

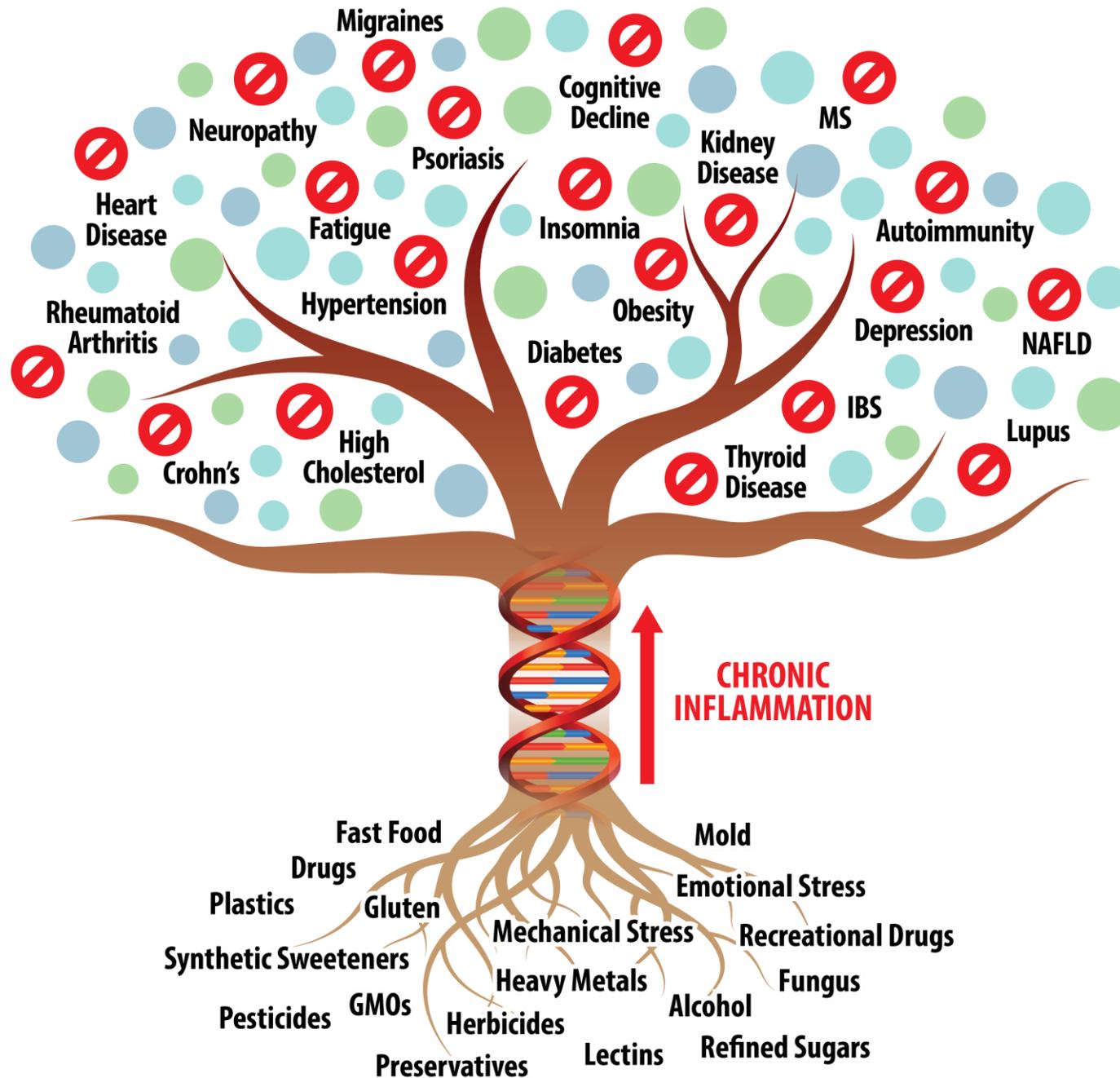
Casual Friday Presents

The Gut-Joint Axis II

and Intervention Development

A BIOGENETIX CLINICAL PRESENTATION

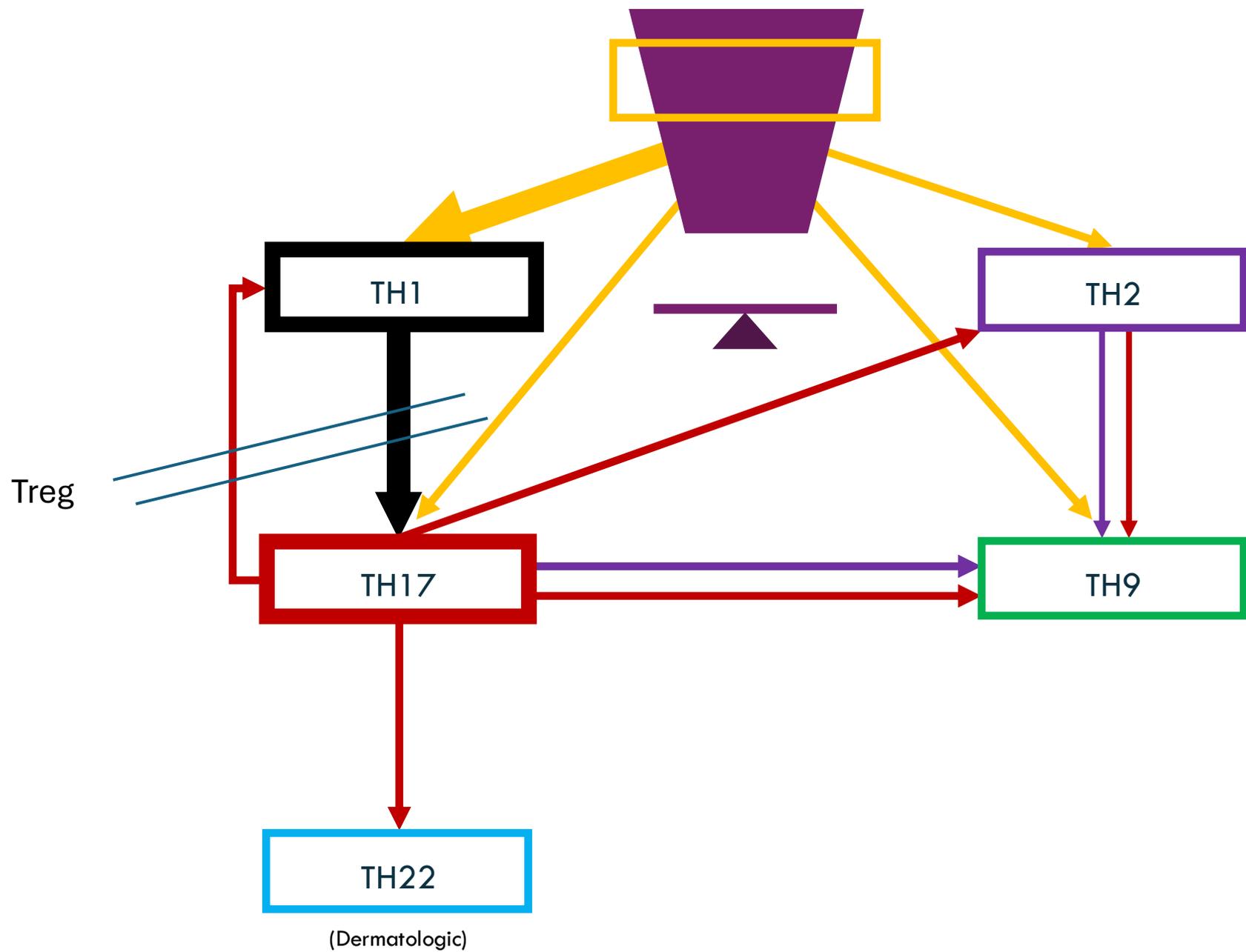
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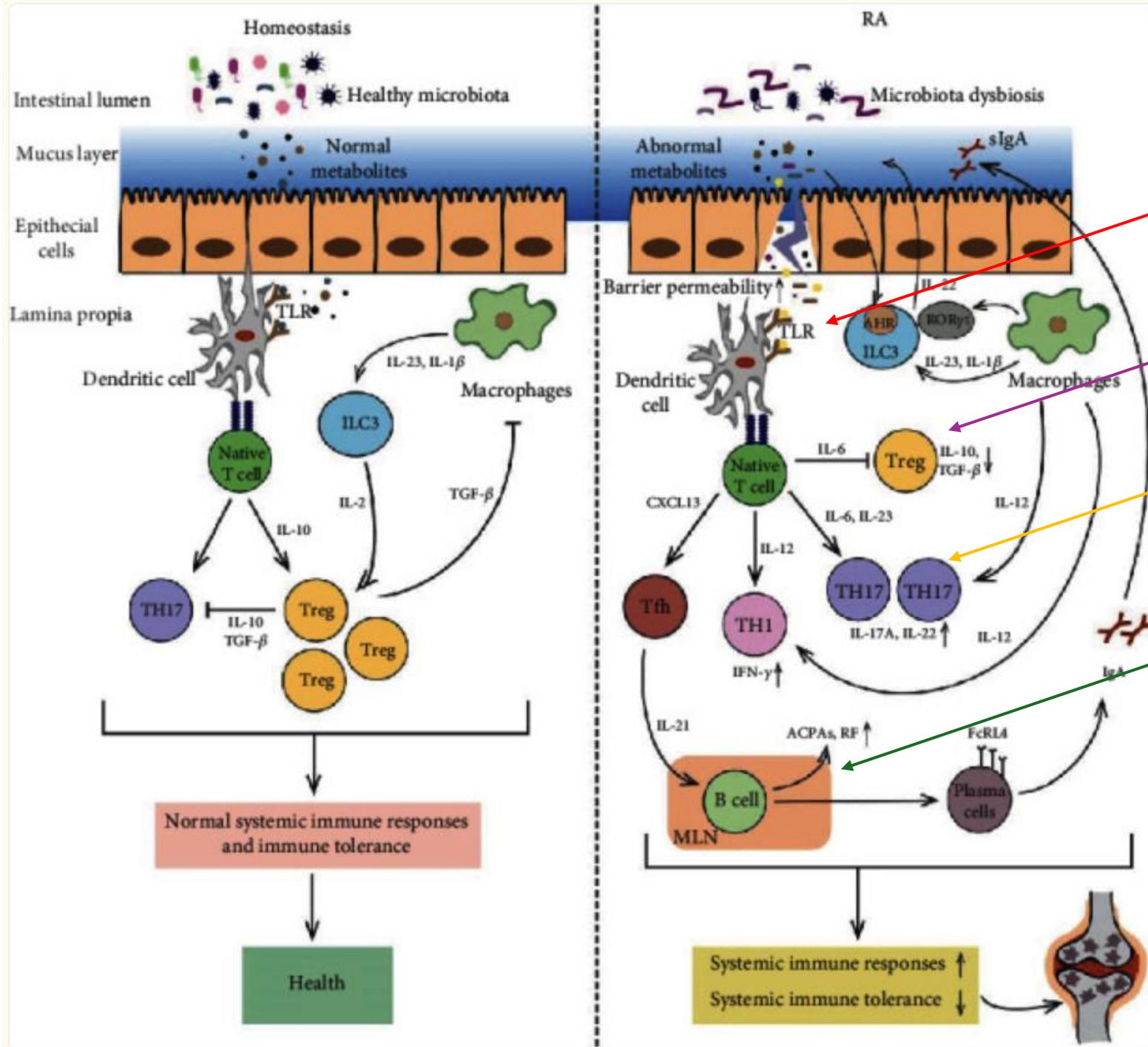


Interactions between Gut Microbiota and Immunomodulatory Cells in Rheumatoid Arthritis

5,8

Rheumatoid arthritis (RA) is one of the most common autoimmune diseases caused by abnormal immune activation and immune tolerance. Immunomodulatory cells (ICs) play a critical role in the maintenance and homeostasis of normal immune function and in the pathogenesis of RA. The human gastrointestinal tract is inhabited by trillions of commensal microbiota on the mucosal surface that play a fundamental role in the induction, maintenance, and function of the host immune system. Gut microbiota dysbiosis can impact both the local and systemic immune systems and further contribute to various diseases, such as RA. The neighbouring intestinal ICs located in distinct intestinal mucosa may be the most likely intermediary by which the gut microbiota can affect the occurrence and development of RA. However, the reciprocal interaction between the components of the gut microbiota and their microbial metabolites with distinct ICs and how this interaction may impact the development of RA are not well studied. Therefore, a better understanding of the gut microbiota, ICs, and their interactions might improve our knowledge of the mechanisms by which the gut microbiota contribute to RA and facilitate the further development of novel therapeutic approaches. In this review, we have summarized the roles of the gut microbiota in the immunopathogenesis of RA, especially the interactions between the gut microbiota and ICs, and further discussed the strategies for treating RA by targeting/regulating the gut microbiota.





Report

Enteric Barrier

Lorène J.

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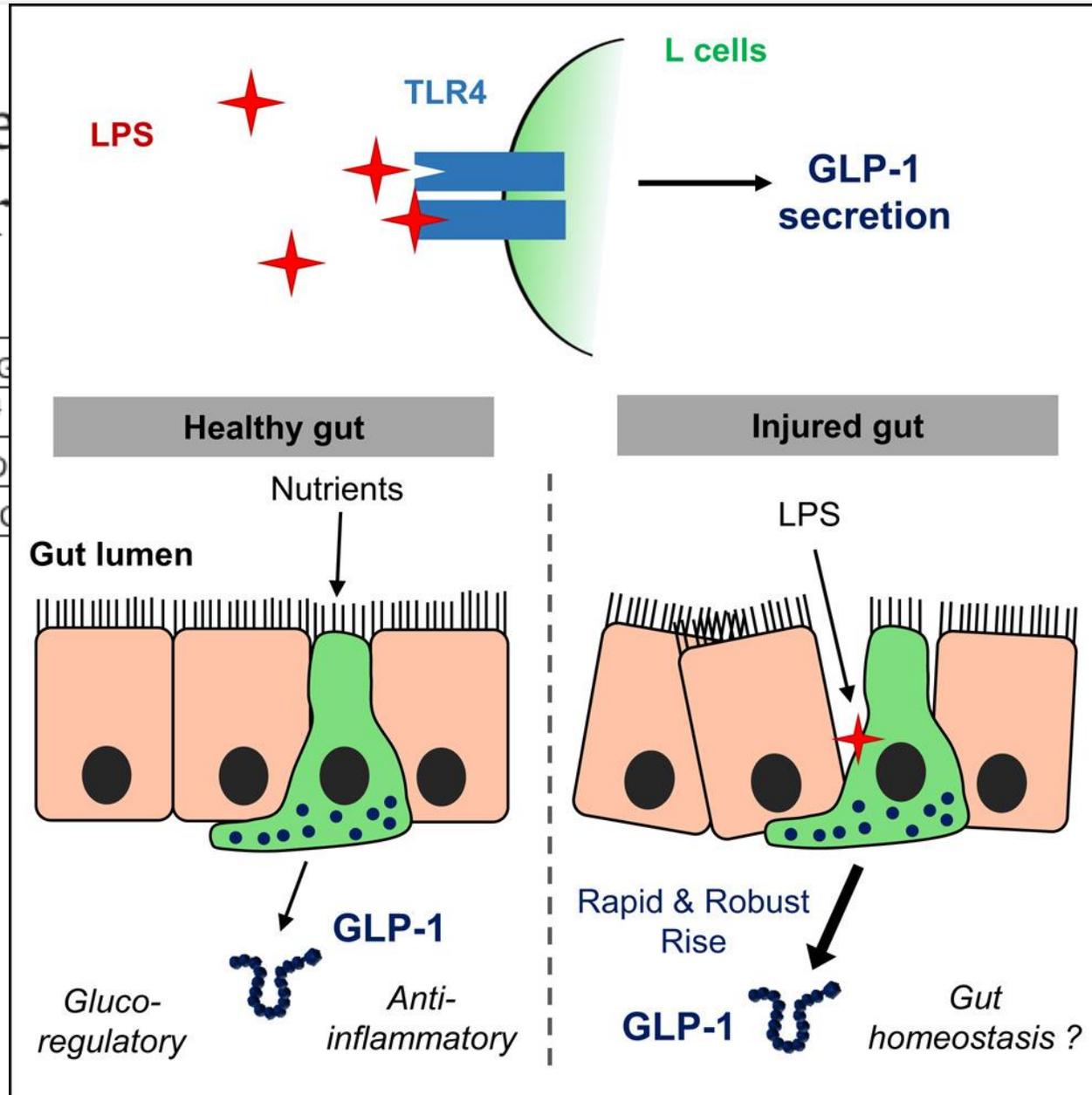
Valérie D

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Using the SCFA Code

Gut Microbiome Metabolites			
Metabolic			
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	24.9		≥ 23.3 micromol/g
n-Butyrate Concentration	4.1		≥ 3.6 micromol/g
n-Butyrate %	16.5		11.8-33.3 %
Acetate %	57.3		48.1-69.2 %
Propionate %	26.2		≤ 29.3 %
Beta-glucuronidase	5,151		368-6,266 U/g

ACETATE (usually the most abundant SCFA)

Acetate is made by a wide range of bacteria, especially early-stage fermenters.

Major producers:

- Bifidobacterium (most important)
- Akkermansia muciniphila
- Bacteroides
- Prevotella
- Many Lactobacillus

Pathways:

- Fermentation of fiber, resistant starch, and oligosaccharides

Acetate is often the first metabolite produced, and then other bacteria use it to make butyrate (cross-feeding).



What acetate does:

Think of acetate as systemic + upstream regulator

- circulates throughout the body (not just gut)
- crosses into bloodstream easily

Effects:

- supports metabolism and appetite regulation (neuro-signaling)
- improves insulin sensitivity
- contributes to tight junction integrity
- feeds butyrate-producing bacteria

Immune effect:

- mild anti-inflammatory
- helps promote Tregs indirectly

2. PROPIONATE

Major producers:

- Bacteroides
- Prevotella
- Veillonella
- some Firmicutes

Three main pathways:

- Succinate pathway (most common)
- Acrylate pathway
- Propanediol pathway

Propionate production is very tied to Bacteroidetes metabolism.



What propionate does:

Immune modulation + metabolic regulation

Key roles:

- strong Treg promoter
- suppresses Th17 differentiation
- reduces inflammatory cytokines
- Systemic effects:
- regulates gluconeogenesis (liver)
- improves lipid metabolism
- stimulates GLP-1 (important for insulin + appetite)

Low propionate is linked to:

- IBD
- metabolic disease
- autoimmune activation



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BUTYRATE (the most critical for gut health)

These are the elite anti-inflammatory bacteria.

Major producers:

- Faecalibacterium prausnitzii
- Roseburia
- Eubacterium rectale
- Clostridium family clusters

Pathways:

- conversion of acetate + fiber → butyrate
- requires cross-feeding networks

**Butyrate production depends on a healthy microbial ecosystem, not just one species.

What butyrate does

This is the most important SCFA for gut integrity.

Primary functions:

- main fuel for colon cells
- strengthens tight junctions
- promotes mucus production

Immune effects:

- strongest inducer of Tregs
- inhibits NF- κ B (inflammation pathway)
- reduces IL-6, TNF, IL-1 β

Epigenetic role:

- potent HDAC inhibitor \rightarrow directly turns on anti-inflammatory genes

Low butyrate is strongly linked to:

- Crohn's disease
- ulcerative colitis
- colorectal inflammation



VALERATE (less clinical utility in most cases)

Produced by protein fermentation and some SCFA pathways.

Bacteria involved:

- certain Clostridia
- Peptostreptococcus
- Bacteroides (minor)



What valerate does:

- similar to butyrate in HDAC inhibition
- may support epithelial health
- can reflect protein fermentation balance

High valerate sometimes indicates:

- more protein fermentation
- less carbohydrate fermentation



TOTAL SCFAs (the big picture)

This reflects overall fermentation capacity of your microbiome.

Low total SCFAs means:

- reduced fiber fermentation
- reduced microbial metabolic output
- less immune regulation



The cross-feeding network (this is key)

SCFAs are not made independently—they depend on microbial cooperation.

Example:

1. Bifidobacterium → produces acetate
2. Other bacteria use acetate → make butyrate
3. Bacteroides/Prevotella → produce propionate

So when you see:

- low Bifidobacterium
 - less acetate
 - less substrate for butyrate

**This can collapse the whole SCFA system

Mapping SCFAs to immune balance

SCFA	Main immune effect
Acetate	indirect Treg support
Propionate	Treg ↑, Th17 ↓
Butyrate	strongest anti-inflammatory
Valerate	butyrate-like

The SCFA system directly controls:

- Treg vs Th17 balance
- intestinal permeability
- systemic inflammation

Low SCFAs →

↓ Tregs

↑ Th17

↑ IL-17 / TNF

→ higher risk of:

- IBD
- rheumatoid arthritis
- Inflammatory dysregulation



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n-Butyrate %	16.5		11.8-33.3 %
Acetate %	57.3		48.1-69.2 %
Propionate %	26.2		≤ 29.3 %
Beta-glucuronidase	5,151		368-6,266 U/g

Mapping SCFAs to immune balance

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Using the SCFA Code

Gut Microbiome Metabolites			
Metabolic			
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	28.9		>=23.3 micromol/g
n-Butyrate Concentration	4.4		>=3.6 micromol/g
n-Butyrate %	15.2		11.8-33.3 %
Acetate %	68.3		48.1-69.2 %
Propionate %	16.3		<=29.3 %
Beta-glucuronidase	725		368-6,266 U/g

Mapping SCFAs to immune balance

SCFA	Main immune effect
Acetate	indirect Treg support
Propionate	Treg ↑, Th17 ↓
Butyrate	strongest anti-inflammatory
Valerate	butyrate-like

Using the SCFA Code

Gut Microbiome Metabolites			
Metabolic			
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	22.1 L		>=23.3 micromol/g
n-Butyrate Concentration	2.5 L		>=3.6 micromol/g
n-Butyrate %	11.3 L		11.8-33.3 %
Acetate %	69.7 H		48.1-69.2 %
Propionate %	19.0		<=29.3 %
Beta-glucuronidase	512		368-6,266 U/g

Mapping SCFAs to immune balance

SCFA	Main immune effect
Acetate	indirect Treg support
Propionate	Treg ↑, Th17 ↓
Butyrate	strongest anti-inflammatory
Valerate	butyrate-like

