

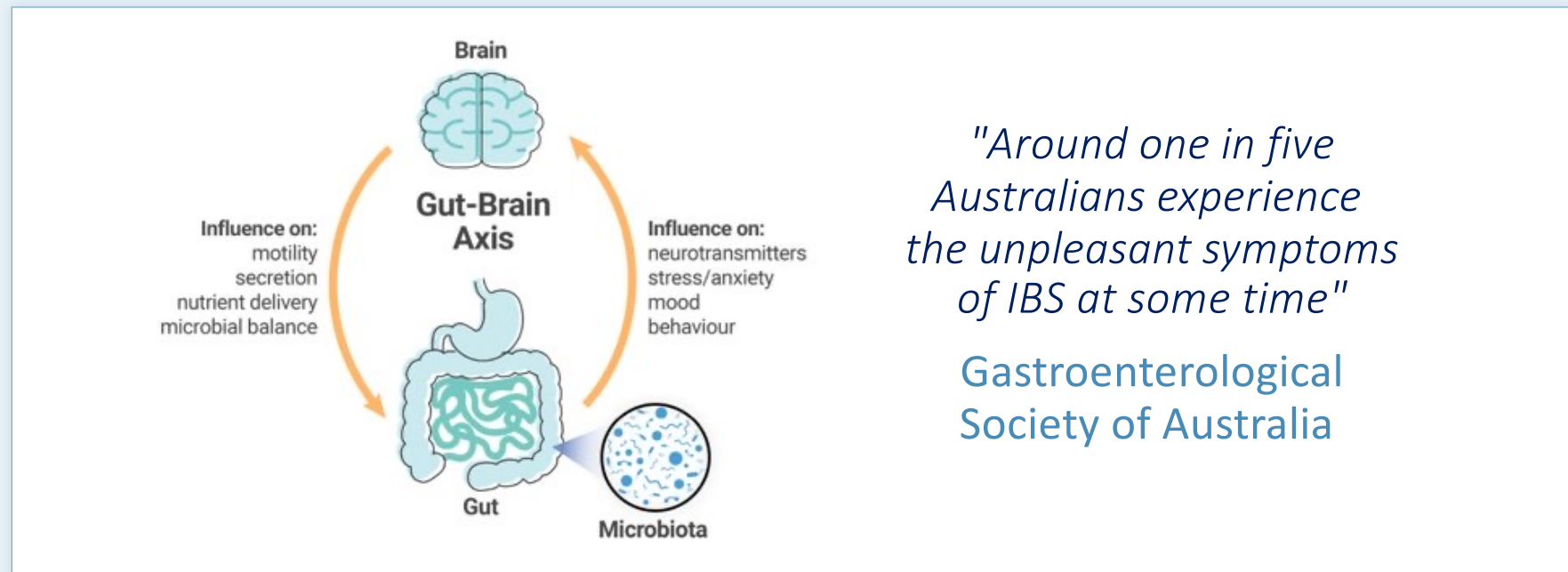


# Evidence-based practical applications of gut microbiome support in Irritable Bowel Syndrome.

Anita Tait  
(Dietitian + Clinical Application Specialist)

Bianca Maree Harrington  
(Dietitian + Lead Microbiome Coach)

## Irritable Bowel Syndrome is a Disorder of the Gut-Brain Interaction.



*"Around one in five  
Australians experience  
the unpleasant symptoms  
of IBS at some time"*

Gastroenterological  
Society of Australia

## Overview

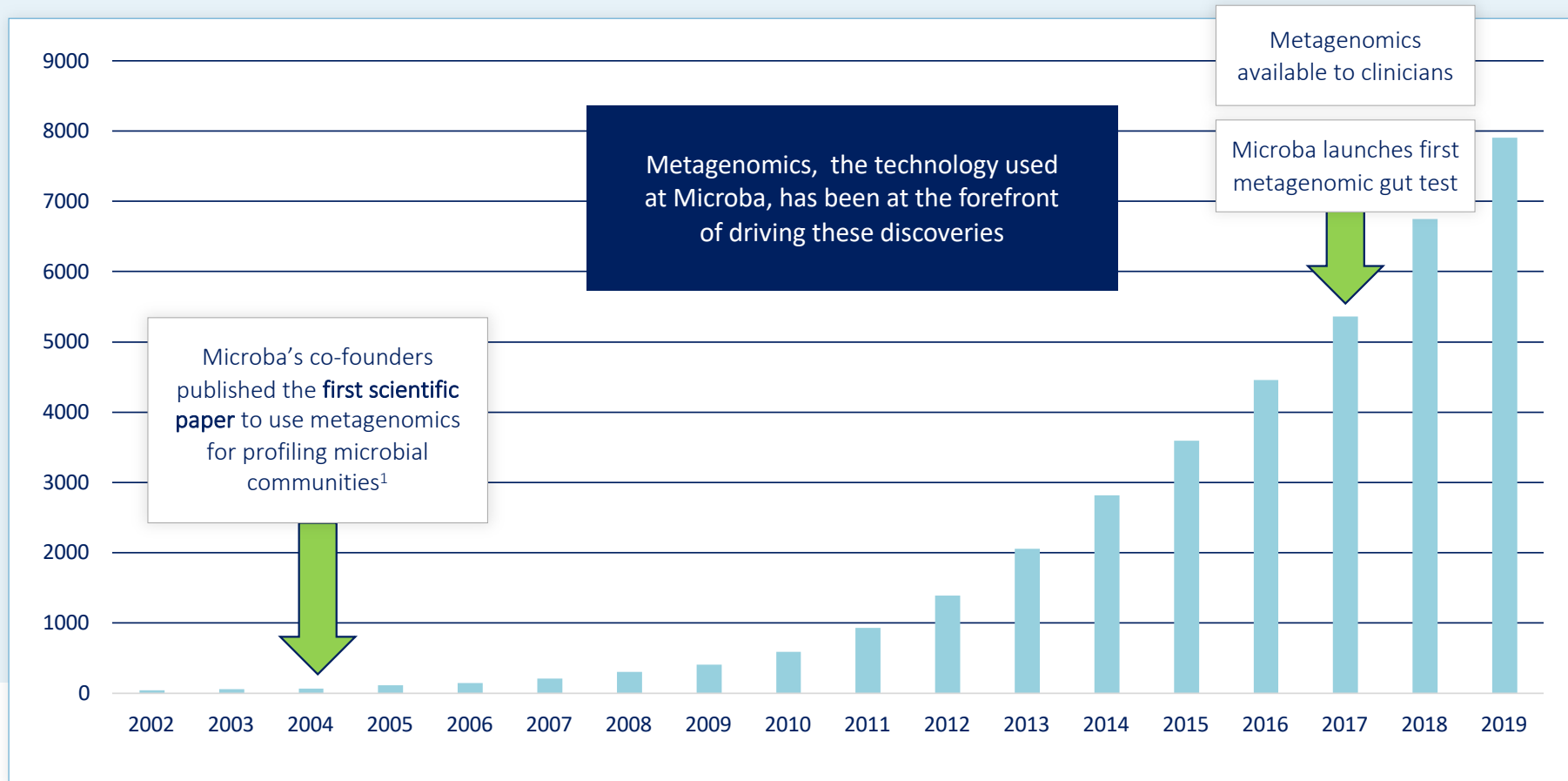
- How is the microbiome altered in Irritable Bowel Syndrome?
- What is Microba's data uncovering about the gut microbiome and Irritable Bowel Syndrome?
- How can you apply the evidence in practice using testing by covering IBS case studies

"Testing is the clinical translation tool between the emerging microbiome evidence and personalised dietary interventions."



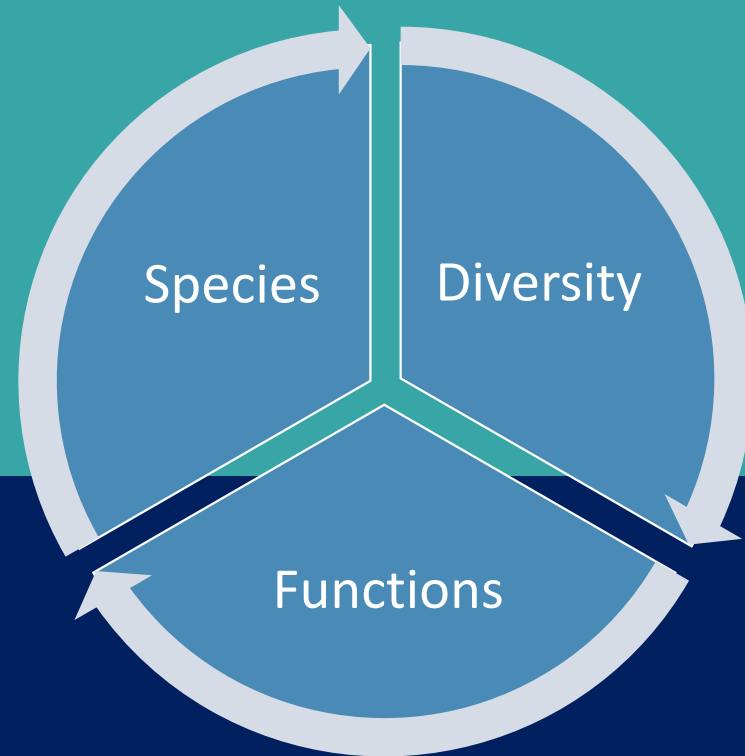
**Anita Tait**  
Accredited Practising Dietitian

# Metagenomics has enabled new gut microbiome discoveries



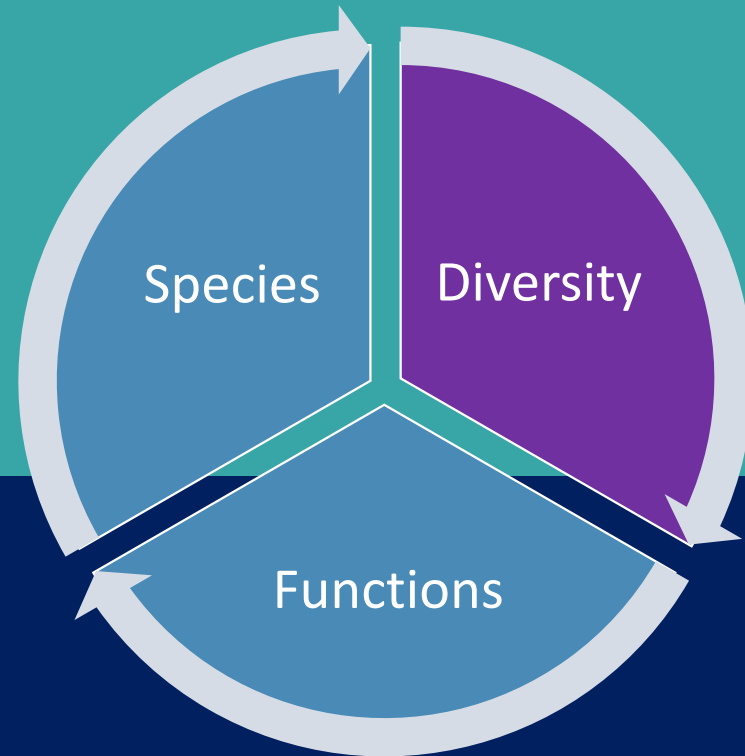
The microbiome is altered  
in Irritable Bowel Syndrome

Microbial Dysbiosis in IBS  
is not the same in everyone



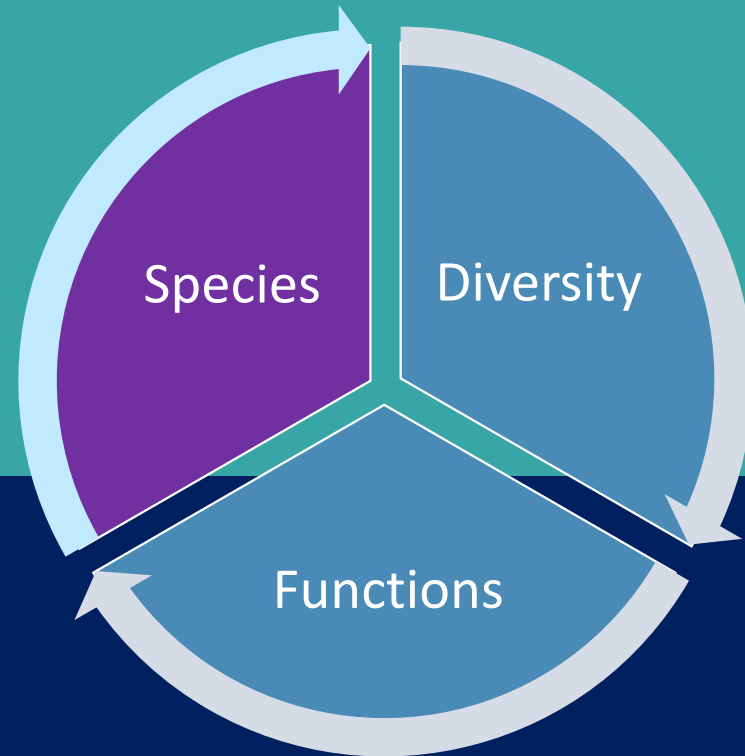
## The microbiome is altered in Irritable Bowel Syndrome

Research shows microbial diversity is reduced in individuals with IBS.



The microbiome is altered  
in Irritable Bowel Syndrome

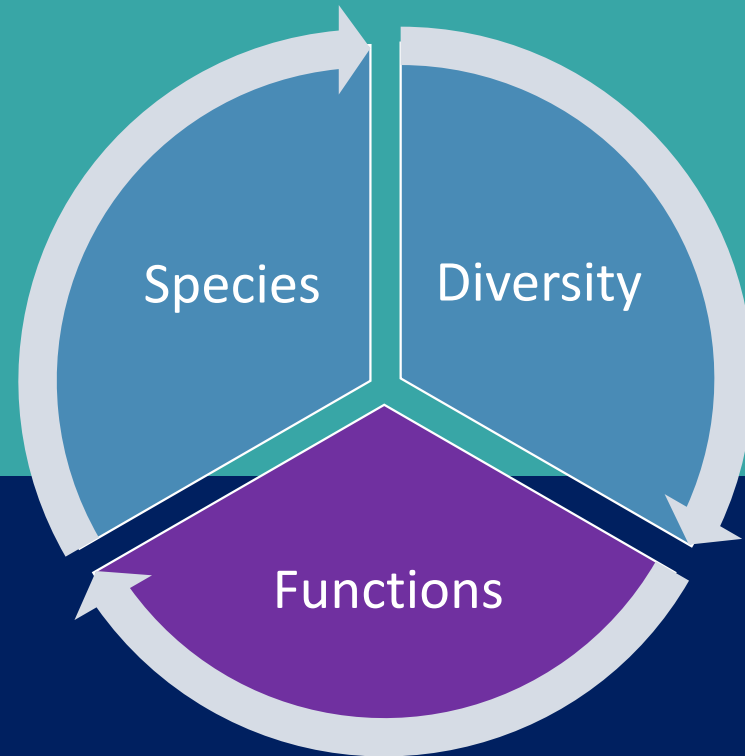
Research shows many microbial  
species are differentially  
abundant in IBS





The microbiome is altered  
in Irritable Bowel Syndrome

Research shows microbiome in  
IBS can have altered microbial  
metabolites



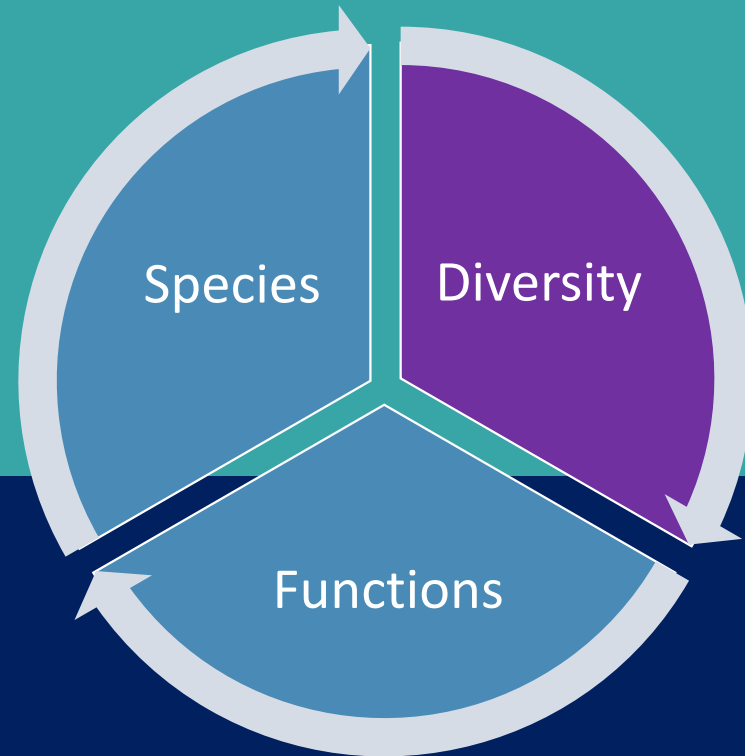
# Microba Future Insight Program: *Understanding The Human Microbiome*

The purpose of this study is to collect information on the microorganisms found within the human gut microbiome and relate it to **medical history, diet, physical activity and mental health** so we can improve understanding of how the human microbiome is associated with health.

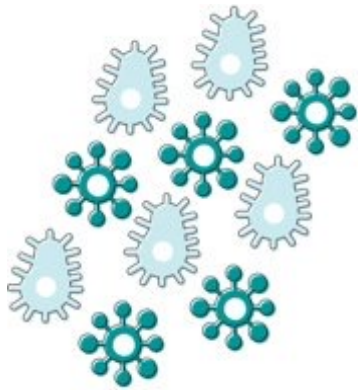
The screenshot displays a user interface for the Microba Future Insight Program. At the top left, it shows the date "December 2019". Below this, there is a "View Report" button and a link to "Edit name / Add notes". The main content area consists of six cards. The first five cards are for questionnaires: "Day of sampling", "Medical history", "Mental", "Exercise", and "Food". Each of these cards has a green progress bar and a "View" link. The sixth card is a green "Microbiome Coach" button with a headset icon and a "Book now!" link.

The microbiome is altered  
in Irritable Bowel Syndrome

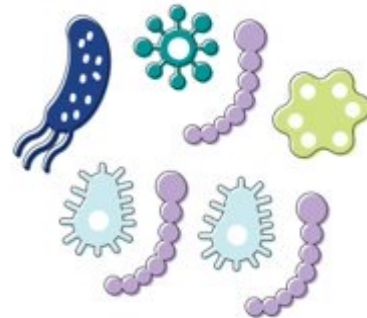
Does our data show impact  
of IBS on microbial diversity?



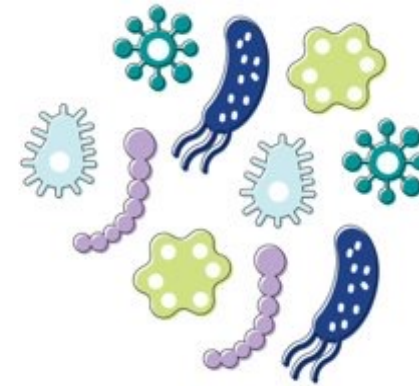
# What is Microbial Diversity?



**LOW DIVERSITY:**  
Low richness  
High evenness



**LOW DIVERSITY:**  
High richness  
Low evenness



**HIGH DIVERSITY:**  
High richness  
High evenness

An aerial photograph of a dense, lush green rainforest. The canopy is thick and varied in shades of green, with some taller trees visible. The text "Microbial diversity is like a rainforest" is centered over the image in a white, serif font.

Microbial diversity is like a rainforest

# Future Insight Program | Microbiome in IBS

## IBS (N= 645)

### Inclusion Criteria:

- IBS-mixed
- IBS-Unclassified
- IBS-Diarrhoea
- IBS-Constipation

### Exclusion Criteria:

- Coeliac Disease
- Inflammatory Bowel Disease
- Bowel resection
- Partial colectomy
- Bariatric surgery

## Healthy Group (N = 530)

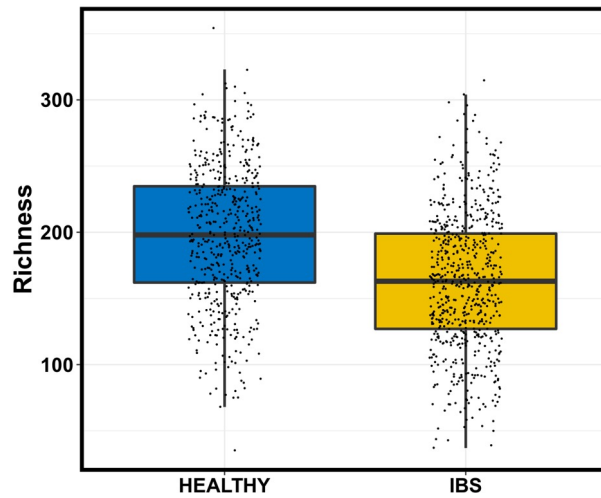
### Exclusion Criteria

- < 18 years of age
- Antibiotics/antifungals/immunosuppressants in last 6 months
- Medications that strongly influence microbiome (e.g., PPIs, statins, antidepressants, laxatives, opioids, etc.)
- Major medical conditions
- BMI > 30
- Smoker
- Pregnant
- Depression, Stress, Anxiety – Moderate or Above
- ≤2 serves of fruits and vegetables daily
- More than 2 alcoholic drinks/day

# Diversity is reduced in IBS compared to Microba Healthy Group

## Richness

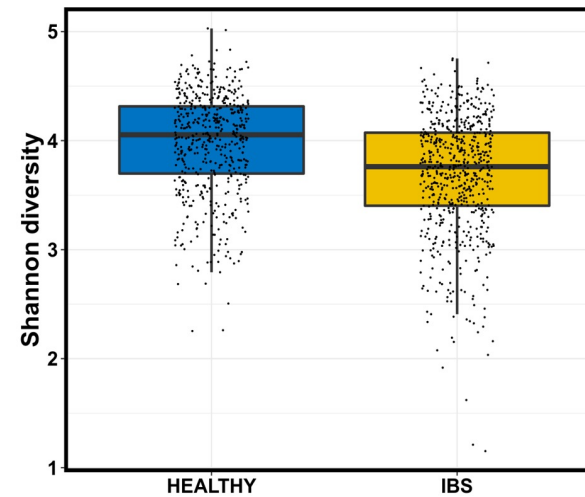
**P=2.7e-29 (adj. ANOVA)**  
**Cohen's f2=0.34**



## Shannon Index

(richness + evenness)

**P=9e-22 (adj. ANOVA)**  
**Cohen's f2=0.29**



# Future Insight Program | Microbiome in IBS

## IBS (N= 645)

### **Inclusion Criteria:**

- IBS-mixed
- IBS-Unclassified
- IBS-Diarrhoea
- IBS-Constipation

### **Exclusion Criteria:**

- Coeliac Disease
- Inflammatory Bowel Disease
- Bowel resection
- Partial colectomy
- Bariatric surgery

## Non-IBS (N = >6,000)

### **Inclusion criteria:**

- Varied health conditions
- Varied intake of medications
- Varied dietary intake
- Varied mental health DASS-21 scores
- Varied physical activity

### **Exclusion criteria:**

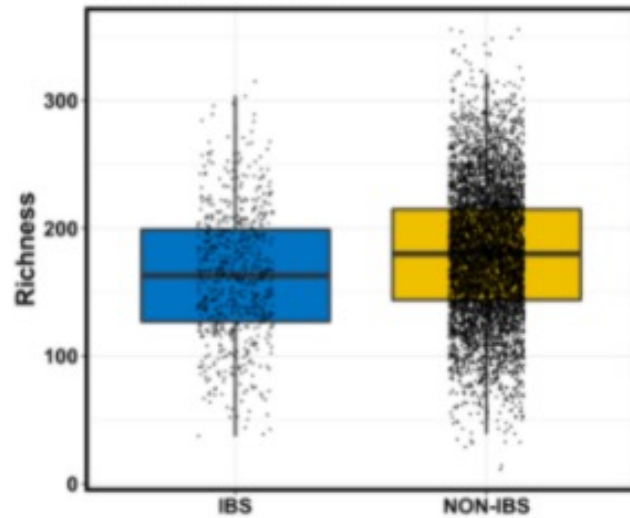
- Coeliac Disease
- Inflammatory Bowel Disease
- Bowel resection
- Partial colectomy
- Bariatric surgery



# Diversity is reduced in IBS versus individuals without IBS

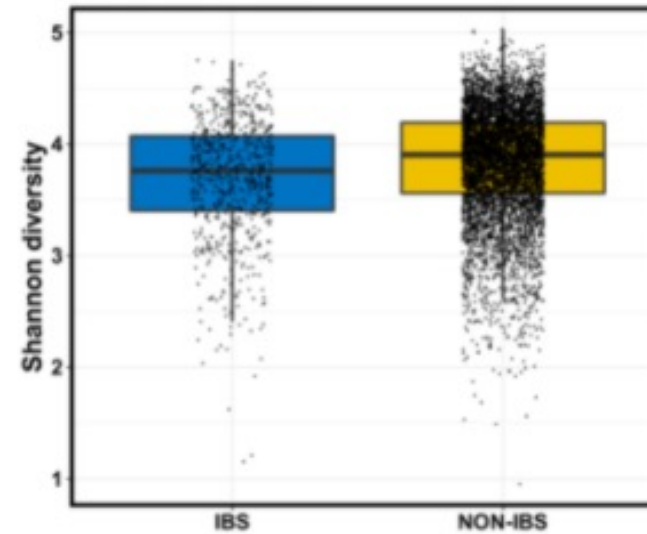
## Richness

$P=6.4e-16$  (adj. ANOVA)  
Cohen's  $f^2=0.099$



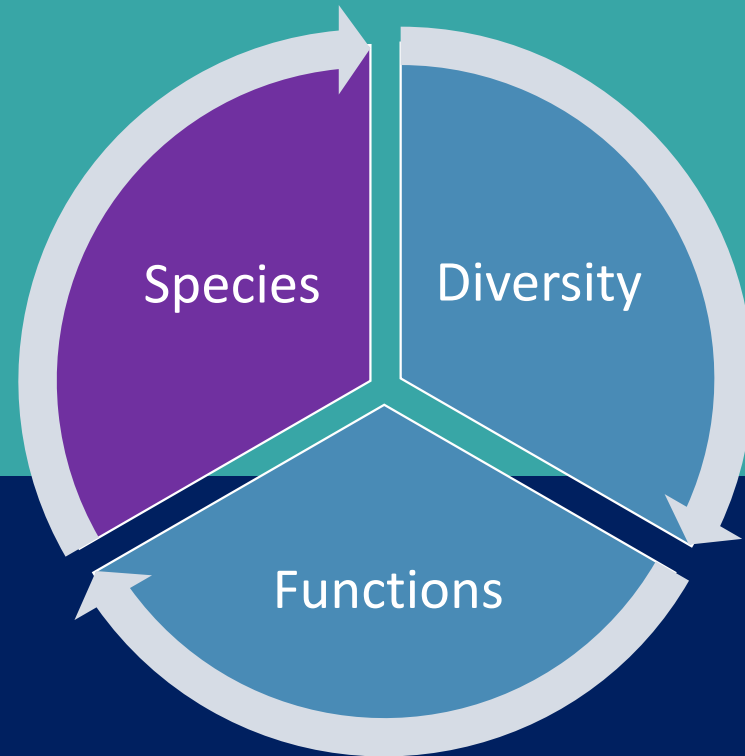
## Shannon Index

$P=1.4e-13$  (adj. ANOVA)  
Cohen's  $f^2=0.09$



The microbiome is altered  
in Irritable Bowel Syndrome

Which species are  
changed in IBS?



## Future Insight Program | Microbiome in IBS



IBS showed **increased abundance of 68 species** compared to healthy group

(48 of these species increased compared to non-IBS)



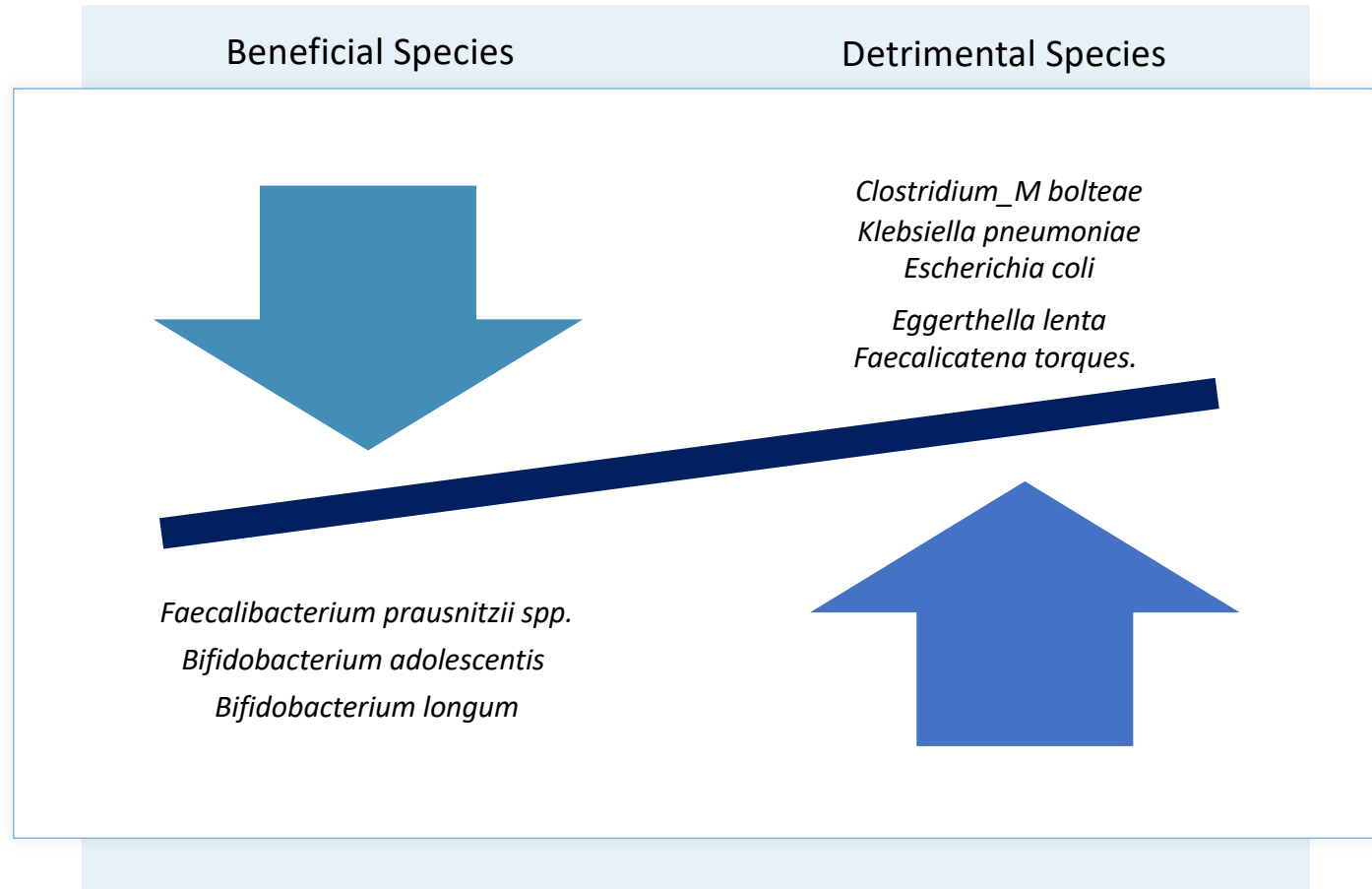
IBS showed **decreased abundance of 133 species** compared to healthy group

(93 of these species decreased compared to non-IBS)

201 species showed altered abundance in IBS (qFDR < 0.05)

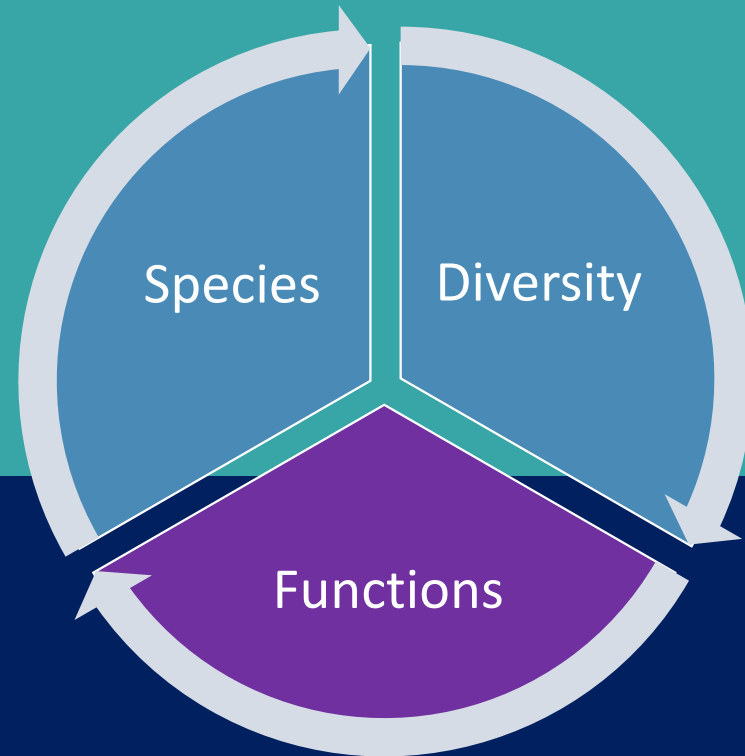
# Species Changes in Irritable Bowel Syndrome

IBS individuals have a reduction in species that produce important Short Chain Fatty Acids.



The microbiome is altered  
in Irritable Bowel Syndrome

Which metabolites  
are different in IBS?



# Future Insight Program | IBS sub-types

## Comparison Groups

### Inclusion Criteria:

- IBS-D n = 149
- IBS-C, IBS-U, IBS-M n = 496
- All IBS n = 645
- NON-IBS n = >6,000

### Exclusion Criteria:

- Coeliac Disease
- Inflammatory Bowel Disease
- Bowel resection
- Partial colectomy
- Bariatric surgery

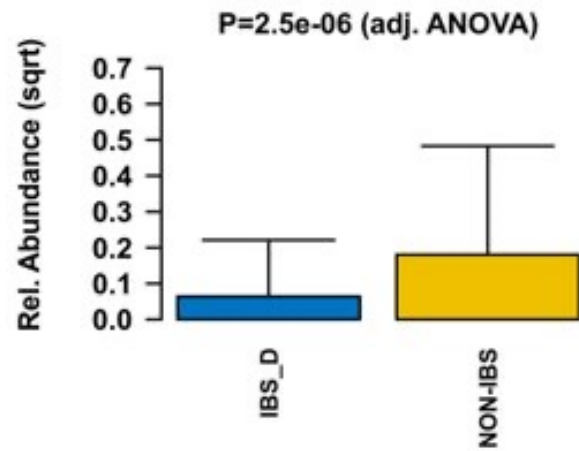
## Healthy Group (N = 530)

### Exclusion Criteria

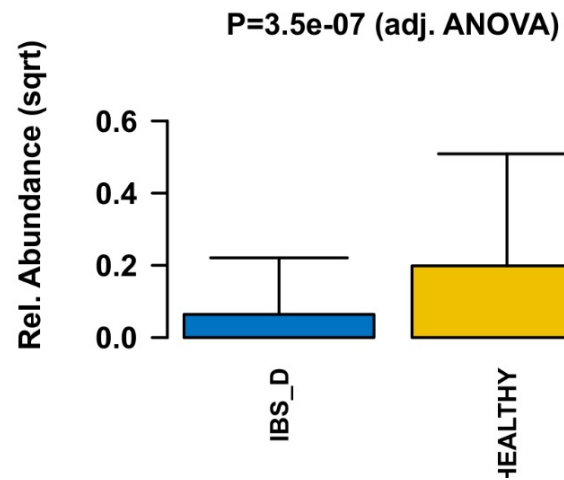
- < 18 years of age
- Antibiotics/antifungals/immunosuppressants in last 6 months
- Medications that strongly influence microbiome (e.g., PPIs, statins, antidepressants, laxatives, opioids, etc.)
- Major medical conditions
- BMI > 30
- Smoker
- Pregnant
- Depression, Stress, Anxiety – Moderate or Above
- ≤2 serves of fruits and vegetables daily
- More than 2 alcoholic drinks/day

# IBS-D is associated with reduced Methane

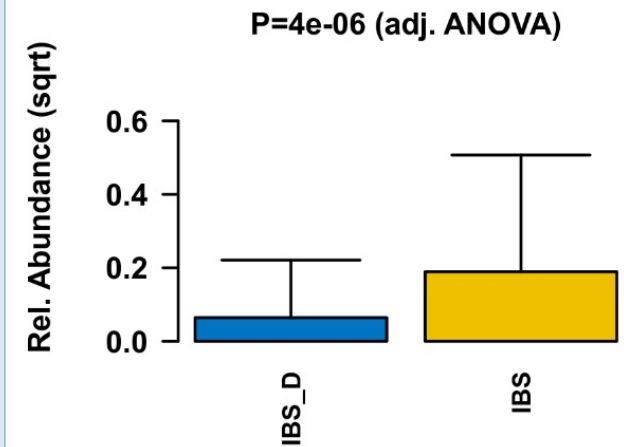
## Non-IBS versus IBS-D



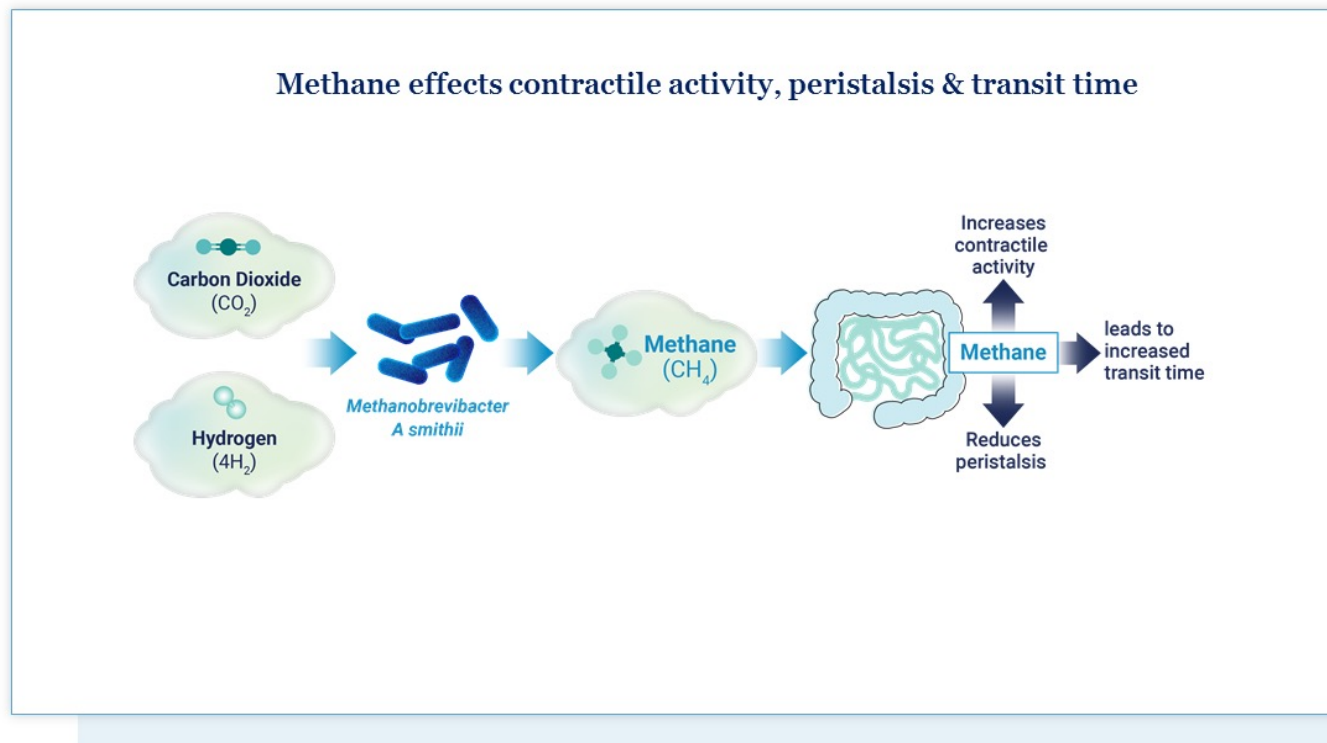
## Healthy versus IBS-D



## All IBS versus IBS-D



# Methane Production



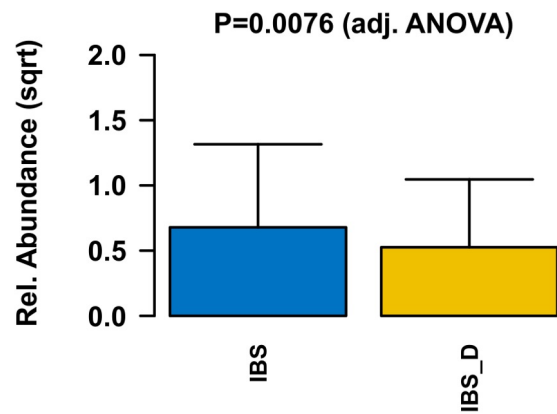
IBS-D individuals have the lower potential to produce Methane within the gut microbiome.

Chaudary *et al*, 2018; Bin Waqar & Ehan, 2019.

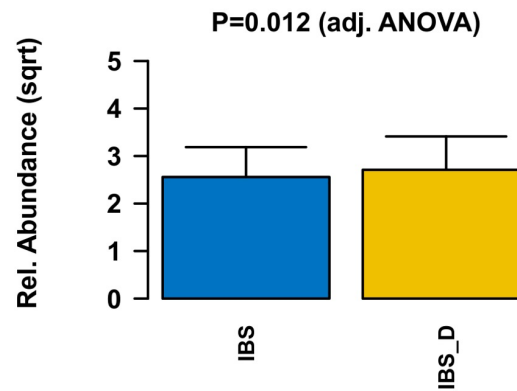


# IBS-D shows markers of an inflammatory microbiome

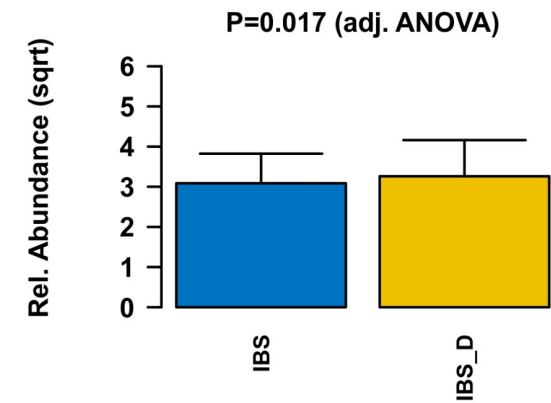
## Reduced Indolepropionic Acid



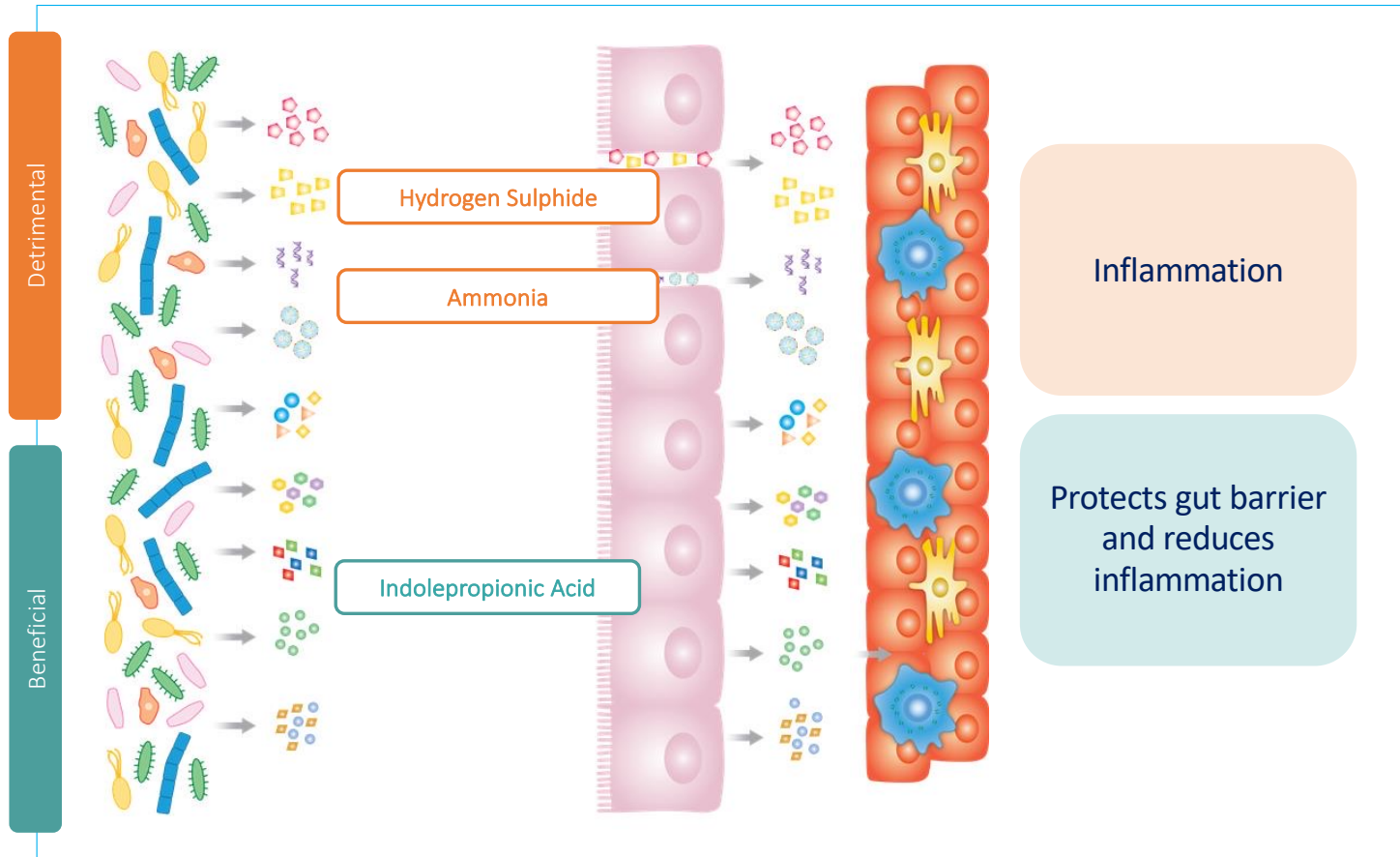
## Increased Ammonia



## Increased Hydrogen Sulphide



# Role of Microbial Metabolites in Inflammation in IBS-D



IBS individuals have a higher potential to produce proinflammatory metabolites and reduced beneficial metabolites.

Specialises in the dietary management of Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD).



**Bianca Maree Harrington**  
Private Practice Dietitian  
& Lead Microbiome Coach



Case Study 1:  
Client K

# Microbial Functional Potential Improvements in IBS

# Clinical History



## Client K

- IBS-D
- 65 y/o female
- Long-term weight management client (June 2015 – currently).

## Medical History

- Obese **BMI 31kg/m<sup>2</sup>**
- High cholesterol **6.1mmol/L (LDL 3.9mmol/L)**
- Hysterectomy, November 2019.

## Bowel Symptoms

- Sudden onset diarrhoea post-surgery accompanied with lower left quadrant abdominal pain.
- Bowels opening >3 times per day.
- Type 6 on the Bristol Stool Chart
- Prior to surgery BO once daily (stool type 3)

## Medical Management

- GP referred client for a colonoscopy.
- Colonoscopy results indicated evidence of diverticular pockets but no active infection or inflammation.
- Referred to see Dietitian for dietary management of IBS.

## Diet History

### Breakfast

1 x slice multigrain toast  
with a poached egg

### Lunch

100g smoked salmon or chicken  
breast with quinoa and salad

### Dinner

100g red meat/poultry/fish  
with three vegetables

### Supper

Piece of fruit and/or  
handful raw nuts

## Dietary Restrictions

- Client K was very averse to eating carbohydrates.
- Decades of dieting had led to avoidance of carbohydrates.
- Belief system that carbohydrates would be the cause of weight gain.

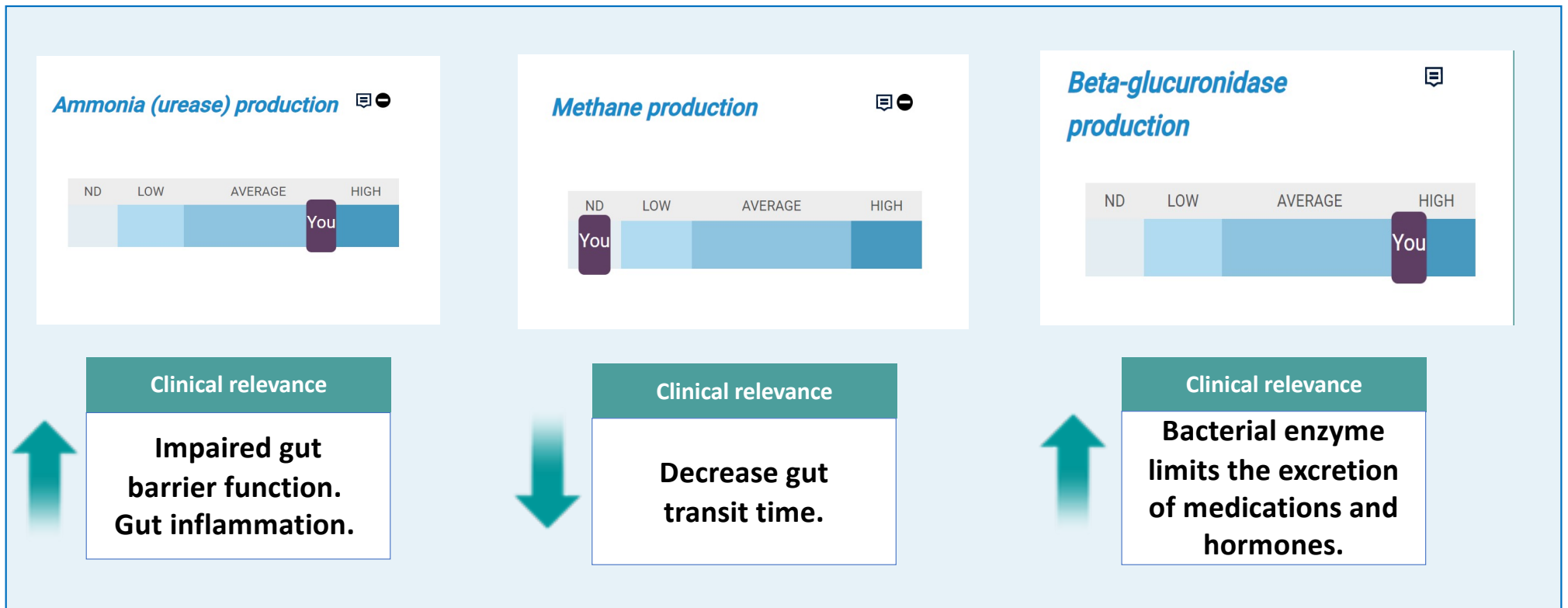
# Diet History



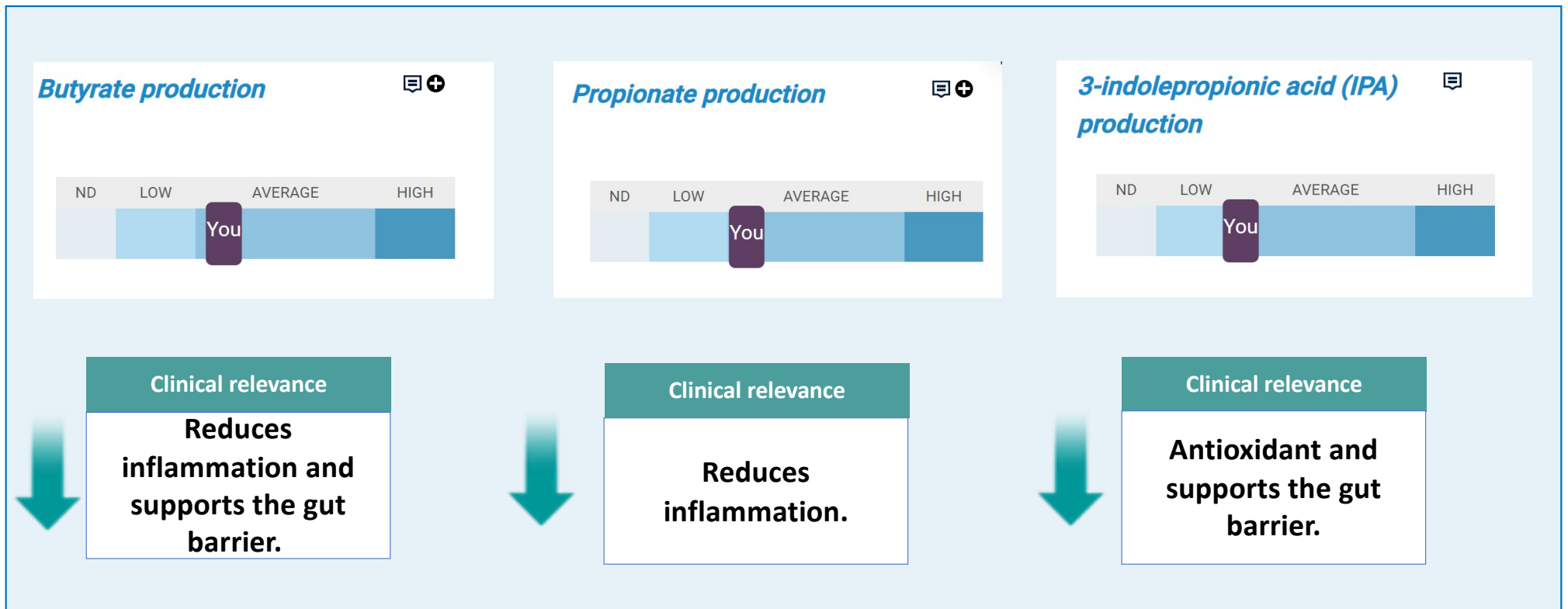
## Recommendations

- Gut Microbiome testing
- Testing would determine:
  - If the gut microbiome was influencing symptoms
  - Gut microbiome diversity
  - Species populations
  - Functional potential

# Microba Insight Results August 2020



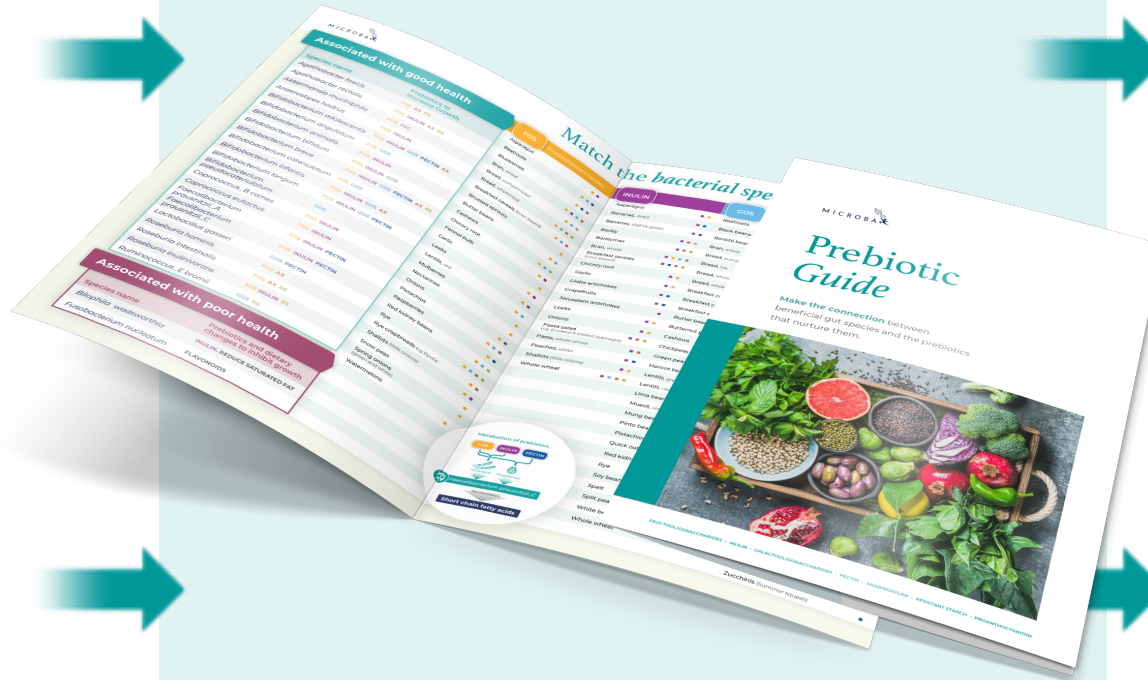
# Microba Insight Results August 2020





# Dietary Recommendations

↓ Butyrate



↓ Propionate

## Resistant Starch:

Introduce cooked and cooled rice/potato

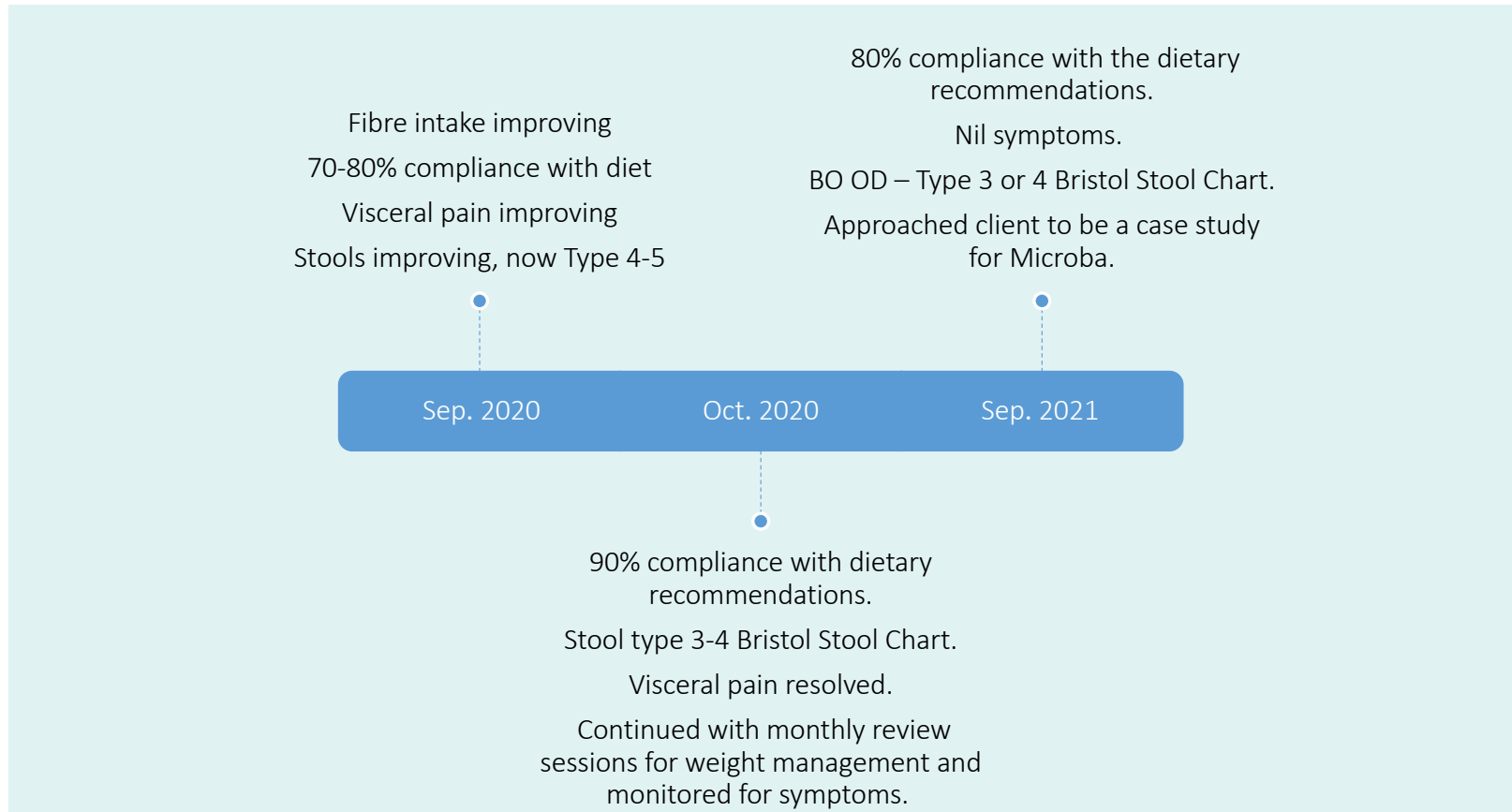
- Client opted to consume rice salad for 2-3 lunch meals per week.
- Introduce legumes (also source of **Galacto-oligosaccharides**)  
Client opted to add in either lentils, chickpeas, black beans and kidney beans into meals at least twice per week.

## Beta-glucans:

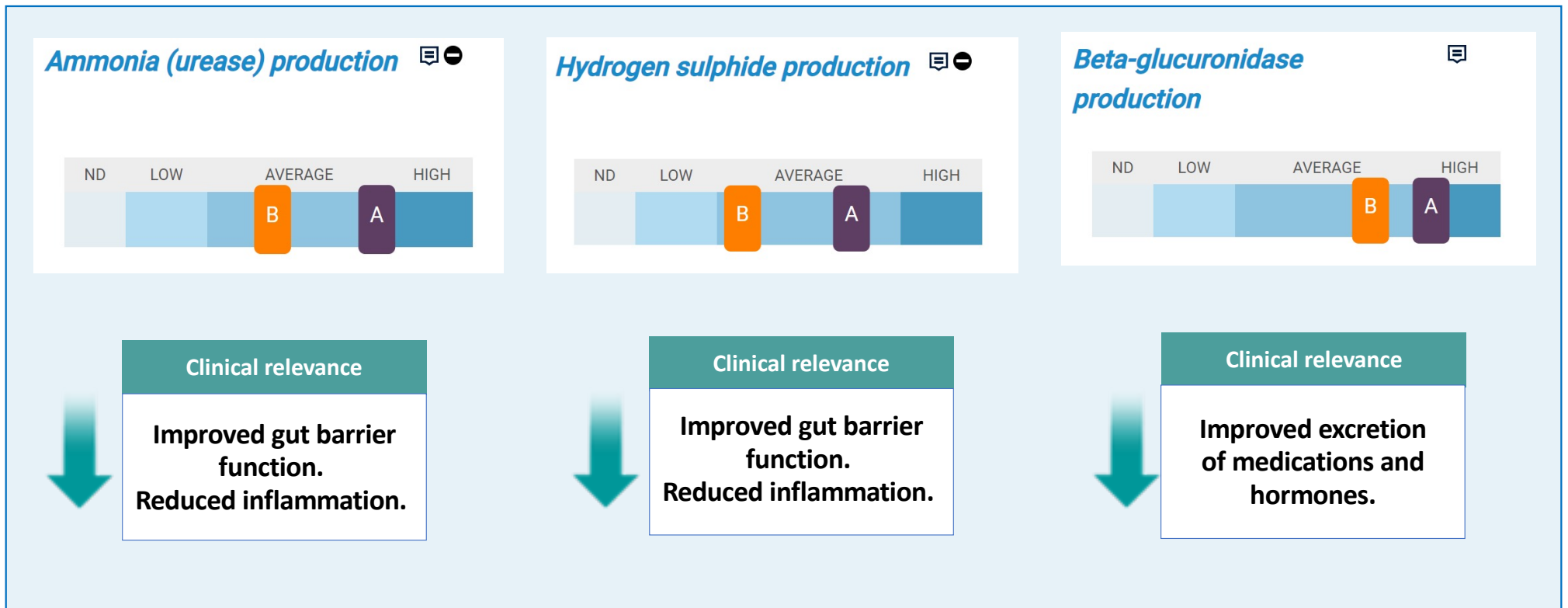
Introduced rolled oats for breakfast.

- Client opted to add in one serve of non-toasted muesli at breakfast daily.

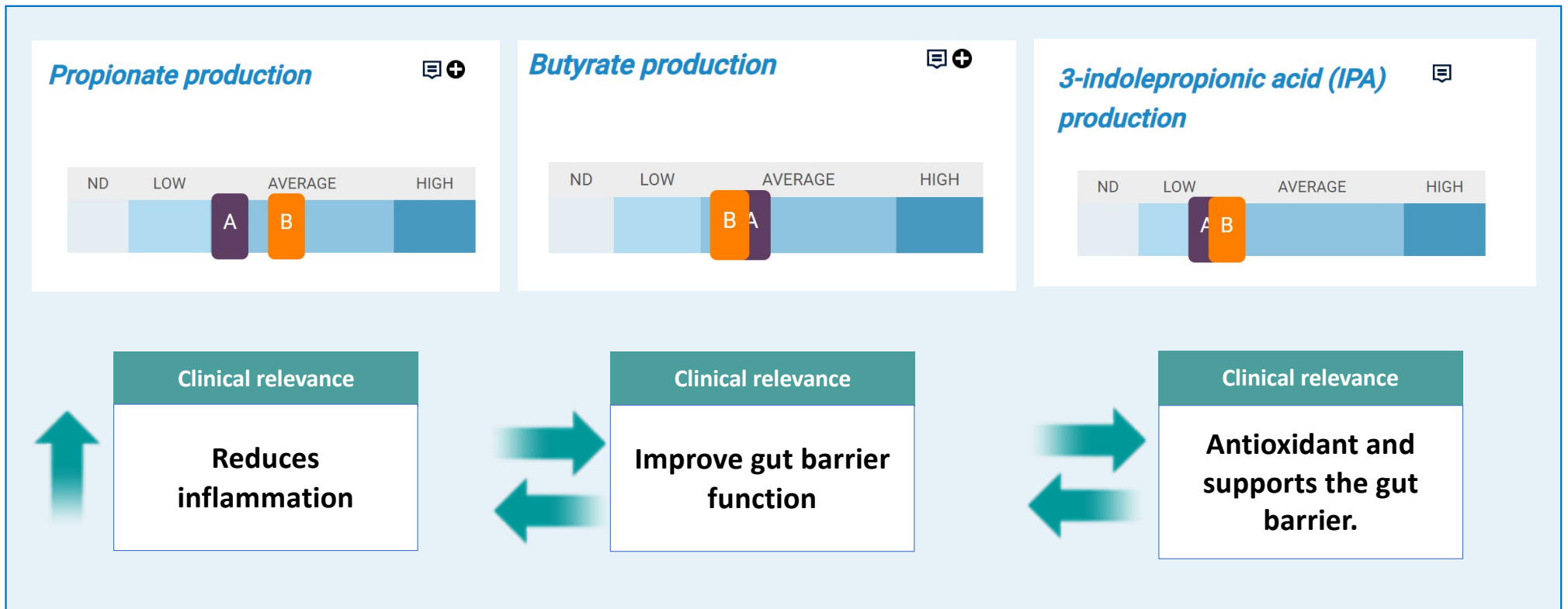
# Dietetic Review



# Microba Insight Results October 2021



# Microba Insight Results October 2021





Case Study 2:  
Client R

# Microbial Species Changes in IBS

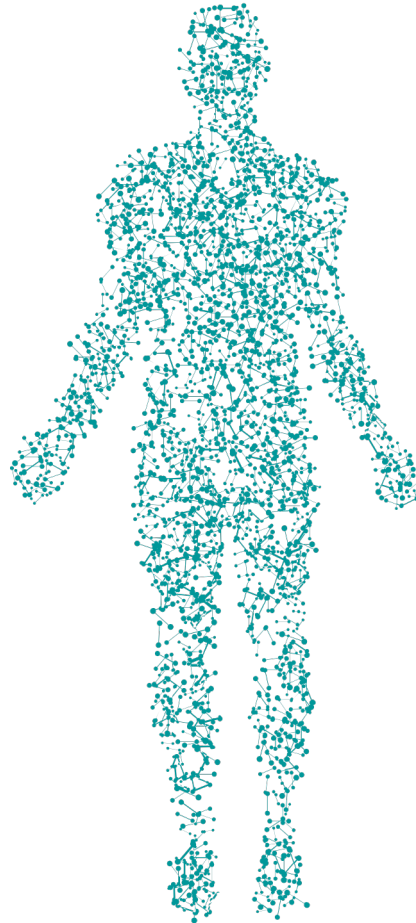
# Clinical History

## Client R

- IBS-M
- 45 y/o female
- Client as of June 2021

## Medical History

- Lipoedema (2018)
- Cholecystectomy (2013)
- Diverticulitis (diagnosed 2006)
- Obese 35.9kg/m<sup>2</sup>



## Bowel Symptoms

- Chronic constipation
- Bloating and visceral pain (since childhood)
- Bowels open 3-4/7
- Stool type varies 2 -7
- Predominately Type 7 at time of initial consultation

## Medical Management

- Underwent Fecal Microbial Transplant therapy with Gastroenterologist in 2019.
- Requested to work with a dietitian to improve her microbiome via diet.

# Microba Insight Results

## Microba Insight Comparison

Detrimental species	Healthy Group %	Relative Abundance % April 2021	Relative Abundance % July 2021	Percentage Improvement %
<i>Clostridium_M bolteae</i>	0.000%-0.000%	0.023%	0.000%	<b>-0.023%</b>
<i>Klebsiella pneumoniae</i>	0.000%-0.000%	0.028%	0.000%	<b>-0.028%</b>
<i>Escherichia coli</i>	0.000%-0.061%	0.077%	0.000%	<b>-0.077%</b>
<i>Eggerthella lenta</i>	0.000%-0.040%	1.030%	0.027%	<b>-1.003%</b>
<i>Faecalicantena torques</i>	0.000%-0.317%	2.580%	0.185%	<b>-2.395%</b>

Detrimental species are associated with increased inflammatory metabolites

# Dietary Recommendations

## Diet History

### Breakfast

- Nil most days or eggs on toast

### Lunch

- Lite 'n' Easy meal (Salad Wrap or Chicken Salad)

### Dinner

- Lite 'n' Easy meal (Stir-fry)

### Supper

- Fruit

## Dietary Restrictions

- Client R had followed several restrictive diets over the years due to suspect food intolerances.
- Client's quality of her diet was quite restrictive



## Recommendations

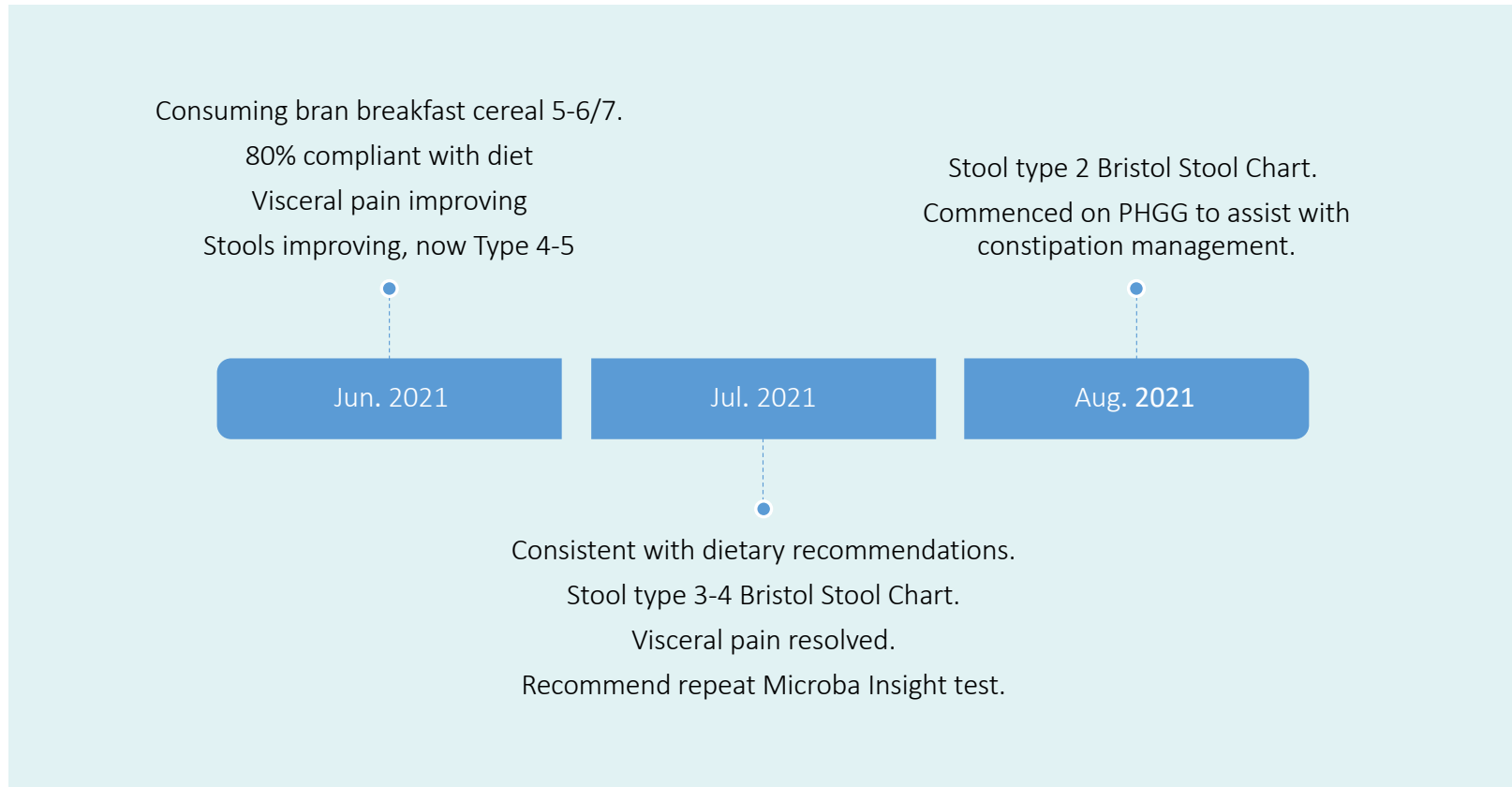
Review gut microbiome results

## Dietary Recommendations

- Slow and gradual dietary introductions.
- Increase resistant starch in diet
  - Add bran-based breakfast cereal



# Dietetic Review



# Microba Insight Results

## Microba Insight Comparison

Detrimental species	Healthy Group %	Relative Abundance % April 2021	Relative Abundance % July 2021	Percentage Improvement %
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Detrimental species are associated with increased inflammatory metabolites

# Microba Insight Results

## Microba Insight Comparison

Beneficial species	Relative Abundance % April 2021	Relative Abundance % July 2021	Percentage Improvement %
<i>Faecalibacterium prausnitzii</i> spp.	0.000%	0.14%	<b>+0.14%</b>
<i>Agathobacter rectale</i>	0.000%	0.854%	<b>+0.854%</b>
<i>Roseburia intestinalis</i>	0.077%	0.485%	<b>+0.408%</b>

Beneficial species are associated with increased health promoting metabolites.

# The **Clinical Utility** of Microbiome Testing

**Identifies the opportunity for personalised dietary interventions to support clients.**

**Having tangible results helps clients acknowledge why they need to make dietary changes.**

**Seeing the report increases client's confidence in making changes to improve their health.**

# Case Study 1

## Microba's Research Program

High ammonia  
High hydrogen sulphide  
Low IPA  
Low methane

## Case study

Low butyrate  
Low propionate  
**Low IPA**  
**Low methane**  
**High ammonia**  
High beta  
glucuronidase

## Dietary recommendations guided by results

Increase prebiotic fibres:  
Resistant starch  
Beta-glucans

## Results

Increased propionate  
Reduced ammonia  
Reduced hydrogen  
sulphide  
Reduced beta  
glucuronidase  
Stool type improved from  
type 6 to type 3  
Visceral pain resolved.

## Case Study 2

### Microba's Research Program

Increase in relative abundance of species associated with poor health:

*Clostridium\_M bolteae*  
*Klebsiella pneumoniae*  
*Escherichia coli*  
*Eggerthella lenta*  
*Faecalicatena torques*

### Case study

Increase in relative abundance of species associated with poor health:

*Clostridium\_M bolteae*  
*Klebsiella pneumoniae*  
*Escherichia coli*  
*Eggerthella lenta*  
*Faecalicatena torques*

### Dietary recommendations guided by results

Increase the prebiotic fibre:

Resistant starch from a bran-based breakfast cereal.

### Results

Significant reduction of detrimental species abundance in all 5-species.

Stool type improved from type 5 to type 3-4

Visceral pain resolved.

# Key points: Understanding the Gut Microbiome & IBS

Microbial Dysbiosis in Irritable Bowel Syndrome is not the same in everyone.

IBS individuals:  
- Reduced diversity  
- Altered species  
- Increased proinflammatory metabolites.

Gut Microbiome analysis allows accurate measurement of the gut microbiome.

Key motivator to assist behaviour change.

Gut microbiome analysis allows patient focused dietary interventions.

Clinical translation tool between the evidence and personalised dietary interventions.

# Thank you!



**Anita Tait**  
Anita.tait@microba.com



**Bianca Maree Harrington**  
Biancamaree.harrington@microba.com



# Join our Free Online Practitioner Program: Microba Insights

The program opens access to exclusive practitioner support

- Access to **one-on-one mentoring** with gut microbiome experts
- Regular updates on **clinically relevant gut microbiome research**
- **Ongoing training** through regular webinars and short videos
- **Clinical reference guides** to support patient care



Register at: [mip.microba.com](https://mip.microba.com)

Contact: Anita Tait

Email: [Anita.tait@microba.com](mailto:Anita.tait@microba.com)

Phone: (+61) 420 654 516