

Bringing the pieces together

Understanding metabolism as an integrated system.



MAVENHEALTH

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Bringing the pieces together

Maven Health Workshop IPM 2026

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Scope of this workshop

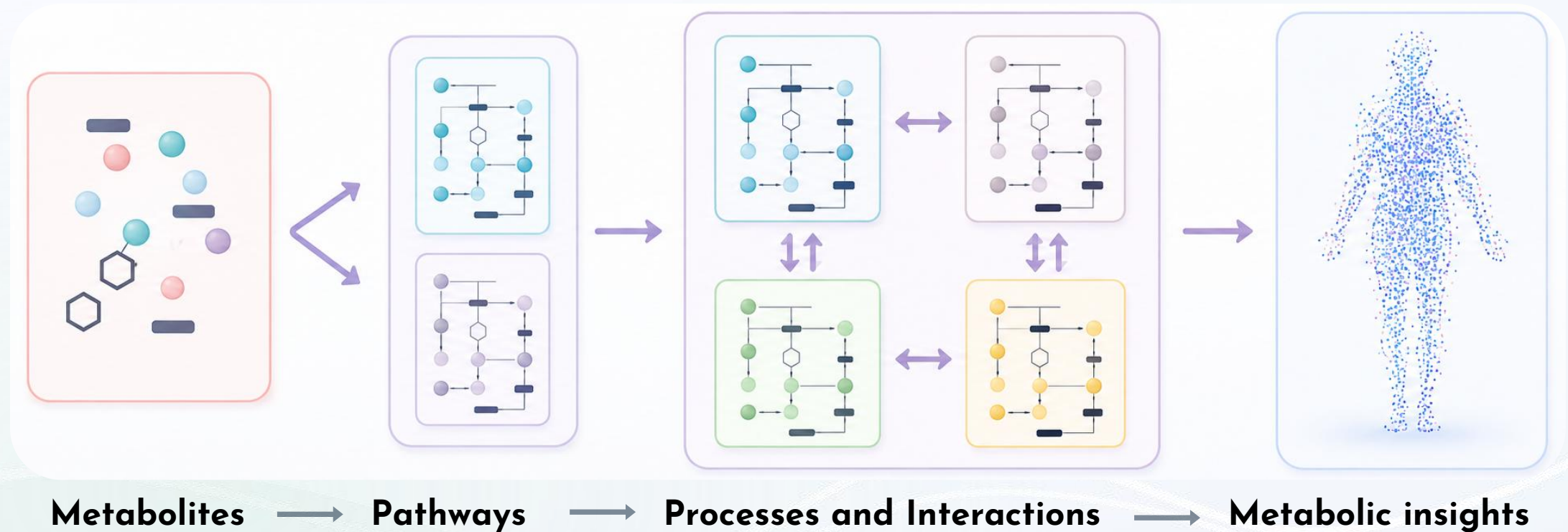
1. Understanding metabolism as an integrated system
2. Why compartments matter for interpretation
3. How we can measure metabolic signals in biological context

The first question

The natural question: “What does this marker mean?”

Beyond the isolated marker

- Metabolites are part of pathways
- Pathways are part of multi-layered systems
- Complex cases require wider metabolic context



The right question

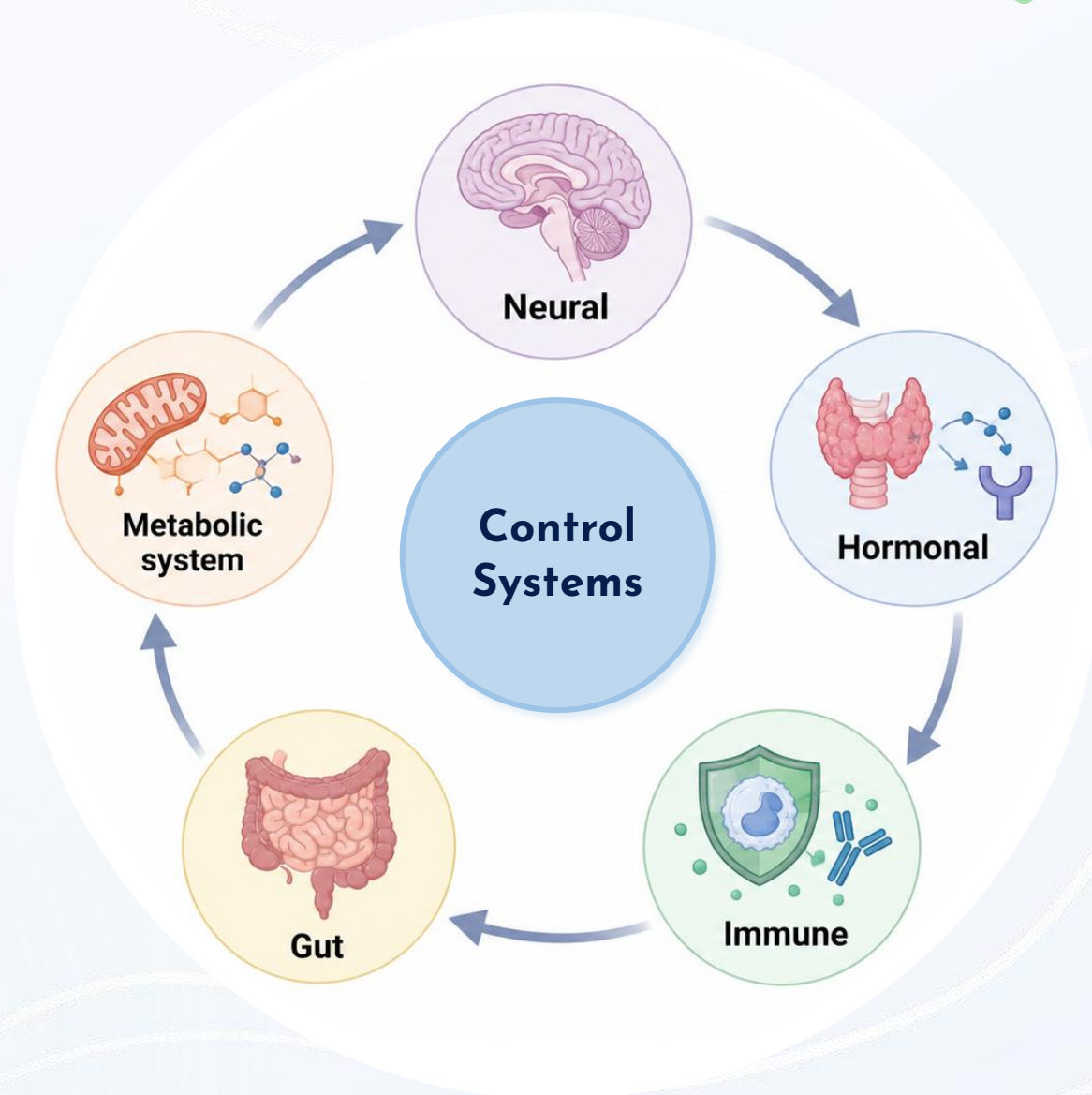
The right question: “What does this marker mean in context?”

Control systems

The organising models

- Biological switchboards
- Continuously communicate and provide feedback

Detect state, send signals, and change response



Metabolism as the connected hub

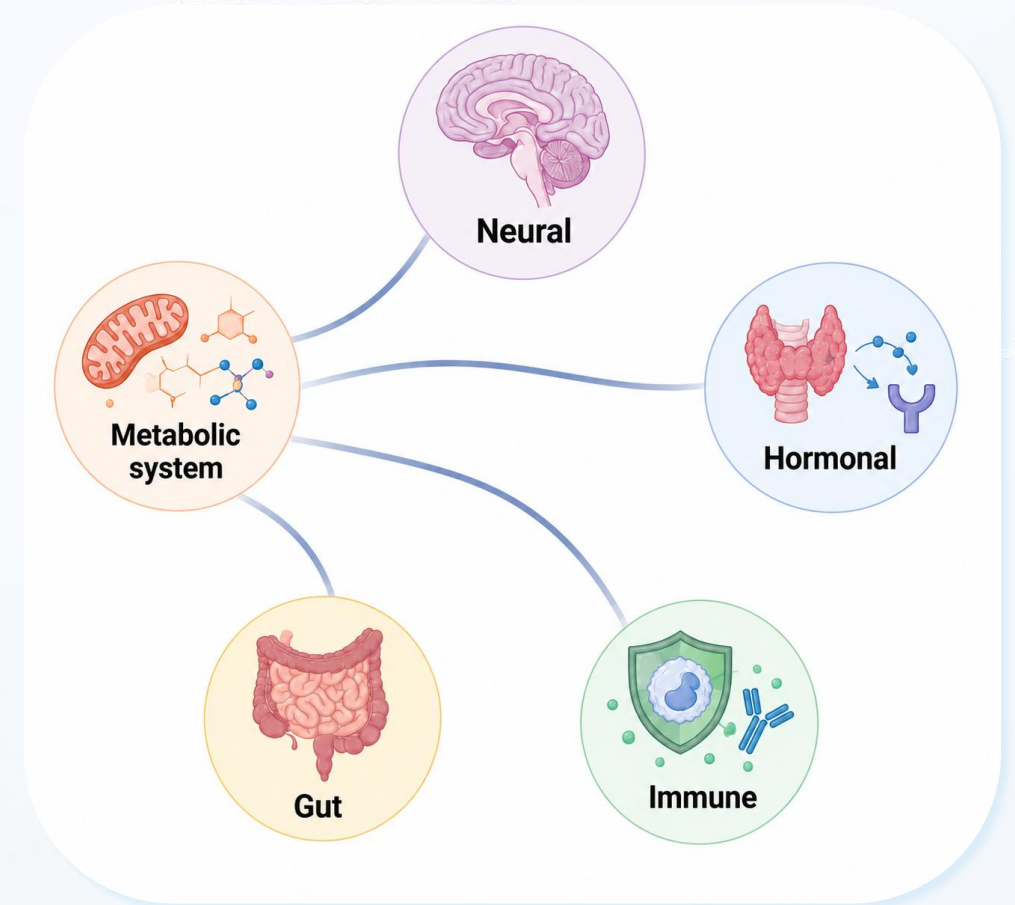
The organising models

- The Metabolic System is widely integrated
- Relation to most other Control Systems
- Connecting Control Systems to diet and lifestyle

Low ATP increases appetite hormone signalling.

Gut-derived acetate contributes to energy metabolism.

High neural energy demand increases lactate production.

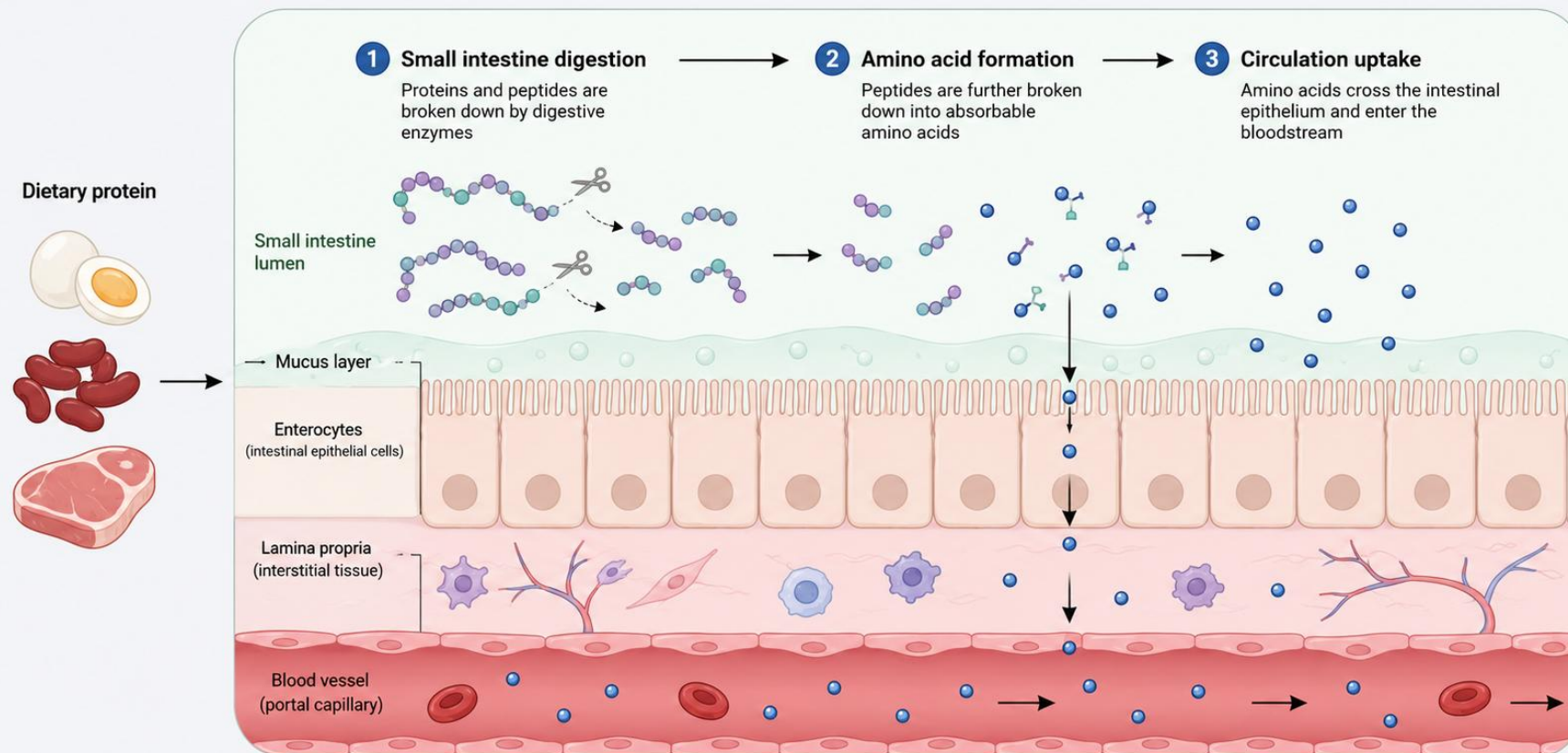


Following are two examples show why metabolic signals become more meaningful in context

Example 1: Protein digestion

Route 1

- Digestion in the **small intestine**
- Amino acids become **available**
- Favourable

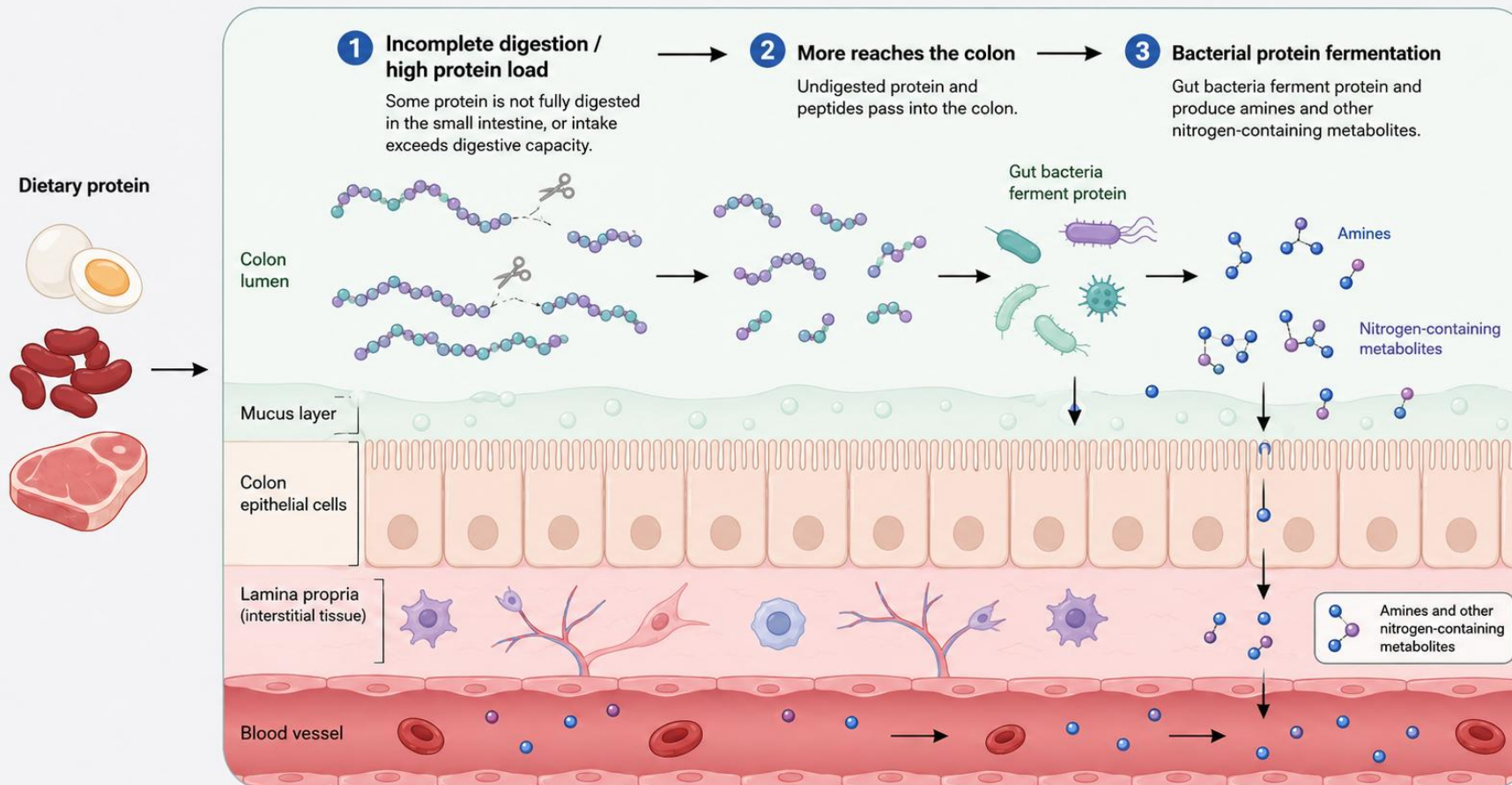


Amino acids for synthesis, repair, nitrogen handling, and signalling

Example 1: Protein digestion

Route 2

- Digestion is **incomplete**
- More reaches the colon
- Gut bacteria can **ferment** protein
- Less favourable



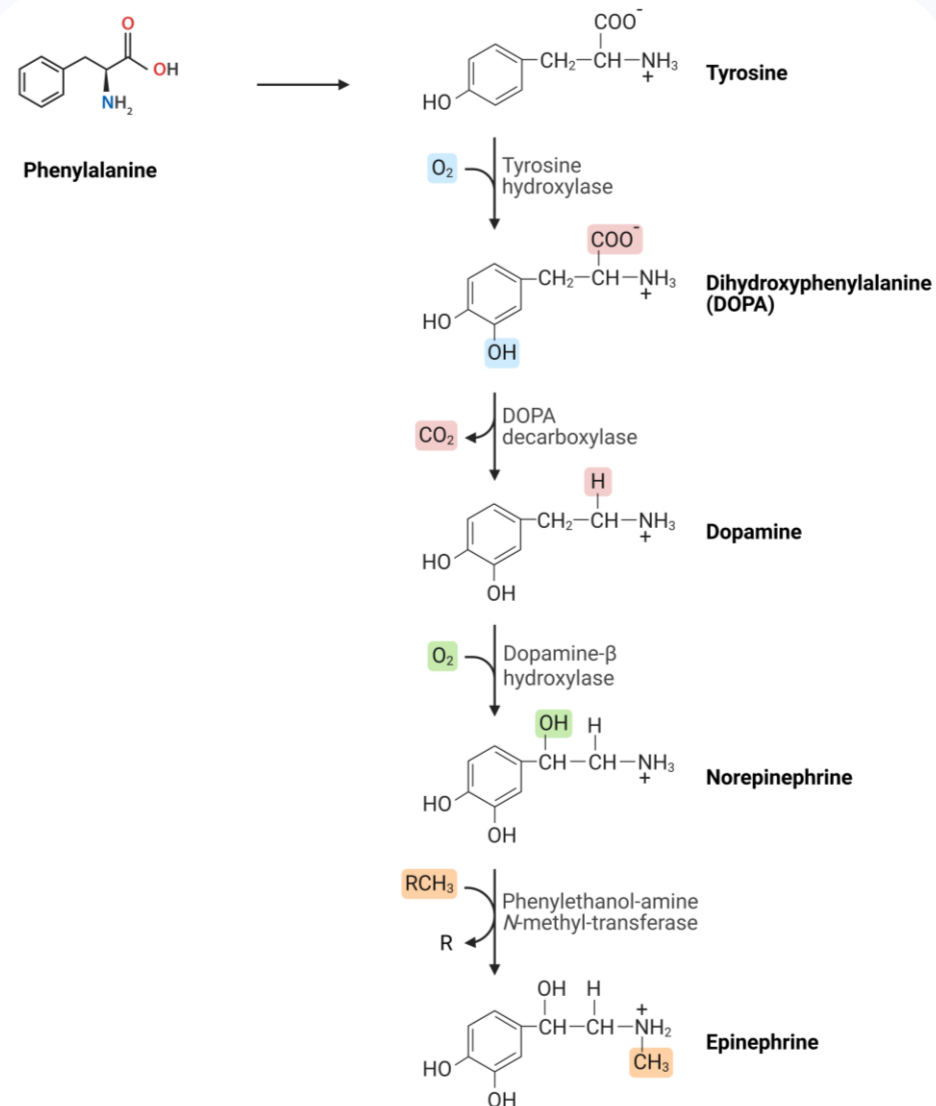
Produces amines and other nitrogen-containing metabolites

Tyrosine and catecholamines

- Tyrosine is a conditionally essential amino acid
- Production is not sufficient in cases of high demand

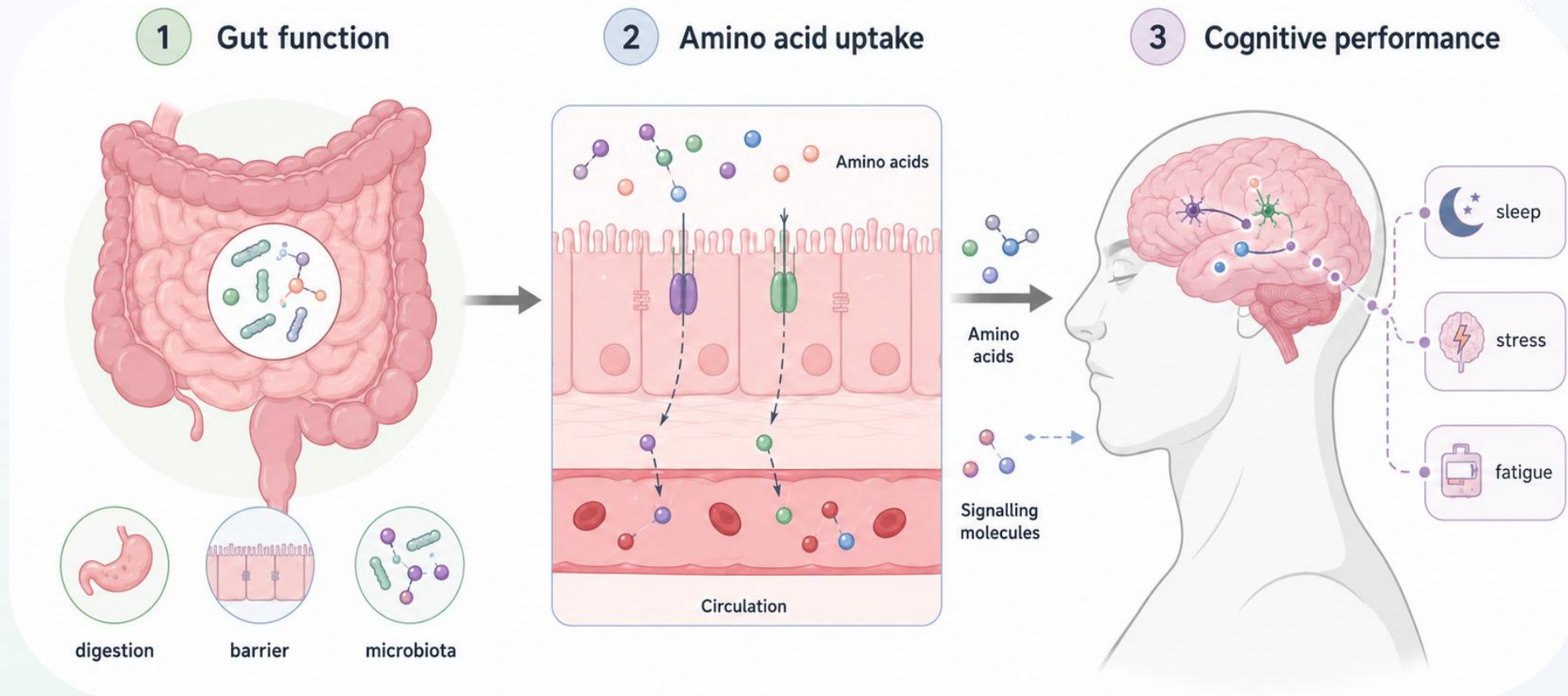


Stress, alertness, motivation, and focus



Protein-gut context takeaway

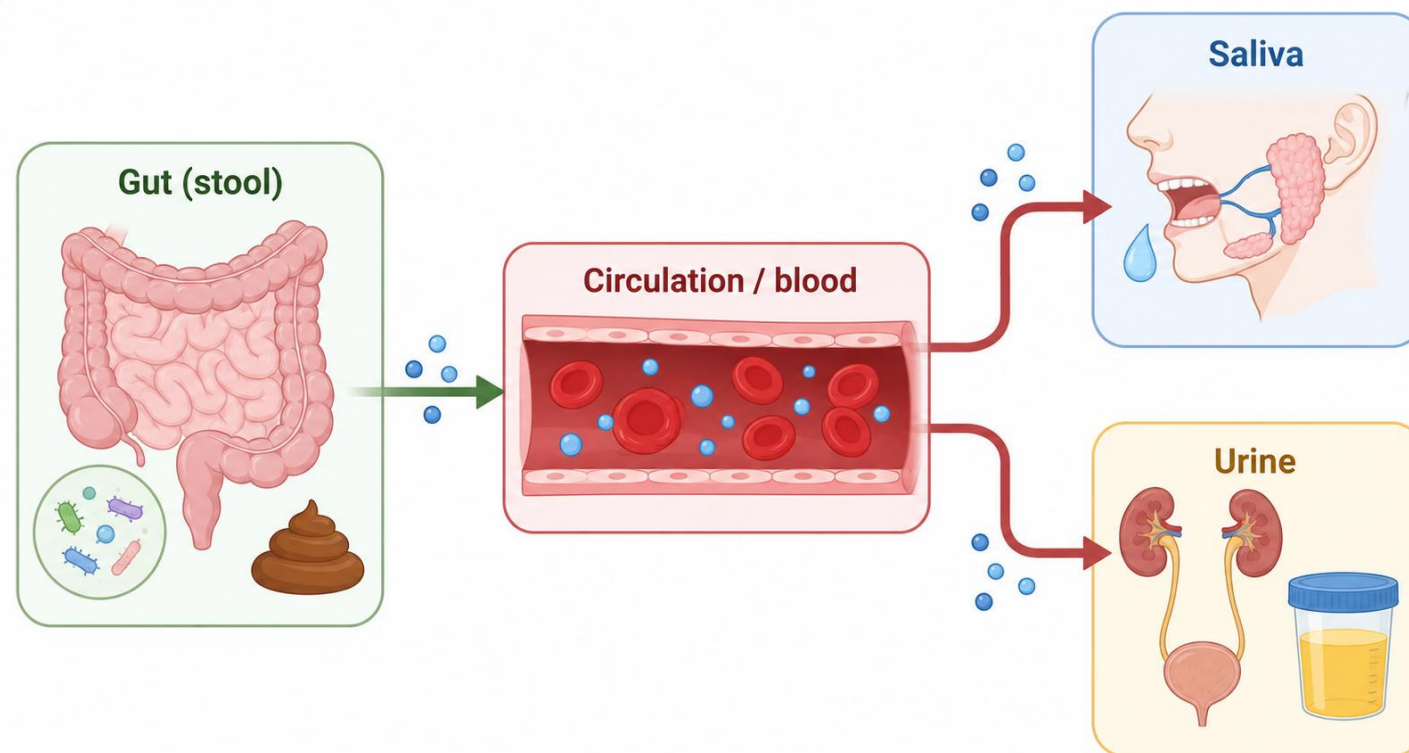
The gut-brain axis



Interpretation comes from the patterns

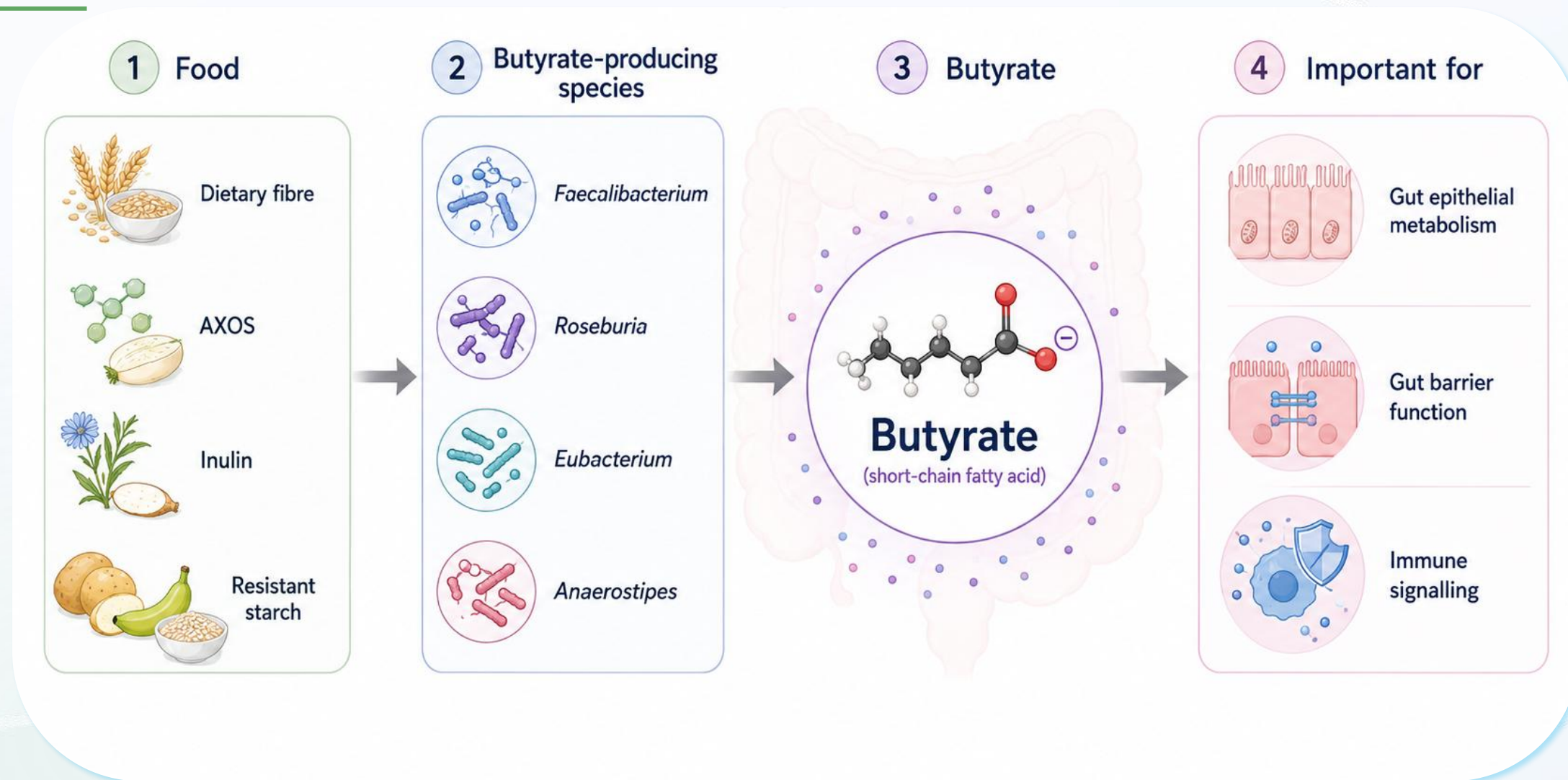
Example 2: Compartments matter

- Compartmentalisation is a key concept in metabolic testing
- One test often shows one part of the biological picture



Different sample types can provide complementary information

Butyrate example

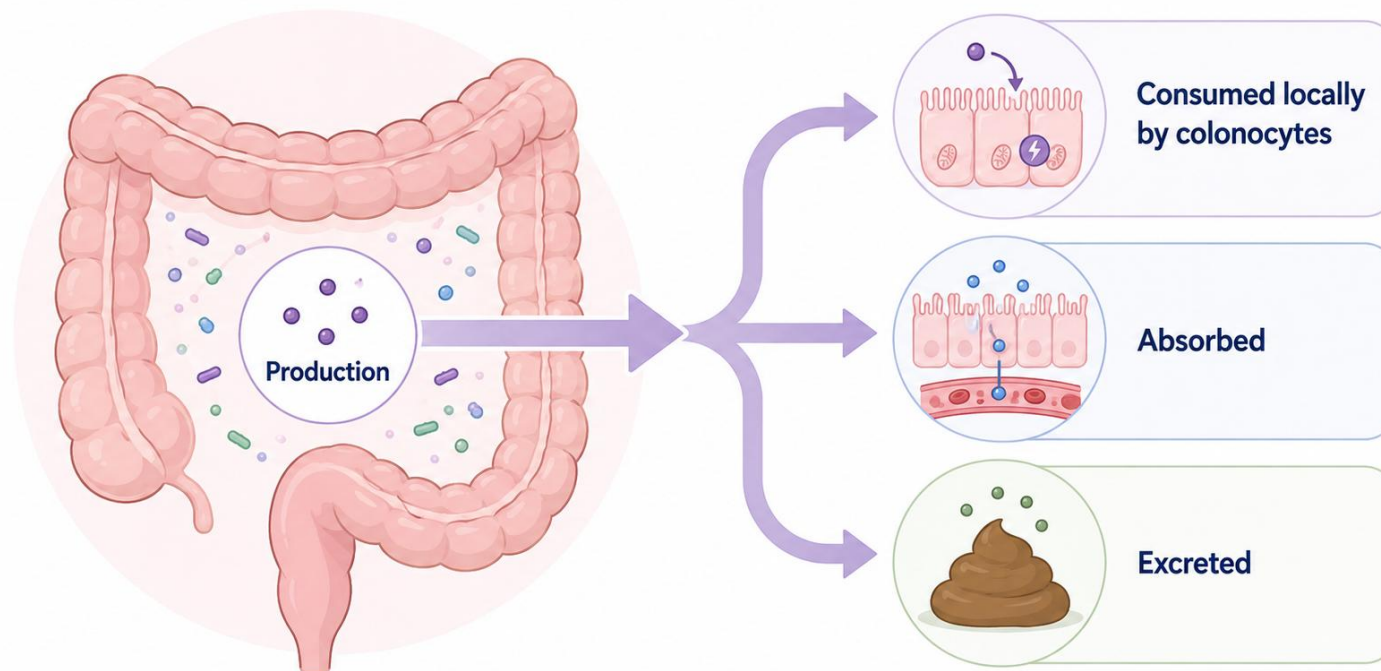


Butyrate routes after production

Three different fates

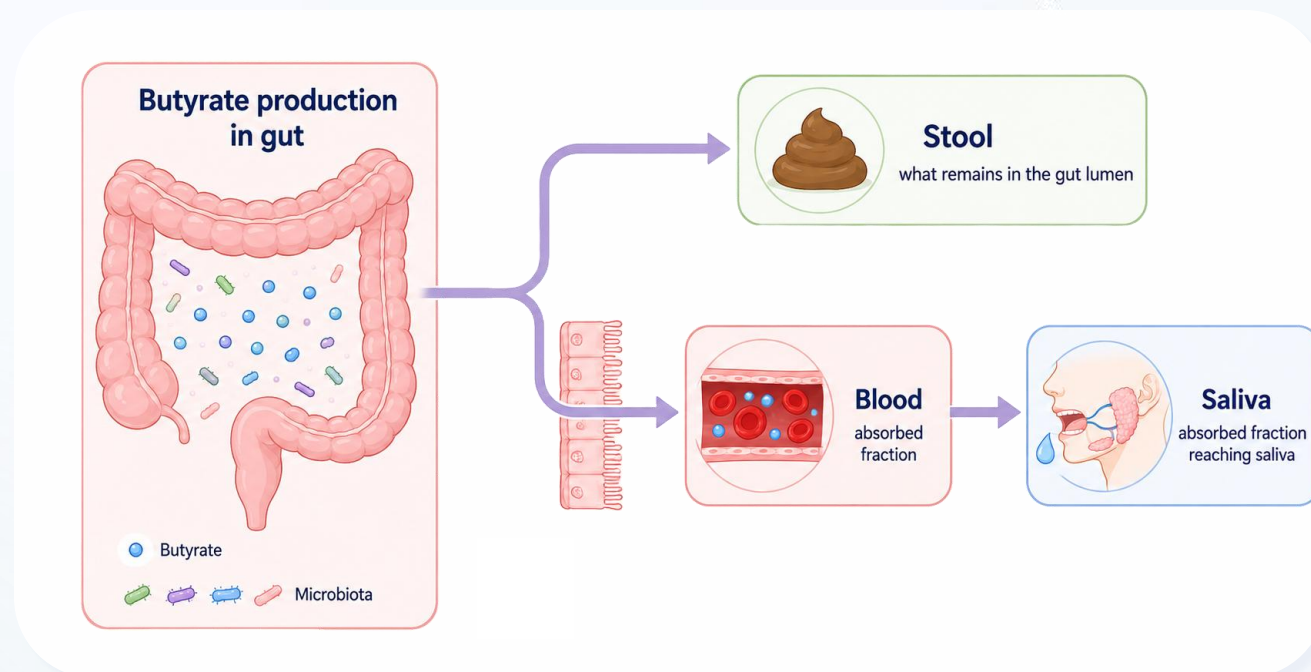
1. Used by colonocytes as fuel
2. Taken up across the gut barrier
3. Remains in the gut lumen and is excreted

Intestinal fate after production



Same metabolite, different compartment

- Butyrate can be measured in stool, blood, or saliva
- Stool butyrate reflects what remains in the gut lumen and is excreted
- Blood or saliva reflects what has been absorbed
- Together, a more complete picture of short-chain fatty acid handling



Interpretation is stronger when production, local use, absorption, excretion, are considered together

Multi-level compartment interpretation

Different tests can work alongside each other

Profile 1: Low saliva/serum butyrate + low stool butyrate

Likely low overall butyrate availability.

Focus on increasing colonic production through more fermentable fibre.

Profile 2: Low saliva/serum butyrate + high stool butyrate

Butyrate is present in the gut lumen but not absorbed.

Focus on gut barrier integrity, and mucosal health.

Stool and saliva/serum levels are not expected to tell exactly the same story

Together, they can build a more complete picture of short-chain fatty acid handling.



Multi-level compartment interpretation

Different tests can work alongside each other

Profile 3: Low stool butyrate + high saliva/serum butyrate

Efficient uptake or low residual stool butyrate.

Maintain diet and gut function. Do not assume low stool butyrate is automatically bad. Assess in context of other SCFAs.

Profile 4: High stool butyrate + high saliva/serum butyrate

High production with systemic appearance.

Usually favourable if stool pattern and gut symptoms are normal.

Stool and saliva/serum levels are not expected to tell exactly the same story

Together, they can build a more complete picture of short-chain fatty acid handling.

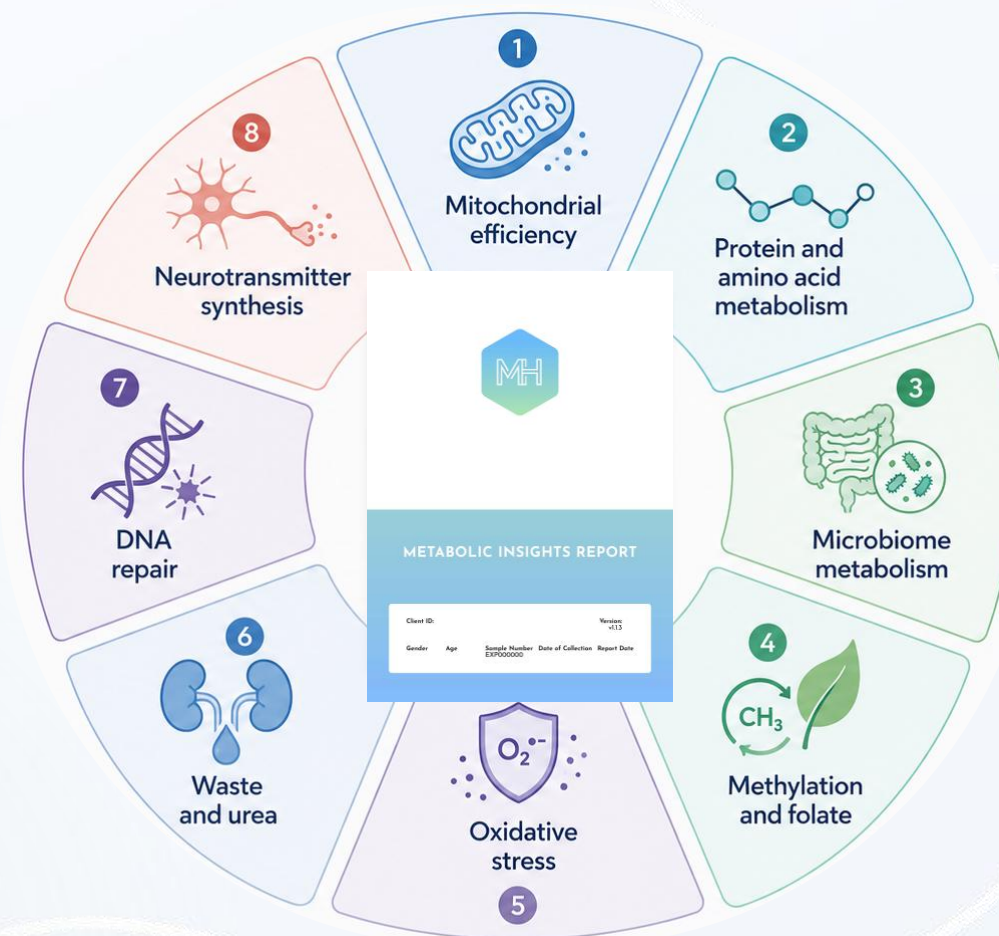


Where Metabolic Insights fits

- Metabolic Insights fits into this systems-level way of thinking
- The test is designed to look at metabolism at a pathway level

It measures metabolites across eight metabolic domains:

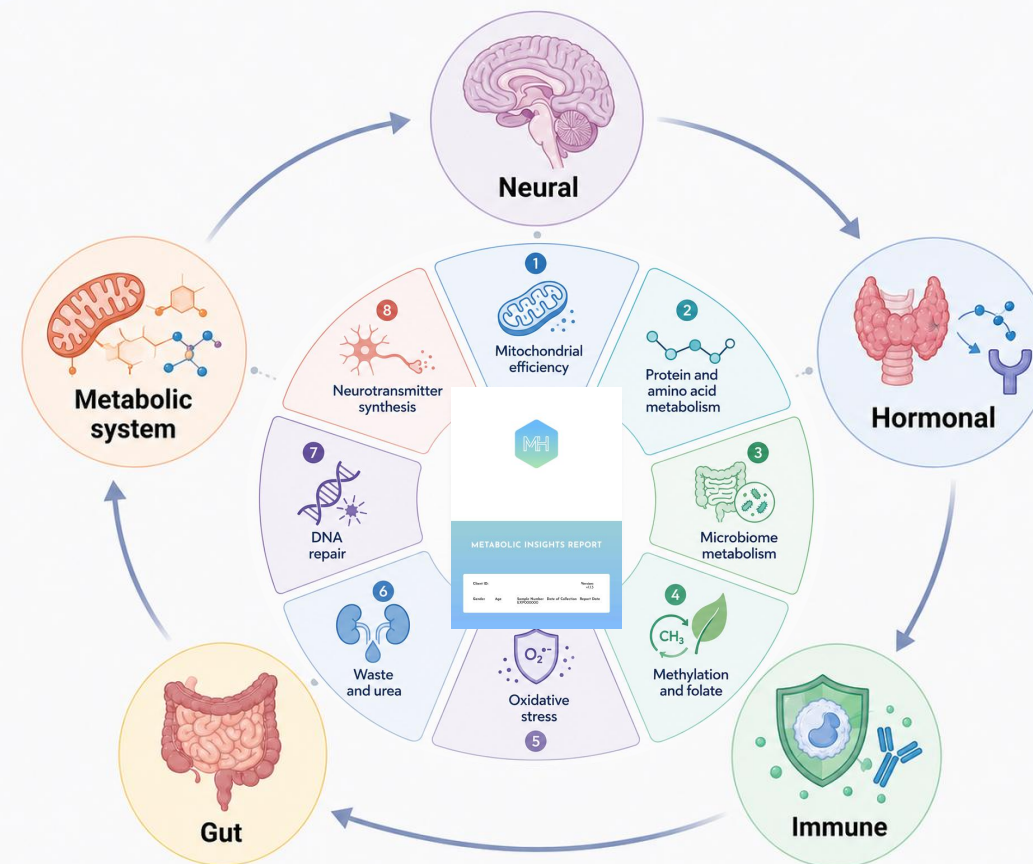
1. Mitochondrial efficiency
2. Protein and amino acid metabolism
3. Microbiome metabolism
4. Methylation and folate
5. Oxidative stress
6. Waste and urea
7. DNA repair
8. Neurotransmitter synthesis



The eight areas as a control-layer map

The eight domains reach the metabolic control layers

- Gut activity
- Neural signalling
- Inflammatory signalling
- Energy regulation
- Hormonal demand



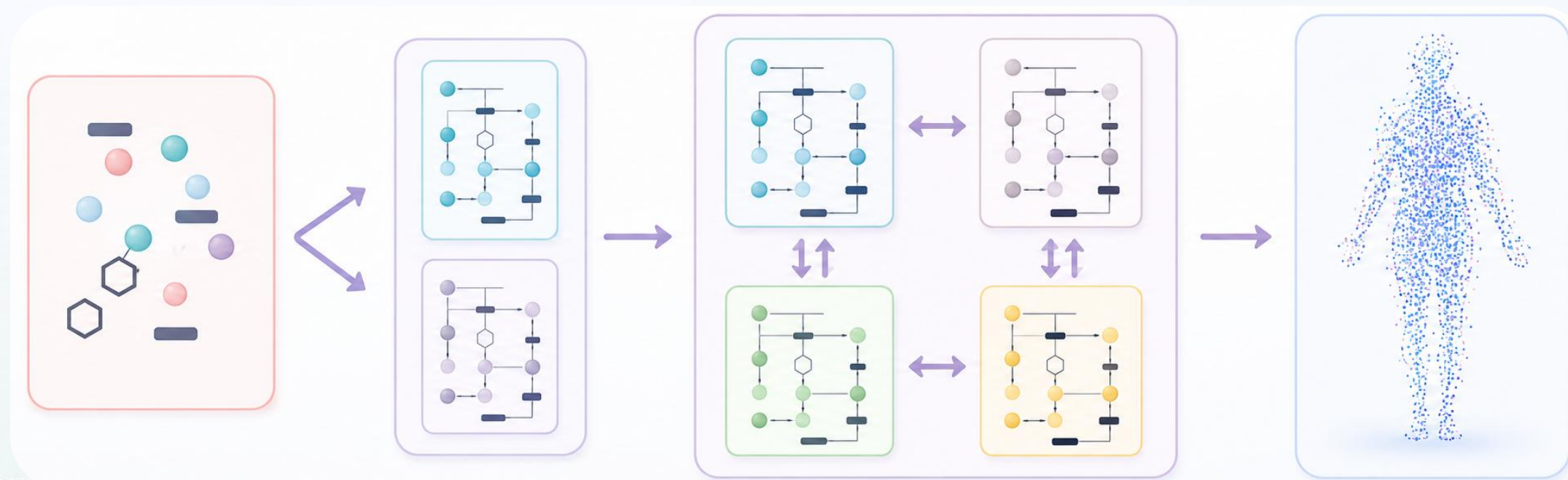
The framework organises metabolic information into patterns

Professional interpretation tool

It gives practitioners a way to

Bring the pieces together

- It provides structured metabolic information
- It can support systems-level thinking
- Interpretation remains within biochemical and functional boundaries

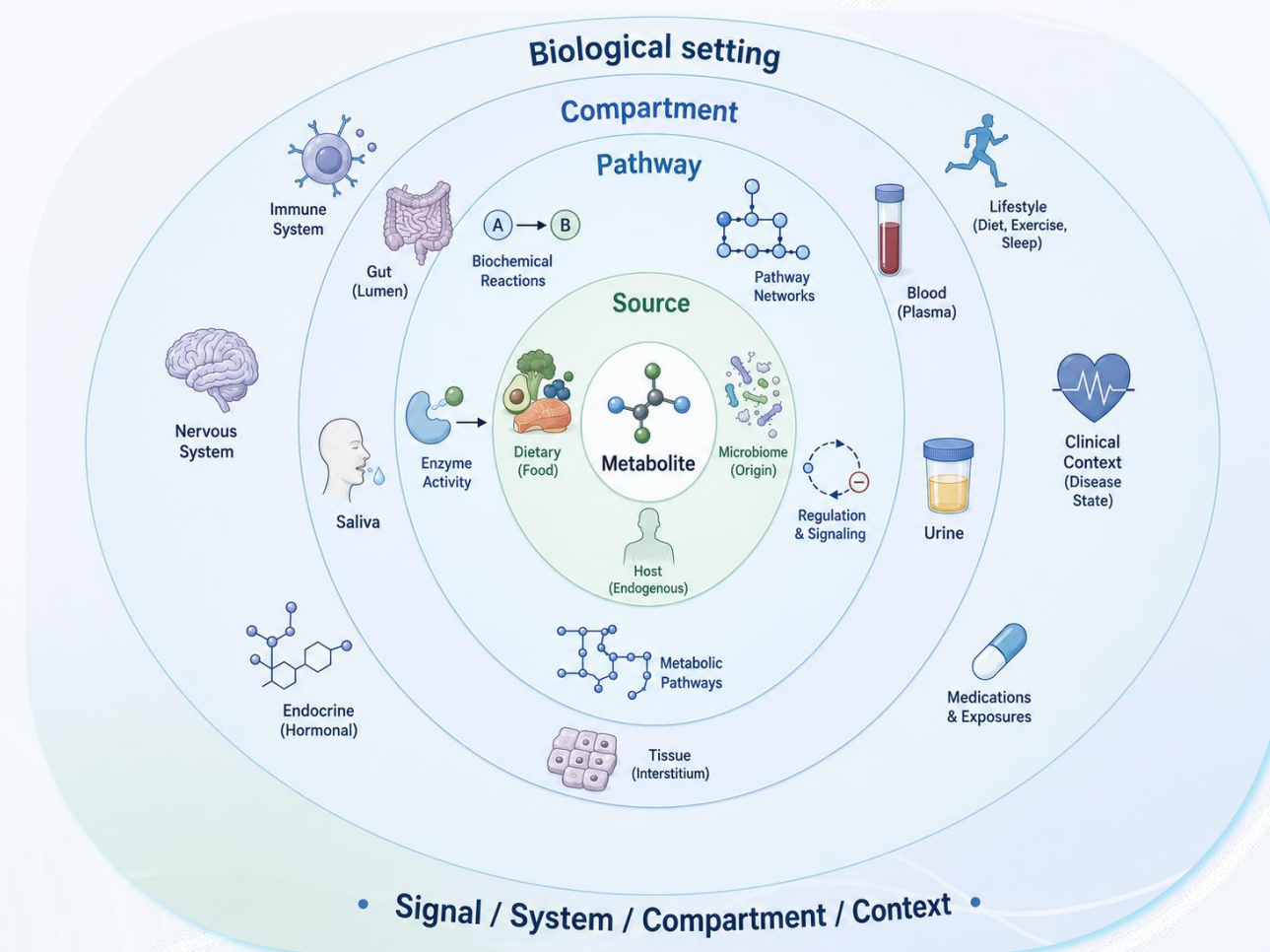


Metabolites → **Pathways** → **Processes and Interactions** → **Metabolic insights**

Main takeaway: signals in context

- Metabolic interpretation becomes stronger when we move from isolated markers to signals in context
- A metabolite has a source, pathway, compartment, and wider biological setting
- The meaning comes from the complete picture

**Systems interpretation mindset:
Signal, system, compartment, context**

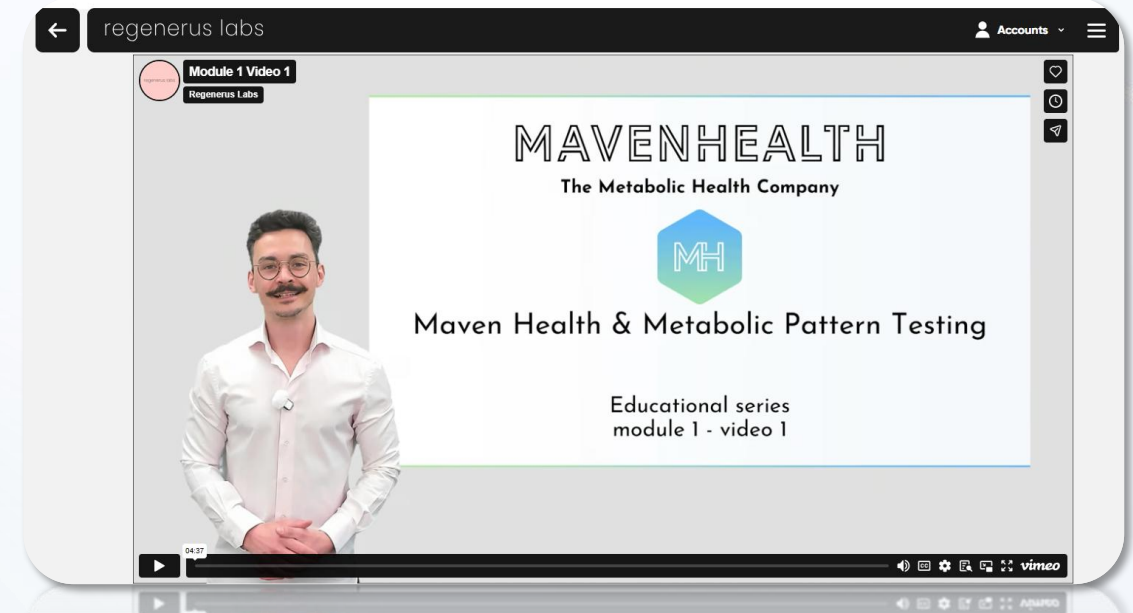




Continue the education pathway

For practitioners who want to go deeper into this framework

- **Educational series** available through Regenerus
- Topics include pathway structure, compartment context, and examples of metabolic pattern interpretation



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The Metabolic Insights report

Thank you for listening!



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