Precision Microbiome Strategies: Building Gut Resilience Through Accurate Testing

18th June 2026

Elena Panzeri, MSc Genetics and Nutrition, BSc Nutritional Therapy, Naturopath, PhD student at UCL (oral-gut-brain axis disorders), Head of Clinical Education at GutID, UK

The Gut Microbiome: A New Frontier in Personalised Medicine.

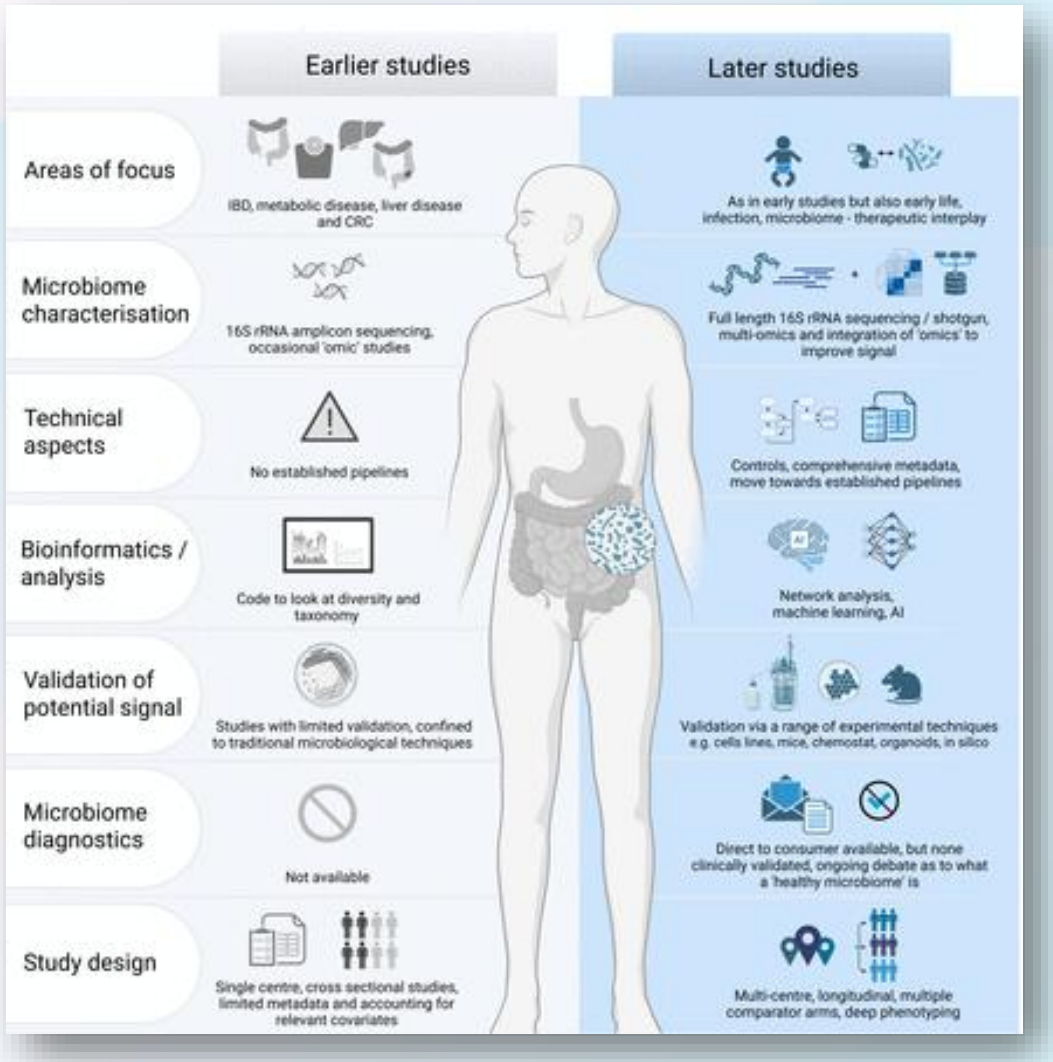


Figure 1-Alexander JL, Mullish BH, Thomas L, *et al*
Recent advances in our understanding of the gut microbiome: an analysis from the Gut Microbiota for Health Expert Panel of the British Society of Gastroenterology
Gut 2026 Jun 2:gutjnl-2026-338252

In just a decade, the microbiome has become one of the most rapidly advancing fields in personalised healthcare.

- Influences immunity, metabolism, inflammation and gut barrier function
- Helps explain why individuals respond differently to the same intervention
- Links nutrition, host physiology and health outcomes
- Provides a potentially modifiable target for personalised care

Increasingly recognised as a source of clinically actionable insights!

Few biological systems are simultaneously so influential, so individual, and so modifiable.

GutID™

How Can the Gut Microbiome Influence Health?

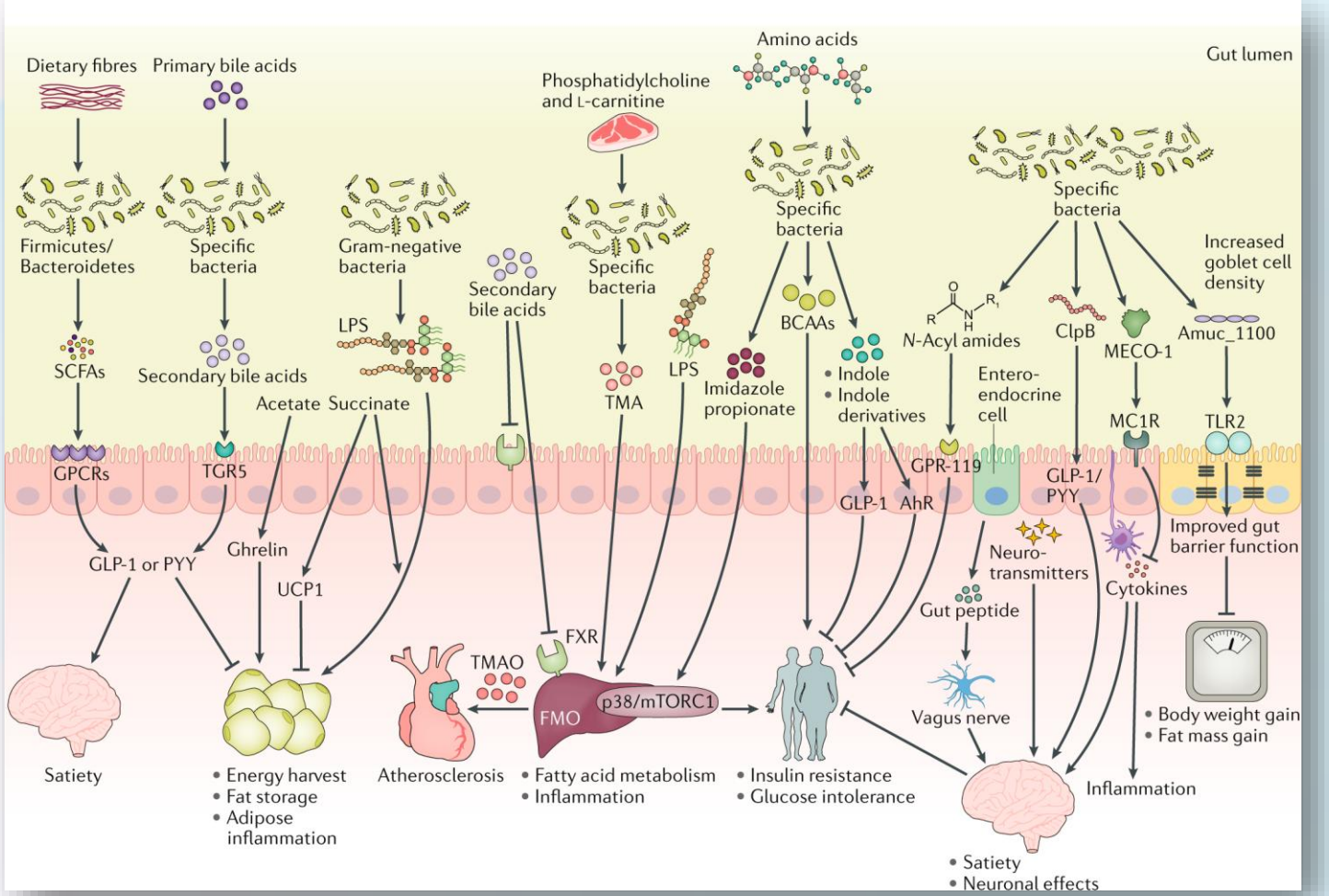


Figure 2- Fan Y, Pedersen O. **Gut microbiota in human metabolic health and disease**. *Nat Rev Microbiol*. 2021 Jan;19(1):55-71

Gut microbes interact with the host primarily through microbial metabolites and signalling molecules.

Health-supporting pathways

SCFAs → energy metabolism, immune regulation, gut barrier integrity
Secondary bile acids → FXR/TGR5 signalling, metabolic homeostasis
Indoles & tryptophan metabolites → AhR activation, mucosal and immune function
Neuroactive compounds → gut–brain communication and neuroendocrine signalling

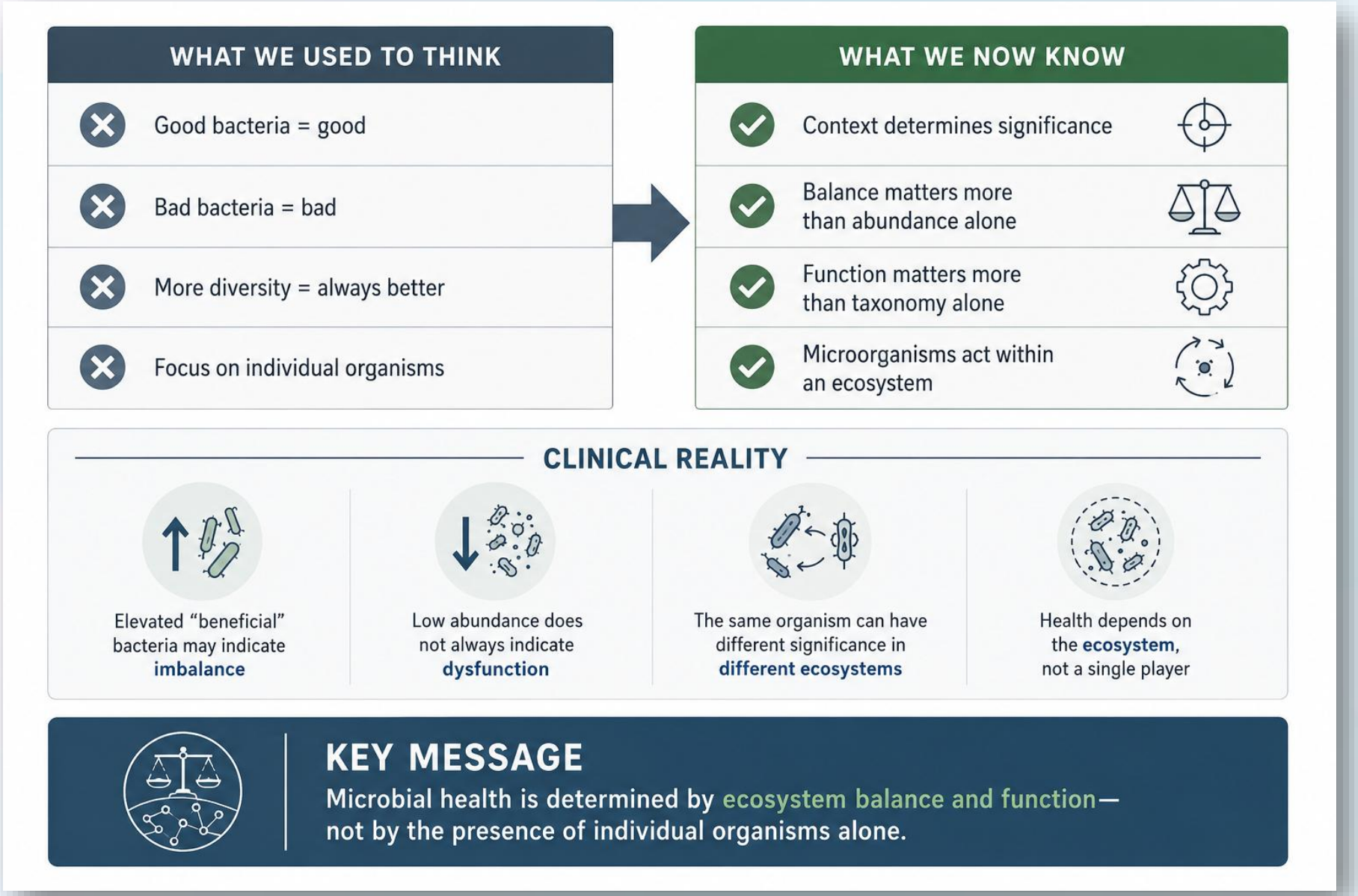
Potentially adverse pathways

LPS (lipopolysaccharide) → immune activation and inflammatory signalling
TMA → TMAO → cardiovascular and metabolic risk pathways

Microbial metabolites provide a mechanistic link between diet, the microbiome, and host physiology.

GutID™

Why Traditional Microbiome Interpretation Often Falls Short



From **reductionist interpretation** to ecosystem-based microbiome assessment

GutID™

Gut Resilience: A Key Determinant of Microbiome Health.

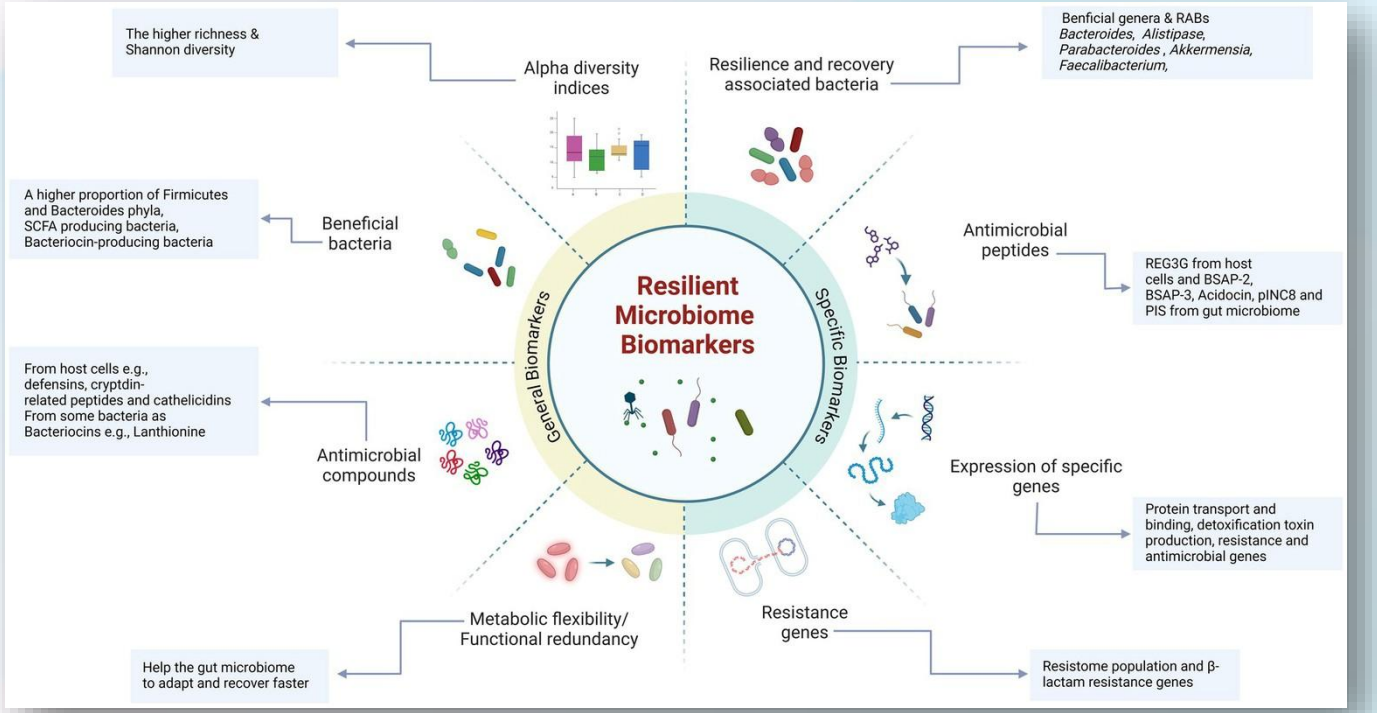


Figure 3- Safarchi A, Al-Qadami G, Tran CD and Conlon M **Understanding dysbiosis and resilience in the human gut microbiome: biomarkers, interventions, and challenges.** *Front. Microbiol. 2025* 16:1559521

The defining feature of a healthy microbiome is not just "who" is present, but how effectively the ecosystem maintains function, adapts, and recovers under pressure!

Resilience = ability of the microbiome to maintain function despite challenges

- Resist disturbance
- Recover after perturbation
- Maintain key functions
- Adapt to change

Influenced by

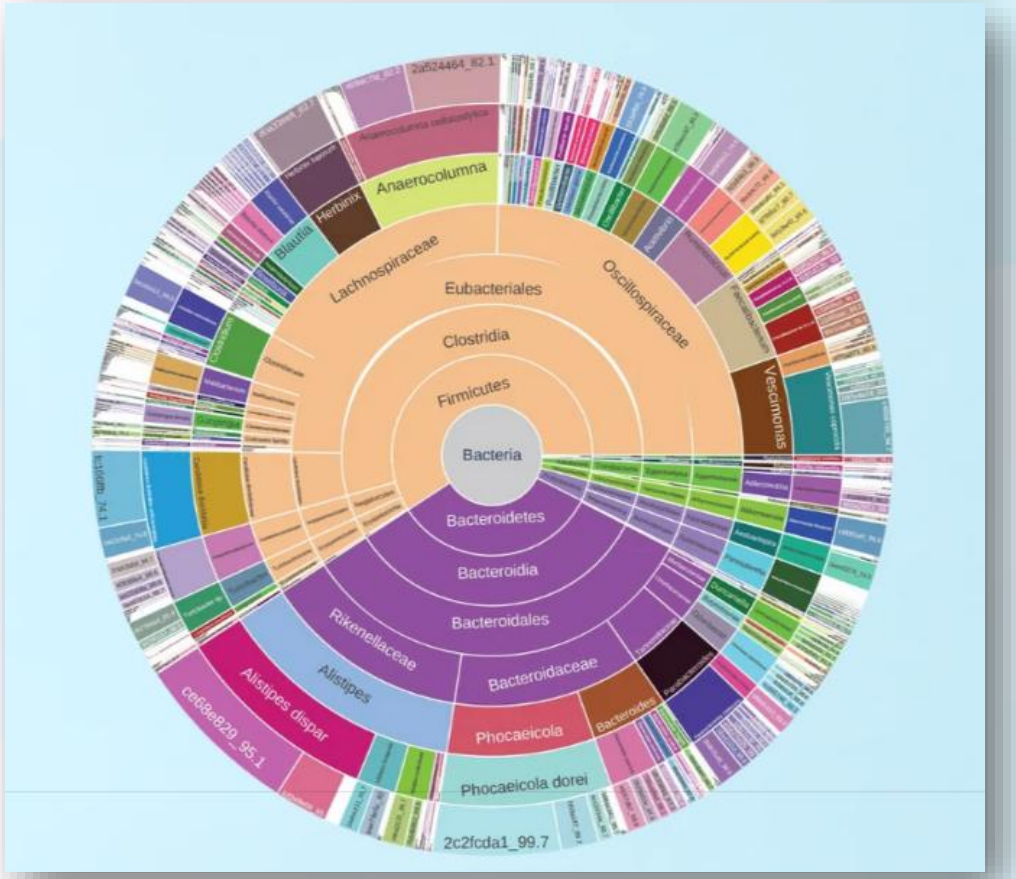
- Diversity and ecological interactions
- Functional redundancy
- Diet, medications and lifestyle

Biomarkers of resilience

- Higher microbial diversity
- SCFA-producing bacteria and balanced "beneficial" bacteria
- Functional redundancy
- Recovery-associated taxa (e.g. *Akkermansia*, *Faecalibacterium*)
- Metabolic flexibility

GutID™

The GutID Ecosystem Approach.



Target Plot: ecosystem structure and microbial composition across taxonomic levels

Integrated analysis: resilience, functional potential, and host–microbiome interactions (gut-axes).

Ecosystem-level interpretation: moving beyond individual organisms toward clinically meaningful patterns

Gut-Brain Axis
- ☑ Mood Disorders
- ☑ Alzheimer's Disease (AD) Risk
- ⚠ Parkinson's Disease (PD) Risk
- ☑ Irritable Bowel Syndrome

Gut-Gastrointestinal Axis
- ☑ Small Intestinal Bacterial Overgrowth (SIBO)
- ☑ Inflammatory Bowel Disease (IBD)
- ☑ Bile Acids (BAs) Metabolism

Gut-Metabolism Axis
- ☑ Obesity
- ☑ Type 2 Diabetes (T2D)
- ⚠ Non-Alcoholic Fatty Liver Disease (NAFLD)

Gut-Heart Axis
- ☑ Hypertension (HTN)
- ☑ Atherosclerosis
- ☑ Trimethylamine (TMA) Production

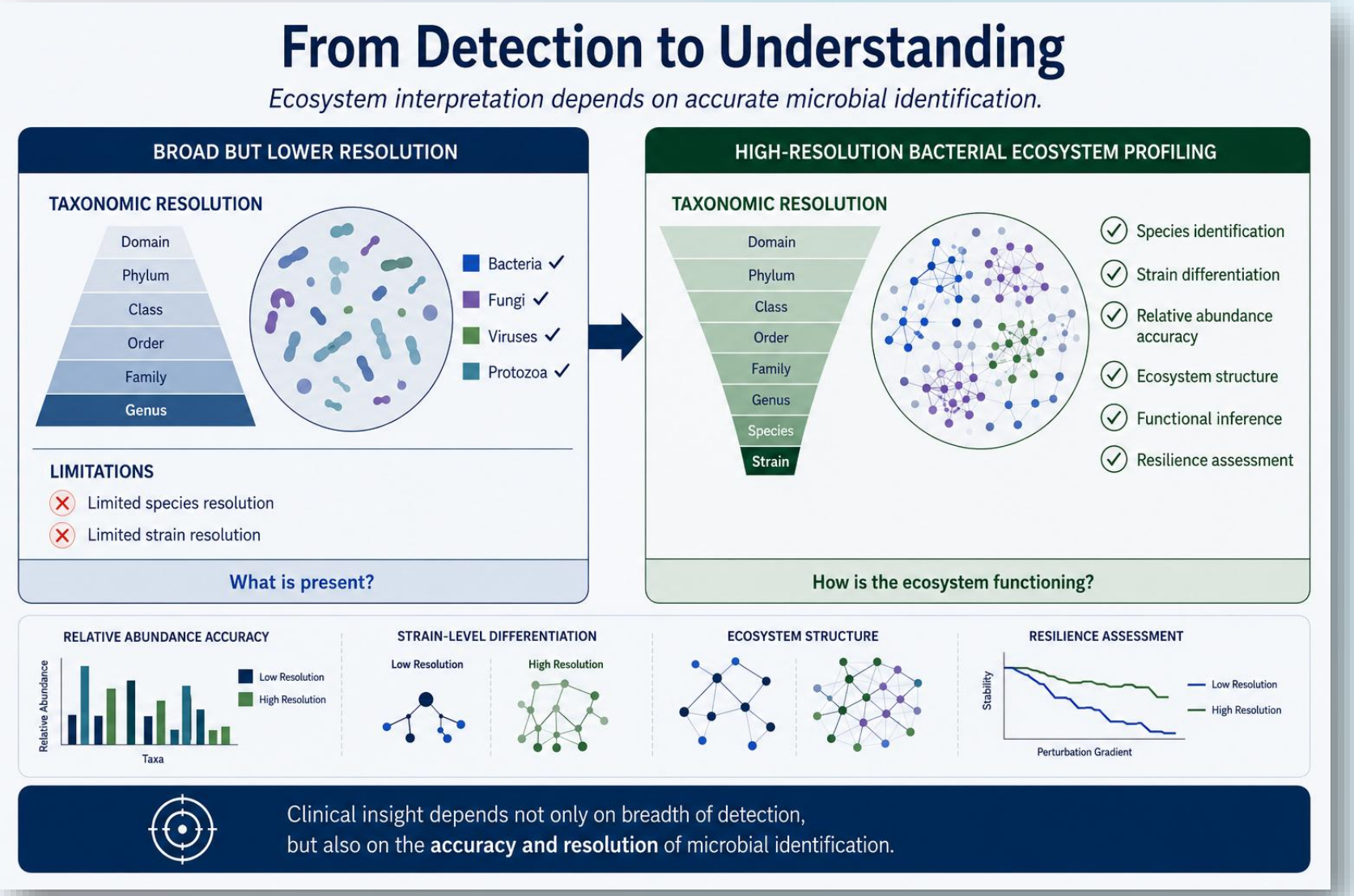
Gut-Immune Axis
- ☑ Lipopolysaccharide (LPS) Production
- ☑ Histamine Production
- ☑ Eczema & Atopic Dermatitis

Beneficial Bacteria
- ☑ Probiotics
- ☑ Mucosa Protection
- ⚠ Short-Chain Fatty Acids (SCFAs) Production

Resilience & Biodiversity
- ☑ Alpha Diversity
- ☑ Richness
- ☑ Evenness
- ☑ Beta Diversity
- ☑ Firmicutes/Bacteroidetes (F/B) Ratio
- ☑ Firmicutes/Bacteroidetes (F/B) Total
- ☑ Fusobacteria
- ⚠ Mycoplasma
- ☑ Resistome Score
- ☑ Enterotype
- ❯ ⚠ **Proteobacteria**
- ⚠ Pathogens
- ☑ Top 10 Species

GutID™

Why Accurate Testing Matters!



Why accuracy matters

- Many microbial functions are species- and strain-specific
- Ecosystem resilience depends on accurate community profiling
- Functional interpretation is only as reliable as the organisms identified

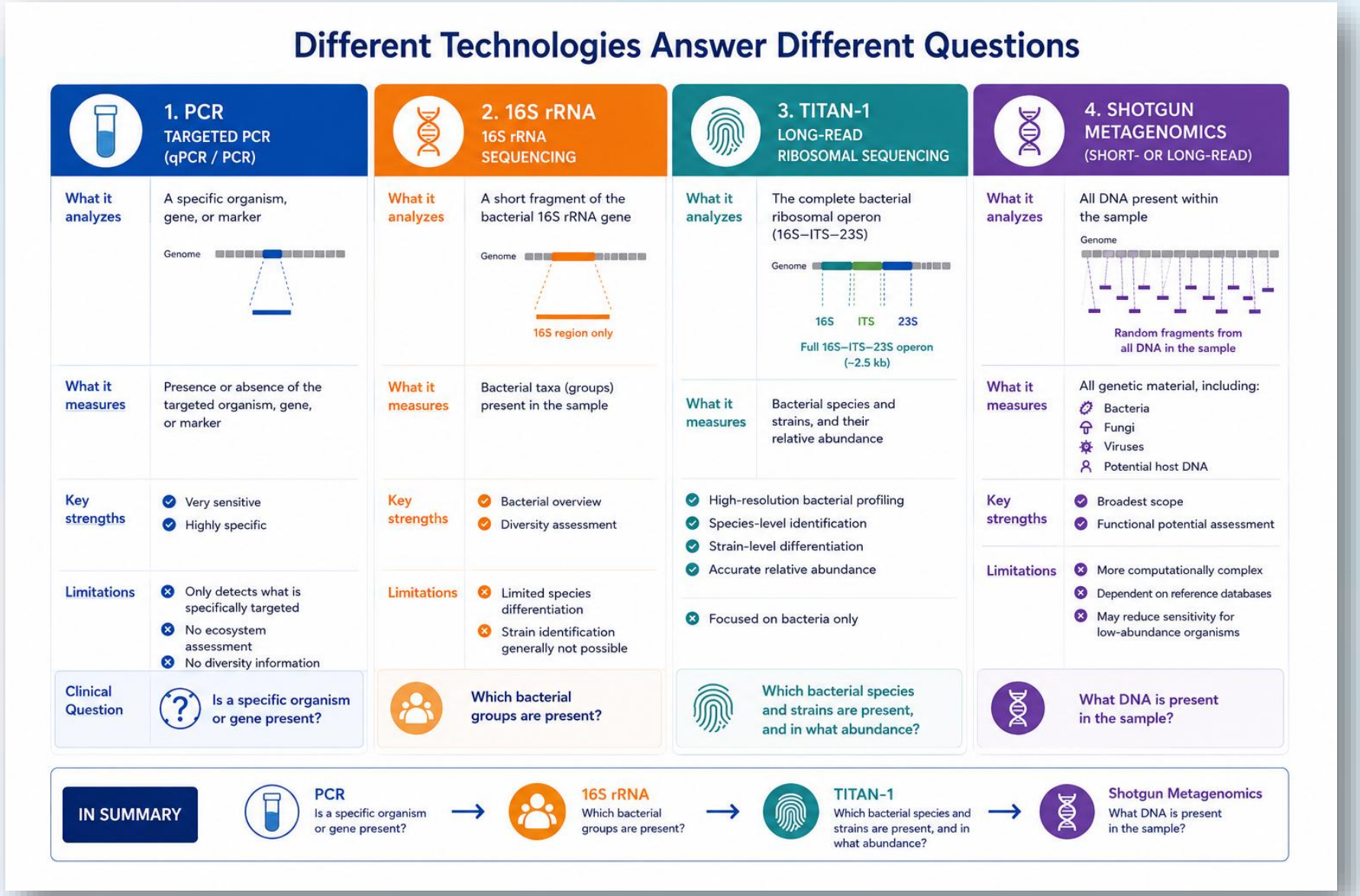
Clinical consideration

Greater taxonomic resolution may provide more ecological insight than broader but lower-resolution microbial surveys.

A high-resolution assessment of bacterial communities may provide greater ecosystem-level insight than a broader but lower-resolution survey of multiple microbial kingdoms

GutID™

Comparing Microbiome Testing Technologies.



Key Clinical Questions

PCR: Is a specific organism or gene present?

16S rRNA: Which bacterial groups are present?

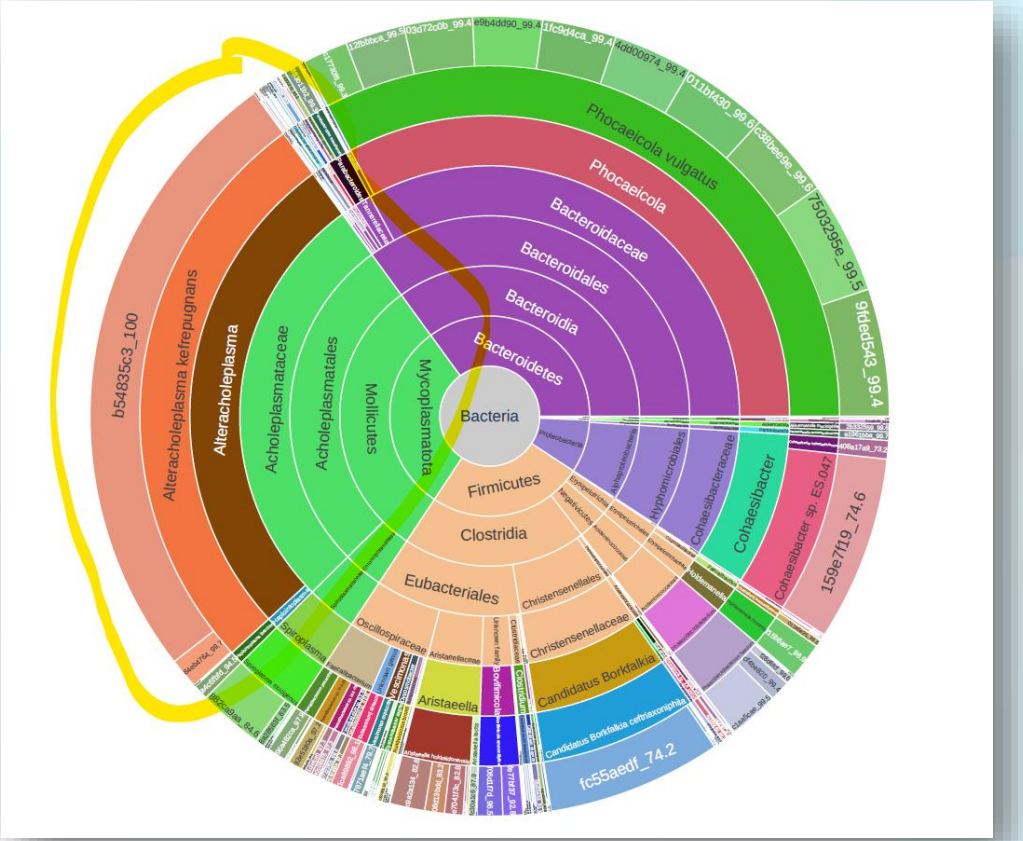
Titan-1 (gut-ID): Which bacterial species and strains are present, and in what abundance?

Shotgun Metagenomics: What DNA is present in the sample?

Different technologies answer different biological questions and provide different levels of ecological insight.

GutID™

Case Study: A Healthy Diet Does Not Guarantee a Resilient Microbiome!



Species	Relative Abundance (%)	Reference Range (%)	Flag
Phocaeicola vulgatus	32.68	1.16 - 45.59	
Alteracholeplasma kefrepugnans	26.78	0 - 0.01	high
Cohaesibacter sp. ES.047	7.49	0 - 0.01	high
Candidatus Borkfalkia ceftriaxoniphila	7.29	0.01 - 4.62	high
Phascolarctobacterium faecium	3.30	0.43 - 8.61	
Spiroplasma mucigenus	3.24	0 - 0.13	high
Aristaeella hokkaidonensis	3.15	0.03 - 3.36	
Bovifimicola ammoniilytica	1.89	Not Established	high
Holdemanella hominis	1.46	0.39 - 37.8	
Faecalibacterium prausnitzii	0.95	0.3 - 6.32	

Clinical Background.
Female, 36 years
Fibre-rich, polyphenol-rich whole-food diet
Regular fermented foods
Daily bowel movements
Persistent gastritis symptoms
Significant stress and disrupted sleep Extensive lifetime antibiotic exposure

Why This Matters
✓ Ecosystem structure may be missed when dominant organisms are not accurately identified
✓ Diet quality alone does not determine microbiome resilience
✓ Host factors, life history, stress, sleep, and previous antimicrobial exposure shape ecosystem function
✓Accurate microbial identification may fundamentally alter ecosystem interpretation and intervention strategy

GutID Findings
~35% of the ecosystem dominated by uncommon or poorly characterised taxa
Alteracholeplasma kefrepugnans (26.8%) Reduced abundance of protective species. Evidence of reduced ecosystem resilience despite an apparently microbiome-supportive diet.

GutID™

Building Resilience: From Interpretation to Intervention.

KEY FINDING	CLINICAL SIGNIFICANCE	INTERVENTION
Dominance of Mycoplasmatota (*Alteracholeplasma kefrepugnans 26.8%*)	Major ecosystem distortion	Black walnut husk + Olive leaf extract
Elevated Proteobacteria (*Cohaesibacter spp.*)	Increased inflammatory potential (LPS burden)	Antimicrobial strategy + polyphenols
Low SCFA-producing bacteria	Reduced resilience and metabolic function	Psyllium husk + pomegranate + green tea
Low *Lactobacillus* / probiotic-associated taxa	Reduced colonisation resistance	Sauerkraut + kefir
Reduced mucosal protection (*Faecalibacterium, Akkermansia*)	Impaired barrier support	DGL + slippery elm
Reduced ecosystem resilience	Lower capacity to recover from perturbation	Increase microbial diversity and functional redundancy
Sleep disruption & chronic stress	Host drivers of dysbiosis	Glycine + sleep optimisation
Frequent snacking & late eating	Disrupted ecological rhythms	Time-restricted eating, no food after 7:30 pm

What changed the clinical management?

Without accurate identification:
"Healthy diet → continue current approach“

With accurate ecosystem assessment:
Target dominant Mycoplasmatota

Address inflammatory Proteobacteria

Support mucosal integrity

Rebuild resilience and SCFA production

GutID™

The Future of Microbiome Testing in Personalised Medicine.

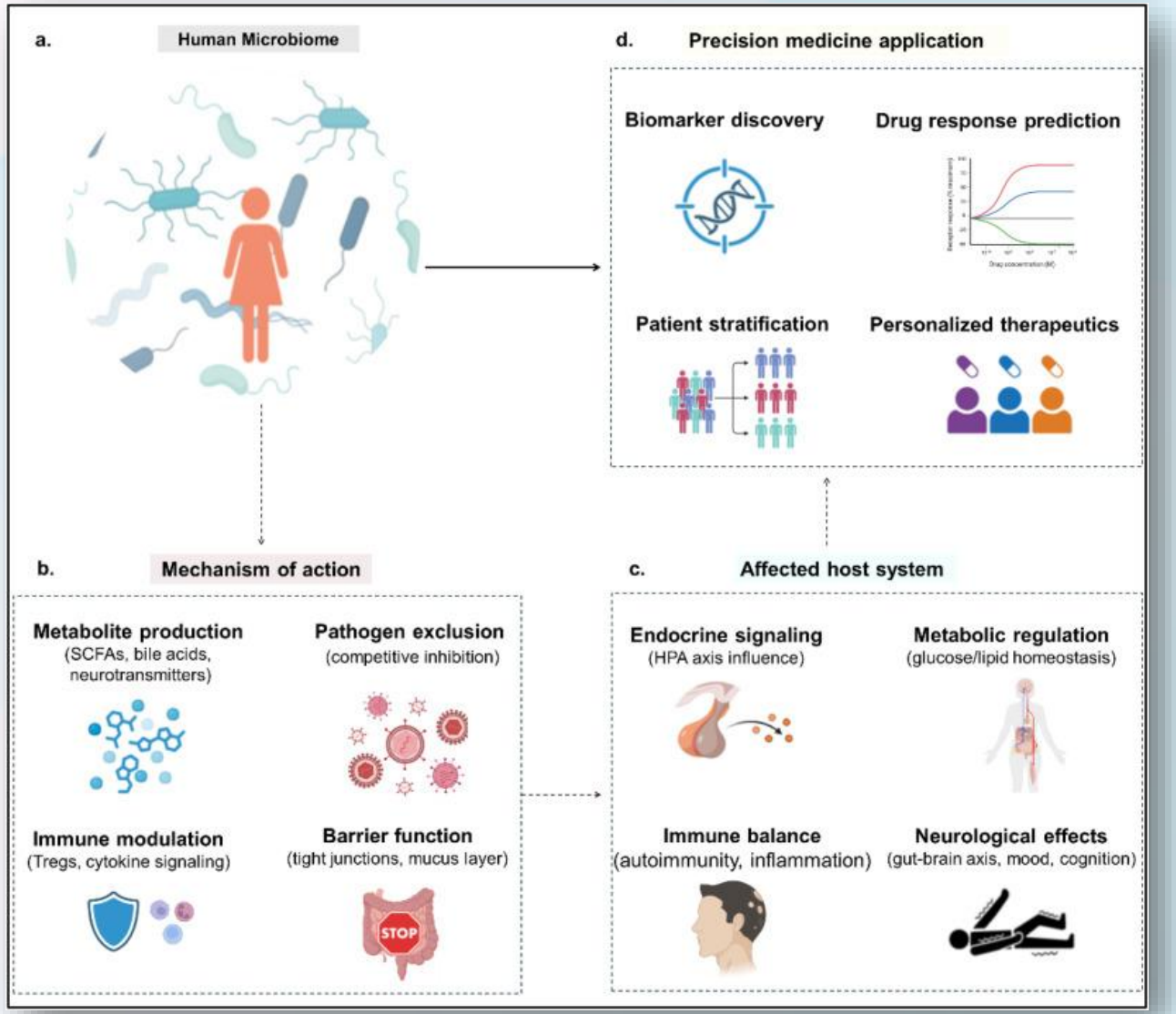


Figure 4-Umama Shahid, **Microbiome-guided precision medicine: Mechanistic insights, multi-omics integration, and translational horizons,** *The Journal of Precision Medicine: Health and Disease,*
Volume 3, 2025

Emerging direction of microbiome testing in PM:

- Moving beyond organism detection toward **ecosystem-level interpretation**
- Integrating **microbial composition, functional potential, host physiology, and clinical data**
- Increasing emphasis on **accuracy, taxonomic resolution, and ecological context**
- Multi-omics approaches (metagenomics, metabolomics, transcriptomics) will improve mechanistic understanding
- Microbiome-informed interventions may support **patient stratification, prevention, and personalised care**

The future of microbiome testing is not simply identifying which microbes are present, but understanding how microbial ecosystems influence human biology and translating that knowledge into precise, clinically meaningful interventions.

GutID™

References.

Alexander, J.L., Mullish, B.H., Thomas, L., Weersma, R.K., Sokol, H., Roberts, L.A., Edwards, L.A., Emmanuel, A., Gerasimidis, K., Hall, L.J., Iqbal, T.H., Kinross, J.M., McIlroy, J., Monaghan, T.M., Sergaki, C., Shawcross, D.L., Stewart, C.J., Lamb, C.A., Williams, H.R.T. and Hansen, R. (2026). Recent advances in our understanding of the gut microbiome: an analysis from the Gut Microbiota for Health Expert Panel of the British Society of Gastroenterology. *Gut*, [online] p.gutjnl-2026-338252. doi:https://doi.org/10.1136/gutjnl-2026-338252.

Fan, Y. and Pedersen, O. (2020). Gut Microbiota in Human Metabolic Health and Disease. *Nature Reviews Microbiology*, [online] 19(1). doi:https://doi.org/10.1038/s41579-020-0433-9.

Safarchi, A., Al-Qadami, G., Tran, C.D. and Conlon, M. (2025). Understanding dysbiosis and resilience in the human gut microbiome: biomarkers, interventions, and challenges. *Frontiers in Microbiology*, 16. doi:https://doi.org/10.3389/fmicb.2025.1559521.

Shahid, U. (2025). Microbiome-guided precision medicine: Mechanistic insights, multi-omics integration, and translational horizons. *The Journal of Precision Medicine: Health and Disease*, [online] 3, p.100018. doi:https://doi.org/10.1016/j.premed.2025.100018.

GutID™