LIVE WEBINAR

From Plate to Microbes:

How Diet Shapes the Gut Microbiome

Wednesday 15 Nov | 7pm AEDT

CO-BIOME By MICROBA

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Meet your speakers

Hayley Parcell
Nutritionist and Head of Co-Biome™ Healthcare

Dr Paula Smith-Brown
Accredited Practising Dietitian and Healthcare Science Liaison

Dr Brad Leech
Nutritionist and Lead Clinical Educator

All participants have been muted

There is an optional 15 minutes for questions at the end

Add your questions in the chat and we will come back to them at the end

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Acknowledgement of Country

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Disclaimers

- The information provided in this webinar is for the use of qualified healthcare professionals.
- The information contained in this webinar is in no way to be taken as prescriptive or to replace a healthcare professional's duty of care and personalised care practices.
- The clinical opinions and patient case studies shared by presenters are solely those of the individual presenters and do not necessarily represent the view of Co-Biome.

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Outline

- **The role of diet in the functioning of the gut microbiome**
- **Understanding the impact of different diets on the gut microbiome**
  - Plant-based diets
  - Animal-based diets
  - Mediterranean diet
- **Case studies: Restrictive diet, keto-style diet, paleo diet**
- **Q & A**

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Diet and the gut microbiome

Dr Paula Smith-Brown

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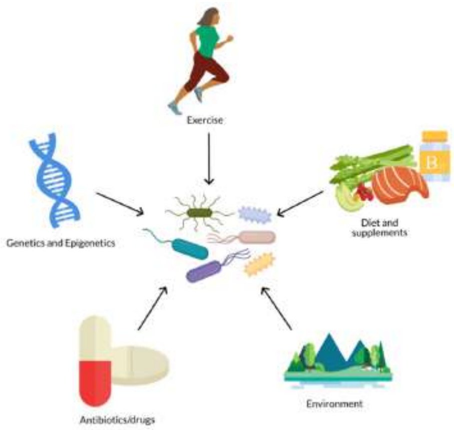
Diet is the biggest modifiable factor impacting microbiome composition and function



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Hughes et al., 2020; David et al., 2014

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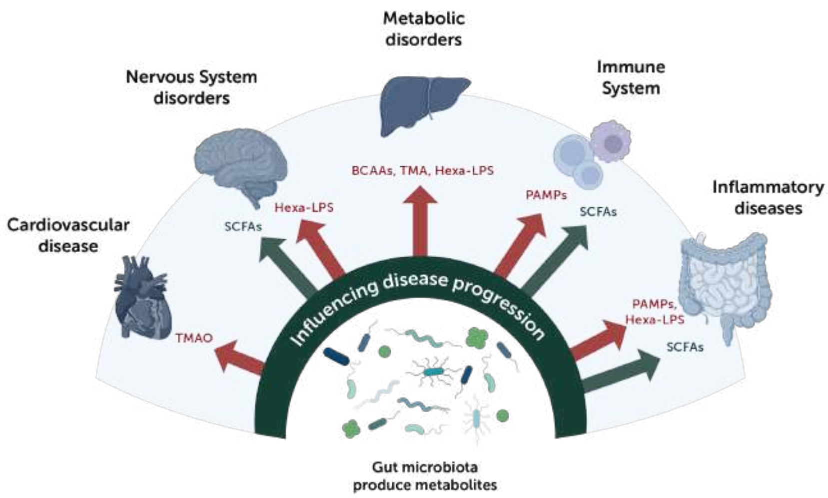
The gut microbiome can influence a variety of health conditions



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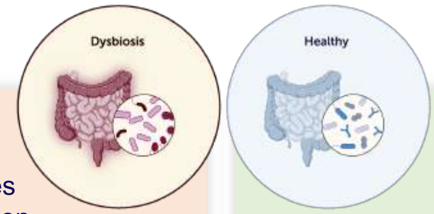
Diet can promote dysbiosis and inflammation

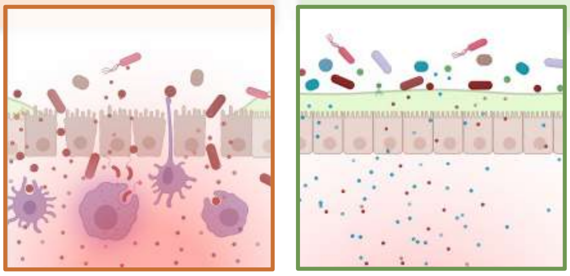


Pro-inflammatory

- Disease associated species
- Increased mucin degradation
- TMA and hexa-LPS producing species

Anti-inflammatory

- Health associated species
- Butyrate and IPA producing species



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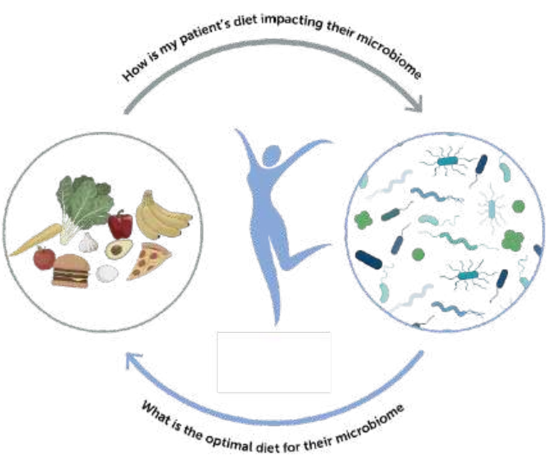
Understanding the interactions between the diet and microbiome can help optimise patient health outcomes



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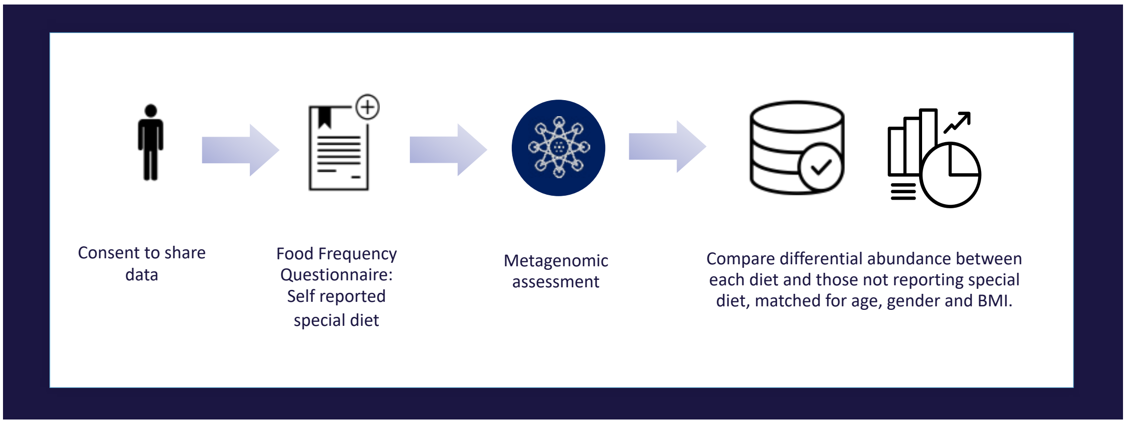
What we've learned about the impact of diets on the gut microbiome from the Future Insights Research Program



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Vegan, ketogenic and paleo diets have a significant impact on species abundance

Number of species significantly (FDR < 0.05) **increased** (Cohen D > 0.3) and **decreased** (Cohen D < 0.3) compared to those reporting no special diet.
Microba Discovery Database, 2023

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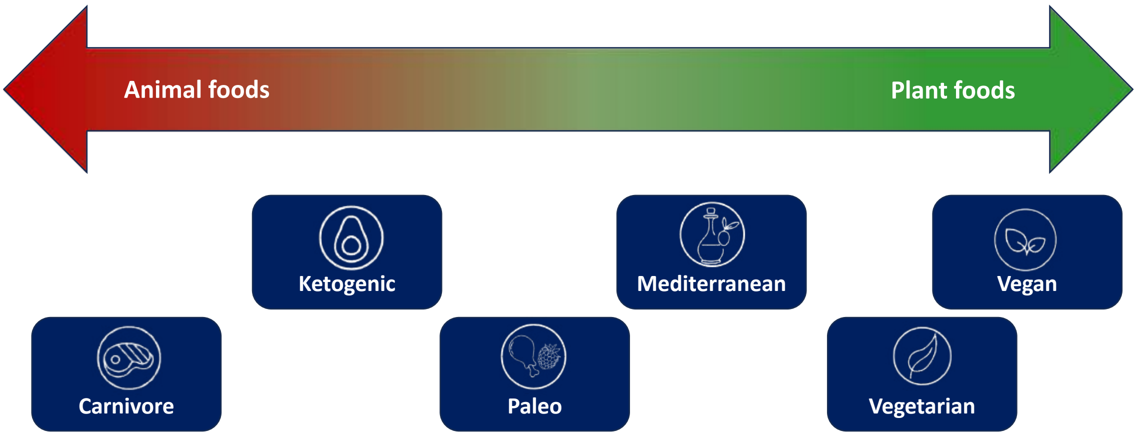
The more extreme the diet the more impact on the microbiome



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Diets are distinct patterns of food consumption

Food Group	Vegan	Vegetarian	Mediterranean	Paleo	Keto	Carnivore	Low FODMAP
Aim	No animal products	No meat	1950's Greek diet	Caveman diet	Ketosis	Eat animal products	Treat IBS
Meats	×	×	✓	✓✓✓	✓✓✓	✓✓✓✓	✓
Fish	×	×	✓✓	✓	✓	✓	✓
Eggs	×	?	✓	✓✓✓	✓✓✓	✓	✓
Dairy	×	✓	✓	×	✓✓	Low lactose	Low lactose
Legumes	✓	✓	✓✓	×	×	×	Restricted
Fruits	✓	✓	✓✓	✓✓	Restricted	×	Restricted
Vegetables	✓	✓	✓✓	✓✓ (no starchy)	✓✓ (non-root)	×	Restricted
Grains	✓	✓	✓	×	×	×	Restricted
Nuts	✓	✓	✓✓	✓✓	✓✓	×	Restricted

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Plant-based diets

Vegan

Vegetarian

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Vegan or vegetarian diets

Omnivore diet v Vegan/ Vegetarian	Vegetarian diet (versus omnivore)	Vegan diet (versus omnivore)
↑ *Bilophila wadsworthia*[1,2,3] Higher levels of this species have been observed in patients with colon cancer and in people that have a diet high in saturated fats. ↑ *Faecalicatena torques*[2,3] Higher levels in individuals with obesity, colon cancer, insulin resistance and high triglyceride levels.	↓ *Alistipes putredinis*[1,2,3] Studies have observed higher levels of this species in patients with colon cancer. However, other studies associated a low abundance of this species with chronic fatigue syndrome, Crohn's disease and irritable bowel syndrome.	↑ *Prevotella copri* & ↓ *Bacteroides* spp[1] *Prevotella copri* prevalence[4]: non-Western country > 95% Western country < 30%

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1. Wang et al., 2019; 2. Zhang et al., 2018; 3. Microba Discovery Database, 2023; 4. Tett et al., 2019

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Vegan diet associated with reduced *Bifidobacterium* and *Streptococcus thermophilus*

Vegan diet (versus omnivore)	Vegetarian diet (versus omnivore)	Omnivore diet v Vegan/ Vegetarian
↓ *Bifidobacterium* [3]		
↓ *B. angulatum & catenulatum*[3]	↓ *Bifidobacterium longum* [1]	↓ *Bifidobacterium pseudocatenulatum*[3]
↓ *Streptococcus thermophilus*[4]	↑ *Streptococcus thermophilus*[2]	

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1. Wang et al., 2019; 2. Zhang et al., 2018; 3. Yin et al., 2023; 4. Microba Discovery Database, 2023

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Animal-based diets

- Paleo
- Ketogenic

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Ketogenic diet

Consistent findings

↓ ***Bifidobacterium* spp.**[1,2,4]
Common probiotic species

↓ ***Agathobacter rectale*** [1,2,4]
Commonly associated with healthy controls in research studies

↓ ***Ruminococcus_E bromii*** [1,2,4]
Primary degrader of resistant starch

↓ ***Veillonella atypica***[1,4]
Lactic acid consuming bacteria increased after running a marathon

Unique findings

↑ ***Akkermansia* strains**[3]
Mediterranean keto diet versus low fat American Heart Association diet

↑ **hydrogen sulphide producing microbes**[1]
High fat and protein ketogenic diet

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1. Mardinoglu et al., 2018; 2. Ang et al., 2020; 3. Dilmore et al., 2023; 4. Microba Discovery Database, 2023

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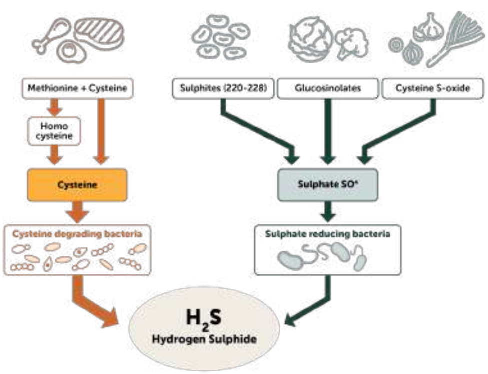
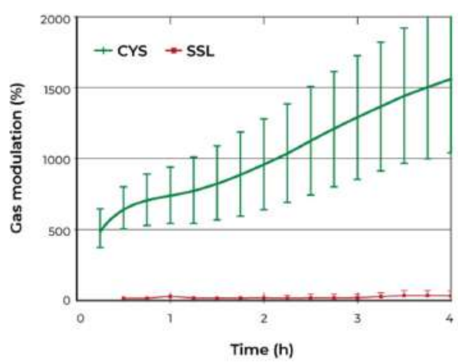
Dietary cysteine and methionine are principal drivers of microbial hydrogen sulphide production

Recent research has revealed that sulphate reducing bacteria make insignificant contributions to overall hydrogen sulphide production in the microbiome.





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Yao et al., 2018

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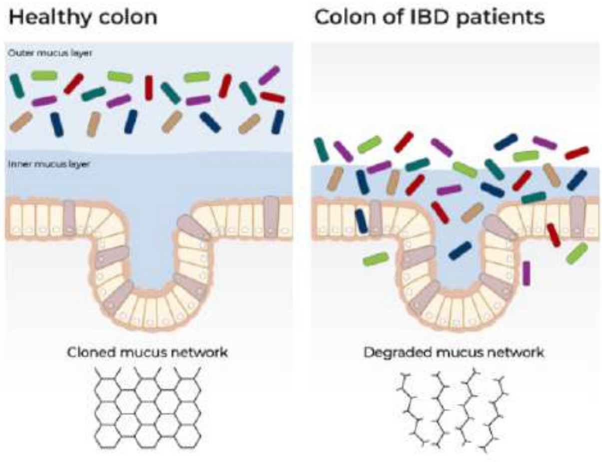
High hydrogen sulphide can compromise intestinal barrier integrity

High levels of hydrogen sulphide can compromise intestinal barrier integrity by splitting mucin disulfide bonds and inhibiting the uptake of butyrate by colon cells.

Average to low levels of hydrogen sulphide can be protective of mucin barrier integrity.



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Ijssennagger et al., 2016

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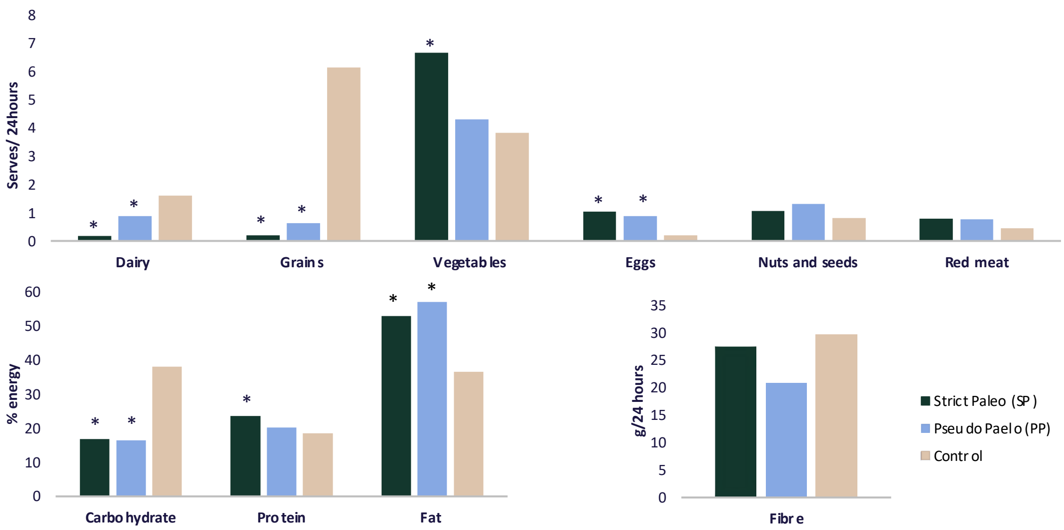
Dietary intake in paleo diet in Australia



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Genoni et al., 2020

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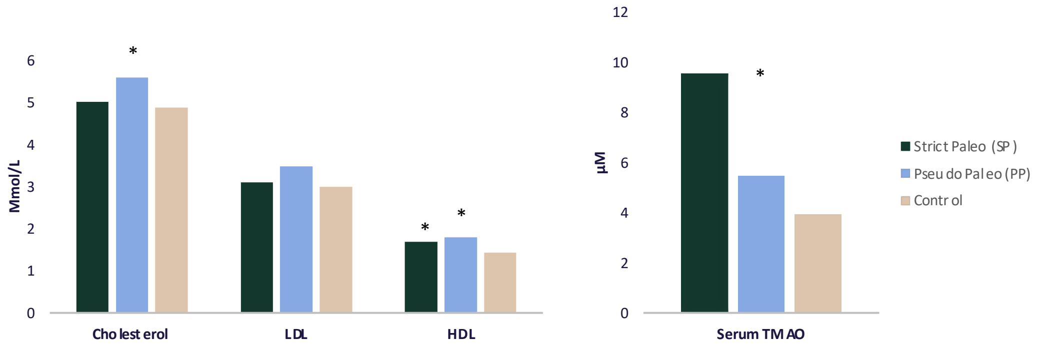
High plasma TMAO seen in strict paleo diets



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Genoni et al., 2020

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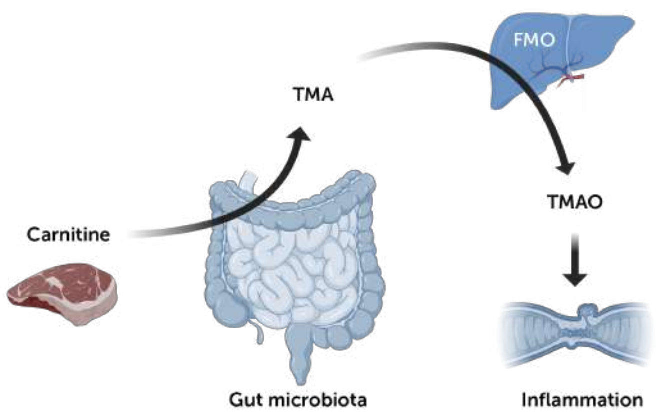
TMAO is associated with systemic inflammation

Higher levels of plasma TMAO are associated with systemic inflammation, especially in patients with type 2 diabetes and cardiovascular disease



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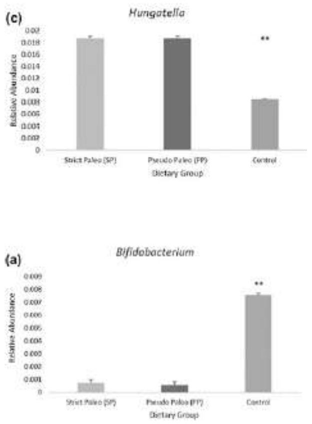
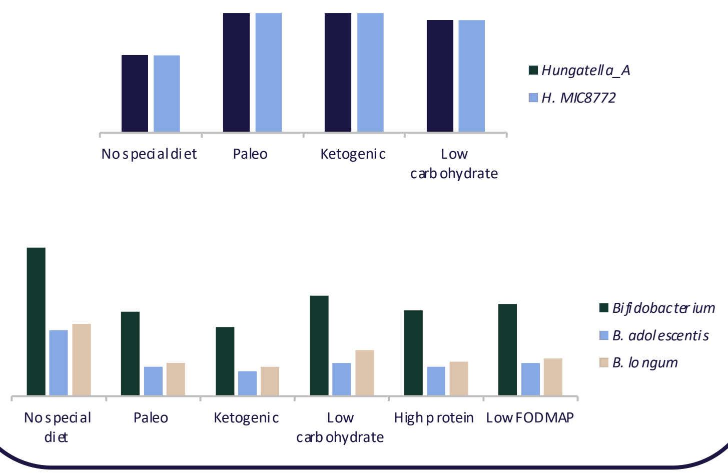
Increased *Hungatella* and decreased *Bifidobacterium* on Paleo diet

Genoni et al, 2020



Microba Discovery Database, 2023



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Genoni et al., 2020

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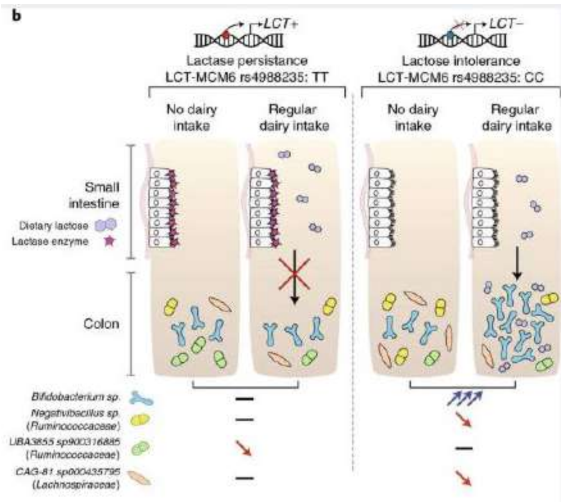
Bifidobacterium abundance is a function of LCT genotype and intake of dairy products

In LCT+ patients (lactose persistence genotype) lactose will not reach the microbiome as it is absorbed in the small intestine



In LCT- patients (lactose intolerance genotype) lactose will be delivered to the large intestine where it can act as a prebiotic leading to increased *Bifidobacterium* abundance

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Qin et al., 2022

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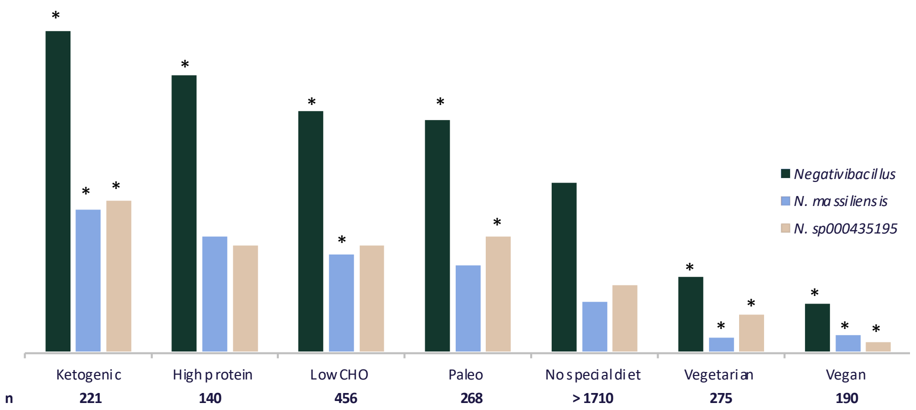
TMA producing *Negativibacillus* compared to no special diet



Microba Discovery Database, 2023
* FDR < 0.05

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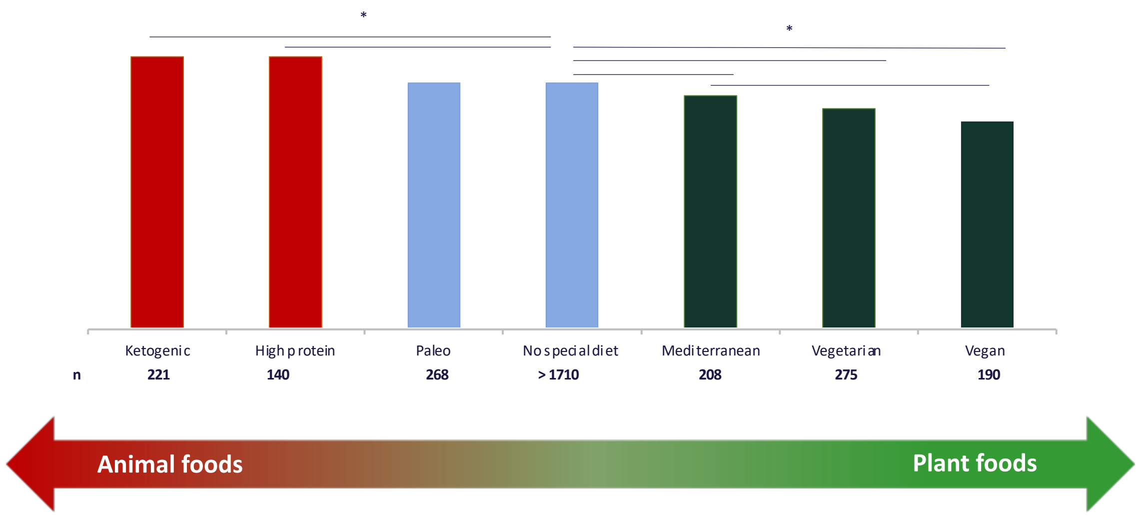
TMA producing microbes associated with animal: plant food ratio



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Mediterranean diet (MedDiet)

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MedDiet is most evidenced–based 'healthy' diet

Systematic Review[1]

84 systematic reviews highlighted benefit for MedDiet in 79 different health outcomes, including:

- Mortality
- Cancer and cardiovascular disease
- Obesity, diabetes and metabolic disease
- Age-related chronic disease
- Neurological disorders
- Liver and renal health

Beneficial to the gut microbiome

- Higher in fibre
- High intake of fruit, vegetables, legumes, nuts and seeds
- High omega-3 fish
- Polyphenol–rich olive oil
- Reduced animal fat, red meat, sugar and processed food

Increasing evidence base on the impact of the MedDiet on the microbiome

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1. Zupo et al., 2023

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Co-Biome Research Insights for MedDiet

What we have learnt from an in-depth science review of >1200 scientific publications over 8 months

Beneficial microbial markers

RESEARCH INSIGHT
A Mediterranean diet has been shown to increase plasma butyrate.
HUMAN (EBM) B

RESEARCH INSIGHT
A Mediterranean diet may increase plasma IPA.
HUMAN (EBM) D

Decrease detrimental microbial markers

RESEARCH INSIGHT
A Mediterranean diet may reduce plasma BCAAs.
HUMAN (EBM) C

Decrease gut inflammation

CLINICAL INSIGHT
To reduce faecal calprotectin, advising patients to follow a Mediterranean diet may be considered.
HUMAN (EBM) D

Grade	Appropriate clinical interpretation
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation, but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution

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Mediterranean diet

All Studies

Olive oil	Fruits and veg	Fish	Legumes	Red meat
≥ 4 tbsp/day[2]	≥ 5 serve/ day[1]	≥ 2 serves/ week[1,3]	≥ 3 serves/ week[1,2]	≤ 2 serve/ week[3]

Some studies

Nuts	Wholegrains	Red wine	Sweets
≥ 3 serve/ week[2]	≥ 2 wholegrain products/day[1]	≥ 7glasses/ week with meals[2]	≤ 2 serve/ week[2,3]

Conflicted studies

Meslier et al, 2020	Chicco et al, 2021
Replace meat, eggs and dairy with fish and legumes	Eggs: 2-4 servings/ week Poultry: 2 servings / week Dairy: 2 serves/day

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1. Meslier et al., 2020; 2. Ruiz-Canela et al., 2018; 3. Chicco et al., 2021

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Plant-rich diets are associated with microbiome health

Key learnings

The omnivore diet shows an increase in pathobiont species *Bilophila wadsworthia* and *Faecalicatena torques* compared to a vegan/vegetarian diet.

Animal-rich diets (ketogenic, high protein) diets have higher TMA producing microbes compared to plant-rich diets (Mediterranean, vegan, vegetarian)

Clinical application

Replace meat in diet with pulses, soy, nuts and seeds.

The Heart Foundation, 2019
< 350g red meat per week

Nutrients to consider when red meat intake low: protein, iron, vitamin B12, zinc

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Dietary carnitine intake has been shown to increase plasma trimethylamine N-oxide (TMAO)

Key learnings

When aiming to reduce plasma TMAO, limiting dietary carnitine may be effective.

The evidence for the role of egg consumption in determining plasma TMAO concentrations is inconsistent, reflecting genuine uncertainty.

Clinical application

Rich dietary sources of carnitine: Kangaroo, beef, lamb, pork, duck, Goat's cheese

When aiming to reduce plasma TMAO levels limit or avoid carnitine and free choline supplementation.

Eggs and krill oil contain lipid-soluble choline which is highly bioavailable so does not reach the microbiome.

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Sulphur-amino acids drive microbial hydrogen sulphide production

Key learnings

High protein and ketogenic diets are associated with increased hydrogen sulphide producing microbes.

When aiming to reduce hydrogen sulphide production, limiting or avoiding dietary and supplemental cysteine may be effective.

Recent research has revealed that sulphate reducing bacteria make insignificant contributions to overall hydrogen sulphide production.

Clinical application

Rich dietary sources of sulphur-amino acids[1]: Cod, chicken breast, eggs, ham, minced beef

Elderly people and those following vegan diet can be at risk of sulphur deficiency.[2]

Dietary requirements for sulphur are increased by regular use of medication, such as paracetamol, which is detoxified in the liver via sulfonation.[2]

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1. Doleman et al., 2017; 2. Nimni et al., 2007

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Dairy intake is associated with *Bifidobacterium* abundance

Key learnings

Reduced abundance of *Bifidobacterium* in vegan, paleo, keto, low carbohydrate, high protein and low FODMAP diet.

In LCT- patients (lactose intolerance genotype) lactose will be delivered to the large intestine where it can act as a prebiotic leading to increased *Bifidobacterium* abundance.

Clinical application

Bifidobacterium are not required for a healthy microbiome.

Some strains of *Bifidobacterium* are probiotics which may be beneficial for your patient.

High levels of *Bifidobacterium* may indicate genetic lactose intolerance with continued lactose consumption.

Nutrients to consider when dairy intake low: protein, calcium, vitamin D

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Summary

- The more extreme the diet the more impact on the microbiome
- Vegan, paleo and ketogenic have most impact on species
- Focus on diet quality, nutrient dense food choices and fibre intake
- Most diets allow fruit, vegetables, nuts and seeds
- A meta-analysis[1] of 18 different research studies found that three serves of nuts per week are sufficient to receive the maximum health benefits. A standard serve of nuts is 28 grams which is equivalent to about 8 Brazil nuts, 14 macadamias, or 20 almonds.
- The cumulative benefits of increased vegetable and fruit intake continues up to approximately 800g of vegetables and fruits per day.[2]

1. Chen et al., 2017; 2. WHO, 2023

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Case studies

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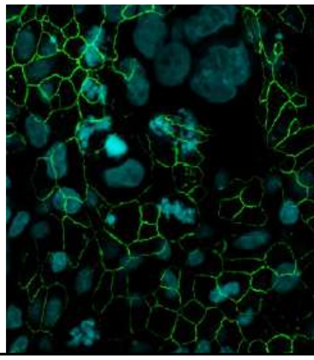

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Patient case study

Restrictive diet and chronic constipation

Age – 25 years

BMI – 18.4 kg/m^2

Diagnosis - Food allergies (since birth), asthma (early childhood), anxiety (2014), IBS-C (2017), rectal prolapse (2020)

Gastrointestinal – One bowel movement every three days, feeling of incomplete BM, low appetite, nausea, food sensitivities

Family history - Anxiety and depression

Systemic - Chronic muscle pain & stiffness, chronic fatigue, chronic burping

Medication – Duloxetine, Cetirizine PRN, Prednisone PRN, Epipen PRN, CFC-free Inhaler PRN.

Dietary – Restrictive diet, low histamine

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Microbiome results: Microbial and GI Markers

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Microbiome results: Microbial and GI Markers

Dietary Intake
Insufficient dietary fibre and/or dietary diversity

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Microbiome results: Microbial and GI Markers

Potential Cause
Multiple microbial markers outside healthy range

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Microbiome results: Species

	Phylum	Species	Abundance	Prevalence	Distance from Average
	Bacteroidota	Bacteroides caccae	14.08%	Common	+4.19
	Firmicutes_A	Faecalibacterium prausnitzii_G	8.33%	Very common	+2.46
	Bacteroidota	Bacteroides_B vulgatus	5.62%	Common	+1.18
	Firmicutes_A	Eisenbergiella MIC9836	4.77%	Rare	
	Firmicutes_A	Clostridium MIC9230	4.70%	Rare	
	Proteobacteria	Escherichia coli	4.28%	Less common	+3.13
	Firmicutes_A	Ruthenibacterium lactatiformans	3.98%	Common	+4.82
	Firmicutes_A	Flavonifractor sp000508885	3.94%	Less common	+4.97
	Actinobacteriota	Eggerthella lenta	3.69%	Less common	+2.92
	Bacteroidota	Parabacteroides merdae	2.91%	Common	+3.31
	Firmicutes_A	Tyzzerella nexilis	2.81%	Rare	
	Bacteroidota	Bacteroides_B massiliensis	2.57%	Common	+1.58
	Bacteroidota	Parabacteroides distasonis	2.33%	Very common	+3.03
	Firmicutes_A	Anaerotruncus colihominis	2.05%	Less common	+7.50
	Firmicutes_A	Clostridium_M citroniae	1.41%	Rare	
	Firmicutes_A	Oscillibacter sp900066435	1.27%	Common	+5.58
	Desulfobacterota_A	Bilophila wadsworthia	1.09%	Common	+2.88
	Firmicutes_A	Acutalibacteraceae MIC7795	1.08%	Less common	+5.42
	Firmicutes_A	Hungatella effluvii	1.03%	Rare	
	Proteobacteria	Citrobacter portucalensis	0.87%	Rare	
	Firmicutes_A	Clostridium_M bolteae	0.72%	Less common	+2.37

Pathobionts
A microbial species associated with negative health outcomes

Overabundance
A value > +2 means the species is over-abundant compared to the healthy cohort

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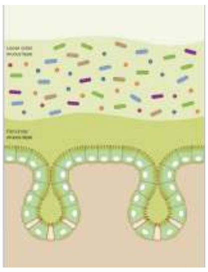
Clinical interpretation and objectives

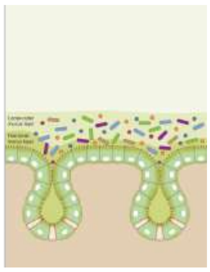
Clinical interpretation

- Multiple clinical indicators and symptoms strongly suggest heightened intestinal permeability
- Pathobionts play a significant role in the development of functional dysbiosis
- Dietary habits appear to deprive the microbiome of essential nutrients and support

Objectives

1. Reduce food reactions
2. Improve intestinal integrity
3. Reduce overabundant pathobiont
4. Maintain restrictive diet short-term (meeting energy intake)





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Patient management plan for gut health

Supplement	Dosage	Duration	Related condition
Mix amino acids	1 teaspoon mixed with 200ml water before breakfast	3 months	Leaky gut, food reactions
HMO	Take 600mg after breakfast and dinner	2 months	Pathobionts, leaky gut
Zinc	Take 15mg after breakfast and dinner	2 months	Leaky gut

Dietary/ Lifestyle	Related condition
Toilet positioning	Constipation
Gut hypnotherapy	Constipation
Consume plenty of raspberries	Low IPA
Aim to consume 20g of dietary fibre every day	Low diversity

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Patient case study

Keto diet for 6 months

Age – 36 years

BMI – 20.9 kg/m^2

Diagnosis – No health conditions

Gastrointestinal – No gut symptoms

Family history – Hypothyroidism, heart disease, cancer

Systemic – Undiagnosed PMS - cyclical headaches, fatigue and low mood

Medication – None

Supplements – Vitamin D, fish oil, B vitamins, Mg, zinc

Dietary
Report one: gluten-free Mediterranean-style diet
Report two: plant-based style keto (carbs below 50g per day)

Reason for diet: “Wedding”

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Report One
Report Two
Marker
Relative Abundance
Distance from Average
IPA producing microbes
0.13%
-0.96
Acetate producing microbes
76.45%
+1.02
Butyrate producing microbes
22.19%
+0.79
Hexa-LPS producing microbes
0.00%
Mucin Degradation
592.76
-0.30
Propionate producing microbes
2.41%
-0.58
Trimethylamine producing microbes
3.93%
+0.78
48% reduction
58% increase
376% increase
26% increase
Marker
Relative Abundance
Distance from Average
IPA producing microbes
0.28%
-0.39
Acetate producing microbes
70.60%
+0.25
Butyrate producing microbes
11.58%
-1.58
Hexa-LPS producing microbes
0.06%
-0.51
Mucin Degradation
935.59
+1.50
Propionate producing microbes
11.50%
+1.77
Trimethylamine producing microbes
4.97%
+1.27
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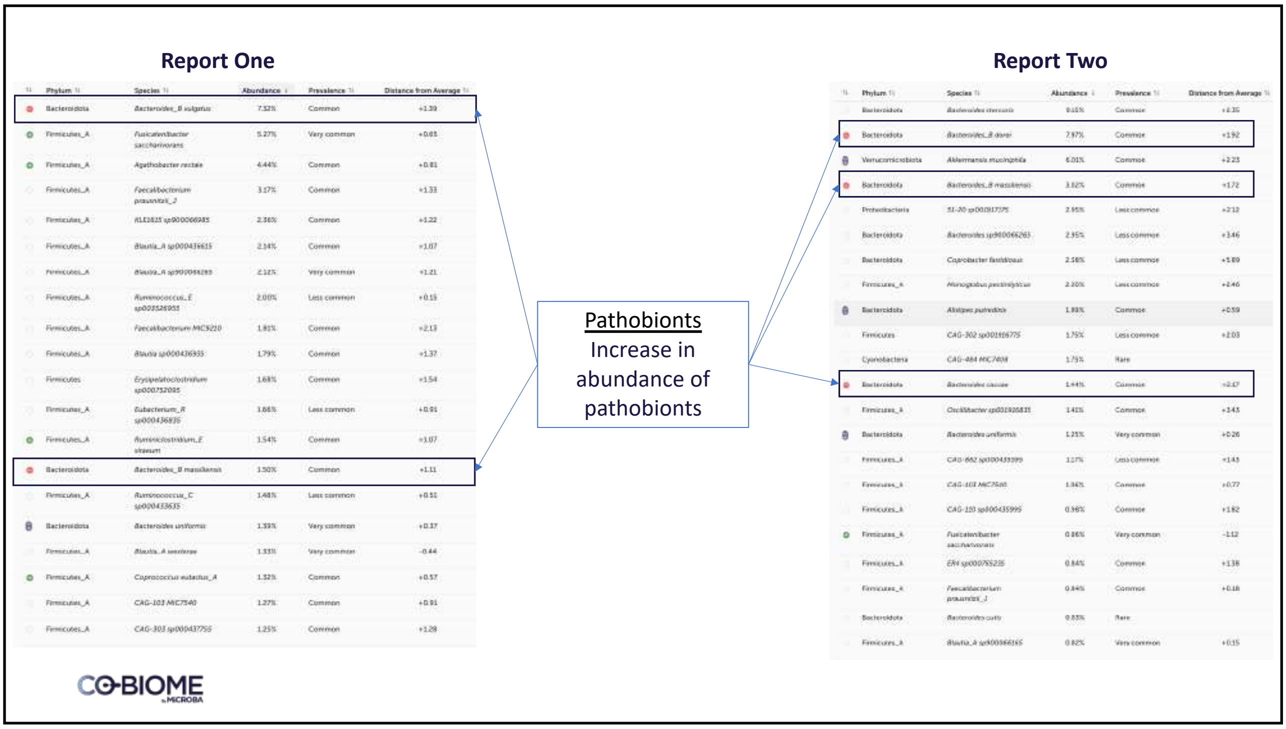
Report One
Report Two
Pathobionts
Increase in abundance of pathobionts
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Report One
Report Two
Over-abundance
Significant increase in *Akkermansia muciniphila*
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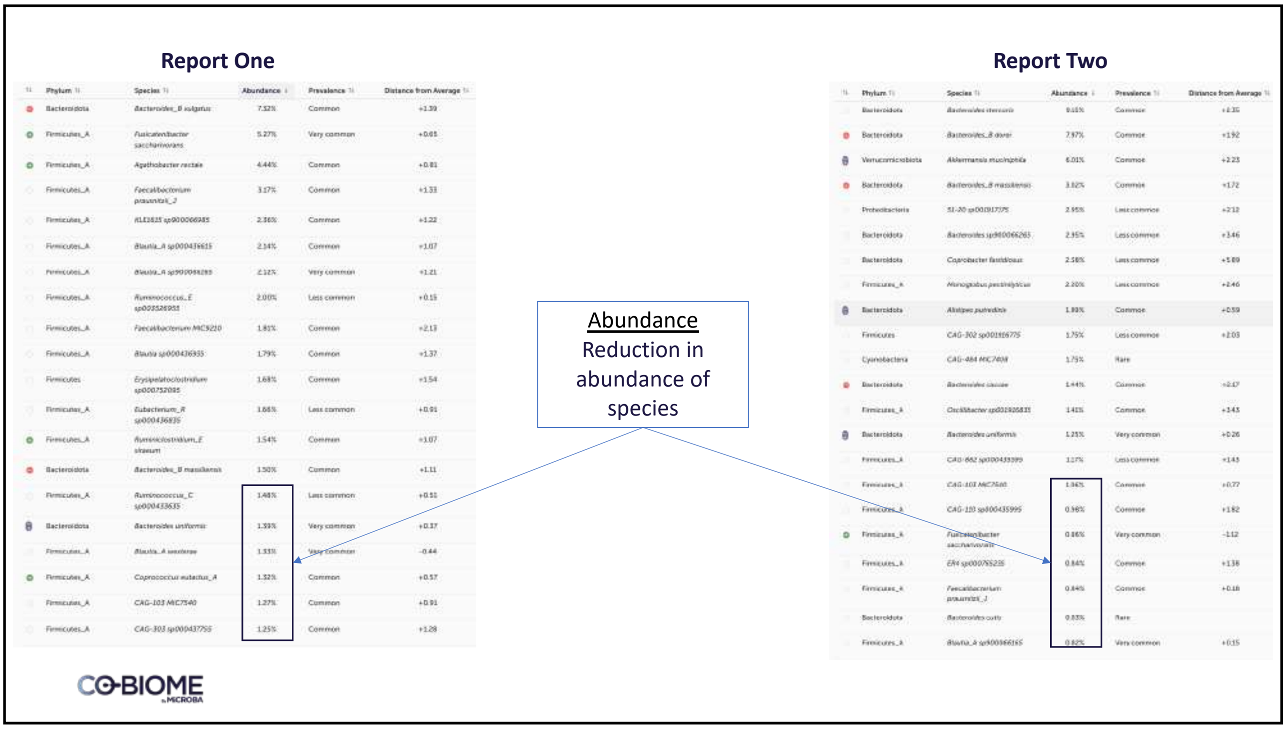
Report One
Report Two
Abundance
Reduction in abundance of species
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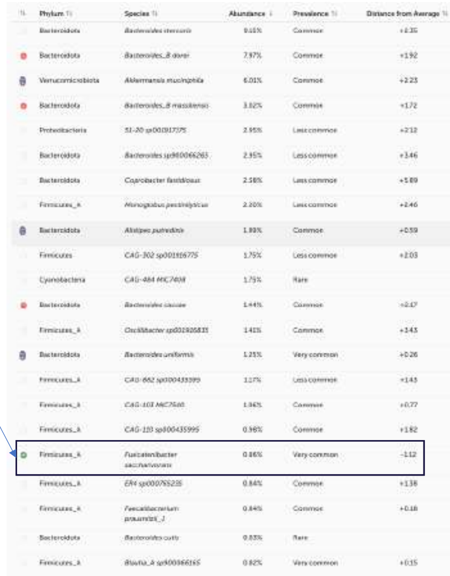
Report One

Commensal
Reduction in the number and abundance

Report Two



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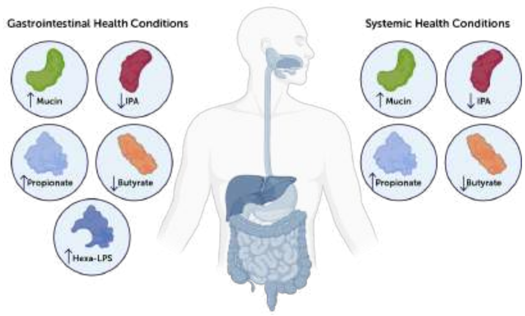
Clinical interpretation and long-term consequence

Clinical interpretation

Insufficient dietary fibre:
- *Akkermansia muciniphila* increased from 0.19% to 6.01%
- Reduction in abundance of many species
- Increase in pathobionts
- Reduction in commensals



Potential long-term consequence

1. Intestinal inflammation
2. Intestinal permeability
3. Systemic inflammation
4. Chronic health disease

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Age – 45 years

BMI – 26 kg/m^2 (overweight)

Diagnosis – Diverticulosis, high cholesterol

Gastrointestinal – Regular bowel motions, mild stomach pain after gluten

Family history - father heart attack age 44, brother heart attack 43, uncle heart attack 45, diabetes with mum, uncle had bowel cancer

Systemic - Fatigue

Medication – Atorvastatin 20mg for 22 years

Dietary – Paleo diet for 5 plus years

Patient case study

CVD prevention and paleo diet

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Microbiome results: Microbial and GI Markers

<u>Inflammation</u>
Markers indicating intestinal and systemic inflammation

OUT OF RANGE

Gastrointestinal Health Marker	Result	Reference Range
Secretory IgA	10000.00	500.00 µg/g - 2,000.00 µg/g
Pancreatic Elastase	87.11	>= 200.00 µg/ml

Microbial Marker (RESEARCH USE ONLY – NOT FOR DIAGNOSTIC USE)	Result	Distance from Average
Propionate producing microbes	23.31%	+2.84
IPA producing microbes	0.03%	-2.02
Hexa-LPS producing microbes	16.40%	+2.89
Hydrogen sulphide producing microbes	25.31%	+3.03
Trimethylamine producing microbes	18.87%	+4.03

<u>High Levels</u>
Increased potential for CVD

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Microbiome results: Species

	Phylum	Species	Abundance	Prevalence	Distance from Average
	Proteobacteria	*Escherichia coli (flexneri)*	16.16%	Less common	+3.92
	Firmicutes_A	*Blautia_A obeum*	5.60%	Common	+2.70
	Firmicutes_A	*Fusicatenibacter saccharivorans*	3.66%	Very common	+0.30
	Firmicutes_A	*Agathobacter rectale*	3.27%	Common	+0.58
	Firmicutes_A	*Ruminococcus_E bromii_B*	3.21%	Common	+0.32
	Bacteroidota	*Bacteroides_B vulgatus*	2.62%	Common	+0.56
	Bacteroidota	*Alistipes putredinis*	2.56%	Common	+0.85
	Firmicutes_A	*Ruminococcus_D bicirculans*	1.78%	Common	+0.62
	Firmicutes_A	*Faecalibacterium prausnitzii_C*	1.63%	Common	+0.80
	Firmicutes_A	*Agathobacter faecis*	1.58%	Common	+0.45
	Proteobacteria	*CAG-495 sp000436375*	1.46%	Less common	+1.05
	Firmicutes_A	*Gemmiger formicilis*	1.41%	Common	+0.49
	Bacteroidota	*Parabacteroides distasonis*	1.33%	Very common	+2.31
	Firmicutes_A	*CAG-217 sp000436335*	1.32%	Common	+0.37
	Firmicutes_A	*CAG-83 sp000435975*	1.28%	Less common	+1.55

Pathobionts
A microbial species associated with negative health outcomes

Overabundance
A value > +2 means the species is over-abundant compared to the healthy cohort

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	Firmicutes_A	*CAG-83 sp000435975*	1.28%	Less common	+1.55

Commensal
A microbial species associated with positive health outcomes

Dietary Intake
A value equal or close to 0 means the species has a **similar abundance** to the healthy cohort

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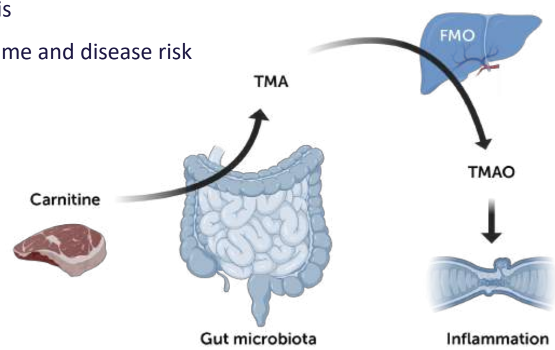
Clinical interpretation and objectives

Clinical interpretation

- High TMA/TMAO is a risk factor for CVD
- Pathobionts are contributing to functional dysbiosis
- Dietary intake is not suitable for patient's microbiome and disease risk

Objectives

1. Reduce impact of TMAO on systemic health
2. Reduce pathobiont (*E.coli*)
3. Provide fuel source for microbiome



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Patient management plan for gut health

Supplement	Dosage	Duration	Related condition
Resveratrol	Take 200mg with dinner	3 months	TMAO
GOS	Take 5g with breakfast and dinner	2 months	Pathobionts
Fish oil	Take 1500mg with breakfast and dinner	6 months	Inflammation, heart health
HMO	Take 600mg after breakfast and dinner	2 months	Dysbiosis, leaky gut

Dietary/ Lifestyle	Related condition
Consume a Mediterranean style diet	Pathobionts
Aim to consume 38g of dietary fibre every day	Pathobionts
Limit red meat and carnitine intake	High TMA
Consume 1 cup of cooked cruciferous veggies each day	High TMAO

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Key takeaways

- While there are many influences on the gut microbiome, we can see that diet has a big impact on microbial composition.
- The literature and our own data analysis show the more extreme the diet the more impact on the microbiome.
- Plant-rich diets are associated with microbiome health with the Mediterranean diet being the most evidence-based.
- There are many factors to consider when prescribing personalised dietary interventions – assessing the gut microbiome can help direct clinical decision-making.

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The MetaXplore™ range

MetaXplore™ — $369
MetaXplore™ provides a metagenomic driven gut microbiome profile, together with the latest research insights for healthcare professionals.
Technology: metagenomics

MetaXplore™ GI — $489
MetaXplore™ GI provides the same comprehensive microbiome profile as MetaXplore™ as well as reporting on seven gastrointestinal health markers and science backed clinical insights to assist clinical decision-making and intervention.
Technology: metagenomics + diagnostic GI health markers + faecal pH

MetaXplore™ GI Plus — $529
MetaXplore™ GI Plus is Co-Biome's most comprehensive functional gut microbiome profile. It provides all the features found in MetaXplore™ and MetaXplore™ GI, plus targeted pathogen panels.
Technology: metagenomics + diagnostic GI health markers + faecal pH + RT-PCR

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If you are not a Co-Biome registered clinician, register today at co-biome.com/register/.

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15 minutes

Q&A from the chat

Hayley Parcell
Dr Paula Smith-Brown
Dr Brad Leech

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LIVE WEBINAR

Thank you for attending

Additional resources:

- MetaXplore™ Range Brochure
- Interpretation Guide
- Pathogen and Pathobiont Management Guide
- Prebiotic Guide
- Low FODMAP Prebiotic Guide

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