

GLP-1 receptor agonist and the gut microbiome

With Wendy Burke

BHsc (Nat), AdvDip (Nut), AdvDip (WHM)

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MEET THE SPEAKERS

Chloe Turner

Clinical Microbiome Consultant and Naturopath



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MEET THE SPEAKERS

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Hormone Naturopath



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Disclaimer

The information contained in this case study 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 Microba.

What we are covering today (it's ambitious)

- 001 Endogenous enteroendocrine hormone (like GLP 1) overview
- 002 The intersection between the gut microbiome and enteroendocrine hormones
- 003 Brief overview on how GLP 1 agonist medications work
- 004 Summary of the current research on how GLP 1 receptor agonists may impact the gut microbiome
- 005 Case study – GLP 1 agonists and inflammatory bowel disease
- 006 Could the gut microbiome have an influence on the GLP 1 agonist response?
- 007 Case study – poor or slow GLP 1 agonist responder taking a PPI
- 008 Case study – poor or slow GLP 1 agonist responder with a history of CVD over time
- 009 Putting it all together – what does it mean in clinic

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001

Setting the scene

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002

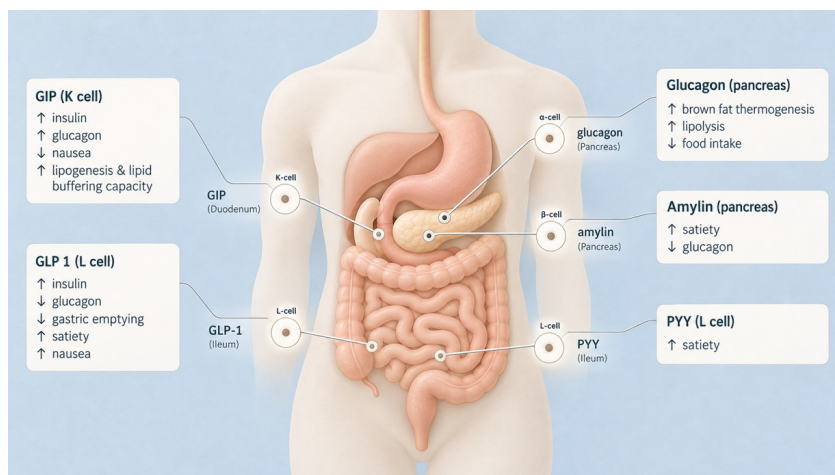
Enteroendocrine hormones and the gut microbiome

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Enteroendocrine & pancreatic hormones



The gut is one of the largest hormone-producing organs in the human body.

The more than 15 types of enteroendocrine cells produce more than 20 hormones that have critical roles in appetite, energy homeostasis and glucose homeostasis (Rho & Choi, 2023).

The "incretins" = insulin secretion action.

(RHO & CHOI, 2023; MELSON ET AL., 2024)

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The intersection of the gut microbiome and enteroendocrine cells

001

Indole metabolites

Small amounts of tryptophan are metabolised by gut microbiota into indole, which promotes GLP-1 production and influences bacterial functions.

(ZENG ET AL 2023, MASSE & LU 2023)

002

Secondary Bile Acids

Primary bile acids from the liver are metabolized by gut microbiota into secondary bile acids, which bind to L cell receptors to promote GLP-1.

003

Short Chain Fatty Acids

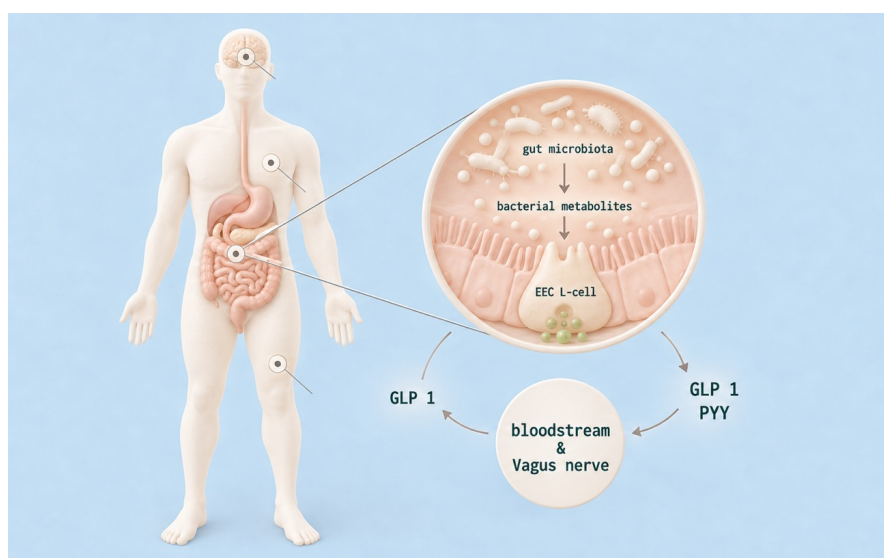
Dietary fibers are fermented to SCFAs by gut microbiota, which bind to L cells and promote GLP-1 production.

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Modified by Wendy Burke from Figure 1 Masse & Lu, 2023 doi.org/10.3389/fendo.2023.1169624 & Zeng et al 2024 doi.org/10.1128/mbio.02032-23

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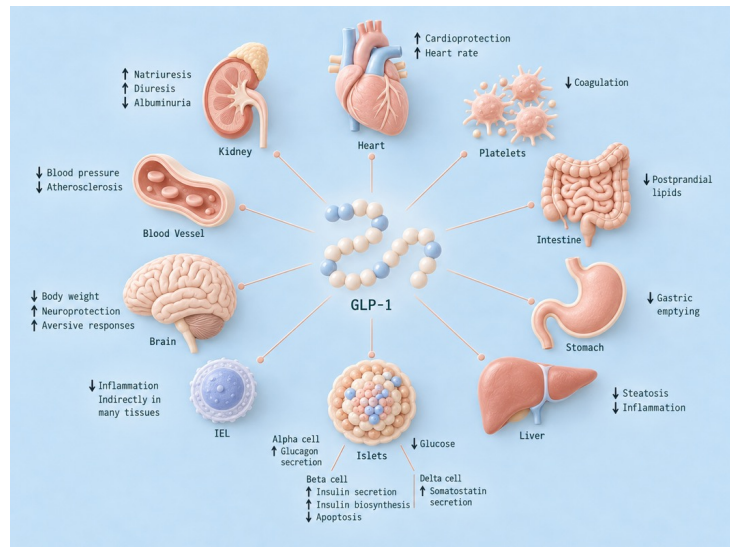
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Target tissues and influence of GLP 1

DRUCKER AND HOLST (2023) DIABETOLOGIA
DOI 10.1007/S00125-023-05906-7



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How GLP 1 agonist medications work

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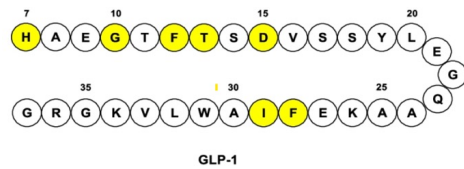


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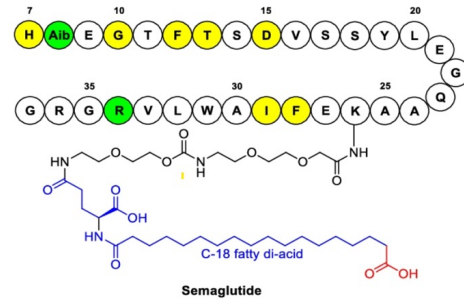
How do GLP 1 receptor agonists work?

Endogenous GLP 1 and GIP hormones are broken down very quickly – within a minute – by enzyme DPP4

GLP 1 receptor agonists (liraglutide, semaglutide, tirzepatide) have been engineered so that their molecular structure resists the breakdown – they hang around and keep the receptor activated



- H Key amino acid for potency
- Aib Substituted amino acid



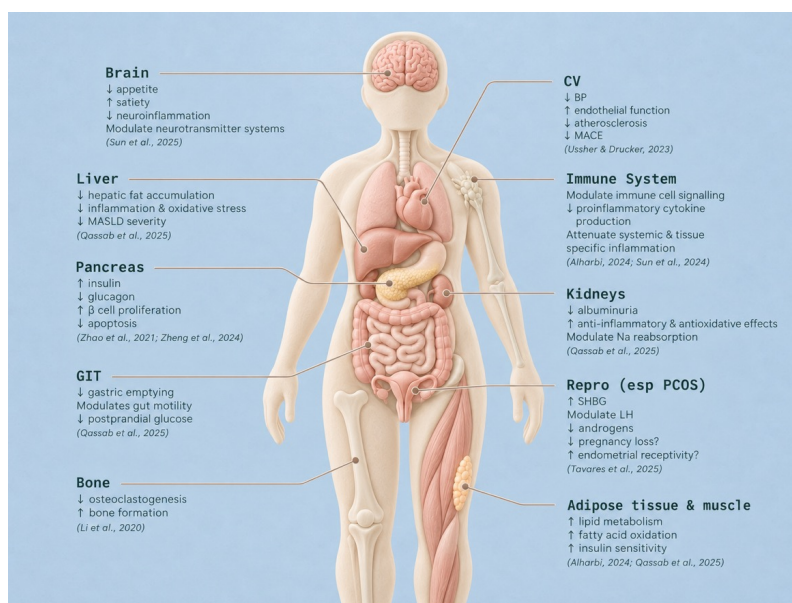
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(CHEN ET AL 2022)

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The whole-body influence of GLP 1 agonists

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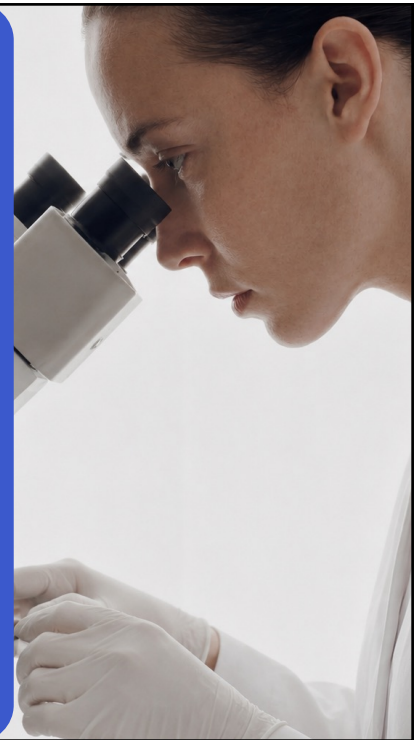
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What the research says about the gut microbiome

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GLP 1 RA's influence on the gut microbiome

Systematic review, 2025 – 38 studies.

Animal Studies – 29 studies

(FOCUSING IN LIRAGLUTIDE - 19, SEMAGLUTIDE - 6)

Liraglutide - showed significant impact on microbiota composition at genus level. Most notable increases were in *Lactobacillus* and *Akkermansia* genera.

Semaglutide - more than half of mice studies showed increases in diversity and richness, though some showed no change or decreases

(predominately 16S sequencing in all studies)

Human Studies – 9 studies

(FOCUSING ON LIRAGLUTIDE 8, NONE FOR SEMAGLUTIDE)

Five studies reported no alteration in gut microbiota after treatment.

Three studies found changes, including increases in:

Faecalibacterium prausnitzii

Akkermansia muciniphila

Peptostreptococcus anaerobius

Bacteroides vulgatus

Diversity changes were less apparent in humans, with many showing no changes.

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"Microbial modulation by GLP-1 agonists can result in an increase in short chain fatty acids.....and can also reduce the abundance of Bacillota highly associated with obesity and insulin resistance.....they can also reduce lipopolysaccharide-producing bacteria, resulting in a lower level of LPS, which can explain the positive effect of GLP-1RAs in metabolic syndrome"

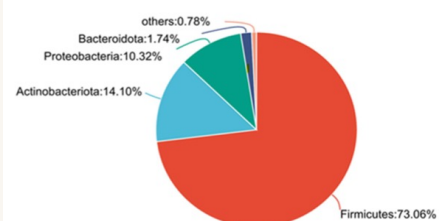
(GOFRON ET AL., 2025)

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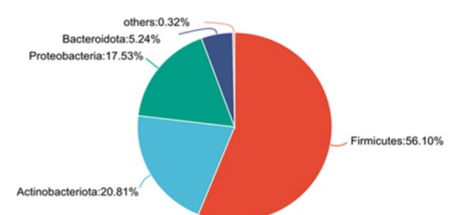
Semaglutide: Microbiota changes in T2DM

(CHEN ET AL 2025) · 16S SEQUENCING

Community analysis pieplot on Phylum level :Baseline



Community analysis pieplot on Phylum level :Semaglutide



(CHEN ET AL 2022)

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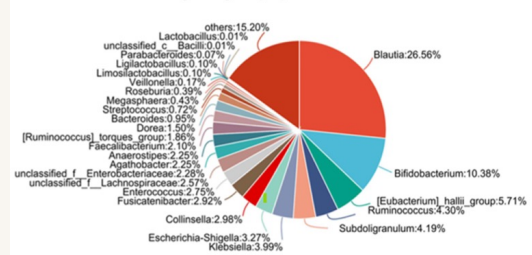
Semaglutide: Microbiota changes in T2DM

(CHEN ET AL 2025) · 16S SEQUENCING

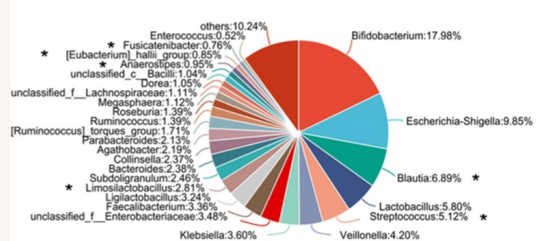
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Community analysis pieplot on Genus level :Baseline



Community analysis pieplot on Genus level :Semaglutide



(CHEN ET AL 2022)

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Tirzepatide: Dual GIP / GIP RA – mice - Phylum

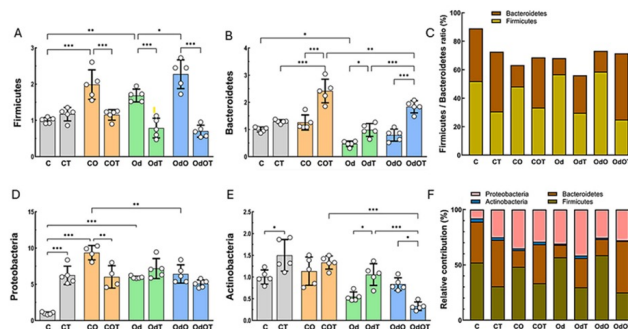


Fig. 3. Cecum bacteria phylogenetic analysis. A – Firmicutes; B – Bacteroidetes; C – Firmicutes/Bacteroidetes Ratio; D – Proteobacteria; E – Actinobacteria; F – Relative contribution of phyla. Data are mean and standard deviation. Statistical significance, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Group abbreviations: C, Control; Od, obese diabetic; O, ovariectomy, T, tirzepatide.

(SILVA-VEIGA ET AL 2025)

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8 TREATMENT ARMS

- C – control
- CT – control Tirz
- CO – control ovariectomy
- COT – control ovariectomy Tirz
- Od – obese diabetic
- OdT – obese diabetic Tirz
- OdO – obese diabetic ovariectomy
- OdOT – obese diabetic ovariectomy Tirz

(CHEN ET AL 2022)

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Tirzepatide: Dual GIP / GIP RA – mice - Species

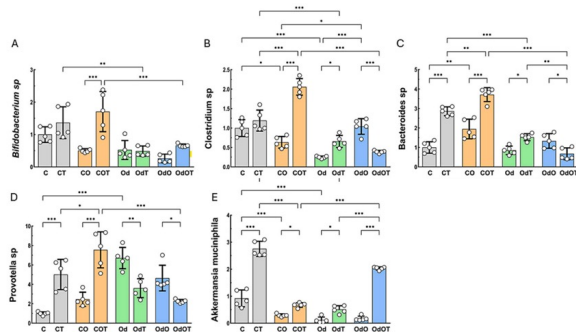


Fig. 4. Cecum species analysis. A - *Bifidobacterium* sp.; B - *Clostridium* sp.; C - *Bacteroides* sp.; D - *Prevotella* sp.; E - *Akkermansia muciniphila*. Data are mean and standard deviation. Statistical significance, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Group abbreviations: C, Control; Od, obese diabetic; O, ovariectomy, T, tirzepatide.

(SILVA-VEIGA ET AL 2025)

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OdO – obese diabetic ovariectomy
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(CHEN ET AL 2022)

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Could microbiota changes contribute to GLP 1 agonists anti-inflammatory action?

GLP 1 RA group

CRP, IL-6, and TNF- α $\downarrow$ (40%+) - approaching those of healthy controls

$\uparrow$ butyrate-producing bacteria (esp *Faecalibacterium prausnitzii* and *Roseburia* spp.)

NSAID group

Modest reductions in CRP, IL-6, and TNF- α without achieving normalisation

No comparable effect on butyrate producing bacteria

Hypothesis - GLP 1 RA anti inflammatory at 3 levels

$\uparrow$ butyrate producers $\uparrow$ intestinal barrier $\downarrow$ endotoxin translocation

$\uparrow$ insulin sensitivity $\downarrow$ metabolic inflammation directly on the liver, adipose tissue, and skeletal muscle

Regulate energy metabolism and appetite through the central nervous system indirectly $\downarrow$ obesity-related inflammation

TANAKA ET AL, 2025. 120 HUMANS. 12 WEEKS. 16S RRNA GENE SEQUENCING

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GLP 1 agonists and SIBO?

Plausible – does slow down gastric motility and alter the migrating motor complex.

ALQIREM ET AL 2025

Retrospective study – 2M patients - outcome was new dx of SIBO following GLP 1 RA exposure – conclusions risk was low (and lowest with tirzepatide and semaglutide)

SUN ET AL 2025

Also retrospective study – 216, 173 T2DM patients, short term (< 1 year) and long term (up to 5 years) evaluated – statistically significant but when converted to meaningful numbers at 12 months is a risk of about 1 in 5,650 people.

DAMIANOS ET AL 2025

Retrospective 99 T2DM patients – testing for methane overgrowth – a third tested positive.

REIS, L ET AL 2026

Systemic review (translated)– concluded there was insufficient research but was plausible

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Case study 1 – Weight and IBD

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Case Study 1 – Weight and IBD

BRIEF PATIENT HISTORY

Age: Mid-50s
Gender: AMAB

- 20yro dx ulcerative colitis – reports asymptomatic but still frequent loose stools
- Hx AUD (sober for 4 years)
- Reported weight gain over last decade decade
- 3 – 5 exercise sessions a week, mix of weights and cardio
- Sedentary desk role
- Diet – not the worst diet but overall not not enough protein or fibre

RX

- Purinethol 5mg
- Mirtazaine 15mg

GLP 1 AGONIST JOURNEY

- Commenced Mounjaro Nov 2025 – 2.5mg dose, then 5mg now tapering down at 2.5mg
- 15kg weight loss

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CASE 1 • OCT 2025

Microba test before GLP 1 / GIP agonist

High	Calprotectin *	1000.71 µg/g
Note: Calprotectin is a marker for acute intestinal inflammation and can estimate the degree of inflammation. Elevated level irritable bowel syndrome (IBS). Calprotectin levels can be used to monitor disease activity and relapse prediction in I seen in patients with bacterial diarrhea, C. difficile toxin and NSAID use. High calprotectin warrants further investigation		
High	Secretory IgA *	2622.93 µg/g
Note: Elevated secretory IgA is seen in patients with intestinal inflammation, intestinal permeability, IBS-D and autoimmune presentation.		
High	Lactoferrin *	140.36 µg/g
Note: Lactoferrin is a marker of intestinal inflammation. It is commonly used to monitor disease activity, treatment response elevated in patients with bacterial rather than non-infectious or viral acute diarrhea. Elevated levels may be associated investigation if the cause is unknown.		
Detected	Faecal Occult Blood	
Low	Faecal pH	5.04

High	Propionate producing microbes	28.85 %	+3.16
High	Trimethylamine producing microbes	7.23 %	+2.04
Low	Acetate producing microbes	54.13 %	-2.32
Low	Butyrate producing microbes	7.71 %	-3.06
Not Detected	IPA producing microbes	0.00 %	-
Borderline High	Hexa-LPS producing microbes	0.50 %	+0.79
Borderline High	BCAA producing microbes	70.21 %	+1.27
Low	Microbial Diversity	2.53^	-3.47
Low	Microbial Richness	53 species	-6.31

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Microba test before GLP 1 / GIP agonist

Just 53 species

6 oral species

No *Akkermansia muciniphila*

Faecalibacterium prausnitzii present

One bifo strain .39%

All

Bacteria (53)

Archaea (0)

Fungi (0)

Protists (0)

Oral Species (6)

Q

Search species...

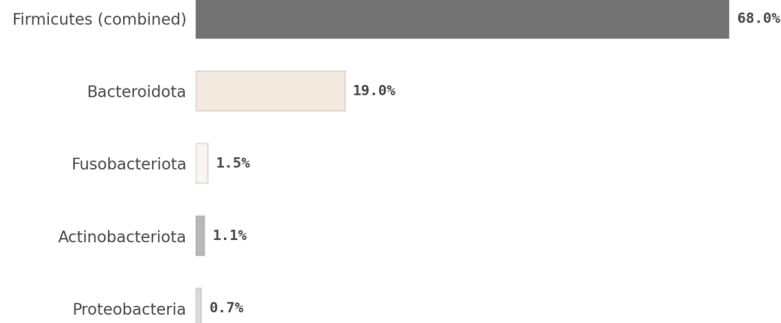
All Associations

All Species

T1	Species T1	Phylum T1	Prevalence T1	Relative Abundance % ↓	Distance from Average T1	
	Megamonas funiformis	Firmicutes_C	Less common	25.17 %	+2.48	More Info
	Blautia_A wexlerae	Firmicutes_A	Very common	12.64 %	+2.08	More Info
	Bacteroides_B vulgatus	Bacteroidota	Common	10.11 %	+1.65	More Info
	Bacteroides stercoris	Bacteroidota	Common	7.68 %	+2.21	More Info
	Fusicatenibacter saccharivorans	Firmicutes_A	Very common	7.52 %	+1.00	More Info
	Faecalibacterium prausnitzii_G	Firmicutes_A	Very common	5.77 %	+2.07	More Info
	Erysipelatoclostridium sp000752095	Firmicutes	Common	4.06 %	+2.34	More Info
	Tyzzerella nexilis	Firmicutes_A	Rare	2.72 %		More Info

Microba test before GLP 1 / GIP agonist

Oct 2025



Case Study 1 – Weight and IBD treatment

TREATMENT AFTER MICROBIOME TEST

- Very hands off – did not want too many interventions
- *Akkermansia muciniphila* Akk11
- Bovine collagen
- Omega 3 capsules (sporadically) – total EPA 1340mg, DHA 670mg
- Mixed prebiotic fibre (sporadically)
- Focus on plant / fish dietary protein and fibre – did not always achieve fibre target

Felt so good in the first month of being on tirzepatide that he ceased taking Purinethol



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CASE 1 · FEB 2026 · 3 MONTHS OF GLP 1 / GIP AGONIST

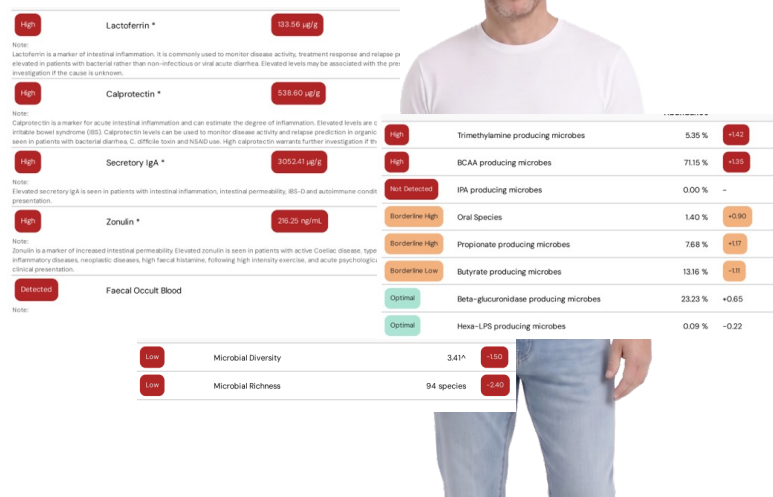
Microba test after three months

GUT MARKERS

Calprotectin halved
Lactoferrin slight drop
SIgA increased
Zonulin increased
Faecal pH now optimal

MICROBIAL FUNCTIONS

Propionate producers no longer high
TMA producers dropped a little
Diversity improved a little
Richness improved a little
Acetate and Butyrate no longer low



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Species and phylum shifts

41 more species detected

Megamonas ↓ 22.94%

E coli ↓ to 0.04%

Faecalibacterium prausnitzii ↑ 1.74%

Roseburia spp. detected now

Bifidobacterium ↑

Parabacteroides distasonis ↑ (.428 to 1.71)

PHYLUM LEVELS

Bacteroidota ↑ (19.03 to 30.49)

Firmicutes ↓ (68.03% to 52.22)

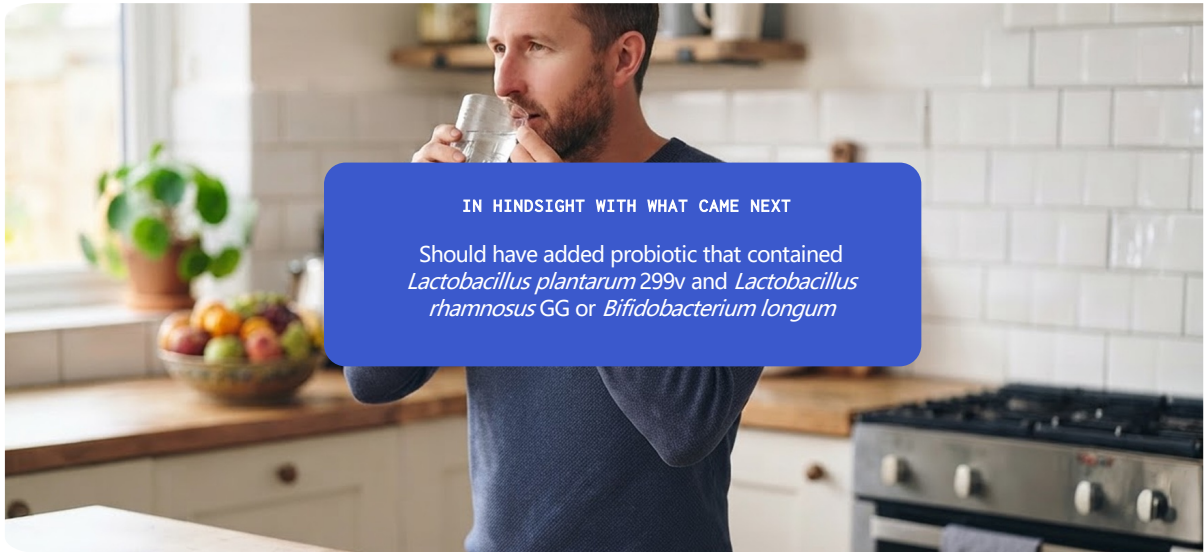
All Species					
Species	Phylum	Prevalence	Relative Abundance %	Distance from Average	
Bacteroides_B vulgatus	Bacteroidota	Common	12.57 %	+1.83	More Info
Bacteroides stercoris	Bacteroidota	Common	9.36 %	+2.37	More Info
Fusicatenibacter saccharivorans	Firmicutes_A	Very common	9.00 %	+1.18	More Info
Blautia_A wexlerae	Firmicutes_A	Very common	5.51 %	+1.15	More Info
Faecalibacterium prausnitzii_G	Firmicutes_A	Very common	4.47 %	+1.80	More Info
Bacteroides uniformis	Bacteroidota	Very common	3.37 %	+1.24	More Info
Faecalibacterium prausnitzii_D	Firmicutes_A	Very common	3.04 %	+1.83	More Info

Case Study 1 – Weight and IBD treatment

CONTINUED TREATMENT

- Akkermansia muciniphila Akk11
- More consistently - Mixed prebiotic fibre to increase butyrate producers (Acacia fibre, PHGG, Chicory, apple, flaxseed, psyllium, pectin)
- More consistently - Omega 3 - EPA 1200mg DHA 800mg
- Add dragon fruit juice and pomegranate juice combination
- Diet – consistent fibre, consistent protein with preference to plant and fish as proteins





IN HINDSIGHT WITH WHAT CAME NEXT

Should have added probiotic that contained *Lactobacillus plantarum* 299v and *Lactobacillus rhamnosus* GG or *Bifidobacterium longum*

CASE 1 · MAY 2026 · 6 MONTHS OF GLP 1 / GIP AGONIST

UC FLARE 6 months post GLP1 /GIP commencement

- Sig A, Calprotectin, Lactoferrin much higher than the first test
- BCAA increased
- Butyrate decreased
- TMA still reduced though
- Dropped 10 species (but still better than original of 53)
- Faecal pH still optimal

High	Secretory IgA *	3167.25 µg/g
High	Calprotectin *	> 2100.00 µg/g
High	Lactoferrin *	> 240.00 µg/g
Detected	Faecal Occult Blood	

Low	Microbial Richness	84 species	-2.77
Low	Microbial Diversity	3.27^	-1.81

High	BCAA producing microbes	76.57 %	+1.77
High	Propionate producing microbes	11.09 %	+1.72
Low	Butyrate producing microbes	11.56 %	-1.59
Low	IPA producing microbes	0.04 %	-1.84
Borderline High	Trimethylamine producing microbes	3.91 %	+0.77
Borderline High	Oral Species	1.78 %	+1.16

Case Study 1 – Weight and IBD treatment

- Added butyrate and HMOs

CONTINUED TREATMENT

- Akkermansia muciniphila Akk11
- Mixed prebiotic fibre to increase butyrate producers (Acacia fibre, PHGG, Chicory, apple, flaxseed, psyllium, pectin)
- Omega 3 - EPA 1200mg DHA 800mg
- Dragon fruit juice and pomegranate juice combination
- Diet – consistent fibre, consistent protein with preference to plant and fish as proteins
- Stress management strategies



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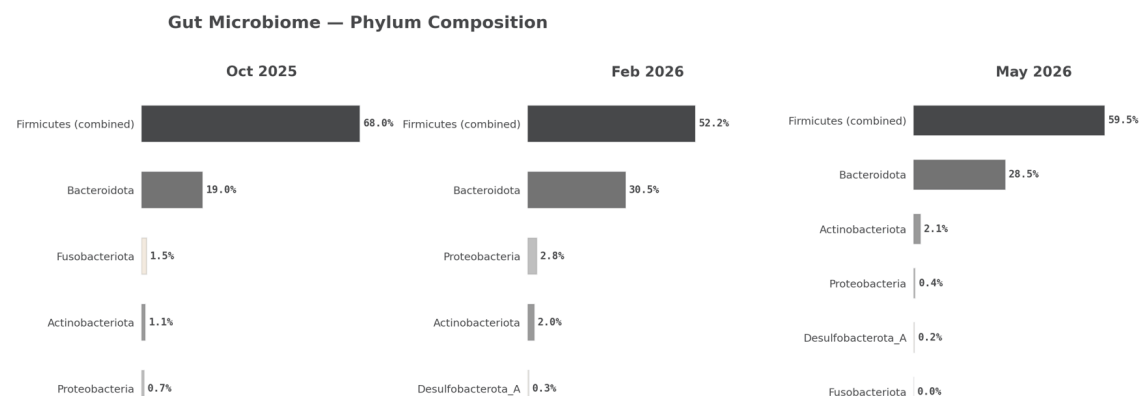
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CASE 1 · OCT 2025 · FEB 2026 · MAY 2026

Gut microbiome – phylum composition



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Case 1: Top 10 increased and decreased strains

Top 10 Species — Increased Relative Abundance (Oct 2025 → May 2026)

Changes measured from October 2025 to May 2026. All three timepoint values shown for context.

Species	Phylum	Oct 2025	Feb 2026	May 2026	Change (Oct → May)
Bacteroides_B vulgaris	Bacteroidota	10.11%	12.57%	16.92%	+6.81%
Ruminococcus_E bromii_B	Firmicutes_A	0.00%	0.78%	4.49%	+4.49%
Faecalibacterium prausnitzii_D	Firmicutes_A	0.00%	3.04%	2.75%	+2.75%
Gemmiger formicilis	Firmicutes_A	0.47%	1.81%	2.61%	+2.14%
Dorea longicatena_B	Firmicutes_A	0.00%	0.10%	1.99%	+1.99%
Blautia_A obeum	Firmicutes_A	0.00%	2.97%	1.97%	+1.97%
CAG-41 sp000066215	Firmicutes_A	0.00%	1.10%	1.91%	+1.91%
Coprococcus_B comes	Firmicutes_A	0.44%	1.62%	2.33%	+1.90%
Faecalibacterium lactaris	Firmicutes_A	0.00%	1.62%	1.74%	+1.74%
Bacteroides uniformis	Bacteroidota	0.40%	3.37%	2.04%	+1.64%

Top 10 Species — Decreased Relative Abundance (Oct 2025 → May 2026)

Changes measured from October 2025 to May 2026. All three timepoint values shown for context.

Species	Phylum	Oct 2025	Feb 2026	May 2026	Change (Oct → May)
Megamonas uniformis	Firmicutes_C	25.17%	2.23%	7.53%	-17.64%
Blautia_A westerae	Firmicutes_A	12.64%	5.51%	7.88%	-4.77%
Faecalibacterium prausnitzii_G	Firmicutes_A	5.77%	4.47%	1.50%	-4.28%
Tyzzerella nexilis	Firmicutes_A	2.72%	0.00%	0.00%	-2.72%
Ruminococcus_B gnavus	Firmicutes_A	2.05%	0.24%	0.15%	-1.90%
Bacteroides stercoris	Bacteroidota	7.68%	9.36%	5.96%	-1.72%
Erysipelatoclostridium sp000752095	Firmicutes	4.06%	1.50%	2.51%	-1.55%
Dorea longicatena	Firmicutes_A	1.55%	1.95%	0.27%	-1.28%
Fusobacterium_A MIC8057	Fusobacteriota	1.12%	0.00%	0.00%	-1.12%
Fusicatenibacter saccharivorans	Firmicutes_A	7.52%	9.00%	6.41%	-1.11%

MOSTLY RETROSPECTIVE STUDIES

Research on GLP 1 agonists and IBD

ZHONG ET AL 2025

review of 7 retrospective cohort studies (5M patients) found increased risk of incidence of colorectal cancer in patients taking GLP 1 RA, noting that the incidence of CRC was not high and consistent with other drugs

COLWILL ET AL 2025

A review of studies (retrospective studies) published from 2021 – 2025 showed some studies with favourable outcomes; reduced IBD hospitalisation, steroid use, CRP, bowel frequency while some showed no significant changes.

DENG ET AL 2025

GLP 1 receptors expressed on intestinal intraepithelial lymphocytes and other immune cells, GLP 1 RAs appear to modify T cell regulation, reducing proinflammatory cytokine production.

YEH ET AL 2026

Most recent on stable IBD patients on advanced therapies / immunomodulators / 5-aminosalicylates did not improve outcome overall. Except in 5-aminosalicylates or no IBD therapy – lower IBD treatment escalation

ALQINAI ET AL 2026

August 2026 – GLP 1 receptor agonist therapy is associated with increased symptomatic remission in UC vs matched controls (retrospective). Clinical improvement proceeding weight loss.

006

Could the microbiome influence the GLP 1 response?

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Could the microbiome influence GLP 1 efficacy?

Very little research exists

TSAI ET AL. 2022

52 T2DM diabetes patients treated with liraglutide or dulaglutide: 34 responders, 18 non-responders.

16s rRNA gene sequencing

Responder = reduction in Hba1c or BMI

Nonresponder = no change

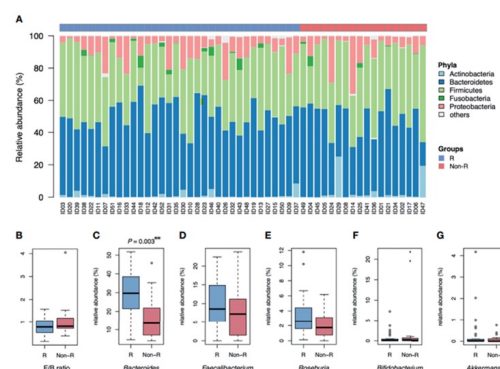


FIGURE 2 | Microbiota composition of type 2 diabetic patients receiving GLP-1 RA treatment: responders and non-responders. **(A)** The barplot is relative abundance of bacteria at the phylum level. Samples are in a sequence of HbA1c reduction across the x-axis. Bacteroidetes was the dominant taxa in most samples. **(B)** The Firmicutes/Bacteroidetes ratio (F/B) was not different between groups. **(C)** The relative abundance of Bacteroidetes was higher in responders than non-responders (** $P < 0.01$, Wilcoxon rank sum tests). **(D, E)** No significant difference in relative abundance of Faecalibacterium and Roseburia in both groups. **(F, G)** Bifidobacterium and Akkermansia were scarce in both groups. Groups are responders (R) and non-responders (Non-R). HbA1c, glycohemoglobin.

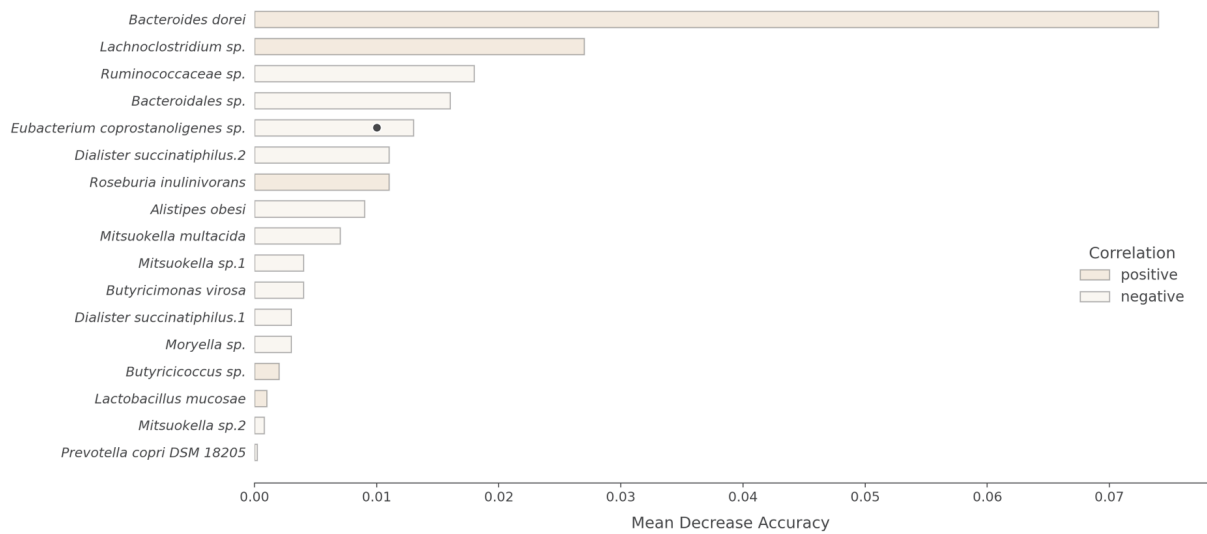
PHYLA AND SPECIES LEVEL

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Species level



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Speculative - metabolites that act like DPP4?

LEVALLEY ET AL. 2020

Some specific *Enterococcus faecalis* strains (in a dysbiotic environment) secrete a metabolite that degrades GLP 1, GIP, glucagon, leptin and PYY to a lesser extent.

Clostridium perfringens, *Clostridium bifermentans*, and *Clostridium butyricum* displays a degradation effect but much smaller than *E. faecalis*.

OLIVARES ET AL. 2024

Found genes that produced DPP4 like enzymes on *Parabacteroides* and *Porphyromonas*.

These strains enriched in patients with T2DM and this may play a role in T2DM.

Mice research on specific *Parabacteroides* strain confirmed enzymes degrade GLP-1, GIP, glucagon, leptin, and PYY—but only when gut barrier integrity is disrupted by high-fat diet or inflammation.

Noting that in both of these studies, the environment has to be dysbiotic for this effect to occur

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Speculative - Dysbiosis causes GLP-1 resistance through low GLP 1r expression?

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GRASSET ET AL., 2017 · 16S SEQUENCING

Healthy gut

GLP-1 binds to GLP1r in enteric nervous system

- NO release
- Vagus nerve
- brain
- Pancreas



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Dysbiotic gut

↓ peptidoglycans from gram-positive bacteria
e.g. some Lactobacillaceae + ↑ ammonia
production and amino acid production

= damage to enteric neurons

→ low GLP-1 receptor expression (ie ↓ number of
receptors)

→ ↓ NO signaling

→ ↓ signaling to brain

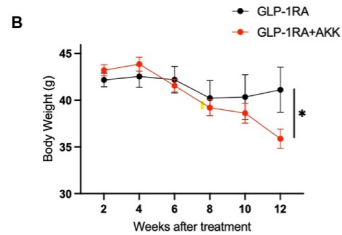


"In conclusion, we show here that in HFD-fed mice with T2D, a specific set of ileum bacteria hampers GLP-1r in the ENS which reduces GLP-1-induced NO production through a NOD2/TLR4/ CD14-dependant mechanism, hence preventing the activation of the gut-brain-periphery axis for the control of insulin secretion and gastric emptying"

Probiotics to support GLP 1 agonists efficacy?

GAO ET AL 2026

Combination of GLP-1 receptor agonist and Akkermansia muciniphila Akk11 reduces adiposity and ameliorates MASLD in T2D mice



Mattoli et al 2025 · probiotics in incretin-based therapy for patients living with obesity: a synergistic approach

	MATTOLI STUDY (LIRAGLUTIDE + PROBIOTIC)	PI-SUNYER 2015 STUDY (LIRAGLUTIDE ONLY)
Liraglutide dose	1.2-1.8 mg/day	3mg / day
Weight (kg)	- 8.08 ± 3.56	- 8.4 ± 7.3
BMI	- 3.02 ± 1.34	- 3.0 ± 2.6
WC (cm)	- 8.38 ± 3.65	- 8.2 ± 7.3

MULTI STRAIN CONTAINING

Bifidobacterium bifidum W23, Bifidobacterium lactis W52, Bifidobacterium lactis W51, Lactobacillus acidophilus W37, Lactobacillus brevis W63, Lactobacillus casei W56, Lactobacillus salivarius W24, Lactococcus lactis W19, Lactococcus lactis W58

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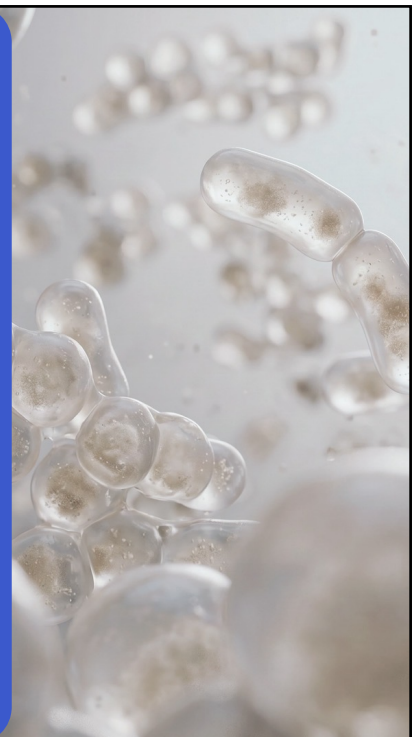
50

007

Case 2 – Low responder to GLP 1 agonist with PPI

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Case 2 - Low responder to GLP 1 agonist with PPI

BRIEF PATIENT HISTORY

Age: late 60s post menopause
Gender: AFAB

- Weight gain in the last 5 years – active whole life
- ? Family and genes (dghtr gastric sleeving)
- 3 x mixed cardio with weights session + 2 weights sessions a week
- Diet – good protein and fibre intake, 4 – 5 alcoholic drinks on the weekend

RX

- PPI use for Barretts oesophagus

GLP 1 AGONIST JOURNEY

- Previous trial of Wegovy resulted in no weight loss
- Restarted under care of GP specialising in Metabolic Care Dec 2025
- Currently Wegovy 2.4mg (highest dose)

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CASE 2 · LOW RESPONDER TO GLP 1 AGONIST

Microba test

High	Secretory IgA *	5240.26 µg/g
Borderline High	Calprotectin *	56.10 µg/g
High	Hydrogen sulphide producing microbes	11.90 % +161
High	Propionate producing microbes	9.66 % +151
High	Hexa-LPS producing microbes	8.24 % +247
High	Trimethylamine producing microbes	11.28 % +296
Borderline High	Beta-glucuronidase producing microbes	25.13 % +0.84
Borderline High	BCAA producing microbes	66.02 % +0.92
Optimal	Microbial Richness	185 species -0.13
Optimal	Mucin Degradation	605.78* -0.21

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Species detected

Look at those top four microbes!

All the LPS producers were E coli strains

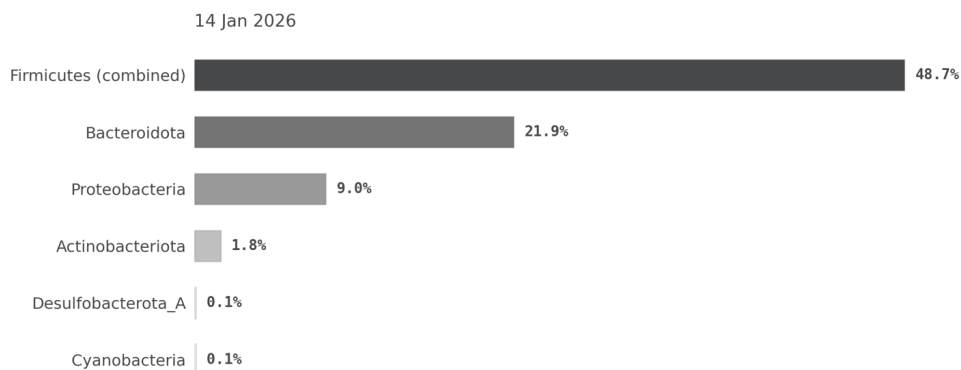
OTHER THINGS OF NOTE

Good butyrate producers, low Bifido,
small level Bilophila wadsworthia, no Akkermansia
muciniphila

T1	Species T1	Phylum T1	Prevalence T1	Relative Abundance %	Distance from Average T1	More Info
	Escherichia coli (coli_D)	Proteobacteria	Less common	7.75 %	+3.12	More Info
	Bacteroides eggertii	Bacteroidota	Common	7.11 %	+2.16	More Info
	Bacteroides uniformis	Bacteroidota	Very common	4.35 %	+1.49	More Info
	Bacteroides_B vulgatus	Bacteroidota	Common	3.61 %	+0.82	More Info

Species detected

Microbiome Phylum Composition



Could the species matter?

Species present vs literature re responder's vs nonresponders

ORGANISM	DETECTED AS	EFFECT DIRECTION
<i>Clostridium perfringens</i> / <i>C. bifermentans</i> / <i>C. butyricum</i>	<i>Clostridium</i>	Negative (GLP-1 reduction)
<i>Parabacteroides merdae</i> (DPP4-like enzyme)	<i>Parabacteroides merdae</i>	Negative (incretin inactivation)
<i>Prevotella copri</i>	<i>Prevotella copri</i>	Negative (GLP-1RA non-response)
<i>Dialister succinatiphilus</i> / <i>Dialister</i> spp.	<i>Dialister</i>	Negative (GLP-1RA non-response)
<i>Alistipes obesi</i>	<i>Alistipes</i>	Negative (GLP-1RA non-response)
<i>Butyricimonas virosa</i>	<i>Butyricimonas</i>	Negative (GLP-1RA non-response)
<i>Roseburia inulinivorans</i>	<i>Roseburia inulinivorans</i>	Positive (GLP-1RA response)
<i>Bacteroides</i> genus	<i>Bacteroides</i>	Positive (GLP-1RA response)

Case 2 – Low responder to GLP 1 agonist

TREATMENT PLAN (JANUARY)

- Combination strain for E Coli
- *Bifidobacterium bifidum* W23, *Bifidobacterium lactis* W51,
- *Bifidobacterium lactis* W52, *Lactobacillus acidophilus*
- W37, *Lactobacillus brevis* W63, *Lactobacillus casei* W56, *Lactobacillus salivarius* W24, *Lactococcus lactis* W19, and *Lactococcus lactis* W58 Prebiotic; GOS
- Mixed fibre with Acacia fibre, PHGG, slippery elm, pectin, cacao, red dragon fruit
- GOS with *Lactobacillus plantarum* (HEAL 9) (DSM 15312) and *Lactobacillus paracasei* (8700:2) (DSM 13434)
- Omega 3 – EPA 1200mg DHA 800mg added in April

UPDATE

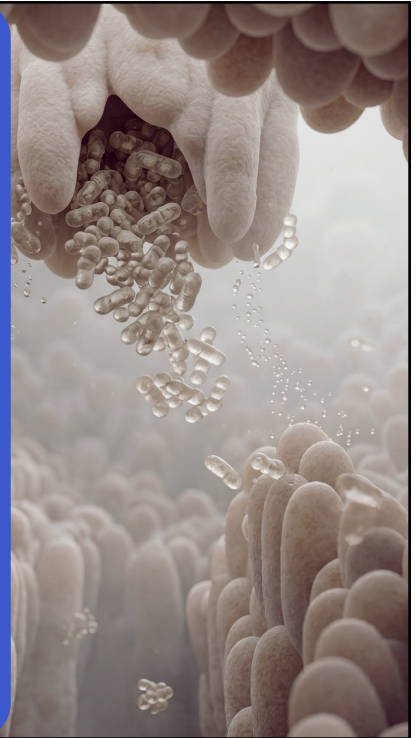
She has not done her next microbiome test (she detests doing them)

As of July 2026 she has lost 9kg

008

Case 3 – Slow responder to GLP 1 / GIP agonist with CVD

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Case 3 - Slow responder to GLP 1/ GIP agonist with CVD

BRIEF PATIENT HISTORY

Mid 50s YO AFAB

- 40yro MACE
- Ex smoker (given up for 10 years)
- Larger bodied for most of life, currently classified as obese
- Trains 2 x weekly (mix of weights and cardio) and 2 walks
- Diet – Better than was Protein and veg focused but has a love of processed carbs. Drinks between 5 – 10 drinks on a weekend.

RX

- Tritace 10mg (ACE inhibitor)
- Betaloc 50mg (beta blocker)
- Lipitor 40mg (atorvastatin)
- Cartia (aspirin)

GLP 1 AGONIST JOURNEY

- Commenced Mounjaro Oct 2025 – currently 7.5ml – 12kg weight loss

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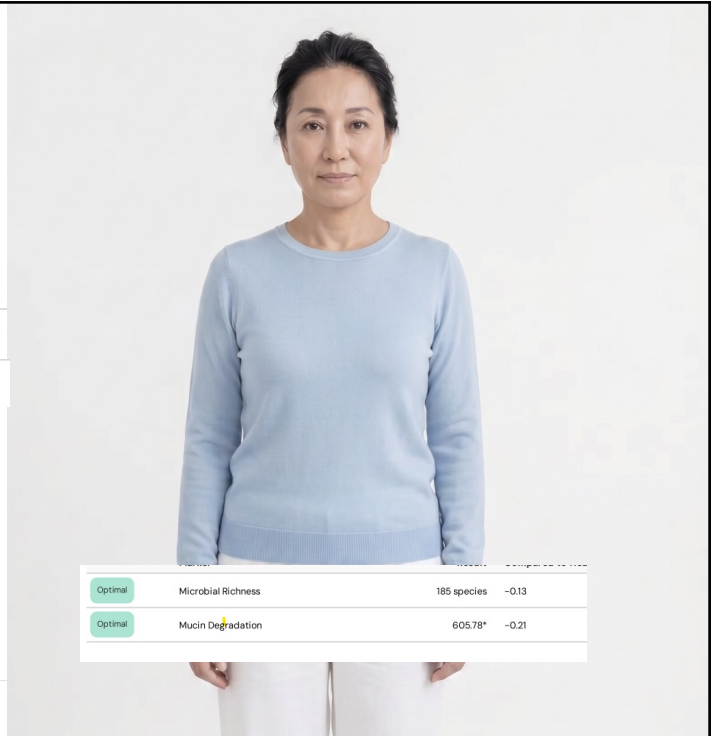
Microba test, slow responder with CVD – before GLP1 / GIP

High	Secretory IgA *	5240.26 µg/g
Borderline High	Calprotectin *	56.10 µg/g

High	Hydrogen sulphide producing microbes	11.90 %	+1.61
High	Propionate producing microbes	9.66 %	+1.51
High	Hexa-LPS producing microbes	8.24 %	+2.47
High	Trimethylamine producing microbes	11.28 %	+2.96
Borderline High	Beta-glucuronidase producing microbes	25.13 %	+0.84
Borderline High	BCAA producing microbes	66.02 %	+0.92

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Species detected

Megamonomas (as per our prev case) may be associated with obesity & colorectal cancer (Wu et al 2024),

High levels of *Prevotella copri* & *Bacteroides vulgaris* also associated with obesity (Pederson et al 2016)

Some *Blautia* spp. associated with IBS & ↑ body fat (Pecyna et al 2025). Some associated with ↓ obesity and T2DM (Hosomi et al 2022)

All

Bacteria (112)

Archaea (0)

Fungi (0)

Protists (0)

Oral Species (1)

Q Search species...

All Associations

All Species

TS	Species TS	Phylum TS	Prevalence TS	Relative Abundance %	Distance from Average TS	
0	Prevotella copri	Bacteroidota	Less common	12.27 %	+0.97	More Info
0	Megamonas funiformis	Firmicutes_C	Less common	7.32 %	+1.70	More Info
0	Agathobacter rectale	Firmicutes_A	Common	7.05 %	+1.17	More Info
0	Bacteroides_B vulgaris	Bacteroidota	Common	6.09 %	+1.24	More Info
0	Ruminococcus_E bromii_B	Firmicutes_A	Common	4.12 %	+0.52	More Info
0	Blautia_A wexlerae	Firmicutes_A	Very common	3.79 %	+0.73	More Info
0	Dialister invisus	Firmicutes_C	Less common	3.05 %	+2.01	More Info
0	Alistipes	Bacteroidota	Rare	3.03 %		More Info

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Species present vs literature on responders vs nonresponders

ORGANISM	DETECTED AS	EFFECT DIRECTION
<i>Clostridium perfringens</i> / <i>C. bifermentans</i> / <i>C. butyricum</i>	<i>Clostridium</i>	Negative (GLP-1 reduction)
<i>Parabacteroides merdae</i> (DPP4-like enzyme)	<i>Parabacteroides merdae</i>	Negative (incretin inactivation)
<i>Prevotella copri</i>	<i>Prevotella copri</i>	Negative (GLP-1RA non-response)
<i>Dialister succinatiphilus</i> / <i>Dialister spp.</i>	<i>Dialister</i>	Negative (GLP-1RA non-response)
<i>Alistipes obesi</i>	<i>Alistipes</i>	Negative (GLP-1RA non-response)
<i>Butyricimonas virosa</i>	<i>Butyricimonas</i>	Negative (GLP-1RA non-response)
<i>Roseburia inulinivorans</i>	<i>Roseburia inulinivorans</i>	Positive (GLP-1RA response)
<i>Bacteroides</i> genus	<i>Bacteroides</i>	Positive (GLP-1RA response)

Treatment after microbiome test

001

Mixed prebiotic fibre

FOS, PHGG, green banana - starch, oats - beta-glucan

002

Omega 3

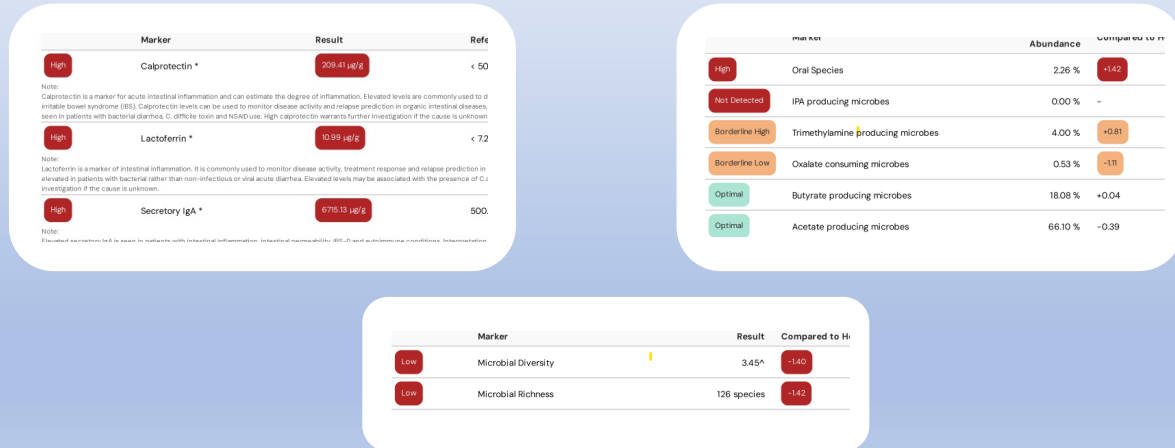
EPA 1200mg DHA 800mg

003

Reduce red meat

Reduce red meat, increase plant and vegetables, try to lay off the carbs

Microba test, slow responder with CVD – 3 months after commencing GLP1 / GIP



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Species and phylum shifts

Increase 14 species

Prevotella ↑ 12.27 to 20.40

Faecalibacterium prausnitzii ↑ 6.05 to 7.51

Small Roseburia spp. ↑

Still no Bifidobacterium

Bacteroidetes ↑ 26.98 to 31.47

Firmicutes ↓ 59.03 to 52

All	Bacteria (126)	Archaea (0)	Fungi (0)	Protists (0)	Oral Species (4)
Q Search species...					
All Associations					
All Species					
Species	Phylum	Prevalence	Relative Abundance %	Distance from Average	
Prevotella copri	Bacteroidota	Less common	20.40 %	+1.28	More Info
Agathobacter rectale	Firmicutes_A	Common	7.57 %	+1.23	More Info
Fusicatenibacter saccharivorans	Firmicutes_A	Very common	3.93 %	+0.37	More Info
Bacteroides_B vulgatus	Bacteroidota	Common	3.59 %	+0.81	More Info
Megamonas funiformis	Firmicutes_C	Less common	3.57 %	+1.25	More Info
Ruminococcus_E bromii_B	Firmicutes_A	Common	3.19 %	+0.32	More Info
Alistipes sp900290115	Bacteroidota	Rare	3.05 %		More Info

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Treatment

Change mixed prebiotic fibre to promote butyrate producers but reduce Prevotella dominance (Mixed fibre with Acacia fibre, PHGG, slippery elm, pectin, cacao, red dragon fruit)

Dragonfruit juice powder

Omega 3 – EPA 1200mg DHA 800mg

Diet support; Reduce simple carbs; transition to millet, rye. Avoid white rice, potato, pasta, noodles. Continue to reduce red meat, transition to Med Diet style.

Letter to GP re the elevated Calprotectin

Retest in 3 months

Microba test, slow responder with CVD – 7 months after commencing GLP1 / GIP

	Marker	Result	Reference Range
Optimal	Secretory IgA *	1481.91 µg/g	500.00 µg/g – 2000.00 µg/g
Optimal	Lactoferrin *	< 0.42 µg/g	< 720 µg/g
Optimal	Calprotectin *	21.32 µg/g	< 50.00 µg/g
Optimal	Zonulin *	52.60 ng/mL	< 100.00 ng/mL
Optimal	Pancreatic Elastase *	532.89 µg/mL	≥ 200.00 µg/mL
Not Detected	Faecal Occult Blood		

High	Oral Species	216 %	+137
Low	Oxalate consuming microbes	0.44 %	-132
Not Detected	IPA producing microbes	0.00 %	-
Borderline High	Propionate producing microbes	7.57 %	+114
Optimal	Hexa-LPS producing microbes	0.05 %	-0.57

	Marker	Result	Reference Range
Low	Microbial Diversity	3.17^	-203
Low	Microbial Richness	107 species	-194

Species detected

Prevotella marginal drop

Agathobacter ↑ 7.99

Faecalibacterium prausnitzii ↓ 7.51 to 5.16

Still no Bifidobacterium

Still no Akkermansia

All	Bacteria (107)	Archaea (0)	Fungi (0)	Protists (0)	Oral Species (4)
Q Search species...					
All Associations					
All Species					
↑↓	Species ↑↓	Phylum ↑↓	Prevalence ↑↓	Relative Abundance % ↓	Distance from Average ↑↓
⊖	Prevotella copri	Bacteroidota	Less common	19.05 %	+1.24
⊕	Agathobacter rectale	Firmicutes_A	Common	15.56 %	+1.78
○	Megamonas funiformis	Firmicutes_C	Less common	6.44 %	+1.62
○	Blautia_A wexlerae	Firmicutes_A	Very common	3.60 %	+0.67
⊖	Bacteroides_B vulgatus	Bacteroidota	Common	3.44 %	+0.78
⊕	Faecalibacterium prausnitzii_K	Firmicutes_A	Common	2.78 %	+1.04

Treatment

Continue mixed fibre with Acacia fibre, PHGG, slippery elm, pectin, cacao, red dragon fruit

Omega 3 – EPA 1200mg DHA 800mg

Dragon fruit juice powder, added pomegranate juice powder

Introduce Pomegranate peel capsule, may reduce the Prevotella (Lebrun et al 2025)

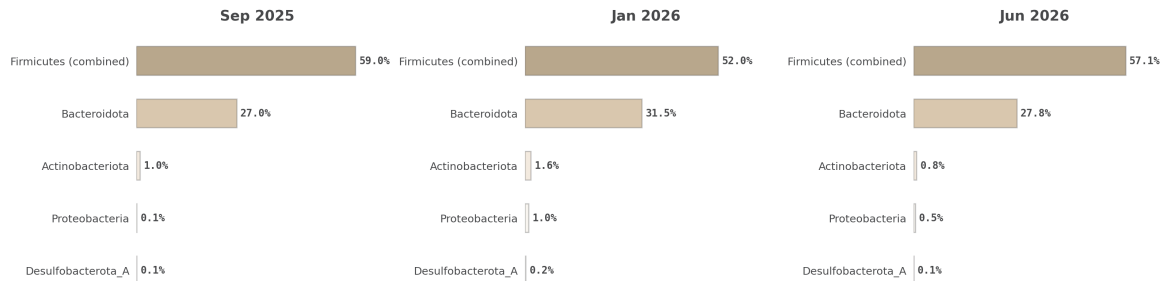
Diet support; Reduce simple carbohydrates; transition to quinoa, millet, rye. Avoid white rice, potato, pasta, noodles. Continue to reduce red meat, transition to Med Diet style.

Stop the Optifast shakes as they have inulin in them (3 mornings a week – no, I didn't know for months, another lesson!) and transition to plainer protein powder

Retest in another 3 months

Gut microbiome – phylum composition

Gut Microbiome — Phylum Composition



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Case 3 - Slow responder to GLP 1/ GIP agonist – top 10 species decreased and increased

Top 10 Species — Increased Relative Abundance (Sep 2025 → Jun 2026)

Changes measured from September 2025 to June 2026. All three timepoint values shown for context.

Species	Phylum	Sep 2025	Jan 2026	Jun 2026	Change (Sep→Jun)
Agathobacter rectale	Firmicutes_A	7.05%	7.57%	15.56%	+8.50%
Prevotella copri	Bacteroidota	12.27%	20.40%	19.05%	+6.78%
Faecalibacterium prausnitzii_K	Firmicutes_A	1.12%	2.75%	2.78%	+1.66%
Agathobacter faecis	Firmicutes_A	0.00%	0.00%	0.68%	+0.68%
Coprococcus sp000066115	Firmicutes_A	0.00%	0.20%	0.58%	+0.58%
CAG-56 sp000066615	Firmicutes_A	0.19%	0.44%	0.72%	+0.53%
Terrisporobacter MIC205	Firmicutes_A	0.00%	0.22%	0.45%	+0.45%
Gemmiger sp003476825	Firmicutes_A	0.00%	0.99%	0.40%	+0.40%
KLE1615 sp000066985	Firmicutes_A	0.82%	0.62%	1.16%	+0.34%
CAG-41 sp000066215	Firmicutes_A	0.31%	0.17%	0.63%	+0.32%

Top 10 Species — Decreased Relative Abundance (Sep 2025 → Jun 2026)

Changes measured from September 2025 to June 2026. All three timepoint values shown for context.

Species	Phylum	Sep 2025	Jan 2026	Jun 2026	Change (Sep→Jun)
Bacteroides_B vulgatus	Bacteroidota	6.09%	3.59%	3.44%	-2.66%
Faecalibacterium prausnitzii_D	Firmicutes_A	2.65%	1.78%	0.36%	-2.29%
Ruminococcus_E bromii_B	Firmicutes_A	4.12%	3.19%	2.09%	-2.03%
Ruminococcus_A sp000437095	Firmicutes_A	2.50%	0.78%	0.51%	-1.99%
Faecalicatena lactaris	Firmicutes_A	1.54%	1.34%	0.46%	-1.09%
Megamonas funiformis	Firmicutes_C	7.32%	3.57%	6.44%	-0.88%
Alistipes sp000290115	Bacteroidota	3.03%	3.05%	2.16%	-0.87%
Eubacterium_E hallii	Firmicutes_A	1.49%	0.58%	0.76%	-0.73%
Alistipes putredinis	Bacteroidota	1.08%	1.31%	0.37%	-0.71%
Parabacteroides merdae	Bacteroidota	1.06%	0.69%	0.40%	-0.66%

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Research on GLP 1 agonists, CVD & inflammation

KRUGER ET AL 2026

Tirzepatide reduced the risk of MACE in T2DM and established atherosclerotic CVD vs standard of care

Also, markedly lower risk of infections leading to hospital admissions - suggesting the benefit may be beyond the atherosclerotic mechanisms

PLUTZKY ET AL 2026

Semaglutide reduced hsCRP and risk of MACE in overweight but not diabetic patients with atherosclerotic CVD.

Reduction preceded major weight loss and also occurred in those without weight loss. It was also independent of LDLs and statin use, suggesting anti-inflammatory impact.

HUGE note – most research on the gut microbiome impacts have been on injectables only

There is one mice study on oral semaglutide and the gut microbiome.

Oral semaglutide uses an absorption enhancer, salcaprozate sodium (SNAC)

In a 21 day rat study, SNAC;

Significantly altered beta diversity,

Depleted some primary fermenters,

Reduced faecal butyrate concentrations,

Elevated TNF α and suppressed BDNF

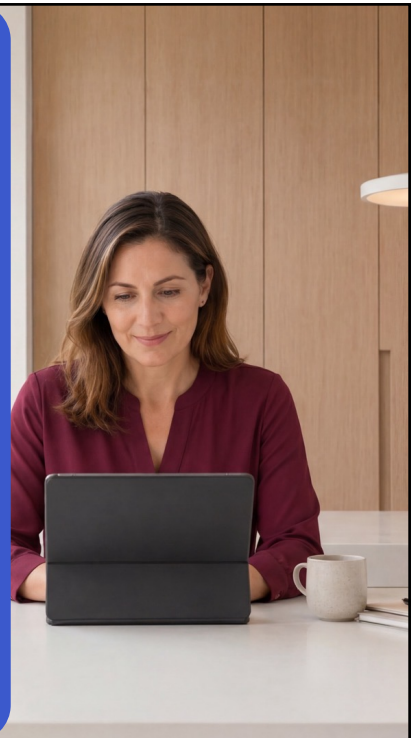
(ARIAEE ET AL 2026)

There are no studies on the oral non peptide small molecule GLP 1 agonist, orforglipron, and the gut microbiome.

009

Putting it all together – what does it mean in clinic

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Putting it all together – what does it mean in clinic?

POTENTIALLY HELPFUL INTERVENTIONS	EXAMPLES
Promoting butyrate and other SCFA producing bacteria	Diet - Med diet, low sat fat, high fibre, polyphenols, reduce simple carbs, transition to whole grain, berries Prebiotic fibres as needed – lactulose, PHGG, GOS, (FOS with caution in Prevotella), acacia fibre, HMO
Reducing LPS producing bacteria	Selective prebiotics as per above Selective antimicrobials (caution re essential oil antimicrobials) Probiotics – Saccharomyces boulardii (BIOCODEX), LGG, combination as per prev. slides Postbiotics - Akkermansia muciniphila Akk11
Reducing intestinal inflammation	Increase butyrate and IPA producers Glutamine, Zinc carnosine, Aloe Vera, Curcumin, Alpha Lipoic Acid, etc Probiotics - L.reuturi, Saccharomyces boulardii (BIOCODEX), LGG,
Supporting secondary bile acid formation	Bitter herbs! Polyphenols
Supporting IPA?	Tryptophan containing foods, green tea, walnuts, soy, polyphenols in general, berries
Support enteric neurons / Vagus nerve (bit more out of the box)	Foods high in Nitrates (beets, green leaf), L arginine (caution with high amine producers), Vagus nerve activities (breathing exercises, humming, singing etc)

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In Summary

001

For some patients, GLP 1 receptor agonists may have a positive impact on gut function through anti-inflammatory actions

002

Dysbiotic microbiomes, (e.g. high amine, ammonia & LPS producers) may be associated with lower responders (WAY more research needed)

003

Whilst research is sparse – its reasonable given what we know about the relationship between EEC's, microbiome and the enteric neurons – that supporting the microbiome through probiotics, postbiotics and prebiotics, diet & specific supplements to support the overall health of the gut & microbiome may enhance efficacy for some patients

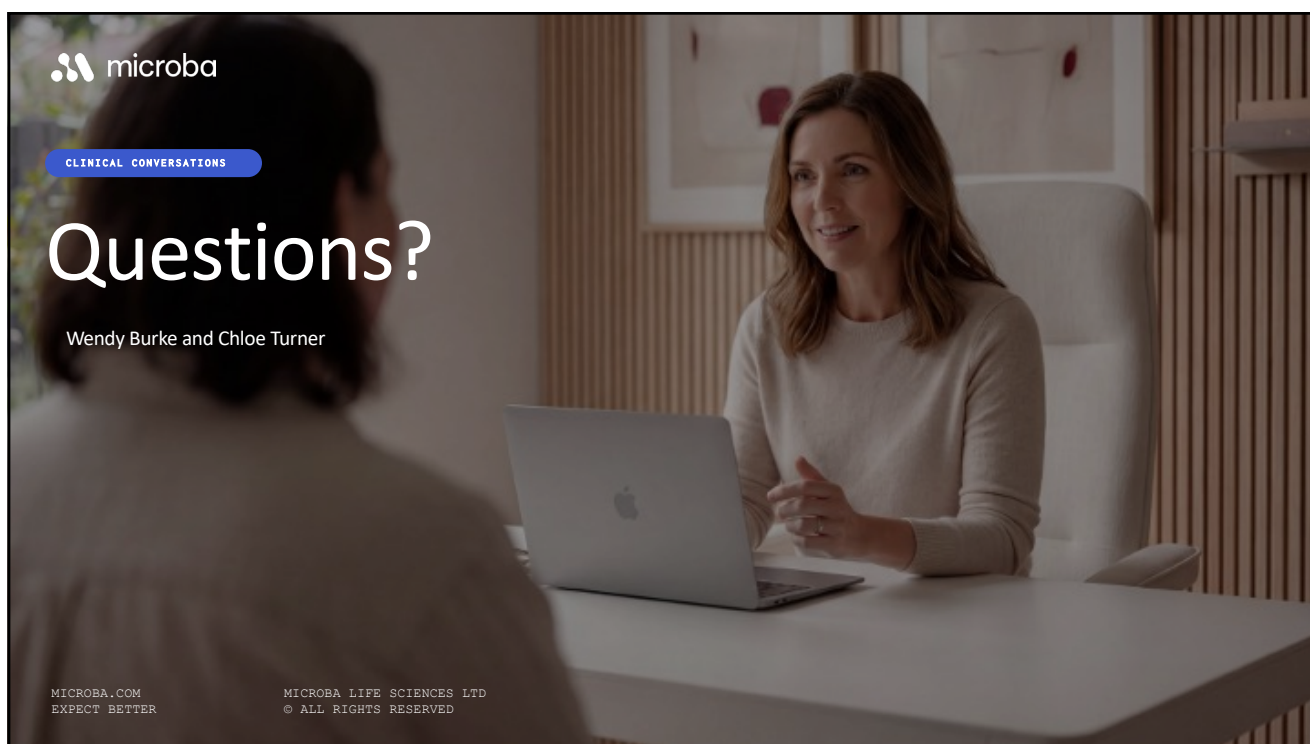
004

Longer term impacts (greater than 3 months) of GLP 1 RAs are still largely unknown – very likely will be entirely depended on diet & supplement strategy during treatment

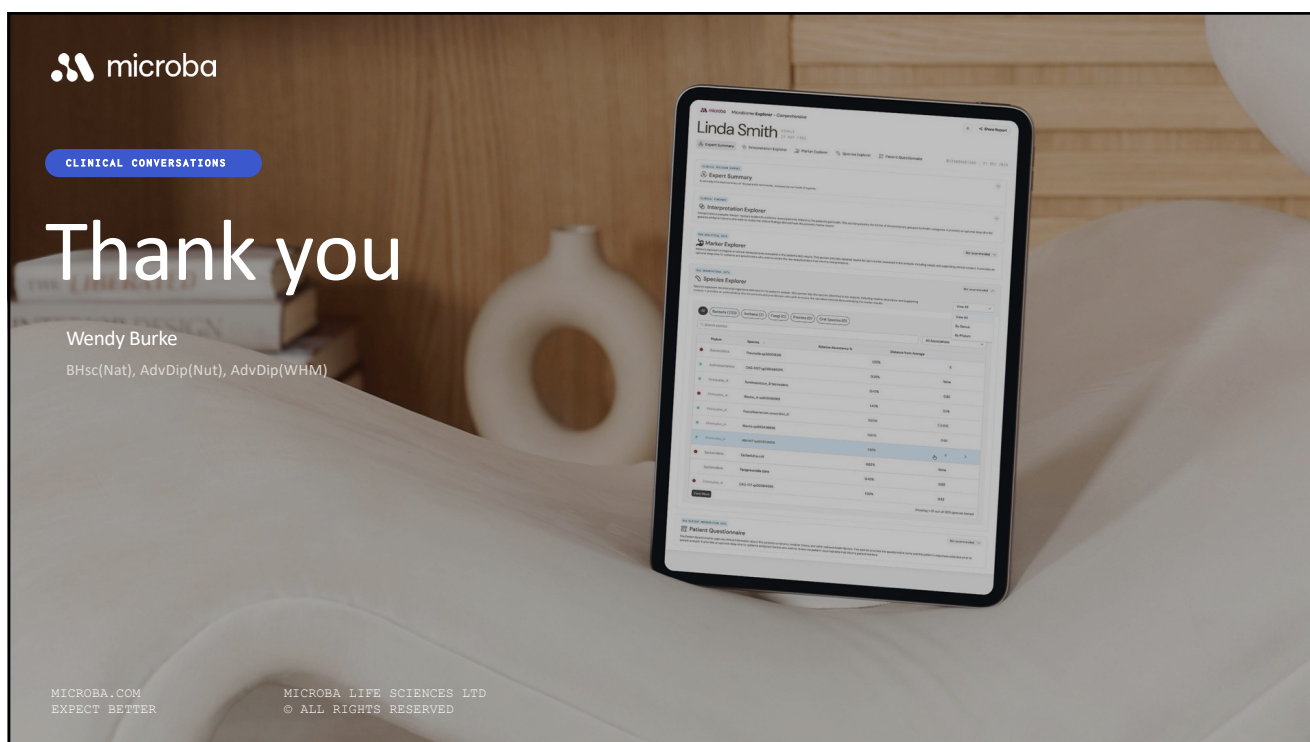
FINAL NOTE

Supporting the microbiome is just one aspect of support.

Movement+++, diet +++, stress management (including joy and purpose), sleep quality, relationship to food - to self - to others, screen time vs outside time should form part of holistic strategy.



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References

References 1 / 5

Alqinai, B., Gayam, S., Hadam-Veverka, J., (2026), GLP 1 receptor agonist therapy is associated with increased symptomatic remission in ulcerative colitis: a matched cohort study. *Inflammatory Bowel Diseases*, , 00(00), 1–10. <https://doi.org/10.1093/ibd/izag167>

Alharbi, S. (2024). Anti-inflammatory role of glucagon-like peptide 1 receptor agonists and its clinical implications. *Therapeutic Advances in Endocrinology and Metabolism*, 15. <https://doi.org/10.1177/20420188231222367>

AlQirem, L., Devarapalli, S., Guzman, A., Qirem, M., & Ali, M. A. (2025). S3058 Comparative Risk of Small Intestinal Bacterial Overgrowth (SIBO) Among Patients Using GLP-1 Receptor Agonists: A Real-World Analysis Using TriNetX. *American Journal of Gastroenterology*, 120(10S2), S658-S658. <https://doi.org/10.14309/01.aig.0001139692.64685.f8>

Ariaee, A., Noueihad, K., Hunter, A., Wignall, A., Wardill, H. R., Davies, M., Prestidge, C. A., & Joyce, P. (2026). Gut microbiota perturbation and systemic inflammation are associated with salcaprozate sodium (SNAC)-enabled oral semaglutide delivery. *Journal of controlled release : official journal of the Controlled Release Society*, 392, 114711. <https://doi.org/10.1016/j.jconrel.2026.114711>

Chen, Y., Shan, Y., Wang, T., Liu, Z., Zhao, Z., & He, Y. (2025). The Effect of Semaglutide on Gut Microbiota in Chinese Patients with Type 2 Diabetes Poorly Controlled by Metformin. *Diabetes, metabolic syndrome and obesity : targets and therapy*, 18, 3865–3881. <https://doi.org/10.2147/DMSO.S537001>

Colwill, M., Povlsen, S., Pollok, R., Patel, K., Goodhand, J., Ahmad, T., & Honap, S. (2025). Glucagon-like peptide-1 (GLP-1) receptor agonists in inflammatory bowel disease: mechanisms, clinical implications, and therapeutic potential. *Journal of Crohn's & colitis*, 19(9), jjaf167. <https://doi.org/10.1093/ecco-jcc/jjaf167>

Damianos, J. A., Fredrick, T. W., Jin, M. F., Ospina-Velasquez, L., & Wang, X. J. (2025). GLP-1 Receptor Agonist Use Is Associated With Small Intestinal Bacterial Overgrowth and Intestinal Methanogen Overgrowth. *Foregut*, 5, 433 - 437. <https://doi.org/10.1177/26345161251353437>

Deng S, Chen Z, Shi Y. Roles of glucagon-like peptide 1 receptor agonists in immune cell biology and autoimmune/autoinflammatory diseases. *Cell Biosci*. 2025 Oct 10;15(1):137. doi: 10.1186/s13578-025-01486-8. PMID: 41074143; PMCID: PMC12512578.

Desai, A., Petrov, J., Hashash, J., Patel, H., Brahmabhatt, B., Kochhar, G., & Farraye, F. (2024). Use of glucagon-like peptide-1 receptor agonists for type 2 diabetes mellitus and outcomes of inflammatory bowel disease. *Alimentary Pharmacology & Therapeutics*, 60(5), 620-632.

Dong, C, Zhou, B, Zhao, B, Lin, Tian, Y, Zhang, R, Xie, D, Wu, S, Yang, L. (2025), GLP-1RAs attenuated obesity and reversed leptin resistance partly via activating the microbiome-derived inosine/A2A pathway. *Acta Pharmaceutica Sinica B*, 1 (2), 1023, <https://doi.org/10.1016/j.apsb.2024.12.006>

Drucker, D. J., & Holst, J. J. (2023). The expanding incretin universe: from basic biology to clinical translation. *Diabetologia*, 66(10), 1765–1779. <https://doi.org/10.1007/s00125-023-05906-7>

References 2 / 5

- Celletti, F., Farrar, J., & De Regil, L. (2026). World Health Organization Guideline on the Use and Indications of Glucagon-Like Peptide-1 Therapies for the Treatment of Obesity in Adults. *JAMA*, 335(5), 434–438. <https://doi.org/10.1001/jama.2025.24288>
- Chen, H., Lu, Y., Shi, S., Zhang, Q., Cao, X., Sun, L., An, D., Zhang, X., Kong, X., & Liu, J. (2022). Design and Development of a New Glucagon-Like Peptide-1 Receptor Agonist to Obtain High Oral Bioavailability. *Pharmaceutical research*, 39(8), 1891–1906. <https://doi.org/10.1007/s11095-022-03265-3>
- Gao, K., Yin, Z., Zhang, C., Dong, Z., Wang, R., Chen, Q., Liu, X., Jiang, C., Wang, Y., Guo, B., Zhou, Z., Jia, Z., Sun, H., & Feng, Y. (2026). Combination of GLP-1 receptor agonist and Akkermansia muciniphila Akk11 reduces adiposity and ameliorates MASLD in T2D mice. *Cell & bioscience*, 16(1), 18. <https://doi.org/10.1186/s13578-025-01525-4>
- Gofron, K. K., Wasilewski, A., & Malgorzewicz, S. (2025). Effects of GLP-1 Analogues and Agonists on the Gut Microbiota: A Systematic Review. *Nutrients*, 17(8), 1303. <https://doi.org/10.3390/nu17081303>
- Government of the United Kingdom, Government Office for Science (2007). Tackling Obesity: Future Choices – Obesity System Atlas
- Grasset, E., Puel, A., Charpentier, J., Collet, X., Christensen, J. E., Tercé, F., & Burcelin, R. (2017). A Specific Gut Microbiota Dysbiosis of Type 2 Diabetic Mice Induces GLP-1 Resistance through an Enteric NO-Dependent and Gut-Brain Axis Mechanism. *Cell metabolism*, 25(5), 1075–1090.e5. <https://doi.org/10.1016/j.cmet.2017.04.013>
- Hosomi, K., Saito, M., Park, J., Murakami, H., Shibata, N., Ando, M., Nagatake, T., Konishi, K., Ohno, H., Tanisawa, K., Mohsen, A., Chen, Y. A., Kawashima, H., Natsume-Kitatani, Y., Oka, Y., Shimizu, H., Furuta, M., Tojima, Y., Sawane, K., Saika, A., ... Kunisawa, J. (2022). Oral administration of *Blautia wexlerae* ameliorates obesity and type 2 diabetes via metabolic remodeling of the gut microbiota. *Nature communications*, 13(1), 4477. <https://doi.org/10.1038/s41467-022-32015-7>
- Krüger, N., Schneeweiss, S., & Wang, S. V. (2026). Tirzepatide and the risk of atherosclerotic cardiovascular events: population based cohort study. *BMJ (Clinical research ed.)*, 394, e100011. <https://doi.org/10.1136/bmj-2026-100011>
- Lebrun, S., Crevecoeur, S., Taminiau, B., Everaert, N., Marzorati, M., Leenders, J., de Tullio, P., Korsak, N., Daube, G., Stiennon, B., Delcenserie, V., & Gonza, I. (2025). Gut Microbiota Modulation by Pomegranate Extract: Insights from a Controlled Supplementation Study. *Plant foods for human nutrition (Dordrecht, Netherlands)*, 81(1), 5. <https://doi.org/10.1007/s11130-025-01454-0>
- LeValley, S. L., Tomaro-Duchesneau, C., & Britton, R. A. (2020). Degradation of the Incretin Hormone Glucagon-Like Peptide-1 (GLP-1) by *Enterococcus faecalis* Metalloprotease GelE. *mSphere*, 5(1), e00585-19. <https://doi.org/10.1128/mSphere.00585-19>
- Li, Z., Li, S., Wang, N., Xue, P., & Li, Y. (2020). Liraglutide, a glucagon-like peptide-1 receptor agonist, suppresses osteoclastogenesis through the inhibition of NF-κB and MAPK pathways via GLP-1R. *Biomedicine & Pharmacotherapy = Biomedecine & Pharmacotherapie*, 130, 110523. <https://doi.org/10.1016/j.biopha.2020.110523>

CLINICAL CONVERSATIONS MICROBA.COM · EXPECT BETTER

References 3 / 5

- Melson, E., Ashraf, U., Papamargaritis, D., & Davies, M. J. (2025). What is the pipeline for future medications for obesity?. *International journal of obesity* (2005), 49(3), 433–451. <https://doi.org/10.1038/s41366-024-01473-y>
- Masse, K. E., & Lu, V. B. (2023). Short-chain fatty acids, secondary bile acids and indoles: gut microbial metabolites with effects on enteroendocrine cell function and their potential as therapies for metabolic disease. *Frontiers in endocrinology*, 14, 1169624. <https://doi.org/10.3389/fendo.2023.1169624>
- Mattioli, Marco & D'Agostino, Elena & Valerii, Luca & Angelino, Donato & Serafini, Mauro & Cristofaro, Paolo. (2024). Probiotics In Incretin-Based Therapy for Patient Living with Obesity: A Synergistic Approach. *Journal of Pharmacy and Pharmacology Research*. 8. DOI:10.26502/fjppr.0102
- Olivares, M., Hernández-Calderón, P., Cárdenas-Brito, S., Liébana-García, R., Sanz, Y., & Benítez-Páez, A. (2024). Gut microbiota DPP4-like enzymes are increased in type-2 diabetes and contribute to incretin inactivation. *Genome biology*, 25(1), 174. <https://doi.org/10.1186/s13059-024-03325-4>
- Ó Cuív, P., de Wouters, T., Giri, R., Mondot, S., Smith, W. J., Blottière, H. M., Begun, J., & Morrison, M. (2017). The gut bacterium and pathobiont *Bacteroides vulgatus* activates NF-κB in a human gut epithelial cell line in a strain and growth phase dependent manner. *Anaerobe*, 47, 209–217. <https://doi.org/10.1016/j.anaerobe.2017.06.002>
- Pansai, N., Detarun, P., Chinnaworn, A., Sangsupawanich, P., & Wichienchot, S. (2023). Effects of dragon fruit oligosaccharides on immunity, gut microbiome, and their metabolites in healthy adults - A randomized double-blind placebo controlled study. *Food research international (Ottawa, Ont.)*, 167, 112657. <https://doi.org/10.1016/j.foodres.2023.112657>
- Pecyna, P., Bykowska-Derda, A., Gabryel, M., Mankowska-Wierzbicka, D., Nowak-Malczewska, D. M., Jaskiewicz-Rajewicz, K., Jaworska, M. M., Grzymislawski, M., Dobrowolska, A., Czaplak-Matysik, M., & Gajeka, M. (2025). *Blautia* spp. in the gut microbiome: Relation to dietary choices and to the nutritional status of patients with irritable bowel syndrome. *Nutrition (Burbank, Los Angeles County, Calif.)*, 138, 112836. <https://doi.org/10.1016/j.nut.2025.112836>
- Pedersen, H. K., Gudmundsdóttir, V., Nielsen, H. B., Hyötyläinen, T., Nielsen, T., Jensen, B. A., Forslund, K., Hildebrand, F., Prifti, E., Falony, G., Le Chatelier, E., Levenez, F., Doré, J., Mattila, I., Plichta, D. R., Pöhö, P., Helgren, L. I., Arumugam, M., Sunagawa, S., Vieira-Silva, S., ... Pedersen, O. (2016). Human gut microbes impact host serum metabolome and insulin sensitivity. *Nature*, 535(7612), 376–381. <https://doi.org/10.1038/nature18646>
- Plutzky, J., Bogdański, P., Colhoun, H. M., Dagdelen, S., Deanfield, J. E., Emerson, S. S., Hovingh, G. K., Kahn, S. E., Ekström, K., Latkovskis, G., Lehrke, M., Hardt-Lindberg, S., Lingvay, I., Nicholls, S. J., Kalayci Oral, T., Terns, P. P., Rasmussen, S., Ridker, P. M., Ryan, D. H., & Lincoff, A. M. (2026). Effect of Semaglutide on the Inflammatory Biomarker High-Sensitivity CRP in Patients With Established Cardiovascular Disease and Overweight or Obesity in SELECT: A Prespecified Secondary Analysis. *Circulation*, 10.1161/CIRCULATIONAHA.125.074482. Advance online publication. <https://doi.org/10.1161/CIRCULATIONAHA.125.074482>
- Qassab, M. al, Mneimneh, M., Jradi, A., Derbas, B., Dabboussi, D., Bains, J. K., Katrib, N., Chaarani, N., Attieh, P., Kanaan, A., Harb, F., Azar, S., & Ghadieh, H. (2025). The Expanding Role of GLP-1 Receptor Agonists: Advancing Clinical Outcomes in Metabolic and Mental Health. *Current Issues in Molecular Biology*, 47. <https://doi.org/10.3390/cimb47040285>

CLINICAL CONVERSATIONS MICROBA.COM · EXPECT BETTER

References 4 / 5

Reis, L., Yamamoto, É. Y., De Jesus, L. B. F., Saraiva, H. P., & Oliveira, É. S. (2026). Semaglutida e Tirzepatida: efeitos dos agonistas GLP-1/GIP na microbiota intestinal e potencial associação com SIBO.. Revista ft. <https://doi.org/10.69849/7wmx9h50>

Ren, X., Xu, J., Zhang, Y., Chen, G., Zhang, Y., Huang, Q., & Liu, Y. (2020). Bacterial Alterations in Post-Cholecystectomy Patients Are Associated With Colorectal Cancer. *Frontiers in oncology*, 10, 1418. <https://doi.org/10.3389/fonc.2020.01418>

Roh, E., & Choi, K. M. (2023). Hormonal Gut-Brain Signaling for the Treatment of Obesity. *International journal of molecular sciences*, 24(4), 3384. <https://doi.org/10.3390/ijms24043384>

Silva-Veiga, F. M., Marinho, T. S., de Souza-Mello, V., Aguilã, M. B., & Mandarim-de-Lacerda, C. A. (2025). Tirzepatide, a dual agonist of glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1), positively impacts the altered microbiota of obese, diabetic, ovariectomized mice. *Life sciences*, 361, 123310. <https://doi.org/10.1016/j.lfs.2024.123310>

Sun, H., Shu, J., Tang, J., Li, Y., Qiu, J., Ding, Z., Xuan, B., Chen, M., Gan, C., Lin, J., Qiu, J., Sheng, H., & Wang, C. (2024). GLP-1 receptor agonists alleviate colonic inflammation by modulating intestinal microbiota and the function of group 3 innate lymphoid cells. *Immunology*, 172, 451–468. <https://doi.org/10.1111/imm.13784>

Szulińska, M., Loniewski, I., van Hemert, S., Sobieska, M., & Bogdański, P. (2018). Dose-Dependent Effects of Multispecies Probiotic Supplementation on the Lipopolysaccharide (LPS) Level and Cardiometabolic Profile in Obese Postmenopausal Women: A 12-Week Randomized Clinical Trial. *Nutrients*, 10(6), 773. <https://doi.org/10.3390/nu10060773>

Tanaka, H., Nakamura, Y., Fujimoto, A., Sato, K., Suzuki, M., (2025), GLP1 receptor agonists attenuate systemic inflammation through microbiota mediated enrichment of *Faecalibacterium prausnitzii* and *Roseburia* spp, (advance preprint) <https://doi.org/10.1101/2025.09.07.674712>

Tsai, C. Y., Lu, H. C., Chou, Y. H., Liu, P. Y., Chen, H. Y., Huang, M. C., Lin, C. H., & Tsai, C. N. (2022). Gut Microbial Signatures for Glycemic Responses of GLP-1 Receptor Agonists in Type 2 Diabetic Patients: A Pilot Study. *Frontiers in endocrinology*, 12, 814770. <https://doi.org/10.3389/fendo.2021.814770>

Ussher, J., & Drucker, D. (2023). Glucagon-like peptide 1 receptor agonists: cardiovascular benefits and mechanisms of action. *Nature Reviews Cardiology*, 20, 463–474. <https://doi.org/10.1038/s41569-023-00849-3>

Wu, C., Yang, F., Zhong, H., Hong, J., Lin, H., Zong, M., Ren, H., Zhao, S., Chen, Y., Shi, Z., Wang, X., Shen, J., Wang, Q., Ni, M., Chen, B., Cai, Z., Zhang, M., Cao, Z., Wu, K., Gao, A., ... Liu, R. (2024). Obesity-enriched gut microbe degrades myo-inositol and promotes lipid absorption. *Cell host & microbe*, 32(8), 1301–1314.e9. <https://doi.org/10.1016/j.chom.2024.06.012>

Yeh, K. H., Ahuja, D., Patel, S. B., Xu, R., Park, S. K., Gold, S., Ramos, G. P., Malik, T., Kaur, M., Bering, J., Ha, C. Y., Jairath, V., Goodwin, S. W., & Singh, S. (2026). Adjunctive GLP1 Receptor Agonists in Patients With Inflammatory Bowel Diseases and Obesity and/or Diabetes: A Target Trial Emulation. *Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association*, S1542-3565(26)00442-8. Advance online publication. <https://doi.org/10.1016/j.cgh.2026.06.008>

References 5 / 5

Zeng, Y., Wu, Y., Zhang, Q., & Xiao, X. (2024). Crosstalk between glucagon-like peptide 1 and gut microbiota in metabolic diseases. *mBio*, 15(1), e0203223. <https://doi.org/10.1128/mbio.02032-23>

Zhao, X., Wang, M., Wen, Z., Lu, Z., Cui, L., Fu, C., Xue, H., Liu, Y., & Zhang, Y. (2021). GLP-1 Receptor Agonists: Beyond Their Pancreatic Effects. *Frontiers in Endocrinology*, 12. <https://doi.org/10.3389/fendo.2021.721135>

Zheng, Z., Zong, Y., Yiyang, Tian, Y., Pang, Y., Zhang, C., & Gao, J. (2024). Glucagon-like peptide-1 receptor: mechanisms and advances in therapy. *Signal Transduction and Targeted Therapy*, 9. <https://doi.org/10.1038/s41392-024-01931-z>

Zhong, Y., Wu, T., & Khan, N. U. (2025). Association between GLP-1 receptor agonists as a class and colorectal cancer risk: a meta-analysis of retrospective cohort studies. *BMC gastroenterology*, 25(1), 614. <https://doi.org/10.1186/s12876-025-04211-4>