

THE GUT MICROBIOME & IT'S EFFECTS ON OVERALL HEALTH

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WHY THIS TOPIC?



PERSONAL
INTEREST



HOT TOPIC



CONFUSED
CONSUMERS

WHAT IS THE GUT MICROBIOME?

Complex community of microbes

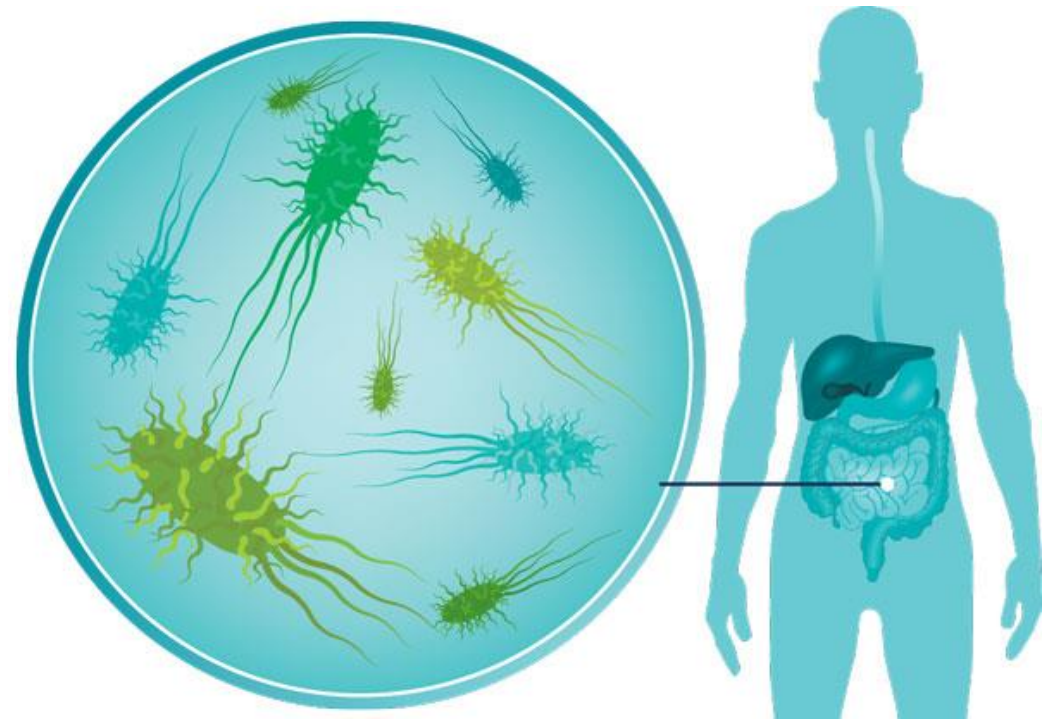
- 100 trillion in GI tract alone

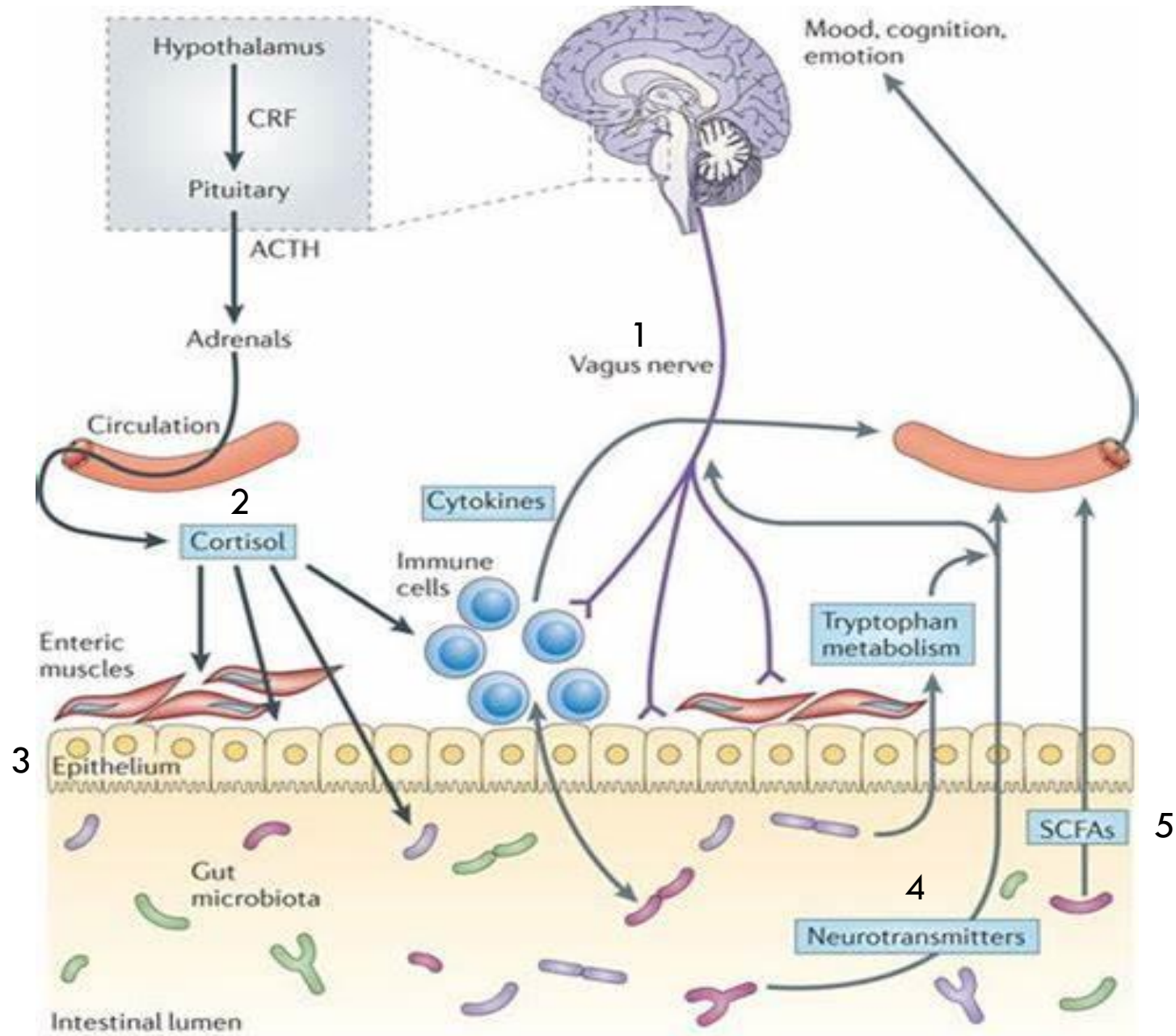
Development begins at birth

- 1st exposed in vaginal birth canal

Microbes benefit health or promote disease

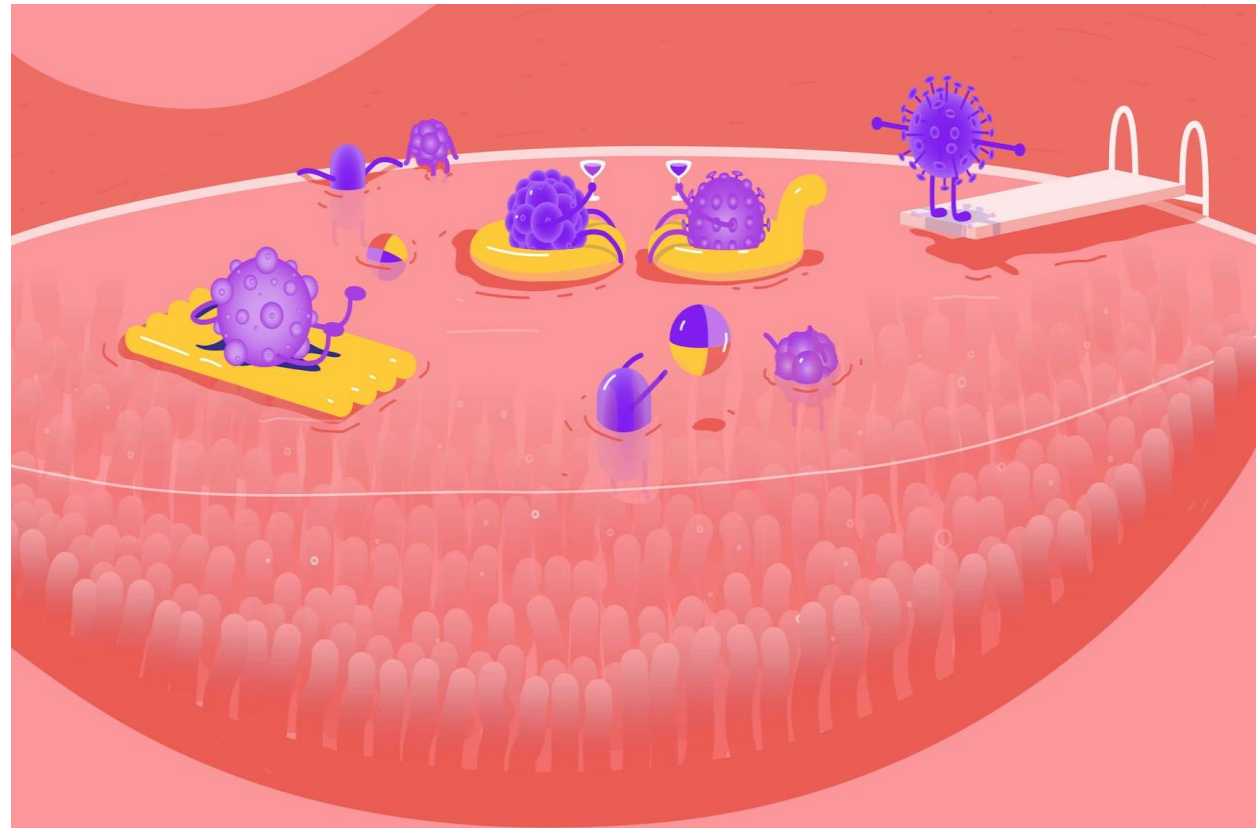
- “Good” and “bad” bacteria





GUT BACTERIA MANIPULATION

- Diet
- Probiotics
- Prebiotics
- Stress
- Inflammation
- Antibiotics
- Medications
- Genetics
- Breastfeeding





RESEARCH STUDY 1

The effects of probiotics on mental health and hypothalamic–pituitary–adrenal axis: A randomized, double-blind, placebo-controlled trial in petrochemical workers

Mohammadi AA, Jazayeri SA, Khosravi-Darani KA, et al.
Nutritional Neuroscience. 2016;19(9):387-397.
doi:10.1179/1476830515Y.0000000023.



STUDY DESIGN

GOAL: Are probiotics effective in improving mental health and HPA-axis markers in petrochemical workers

DESIGN: Randomized, double-blind, placebo controlled trial

INTERVENTION: 70 subjects: Divided into 2 groups: Probiotic vs Placebo for 6 weeks

CRITERIA

Inclusion

- Petrochemical worker
- 20-60 years old

Exclusion

- Pregnant
- Allergies
- Antibiotics
- Nutritional supplements
- Insulin
- CKD, lung disease, chronic or acute inflammatory disease, hepatic disease, thyroid disease, severe intestinal disease, peptic ulcer

Table 3 The effect of daily consumption of probiotic yogurt and probiotic capsule on mental health and hypothalamic–pituitary–adrenal axis

	Conventional yogurt (n = 20)				Probiotic yogurt (n = 25)				Probiotic capsule (n = 25)				P**
	Wk0	Wk6	Change	P*	Wk0	Wk6	Change	P*	Wk0	Wk6	Change	P*	
GHQ scores	19.3 ± 1.5	16.0 ± 1.9	−3.3 ± 1.7	0.05	18.0 ± 1.5	13.5 ± 1.9	−4.5 ± 1.7	0.007	16.9 ± 1.8	9.8 ± 1.9	−7.1 ± 1.7	0.001	0.29
DASS scores	28.4 ± 4.4	21.7 ± 4.6	−6.7 ± 3.3	0.08	23.3 ± 3.7	13.0 ± 3.7	−10.3 ± 3.9	0.02	18.9 ± 3.2	9.4 ± 4.0	−9.5 ± 4.3	0.006	0.80
Kynurenine (pmol/ml)	334.5 ± 73.2	242.6 ± 59.4	−91.9 ± 103.3	0.38	195.2 ± 37.2	166.6 ± 38.4	−28.6 ± 51.7	0.58	122.4 ± 17.6	226.0 ± 49.9	103.6 ± 52.9	0.06	0.13
Tryptophan (µg/ml)	11.9 ± 0.3	11.7 ± 0.6	−0.2 ± 0.7	0.81	12.0 ± 0.3	12.2 ± 0.3	0.2 ± 0.4	0.68	12.1 ± 0.2	12.3 ± 0.3	0.2 ± 0.4	0.63	0.86
Kynurenine/tryptophan ratio	28.5 ± 6.2	41.8 ± 24.2	13.3 ± 26.5	0.62	16.4 ± 3.2	14.6 ± 3.8	−1.8 ± 4.7	0.71	10.3 ± 1.5	16.5 ± 3.7	6.2 ± 4.0	0.13	0.74
Neuropeptide Y (ng/l)	1565.5 ± 248.4	1364.2 ± 223.7	−201.3 ± 76.7	0.39	1235.2 ± 213.9	1314.2 ± 219.3	79.0 ± 84.1	0.95	1211.2 ± 205.7	1067.8 ± 162.6	−143.4 ± 94.3	0.27	0.46
Cortisol (ng/ml)	116.5 ± 21.9	124.2 ± 16.9	7.7 ± 20.0	0.32	93.0 ± 14.2	104.0 ± 15.1	11.0 ± 14.6	0.57	90.5 ± 15.3	108.5 ± 15.2	18.0 ± 11.1	0.38	0.66
ACTH (pg/ml)	6.3 ± 1.3	6.4 ± 1.1	0.1 ± 1.6	0.09	6.8 ± 1.3	5.4 ± 1.0	−1.4 ± 1.7	0.58	9.6 ± 2.0	6.4 ± 1.2	−3.2 ± 1.5	0.49	0.60

All values are mean ± SE.

*Obtained from the paired samples *t*-test.

**Obtained from ANOVA test.

ACTH, adrenocorticotrophic hormone; DASS, depression anxiety and stress scale; GHQ, general health questionnaire.

INTERESTING EAL FINDINGS

Strengths

- 2-week wash out period
- Ratio of males vs. females
- Dietary restrictions
- Energy intake
- Physical activity
- Strain specificity

Limitations

- Small sample size
- Large age range
- Ethnic group
- Short study period
- Subjective questionnaires
- Self-administered variables
- Did not measure SCFAs

CONCLUSION OF STUDY 1



- Probiotics improved mental health in petrochemical workers
- Probiotics did not improve labs related to HPA axis

POSITIVE RATING



RESEARCH STUDY 2

Probiotics Ameliorate Stool Consistency in Patients with Chronic Constipation

Yoon, J.Y., Cha, J. M., Oh, J. K., et al. (2018). Probiotics Ameliorate Stool Consistency in Patients with Chronic Constipation: A Randomized, Double-Blind, Placebo-Controlled Study. *Digestive Diseases and Sciences*, 63 (10), 2754–2764. doi:10.1007/s10620-018-5139-8

STUDY DESIGN

GOAL: Are probiotics effective in improving clinical symptoms, changing fecal microbiota and regulating serum immune cytokine levels with patients who have IBS-C or FC

DESIGN: Randomized, double-blind, placebo controlled trial

INTERVENTION: 171 subjects: Divided into 2 groups: Probiotic vs Placebo for 4 weeks: Followed by 4-week washout without intervention

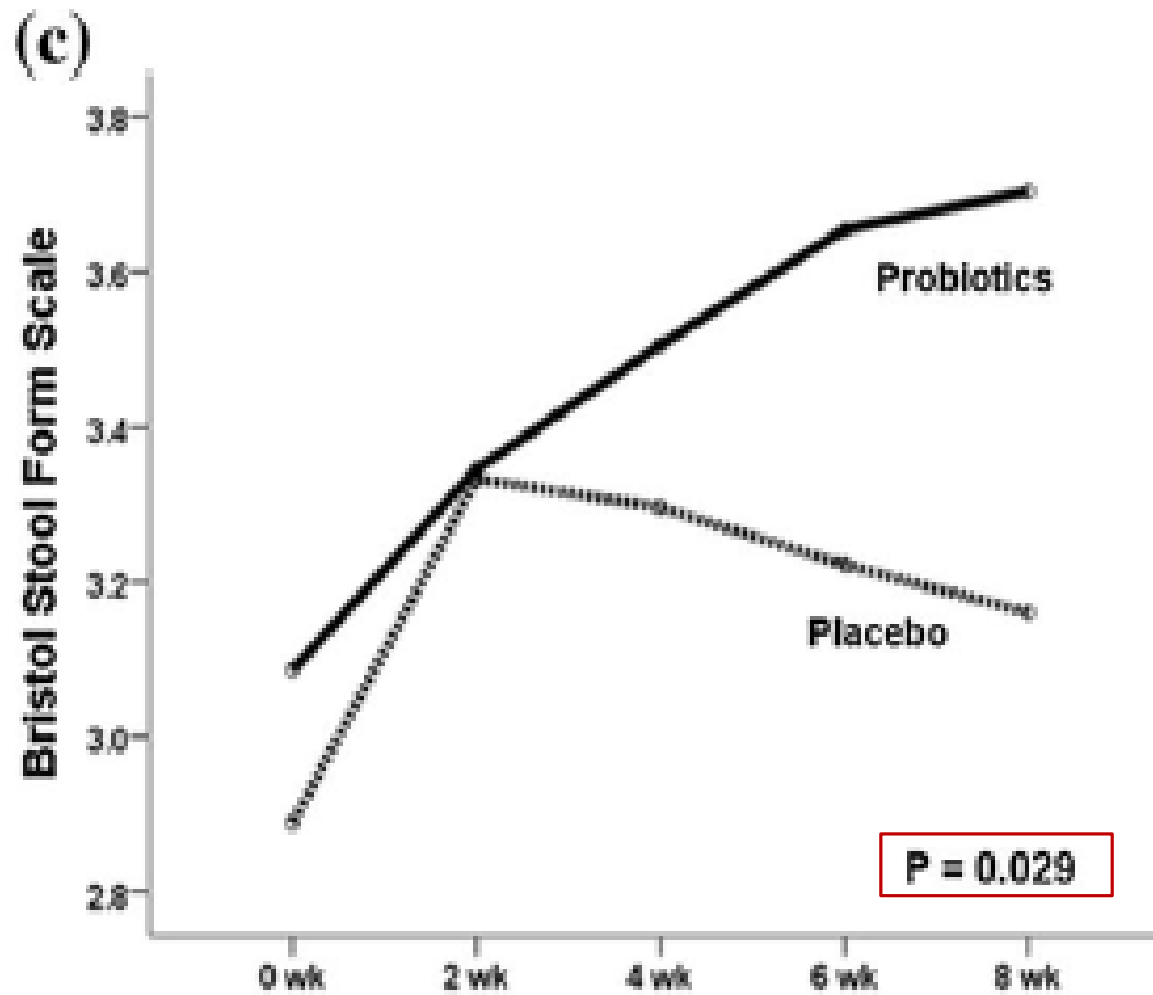
CRITERIA

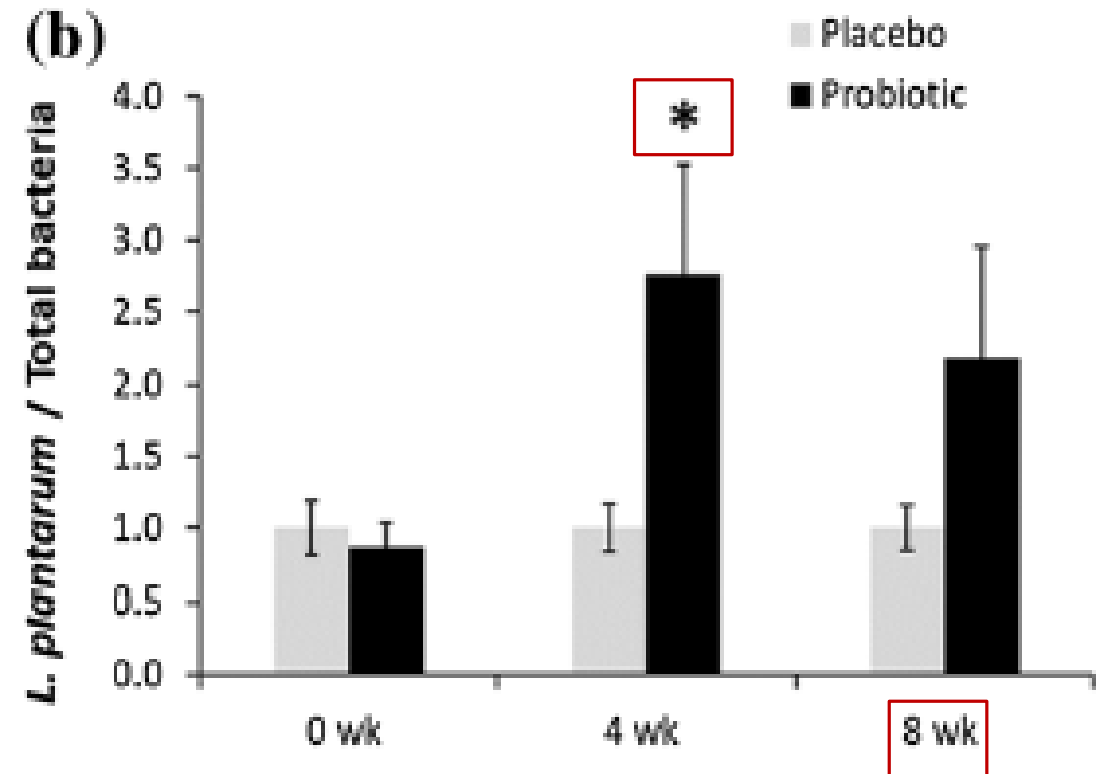
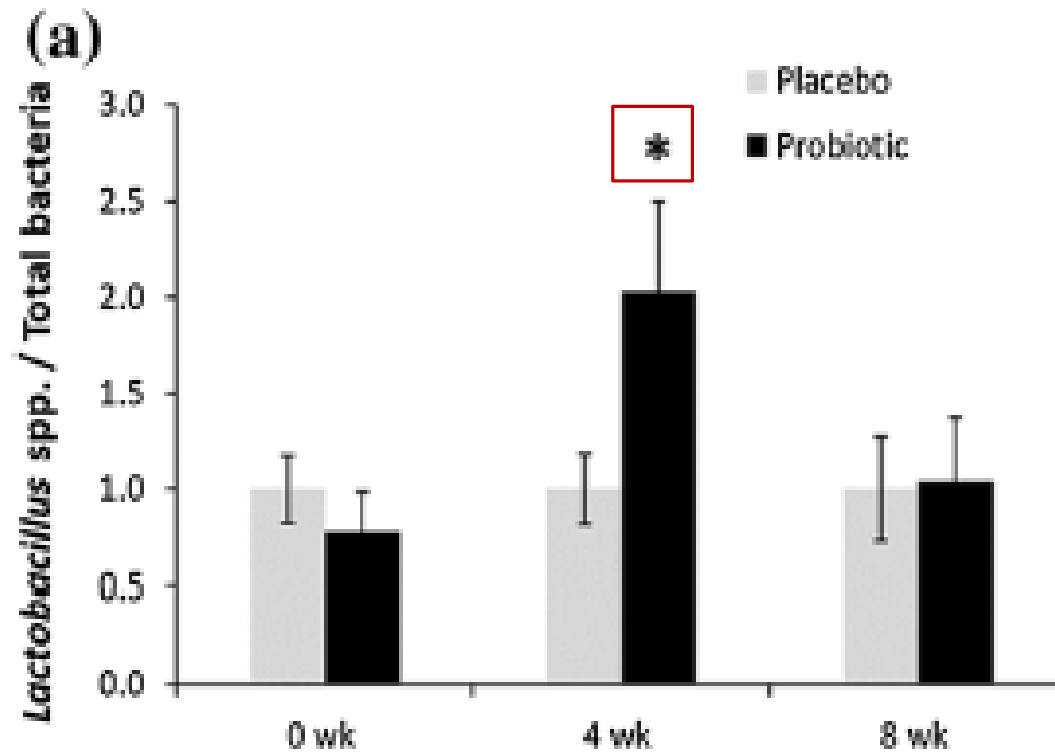
Inclusion

- 18-75 years old
- Chronic constipation: diagnosed with IBS-C or FC

Exclusion

- Prescription for GI medication
- Dietary supplements
- Abnormal weight loss
- Significant bowel changes
- Neurological or psychiatric disorders
- Pregnant or breastfeeding
- Previous colorectal operation
- Abnormal serum transaminase or serum creatinine
- Progressive malignancy or heart failure





INTERESTING EAL FINDINGS

Strengths

- 100% compliance
- Baseline measurements
- Followed subjects after intervention
- More than one test method

Limitations

- Single-center study
- Short intervention period
- Fecal microbiota not identified by complete sequencing

CONCLUSION OF STUDY 2



- Probiotics significantly improved stool consistency
- Beneficial effect of *L. plantarum* remained after discontinued probiotic supplementation
- No improvement in clinical symptoms
- No significant change in IL-10, IL-12 or TNF-alpha

NEUTRAL RATING



RESEARCH STUDY 3

Intestinal Microbiota is Altered in Patients with Colon Cancer and Modified with Probiotic Intervention

Hibberd, A. A., Lyra, A., Ouwehand, A. C., et al. (2017). Intestinal microbiota is altered in patients with colon cancer and modified by probiotic intervention. *BMJ Open Gastroenterology*, 4(1). doi: 10.1136/bmjgast-2017-000145

STUDY DESIGN

- GOAL: Can probiotic intervention modify the microbiota composition of patients with colon cancer
- DESIGN: Prospective
- INTERVENTION: 21 control subjects (baseline) and 15 colon cancer subjects (divided into 2 groups: probiotic $n = 8$ vs placebo $n = 7$)

CRITERIA

Inclusion

- Stage I – III colon cancer
- Presence of at least 1 malignant tumor in colon
- 18+ years old

Exclusion

- Patients with adenomas
- Recent antibiotics
- Probiotic use

Table 2 Microbiota alterations in colon cancer mucosa and tumour samples compared with non-cancer control mucosa at colonoscopy

Phylum	Genus	Relative abundance (%)			Mucosa vs control, p value (FDR)	Tumour vs control, p value (FDR)
		Control (n=14)	Colon cancer Mucosa (n=12)	Tumour (n=12)		
Actinobacteria	<i>Coriobacteriaceae</i> spp	0.25±0.46	0.38±0.23	0.30±0.25	0.04 (0.1)	–
Bacteroidetes	<i>Rikenellaceae</i> spp	0.03±0.06	0.36±0.55	0.29±0.60	0.004 (0.05)	0.009 (0.07)
	<i>Prevotella</i>	5.1±16	5.1±9.2	4.4±8.7	–	0.01 (0.09)
	<i>Odoribacter</i>	0.08±0.13	0.18±0.18	0.16±0.20	0.04 (0.1)	–
	[<i>Barnesiellaceae</i>] spp	0.17±0.35	0.33±0.27	0.27±0.32	0.05 (0.1)	–
Euryarchaeota	<i>Methanobrevibacter</i>	0.01±0.04	0.40±0.50	0.23±0.31	0.001 (0.04)	0.002 (0.03)
Firmicutes	<i>Selenomonas</i>	0.00±0.00	0.24±0.41	4.1±8.3	0.03 (0.1)	<0.001 (0.003)
	<i>Peptostreptococcus</i>	0.00±0.00	1.3±2.4	2.1±2.6	<0.001 (0.01)	0.001 (0.01)
	<i>Clostridium</i>	0.12±0.42	0.28±0.30	0.45±0.56	0.002 (0.04)	0.001 (0.01)
	<i>Dialister</i>	0.12±0.30	1.5±1.5	1.4±1.4	0.006 (0.05)	0.003 (0.03)
	<i>Parvimonas</i>	0.01±0.01	1.6±2.9	2.3±3.3	0.02 (0.1)	0.007 (0.06)
	[<i>Mogibacteriaceae</i>] spp	0.05±0.08	0.24±0.29	0.22±0.22	0.02 (0.1)	0.009 (0.07)
	<i>Bulleidia</i>	0.01±0.02	0.30±0.76	0.58±1.1	–	0.02 (0.1)
	Unclassified <i>Clostridiales</i>	0.17±0.32	0.44±0.44	0.31±0.23	0.004 (0.05)	0.03 (0.2)
	<i>Streptococcus</i>	10±9.6	3.7±6.0	4.0±3.4	0.005 (0.05)	–
	<i>Oscillospira</i>	0.32±0.37	0.94±0.60	0.71±0.57	0.007 (0.05)	–
	<i>Christensenellaceae</i> spp	0.05±0.13	0.19±0.28	0.13±0.25	0.02 (0.1)	–
	<i>Clostridiaceae</i> spp	0.48±0.95	1.4±1.5	1.5±3.2	0.02 (0.1)	–
	<i>Ruminococcaceae</i> spp	2.2±2.9	6.4±5.3	4.8±4.9	0.02 (0.1)	–
	<i>Clostridiales</i> spp	1.6±1.6	3.6±2.6	3.1±2.6	0.02 (0.1)	–
	<i>Ruminococcus</i>	0.52±0.91	2.0±2.7	1.1±1.5	0.03 (0.1)	–
Fusobacteria	<i>Fusobacterium</i>	0.23±0.60	1.5±2.2	7.6±7.8	0.003 (0.04)	<0.001 (0.006)

Table 3 Microbiota alterations with probiotic intervention in patients with colon cancer at surgery

Genus	Effect of probiotic	Faecal			Mucosa	
		No Probiotic abundance (%), n=7	Probiotic abundance (%), n=8	p Value (FDR)	No probiotic abundance (%), n=6	Probiotic abundance (%), n=7
<i>Clostridiales</i> spp	Increase	3.5±3.1	8.5±4.1	0.02 (0.3)	2.8±2.0	7.5±3.3
<i>Faecalibacterium</i>	Increase	3.2±2.6	6.5±2.0	0.02 (0.3)	3.3±2.8	8.1±3.5
[<i>Eubacterium</i>]	Increase	0.86±1.8	2.9±2.7	0.05 (0.3)	0.50±0.73	2.1±1.9
<i>Roseburia</i>	Increase	–	–	–	0.05±0.07	1.7±2.2
<i>Lachnospira</i>	Increase	–	–	–	0.10±0.08	1.4±0.85
<i>Fusobacterium</i>	Decrease	0.81±0.87	0.03±0.05	0.01 (0.3)	–	–
<i>Erysipelotrichaceae</i> spp	Increase	0.42±0.59	1.3±1.0	0.02 (0.3)	–	–
<i>Coriobacteriaceae</i> spp	Increase	0.49±0.46	1.3±0.75	0.04 (0.3)	–	–
<i>Porphyromonas</i>	Decrease	0.43±0.56	0.00±0.00	0.05 (0.3)	–	–
[<i>Prevotella</i>]	Decrease	0.22±0.38	0.00±0.00	0.05 (0.3)	–	–
<i>Peptostreptococcus</i>	Decrease	0.42±0.71	0.04±0.06	0.05 (0.3)	–	–
Unclassified	Increase	–	–	–	0.03±0.08	1.1±2.1
<i>Rikenellaceae</i>						
<i>Bacteroidales</i> spp	Decrease	–	–	–	0.68±1.6	0.00±0.00
Unclassified	Increase	–	–	–	–	–
<i>Clostridiales</i>						
[<i>Bamesiellaceae</i>] spp	Increase	–	–	–	–	–

INTERESTING EAL FINDINGS

Strengths

- Biopsy samples taken from mucosa of colon
- Fecal sample taken at baseline and after colonoscopy
- Control group

Limitations

- Small sample size
- Fecal sample timing not controlled post colonoscopy
- Intervention length varied

CONCLUSION OF STUDY 3



- Patients with colon cancer harbor distinct microbiota
- CRC-associated genera such as *Fusobacterium* and *Peptostreptococcus* was reduced in fecal microbiota of patients who received probiotics

NEUTRAL RATING

ROLE OF THE RD

RD's need to stay current

- Supplements are in scope of practice
- Encounter patients with mental health disorders, IBS-C, FC, and colon cancer
- Food experts



COULD PROBIOTICS BECOME A NEW CLASS OF ANTIDEPRESSANTS? A NEW TREATMENT FOR CONSTIPATION RELIEF? COLON CANCER INTERVENTION?



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THANK YOU!

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<https://uwgbresearchreviews.weebly.com/>

QUESTIONS?

