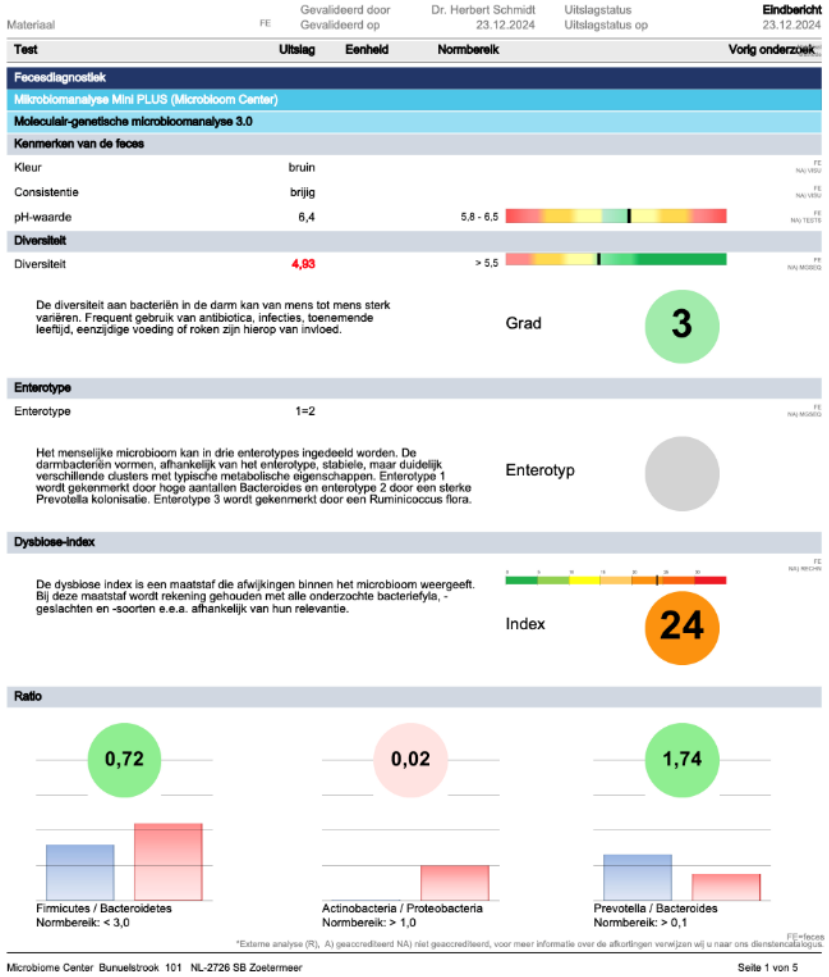
Example case 1: Ingeborg, 61 year

QFS example case 1

- **Ingeborg, 61 year**
- 2009 complaints of flu, lasted for months, finally with pneumonia in ZH where Q fever was detected.
- When she was two already suffering from joints and kept that whole life, in addition many unexplained physical complaints.
- Sitting at home since June 2023, fatigue, forgetful, rehabilitation process without result, poor condition, does not move.
- Since Q fever suffers from intestines, does not dare to leave the house because of IBS, attacks of urgency and then sometimes too late to the toilet. If she has to go away for a day, she doesn't eat anything.
- 2dd bread meal, can easily be done without a snack

- Microbiome analysis

QFS example case 1



Materiaal	FE	Gevalideerd door Gevalideerd op	Dr. Herbert Schmidt 23.12.2024	Uitslagstatus Uitslagstatus op	Eindbericht 23.12.2024

Test	Uitslag	Eenheid	Normbereik	Vorig onderzoek
Feceadiagnostiek				
Mikrobiomanalyse Mini PLUS (Microbioom Center)				
Moleculair-genetische microbioomanalyse 3.0				
Kenmerken van de feces				
Kleur	bruin			
Consistentie	brijig			
pH-waarde	6,4		5,8 - 6,5	
Diversiteit				
Diversiteit	4,93		> 5,5	

De diversiteit aan bacteriën in de darm kan van mens tot mens sterk variëren. Frequent gebruik van antibiotica, infecties, toenemende leeftijd, eenzijdige voeding of roken zijn hierop van invloed.

Grad **3**

Enterotype				
Enterotype	1=2			

Het menselijke microbioom kan in drie enterotypes ingedeeld worden. De darmbacteriën vormen, afhankelijk van het enterotype, stabiele, maar duidelijk verschillende clusters met typische metabolische eigenschappen. Enterotype 1 wordt gekenmerkt door hoge aantallen Bacteroides en enterotype 2 door een sterke Prevotella kolonisatie. Enterotype 3 wordt gekenmerkt door een Ruminicoccus flora.

Enterotyp

Dysbiose-Index

De dysbiose index is een maatstaf die afwijkingen binnen het microbioom weergeeft. Bij deze maatstaf wordt rekening gehouden met alle onderzochte bacteriefyla, -geslachten en -soorten e.e.a. afhankelijk van hun relevantie.

Index **24**

Ratio

0,72	0,02	1,74
Firmicutes / Bacteroidetes Normbereik: < 3,0	Actinobacteria / Proteobacteria Normbereik: > 1,0	Prevotella / Bacteroides Normbereik: > 0,1

*Externe analyse (R), A) geaccrediteerd NA) niet geaccrediteerd, voor meer informatie over de afkortingen verwijzen wij u naar ons dienstencatalogus. FE=feces

Microbiome Center Bunuelstrook 101 NL-2726 SB Zoetermeer Seite 1 von 5

Test		Uitslag	Eenheid	Normbereik	Vorig onderzoek
Indeling van bacteriën naar fylum					
Actinobacteria		0,1	%	1,5 - 7	
Bacteroidetes		55,1	%	20 - 45	
Firmicutes		39,8	%	50 - 75	
Fusobacteria		0,0	%	0,0 - 1,0	
Proteobacteria		5,0	%	1,0 - 3,5	
Verrucomicrobia		0,0	%	1,5 - 5,0	
Overige		0,0	%		
Metaboloom (stofwisselingsactieve bacteriegroepen)					
Secundaire galzuren		-11,4	%		
TMA / TMAO		-39,0	%		
Indoxylsulfaat		-50,0	%		
Fenolen		6,8	%		
Ammoniak		110,7	%		
Histamine		-50,0	%		
Equol		-7,0	%		
Beta-glucuronidasen		-48,7	%		
Indeling van bacteriën naar fylum met de belangrijkste bacteriegeslachten en -soorten					
Actinobacteria					
Bifidobacterium		5,0 x 10^8	KVE/g feces	> 1,0 x 10^10	
Bacteroidetes					
Bacteroides		1,9 x 10^11	KVE/g feces	> 5,0 x10^10	
Prevotella		3,3 x 10^11	KVE/g feces	> 1,0 x 10^10	
Prevotella	copri	33	%		
Firmicutes					
Butyraatproducerende bacteriën					
Totaal kiemgetal		1,6 x 10^11	KVE/g feces	> 2,4 x 10^11	
Faecalibacterium prausnitzii		6,0 x 10^10	KVE/g feces	>1,0 x10^11	
Eubacterium rectale		1,9 x 10^10	KVE/g feces	> 2,0 x 10^10	
Eubacterium hallii		6,4 x 10^9	KVE/g feces	> 1,5 x 10^10	
Roseburia spp.		4,8 x 10^10	KVE/g feces	> 3,0 x10^10	
Ruminococcus spp.		9,6 x 10^8	KVE/g feces	> 5,0 x 10^10	
Coprococcus spp.		2,6 x 10^10	KVE/g feces	> 5,0 x 10^10	
Butyrivibrio spp.		2,9 x 10^9	KVE/g feces	>1,5 x 10^10	
Clostridia					
Totaal kiemgetal		2,4 x 10^9	KVE/g feces	< 4,0 x 10^9	
Clostridia Cluster I		2,5 x 10^8	KVE/g feces	< 2,0 x 10^9	
Fusobacteria					
Fusobacterium		< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^7	
Verrucomicrobia					
Akkermansia muciniphila		< 1,0 x 10^5	KVE/g feces	> 5,0 x 10^9	
Proteobacteria					
Pathogene of potentieel pathogene bacteriën					
Haemophilus spp.		1,2 x 10^8	KVE/g feces	< 5,0 x 10^8	

Microbiome Center

QFS example case 1

Test	Uitslag	Eenheid	Normbereik	Vorig onderzoek
Acinetobacter spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^6	
Proteus spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^6	
Klebsiella spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^7	
Enterobacter spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^6	
Serratia spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^7	
Hafnia spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^6	
Morganella spp.	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^6	
Citrobacter spp.	< 1,0 x 10^5	KVE/g feces	< 5,0 x 10^8	
Pseudomonas spp.	< 1,0 x 10^5	KVE/g feces	< 5,0 x 10^7	
Providencia spp.	< 1,0 x 10^5	KVE/g feces	< 5,0 x 10^7	
H2S-vorming				
Sulfaatreducerende bacteriën (SRB)	1,6 x 10^9	KVE/g feces	< 2,5 x 10^9	
Desulfovibrio piger	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^9	
Desulfomonas pigra	< 1,0 x 10^5	KVE/g feces	< 1,0 x 10^9	
Bilophila wadsworthia	< 1,0 x 10^5	KVE/g feces	< 2,0 x 10^9	
Immunogeniciteit / mucine vorming				
Immunogeen werkende bacteriën				
Escherichia coli	< 1,0 x 10^5	KVE/g feces	10^6 - 10^7	
Enterococcus spp.	8,70 x 10^6	KVE/g feces	10^6 - 10^7	
Lactobacillus spp.	6,5 x 10^6	KVE/g feces	10^5 - 10^7	
Mucine vorming / slijmvliesbarrière				
Akkermansia muciniphila	< 1,0 x 10^5	KVE/g feces	> 5,0 x 10^9	
Faecalibacterium prausnitzii	6,0 x 10^10	KVE/g feces	>1,0 x10^11	
Archaea				
Methanogenen				
Methanobrevibacter spp.	< 1,0 x 10^5	KVE/g feces	< 5,0 x 10^8	

Opmerking: Het nieuwe OmicSnap-buisje en de daarin aanwezige matrix maken een nog effectievere monsteranalyse mogelijk, vooral bij grampositieve bacteriën.
Dit resulteert in lichte verschuivingen in de normberekken.
We vragen u hier rekening mee te houden.

Mycobloom: relevante gisten				
Candida albicans (CA)	<1,0 x 10^3	KVE/g feces	<1,0 x 10^3	
Candida krusei (CK)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Candida glabrata (CG)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Candida dubliniensis (CD)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Candida parapsilosis (CP)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Candida tropicalis (CTp)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Candida lusitaniae (CL)	<1,0 x 10^3	KVE/g feces	< 1,0 x 10^3	
Vertering				
Vetgehalte	4,30	g/100g	< 3,5	
Stikstofgehalte	0,30	g/100g	< 1,0	
Suikergehalte	5,50	g/100g	< 2,5	
Watergehalte	78,30	g/100g	75 - 85	
Extra parameter(s)				
Calprotectine	24,34	mg/l	< 50	

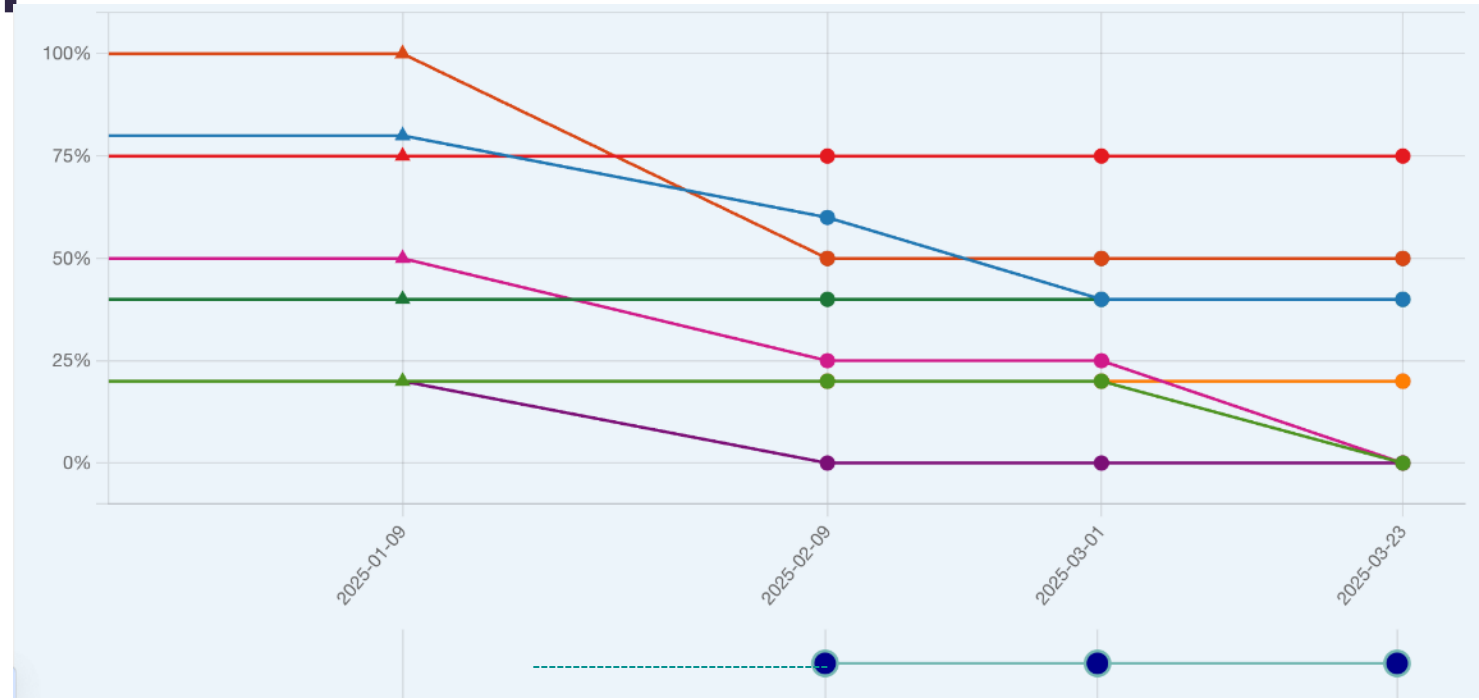
Test	Uitslag	Eenheid	Normbereik	Vorig onderzoek
Alfa-1-antitripsine	6,8	mg/dl	< 27,5	
Secretoir Immunoglobuline A	1267,1	µg/ml	510 - 2040	
Zonuline	78,42	ng/ml	< 55	
Speciale gastro-enterologische diagnostiek				
Gluten-sensitieve enteropathie / coeliakie				
Anti-gliadine antilichamen in feces	36,50	U/l	< 100	
Anti-transglutaminase antistoffen in feces	54,44	U/l	< 100	

QFS example case 1

PHGG	4
L. rhamnosus GG	2
Bacillus coagulans Unique IS-2	2
DJ repair	3
Akkermansia muciniphila, gepasteuriseerd	1
L fermentum ME-3	1
Acaciavezels	2

- MyOwnBlend
- Eating sourdough spelt bread
- Three weeks later clear effect: 1 time daily bowel movement and no more diarrhea attacks
- Has gone for longer walks with the dog
- Quality of life back

QFS example case 1



Example case 2: Caroline, 40 year

QFS example case 2

- **Caroline , 40 year**
- 13 years ago Q fever contracted at petting zoo, watched goat give birth
- High fever, difficulty breathing, muscle pain immediately tested and Q fever came out.
- Treated with AB but complaints persisted: fatigue, muscle pain, shortness of breath, painful joints.
- Can work 2 days, sports often don't work, has a positive outlook on life.
- Already many abdominal complaints before Q fever, known with IBS
- Since Q fever even more complaints: bloating, constipation, abdominal pain
- Nutrition:

  B: 2 slices of bread with dark chocolate spread (LV)
  S: cereal bar
  L: 6 spoons of soy yogurt with some fruit, flaxseed
  S: cookie or candy
  D: varied, pasta/rice/potato, mainly meat or vegetarian.
- Microbiome analysis: no abnormalities
  - Div 8, DI 12, bifi= buty= pathogenes= canida= inflammation= zon=

QFS example case 2

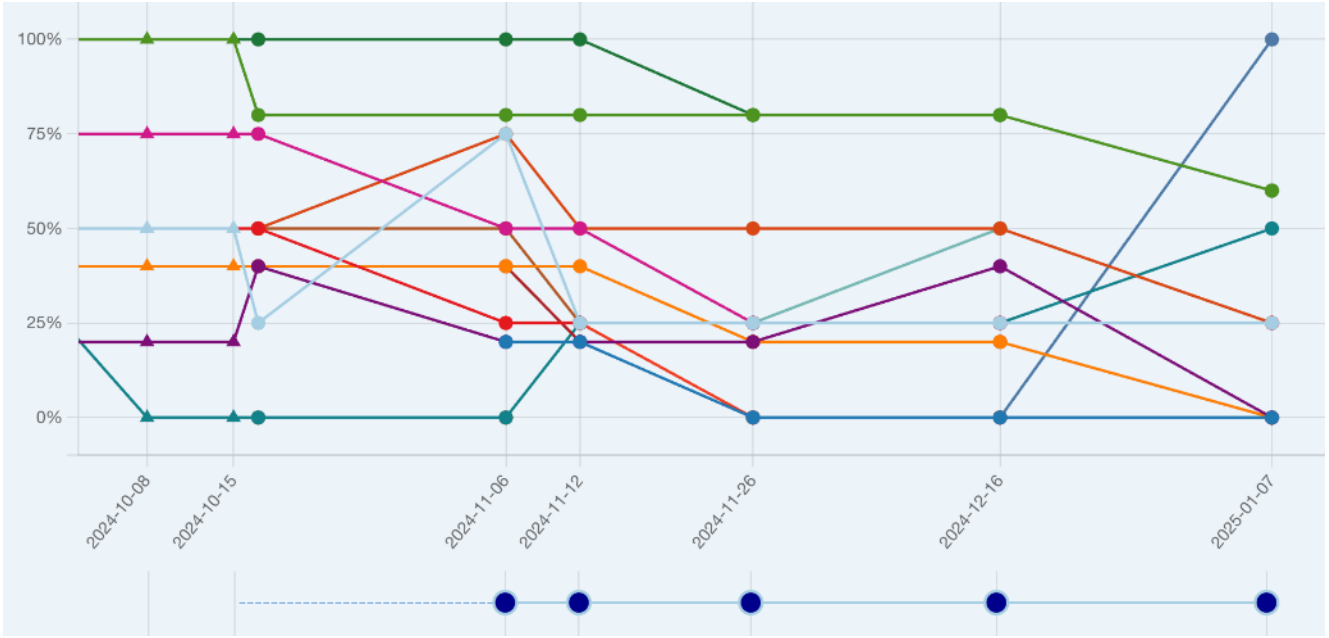
Bacillus coagulans Unique IS-2	2
Bifidobacterium lactis HN019	2
L. plantarum P-8	1
L fermentum ME-3	2
L. rhamnosus SP1	1
Enterococcus faecium + Bacillus subtilis	1
L. rhamnosus GG	1
PHGG	3
Acaciavezels	2

Started with sourdough spelt bread, no more stomach ache in the morning after breakfast.
In the evening large portion of healthy which makes you feel full, relieved feeling inside. More energy, better in body.

"What a fantastic stuff this is, so very happy with it."

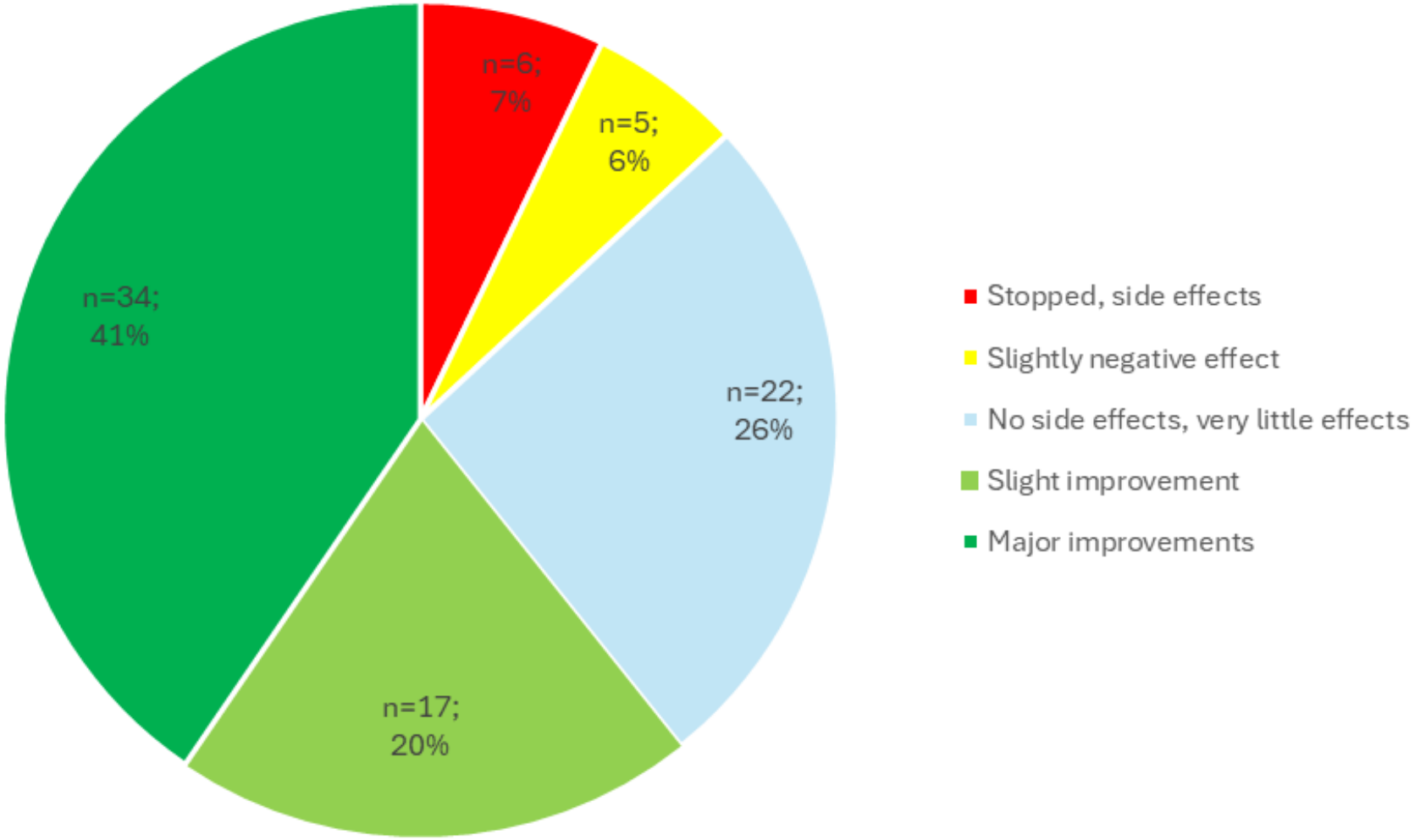
Feeling that probiotics have made the biggest difference, more than food, but food does help.

QFS example case 2



- Constipatie
- Diarree
- Pds En Melk-Intollerantie
- Opgeblazen gevoel
- Flatulentie
- Slecht Slapen
- Buikpijn
- Cognitie
- Vaak Moeten Plassen
- Sombere stemmingen
- Stress
- Moeite Met Leefstijladvies?
- Angstig/gespannen
- Vermoeidheid
- Vaginale klachten
- Acne

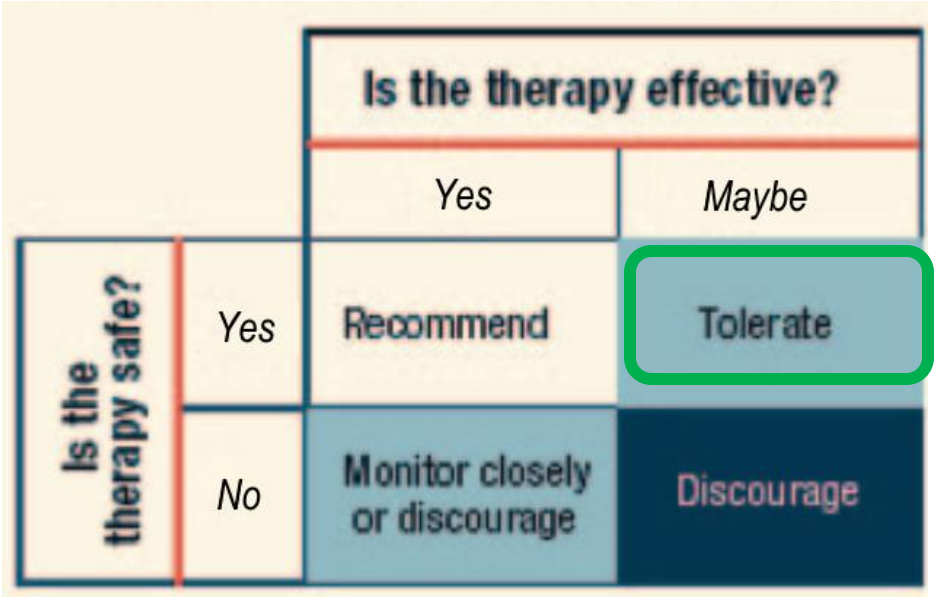
Experiences patient practice/EPD



The next step?

Is there sufficient reason to start treatment??

→ Ethical framework provides guidance



Question the patient can ask themselves

- Wat are my possibilities?
- What are the pros and cons of these?
- What does this mean for my situation?

- *Medische Oncologie | 'Integratieve zorg is een aanvulling, geen vervanging'. https://medischeoncologie.nl/artikelen/2022/maart/integratieve-zorg-is-een-aanvulling-geen-vervanging (accessed Dec 9, 2025).*
- *Kemper KJ, Vohra S, Walls R, the Task Force on Complementary and Alternative Medicine, the Provisional Section on Complementary, Holistic, and Integrative Medicine. The Use of Complementary and Alternative Medicine in Pediatrics. Pediatrics 2008; 122: 1374–86.*

Do you have any questions?

Thank you for your attention!