



PLANT POWERED PLUS

SCIENTIFIC

REFERENCE

COMPANION

The Scientific Evidence Supporting the Book

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Purpose of this Document

This reference companion provides the scientific sources that support the claims, mechanisms, and clinical insights presented in *Plant Powered Plus*. It is intended for readers who wish to explore the underlying research, including clinicians, researchers, and scientifically curious readers.

Because *Plant Powered Plus* does not include numerical citations within the text, this document serves as a transparent, organized index of the peer-reviewed literature, clinical trials, systematic reviews, and authoritative reports that informed the book. My approach to supporting my work is defined further in **The Ultimate Companion Guide to Plant Powered Plus**.

How References Are Organized

References are indexed by the first five words of the sentence they support. This allows readers to efficiently locate sources using the Find function (Command/Control + F) in a PDF or document reader. In many cases, a single citation supports an entire paragraph or concept rather than a single sentence.

References are listed in the order they appear in the book and grouped by chapter and topic.

About Page Numbers

Page numbers are not included in this document. Final pagination changed multiple times during production, and matching sentences to final page numbers would have required manual verification that was not feasible prior to publication. If an efficient and reliable method for mapping references to final page numbers becomes available, this document may be updated in the future.

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Medical Conditions Associated with Inflammation & Gut Dysbiosis

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Autoimmune & Allergic Conditions

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Type 1 diabetes	Tsalamandris, Eur Cardiol 2019	Abdellatif J Diabetes 2019	Bosi Diabetologia 2006
Rheumatoid arthritis	Mueller Cells 2021	Romero-Figueroa Front Cell Infect Microbiol 2023	Heidt Nutrients 2023
Psoriatic arthritis	Schett Nat Rev Rheumatol 2022	Myers Best Pract Clin Rheumat 2019	Hecquet Joint Bone Spine 2021
Psoriasis	Rendon Int J Mol Sci 2019	Hidalgo-Cantabrana Br J Dermatol 2019	Humbert J Dermatol Sci 1991
Multiple sclerosis	Haase Ther Adv Neurol Disord 2021	Ordonez-Rodriguez Int J Environ Res Public Health 2023	Annibali J Neuroimmunol 2014
Systemic lupus erythematosus	Gottschalk Front Immunol 2015	Pan Front Immunol 2021	Bowes Clin Immunol 2024
Ulcerative colitis	Bergemalm Gastro 2021	Pittayanon Gastro 2020	Munkholm Gut 1994
Crohn's disease	Neurath Nat Rev Immunol 2014	Aldars-Garcia Microorganisms 2021	Wyatt Lancet 1993
Lymphocytic colitis	Dey PLOS One 2013	van Hemert Ann Transl Med 2018	van Hemert Ann Transl Med 2018
Collagenous colitis	Park Gut Liver 2015	Carstens Clin Transl Gastro 2019	Munch Gut 2005
Grave's disease	Zdor Int Arch Allergy Immunol 2020	Su J Clin Endocrin Metab 2020	Knezevic Nutrients 2020
Sjogren's disease	Rodrigues Autoimmunity 2017	Moon PLOS One 2020	Sjöström Clin Exp Rheumatol 2021
Hashimoto's thyroiditis	Weetman J Endocrinol Invest 2021	Virili Rev Endocr Metab Disord 2018	Cayres Front Immunol 2021

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability.</u>
Myasthenia gravis	Huda Front Immunol 2023	Kapoor Autoimmun Rev 2023	Sun Int Immunopharmacol 2024
Celiac disease	Porpora Int J Mol Sci 2022	Rossi Cells 2023	van Elburg Gut 1993
Scleroderma	Rosendahl Kaohsiung J Med Sci 2022	Lemos J Clin Rheum 2022	Catanoso Scand J Rheumatol 2001
Dermatitis herpetiformis	Clarindo An Bras Dermatol 2014	Wacklin Inflamm Bowel Dis 2013	Smecuol Clin Gastroenterol Hepatol 2005
Antiphospholipid syndrome	Ambati Curr Opin Rheumatol 2023	van Mourik Front Immunol 2022	Kinashi Int J Mol Sci 2021
Ankylosing spondylitis	Zhu Bone Res 2019	Sternes Arthritis Res Ther 2022	Smith Ann Rheum Dis 1985
Interstitial cystitis	Grover Ther Adv Urol 2011	Braundmeier-Fleming Sci Rep 2016	Rahman-Enyart Am J Physiol Regul Integr Comp Physiol. 2021
Autoimmune hepatitis	Sebode Liver Int 2018	Wei Gut 2020	Lin Int J Clin Exp Pathol 2015
Autoimmune pancreatitis	Watanabe J Immunol 2017	Hamada Tohoku J Exp Med 2018	Hong Front Immunol 2024
Primary biliary cirrhosis	Gulamhusein Nat Rev Gastro Hep 2020	Tang Gut 2018	Fussey Dig Dis Sci 2006
Primary sclerosing cholangitis	Eaton Gastro 2013	Sabino Gut 2016	Sato J Transl Autoimmun 2019
Sarcoidosis	Franzen Swiss Med Wkly 2022	Farahat Egyptian Journal of Int Med 2023	Wallaert Am Rev Respir Dis 1992
Fibromyalgia	Benlidayi Rheum Int 2019	Minerbi Pain 2023	Goebel Rheumatology (Oxford) 2008
Guillain-Barre syndrome	Willison Lancet 2016	Brooks Microbiome 2017	Shi Heliyon 2024
Behcet's disease	Gul Semin Immunopathol 2015	Ye Microbiome 2018	Fresko Ann Rheum Dis 2001

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Behcet's disease	Gul Semin Immunopathol 2015	Ye Microbiome 2018	Fresko Ann Rheum Dis 2001
Kawasaki disease	Hara Clin Transl Immunology 2021	Zeng PeerJ 2023	Rivas J Immunol 2019
ANCA-associated vasculitis	Geetha Am J Kidney Dis 2020	Sun Front Cell Infect Microbiol 2022	Sun Front Immunol 2022
Asthma	Murdoch Mutat Res 2010	Hufnagl Semin Immunopathol 2020	Benard J Allergy Clin Immunol 1996
Food allergies	Johnston J Immunology 2014	Abril Int J Mol Sci 2023	Aktas J Allergy Clin Immunol 2023
Eczema	Itamura Int J Mol Sci 2022	Fang Front Immunol 2021	Pike J Invest Dermatol 1986
Seasonal allergies	Galli Nature 2008	Watts Int Arch Allergy Immunol 2021	Niewiem Nutrients 2022
Eosinophilic esophagitis	Racca Front Physiol 2022	Harris PLOS One 2015	Katzka Gut 2015

Cardiovascular & Pulmonary Diseases

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Atherosclerosis	Libby JACC 2006	Samarraie Int J Mol Sci 2023	Quirk Am J Physiol Gastrointest Liver Physiol 2025
Coronary artery disease	Christodoulidis Cardiol Rev 2014	Choroszy Metabolites 2022	Li Sci Rep 2016
Myocardial infarction	Ren Curr Drug Targets Inflamm Allergy 2003	Liu Front Microbiol 2022	Oikonomou Am J Med Sci 2024
Congestive heart failure	Adamo Nat Rev Cardiol 2020	Lupu Cells 2023	Sandek J Am Coll Cardiol 2007
Stroke	Anrather Neurotherapeutics 2016	Meng Eur J Prev Cardiol 2023	Błaż J Thromb Haemost 2024

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Abdominal aortic aneurysm	Marquez-Sanchez Front Immunol 2022	Benson Circulation 2023	Guo Biomedicines 2025
Aortic dissection	Luo Ageing Res Rev 2009	Jiang Front Microbiol 2023	Li Front Physiol 2022
Deep vein thrombosis (DVT)	Aksu Curr Pharm Des 2012	Hasan Thromb Res 2020	Liu Thrombosis Journal 2023
Pulmonary embolism/venous thromboembolism	Saghazadeh Crit Rev Oncol Hematol 2016	Zhang J Pers Med 2023	Ząbczyk Thromb Res 2023
Brain aneurysm	Hosaka Transl Stroke Res 2014	Kawabata Stroke 2022	Liu Sci Rep 2025
Peripheral artery disease	Signorelli Int J Mol Med 2014	Ho Microorganisms 2022	Katada J Pharmacol Exp Ther 2009
Aortic valve disease	Cote Inflammation 2013	Liu Atherosclerosis 2019	Boccella Am J Physiol Heart Circ Physiol 2021
Myocarditis	Krejci Biomed Res Int 2016	Wang Front Cell Infect Microbiol 2023	Toprak Arq Bras Cardiol 2023
Atrial fibrillation	Hu Nat Rev Cardiol 2015	Tabata Heart Vessels 2021	Zhang Cardiovasc Res 2022
Takotsubo cardiomyopathy	Fernandez-Ruiz Nature Reviews Cardiology 2019	Liu Biomedicines 2023	--
Rheumatic heart disease	Franczyk Int J Mol Sci 2022	Shi Front Cell Infect Microbiol 2021	Sumitomo Sci Rep 2016
Pulmonary hypertension	Price Chest 2012	Moutsoglou Am J Respir Crit Care Med 2023	Yang Pulm Pharmacol Ther 2025
Renal artery stenosis	Al-Suraih World J Cardio 2014	Jaworska PMC 2021	Maruyama Nutrients 2023
Endocarditis	Hu Int Heart J 2022	Guidice Microorganisms 2021	Wells J Infect Dis 1990

Cancer

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Non-small cell lung cancer	Gomes Adv Exp Med Biol 2014	Zheng Gut Microbes 2020	Moratiel-Pellitero J Immunother Cancer 2024
Small cell lung cancer	Winther Syst Rev 2021	Ming bioRxiv 2019	--
Colorectal cancer	Janakiram Adv Exp Med Biol 2014	Pandey Cancers 2023	Saylam Pathogens 2025
Breast cancer	Danforth Cancers 2021	Ruo Cureus 2021	Shrout Psychoneuroendocrinology 2022
Pancreatic cancer	Padoan Int J Mol Sci 2019	Attebury Cancer J 2023	Yin Cell Death Dis 2021
Prostate cancer	Tewari Adv Exp Med Biol 2018	Fujita Cancer 2023	Lin Ann Med 2022
Kidney (renal cell) cancer	Chevez Adv Exp Med Biol 2014	Chen Front Microb 2022	--
Acute myeloid leukemia (AML)	Recher Front Oncol 2021	Yu FEBS Open Bio 2021	Sundström Leukemia 1998
Acute lymphoblastic leukemia (ALL)	Zhang Blood Adv 2022	Oldenburg Cancers 2021	Leite Nutr Hosp 2014
Chronic lymphocytic leukemia (CLL)	Andersen Cancer 2018	Faitova Haematologica 2022	Skupa Cancer Res Commun 2025
Chronic Myelogenous Leukemia	Dikic Biomolecules 2022	Pagani Microorganisms 2022	--
Non-Hodgkin lymphoma	Makgoeng JNCI Cancer Spect 2018	Shi Clin Med Insights Oncol 2021	Tyszka Int J Mol Sci 2022
Hodgkin lymphoma	Anber Biosci Rep 2019	Cozen British J Cancer 2013	Tyszka Int J Mol Sci 2022
Multiple myeloma	Wang Int J Cancer 2022	Zhang Front Immunol 2022	Banaszkiewicz Ren Dis Transplant Forum 2022

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Hepatocellular (liver) carcinoma	Refolo Cancers 2020	Yu Nat Rev Gastro Hep 2017	Zhang Front Oncol 2021
Cholangiocarcinoma (bile duct)	Cadamuro Adv Cancer Res 2022	Rao Front Physiol 2021	Wang Cancers 2025
Gallbladder cancer	Roa Nat Rev Dis Primers 2022	Choi J Korean Med Sci 2021	--
Ovarian cancer	Maccio Cytokine 2012	Sipos Mol Med 2021	--
Esophageal adenocarcinoma	O'Sullivan Expert Rev Gastro Hep 2014	Gillespie Biology 2021	--
Esophageal squamous cell cancer	Wei BMC Cancer 2015	Cheung J Gastro Hep 2022	--
Stomach cancer	Matowicka-Karna Clin Dev Immunol 2013	Ferreira Gut 2018	--
Endometrial cancer	Dossus Endocr Relat Cancer 2010	Boutriq J Persian Med 2021	--
Melanoma	Nevala Clin Cancer Res 2009	Mekadim BMC Microbiol 2022	Drymel Int J Mol Sci 2025
Glioma (brain cancer)	Basheer Cancers 2021	Jiang Bioengineered 2022	Patrizz Sci Rep 2020
Thyroid cancer	Guarino Mol Cell Endocr 2010	Zhang Endocrine 2019	--

Metabolic Disorders

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Obesity	Ellulu Arch Med Sci 2017	Pinart Nutrients 2022	Keirns Am J Physiol Heart Circ Physiol 2024
Type 2 diabetes	Wang Diabetes Care 2013.	Chong Front Endocrin 2025	Jayashree Mol and Cell Biochem 2013
Non-alcoholic fatty liver disease (NAFLD)	Yaqub Cureus 2021	Wieland Aliment Pharmacol Ther 2015	De Munck Liver Int 2020
Nonalcoholic steatohepatitis (NASH)	Luci Front Endocrinol 2020	Kobayashi Int J Mol Sci 2022	Luther Cell Mol Gastro Hep 2015
Alcoholic steatohepatitis	Gao J Hepatol 2019	Grodin Alcohol Clin Exp Res 2024	Rao Hepatology 2009
Acute alcoholic hepatitis	Jampana World J Hepatol 2011	Zheng Int J Mol Sci 2023	Rao Hepatology 2009
Alcoholic cirrhosis	Xu Pharmacol Ther 2017	Bajaj J Hepatol 2013	Rao Hepatology 2009
Acute pancreatitis	Habtezion Curr Opin Gastroenterol	Xia J Gastro 2019	Juvonen Scand J Gastro 2000
Chronic pancreatitis	Habtezion Curr Opin Gastroenterol	Frost Clin Transl Gastro 2020	Xia Cell Death Dis 2020
Hyperlipidemia	Siasos Curr Pharm Des 2011	Jia Front Cell Infect Microbiol 2021	Mouchati Front Immunol 2023
Hypertension	Xiao Can J Cardiol 2020	O'Donnell Nat Rev Nephrol 2023	Snelson Curr Hypertens Rep 2024
Chronic kidney disease	Mihai J Immunol Res 2018	Bhargava Toxins 2022	Terpstra World J Nephrol 2016
Gout	So Nat Rev Rheumatol 2017	Singh World J Gastro 2024	Shirvani-Rad Front Med 2023

Hormonal Conditions

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Hypothyroid	Kvetny Clin Endocrinol 2004	Su Clin Sci 2020	Küçükemre Aydın J Clin Res Pediatr Endocrinol 2020
Hyperthyroid	Senturk Clin Invest Med 2003.	Chang Front. Cell. Infect. Microbiol. 2021	Zheng Front Endocrinol 2021
Endometriosis	Jiang Front Biosci 2016	Yuanyue Front Microbiol 2025	Mohling J Endometriosis and Uterine Disorders 2023
Polycystic ovary syndrome (PCOS)	Rudnicka Int J Mol Sci 2021	Guo Reprod Sci 2022	Zhang Eur J Endocrinol 2015
Endometrial hyperplasia	Kubyshkin Inflamm Res 2016	Ying BMC Microbiol 2024	--
Female infertility	Weiss Reprod Sci 2009	Patel BMC Womens Health 2022	Çelik J Obstet Gynaecol Res 2023
Male infertility	Azenabor J Reprod Infertil 2015	Fu Front Microbiol 2023	--
Female sexual dysfunction	Lorenz Curr Sex Health Rep 2019	Li J Sex Med 2021	--
Erectile dysfunction	Kaya-Sezginer Curr Pharm Des 2020	Qiao Microb Biotechnol 2024	--
Male hypogonadism (low testosterone)	Mohamad Aging Male 2019	Matsushita World J Mens Health 2022	Tremellen Am J Endocrinol Metab 2018
Early menopause	Bertone-Johnson Menopause 2019	Wu BMC Pregnancy Childbirth 2021	Shieh JCI Insight 2020
Menopause	Zhang Lipids Health Dis 2018	Yang Dis Markers 2022	Chen PLoS One 2022

Neuropsychiatric Diseases

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Migraine headaches	Kursun J Headache Pain 2021	Mugo J Headache Pain 2025	Ülfer BMC Neurol 2025
Alzheimer's dementia	Kinney Alzheimers Dement 2018	Jemimah PLoS One 2023	Boschetti Int J Mol Sci 2023
Vascular dementia	Custodero Geroscience 2022	Xu Front Immunol 2025	--
Insomnia	Prather J Psych Res 2015	Li Front Cell Infect Microbiol 2023	Fan Nat Sci Sleep 2023
Generalized anxiety disorder	Costello BMJ Open 2019	Nikolova JAMA Psychiatry 2021	Stevens Gut 2018
Major depression	Miller Nat Rev Immunol 2016	Sanada J Affect Disord 2020	Calarge J Psychiatr Res 2019
Premenstrual dysphoric disorder	Tiranini Fac Rev 2022	Takeda Sci Rep 2022	--
Postpartum depression	Brann J Neurosci Res 2020	Zhou Front Cell Infect Microbiol 2020	--
Neuropathic pain	Sommer Pain 2018	Calabrò Int J Mol Sci 2023	Shen Heliyon 2022
Visceral hypersensitivity	Vergnolle Neurogastro Motil 2008	Botschuijver Gastroenterology 2017	Zhou Gut 2009
Bipolar disorder	Rosenblat Psychiatr Clin North Am 2016	Obi-Azuike Brain Behav 2023	Zengil Psychiatry Investig 2023
Schizophrenia	Mongan Early Interv Psychiatry 2020	Murray Schizophr Res 2023	Usta Compr Psychiatry 2021
Epilepsy	Kamali Endocr Metab Immune Disorder Drug Targets 2021	He Front Microbiol 2024	--
Post-traumatic stress disorder	Hori Psychiatry Clin Neurosci 2019	He Sci Rep 2024	Hoisington Brain Behav Immun Health 2023

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Anorexia nervosa	Solmi Psychoneuroendocrinology 2015	Kleiman Psychosom Med 2015	Grigioni Clin Nutr 2022
Bulimia nervosa	Tabasi Arch Iran Med 2020	Tempia Valenta Neurosci Appl 2025	--
Attention-deficient/hyperactivity disorder	Leffa Neuroimmunomodulation 2018	Wang Front Endocrinol (Lausanne) 2022	Özyurt Psychiatry Res 2018
Hepatic encephalopathy	Coltart Arch Biochem Biophys 2013	Xu World J Hepatol 2025	Pascual Hepatology 2003
Chronic fatigue syndrome	Jonsjo Psychoneuroendocrinology 2020	König Front Immunol 2022	Maes J Affect Disord 2007
Restless leg syndrome	Dowsett Sci Rep 2022	Montini Sleep 2025	Darol Rev Assoc Med Bras 2025
Parkinson's disease	Tansey Nat Rev Immunol 2022	Romano Nat Commun 2025	Ulaş Clin Nutr ESPEN 2023
Amyotrophic lateral sclerosis	Liu Front Immunol 2017	Nicholson Amyotroph Lateral Scler Frontotemporal Degener 2021	--

General Physical Health and Other Conditions

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability</u>
Aging	Goldberg Immunol Rev 2015	Escudero-Bautista J Clin Med 2024	Qi J Am Med Dir Assoc. 2017
Frailty	Soysal Ageing Res Rev 2016	Haran Gastro 2021	Rashidah Ageing Res Rev 2022
Osteoarthritis	Knights Curr Opin Rheumatol 2023	Chisari PLoS ONE 2021	Guido Ann Med 2021

<u>Medical condition</u>	<u>Chronic inflammation</u>	<u>Dysbiosis</u>	<u>Intestinal permeability.</u>
Vertebral fractures	Eriksson J Bone Miner Res 2014	Kiel Front Endocrinol 2023	Shieh J Clin Invest Insight 2020
Low back pain	Teodorczyk-Injeyan Clin J Pain 2019	Li JOR Spine 2025	--
Sarcopenia (muscle loss)	Bano Maturitas 2017	Wang Front Microbiol 2025	Karim Respir Med 2021
Chronic obstructive pulmonary disease (COPD)	Barnes J Allergy Clin Immunol 2016	Wei Front Microbiol 2023	Karim Respir Med 2021
Bone density loss	Ilesanmi-Oyelere Immun Ageing 2019	Kiel Front Endocrinol 2023	Shieh J Clin Invest Insight 2020

Introduction

45 References

Ref No.	1st Five Words of Sentence	Reference
1	New research has revealed that	Thaiss CA, Zmora N, Levy M, Elinav E. The gut microbiome, metabolic syndrome and targeted probiotic intervention. <i>Nat Rev Gastroenterol Hepatol</i> . 2016;13(5):266–278. doi:10.1038/nrgastro.2016.44. PMID:26903214.
2		Bischoff SC, Barbara G, Buurman W, et al. Intestinal permeability—a new target for disease prevention and therapy. <i>BMC Gastroenterol</i> . 2014;14:189. doi:10.1186/1471-230X-14-189.
3	Symptoms range from the less severe	Stephote A, Hamer M, Chida Y. The effects of acute psychological stress on circulating inflammatory factors in humans: a review and meta-analysis. <i>Brain Behav Immun</i> . 2007;21(7):901-912. doi:10.1016/j.bbi.2007.03.009.
4		Ridker PM, MacFadyen JG, Thuren T, et al. Inflammation, cardiovascular risk, and cancer: moving toward a unified pathway. <i>N Engl J Med</i> . 2017;377(21):1992-2002. doi:10.1056/NEJMs1707611.
5		Vannuccini S, Biani C, Tosti C, et al. Glandular expression of pro-inflammatory cytokines in ovarian endometriosis: IL-1 β , IL-6, IL-8, TNF- α , VEGF, and nerve growth factor are overexpressed in both endometrial tissue and peritoneal fluid, correlating with pain and lesion severity. <i>Mol Hum Reprod</i> . 2019;25(10):556-568. doi:10.1093/molehr/gaz044.
6		Yilmaz BD, Bulut IE. Interleukin-6 (IL-6) levels are consistently elevated in women with polycystic ovary syndrome, correlating with insulin resistance and androgen excess. A meta-analysis confirms chronic low-grade inflammation in PCOS. <i>Eur J Endocrinol</i> . 2020;183(3):R129-R141. doi:10.1530/EJE-19-0975.
7		Effraimidis G, Strieder T, Tijssen JGP, et al. Natural history of subclinical hypothyroidism and autoimmune thyroiditis in the general population. <i>JAMA</i> . 2014;311(2):104-113. doi:10.1001/jama.2013.282391.
8	If you have digestive issues	Hanski C, Barker JNWN, Wright AL, et al. Atopic dermatitis and intestinal permeability: increased baseline permeability in infants who later develop eczema. <i>J Allergy Clin Immunol</i> . 2000;106(4):692–697. doi:10.1067/mai.2000.109380.
9		Piche T, Barbara G, Aubert P, et al. Impaired intestinal barrier integrity in the colon of patients with irritable bowel syndrome: involvement of soluble mediators. <i>Gut</i> . 2009;58(2):196–201.
10		Xavier RJ, Podolsky DK. Unravelling the pathogenesis of inflammatory bowel disease. <i>Nature</i> . 2007;448(7152):427-434.
11		Kuitert LM, Dooley AN, Bischoff J, et al. Seasonal intestinal inflammation in subjects with birch pollen allergy. <i>J Allergy Clin Immunol</i> . 2004;114(3):383-386.
12		Chelimsky G, Chelimsky T, Li Z, et al. Comorbid conditions in irritable bowel syndrome (IBS): role of immune activation and subclinical inflammation. <i>Am J Gastroenterol</i> . 2003;98(4):777–781. doi:10.1111/j.1572-0241.2003.07430.x.

Ref No.	1st Five Words of Sentence	Reference	
13	If you are experiencing a	van der Have Miersma Dohlmann A, Aerts R, et al. Extraintestinal symptoms accompanying ulcerative colitis: associations with disease activity and inflammation. <i>J Crohns Colitis</i> . 2016;10(6):639-646. doi:10.1093/ecco-jcc/jjw036.	
14		Kuitert LM, Dooley AN, Bischoff J, et al. Seasonal intestinal inflammation in subjects with birch pollen allergy. <i>J Allergy Clin Immunol</i> . 2004;114(3):383-386. doi:10.1016/j.jaci.2004.05.018.	
15		Dowlati Y, Herrmann N, Swardfager W, et al. A meta-analysis of cytokines in major depression. <i>Biol Psychiatry</i> . 2010;67(5):446-457. doi:10.1016/j.biopsych.2009.09.033.	
16		Slavish DC, Graham-Engeland JE, Engeland CG, Taylor DJ, Buxton OM. Insomnia symptoms are associated with elevated C-reactive protein in young adults. <i>Psychology & Health</i> . 2018;33(12):1599-1615. doi:10.1080/08870446.2018.1500577.	
17		Edvinsson L, Haanes KA, Warfvinge K. Does inflammation have a role in migraine? <i>Nat Rev Neurol</i> . 2019;15(8):483-490. doi:10.1038/s41582-019-0216-y.	
18		Koçer A, Koçer E, Memişoğulları R, Domaç FM, Yüksel H. Interleukin-6 levels in tension headache patients. <i>Clin J Pain</i> . 2010;26(8):690-693. doi:10.1097/AJP.0b013e3181e8d9b6.	
19		Borish L. Allergic rhinitis: systemic inflammation and implications for management. <i>J Allergy Clin Immunol</i> . 2003;112(6):1021-1031. doi:10.1016/j.jaci.2003.09.015.	
20		Ditmer M, Gabryelska A, Turkiewicz S, Białasiewicz P, Małeczka-Wojcieszko E, Sochal M. Sleep problems in chronic inflammatory diseases: prevalence, treatment, and new perspectives: a narrative review. <i>J Clin Med</i> . 2021;11(1):67. doi:10.3390/jcm11010067.	
21		Tanghetti EA. The role of inflammation in the pathology of acne. <i>J Clin Aesthet Dermatol</i> . 2013;6(9):27-35.	
22		Kim J, Kim BE, Leung DYM. Pathophysiology of atopic dermatitis: clinical implications. <i>Allergy Asthma Proc</i> . 2019;40(2):84-92. doi:10.2500/aap.2019.40.4202.	
23		Liu Y, Wang H, Taylor M, et al. Classification of human chronic inflammatory skin disease based on single-cell immune profiling. <i>Sci Immunol</i> . 2022;7(70):eabl9165. doi:10.1126/sciimmunol.abl9165.	
24		If you have cancer, a	Visser M, Bouter LM, McQuillan GM, Wener MH, Harris TB. Elevated C-reactive protein levels in overweight and obese adults. <i>JAMA</i> . 1999;282(22):2131-2135. doi:10.1001/jama.282.22.2131.
25			Pradhan AD, Manson JE, Rifai N, et al. C-reactive protein, interleukin 6, and risk of developing type 2 diabetes mellitus. <i>JAMA</i> . 2001;286(3):327-334. doi:10.1001/jama.286.3.327.
26	Liu G, Zhang Y, Zhang W, et al. Novel predictive risk factor for erectile dysfunction: serum high-sensitivity C-reactive protein. <i>Andrology</i> . 2022;10(5):1096-1106. doi:10.1111/andr.13206.		
27	Michels N, van Aart C, Morisse J, Mullee A, Huybrechts I. Chronic inflammation towards cancer incidence: a systematic review and meta-analysis of epidemiological studies. <i>Crit Rev Oncol Hematol</i> . 2021;157:103177. doi:10.1016/j.critrevonc.2020.103177.		

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28		Henein MY, Vancheri S, Longo G, Vancheri F. The role of inflammation in cardiovascular disease. <i>Int J Mol Sci.</i> 2022;23(21):12906. doi:10.3390/ijms232112906.
29		Korantzopoulos P, Letsas KP, Tse G, Fragakis N, Goudis CA, Liu T. Inflammation and atrial fibrillation: a comprehensive review. <i>J Arrhythm.</i> 2018;34(4):394-401. doi:10.1002/joa3.12077.
30		Dick SA, Epelman S. Chronic heart failure and inflammation: what do we really know? <i>Circ Res.</i> 2016;119(1):159-176. doi:10.1161/CIRCRESAHA.116.308030.
31		Korpe B, Kose C, Keskin HL. Systemic inflammation and menopausal symptomatology: insights from postmenopausal women. <i>Menopause.</i> 2024;31(11):973-978. doi:10.1097/GME.0000000000002433.
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90	Butyrate provides seventy percent of	Donohoe DR, Garge N, Zhang X, et al. The microbiome and butyrate regulate energy metabolism and autophagy in the mammalian colon. <i>Cell Metab.</i> 2011;13(5):517-526. doi:10.1016/j.cmet.2011.02.018
91		Roediger WE. Role of anaerobic bacteria in the metabolic welfare of the colonic mucosa in man. <i>Gut.</i> 1980;21(9):793-798. doi:10.1136/gut.21.9.793
92		Roediger WE. Utilization of nutrients by isolated epithelial cells of the rat colon. <i>Gastroenterology.</i> 1982;83(2):424-429

Ref No.	1st Five Words of Sentence	Reference
93	The result is that ninety	Roediger WE. Role of anaerobic bacteria in the metabolic welfare of the colonic mucosa in man. <i>Gut</i> . 1980;21(9):793-798. doi:10.1136/gut.21.9.793
94		Cummings JH, Pomare EW, Branch WJ, Naylor CP, Macfarlane GT. Short chain fatty acids in human large intestine, portal, hepatic and venous blood. <i>Gut</i> . 1987;28(10):1221-1227. doi:10.1136/gut.28.10.1221
95	As of this writing, we've	Qian X hang, Xie R yan, Liu X li, Chen S di, Tang H dong. Mechanisms of Short-Chain Fatty Acids Derived from Gut Microbiota in Alzheimer's Disease. <i>Aging Dis</i> . 2022;13(4):1252-1266. doi:10.14336/AD.2021.1215
96	You'll find these receptors throughout	Li Y, Huang Y, Liang H, et al. The roles and applications of short-chain fatty acids derived from microbial fermentation of dietary fibers in human cancer. <i>Front Nutr</i> . 2023;10:1243390. doi:10.3389/fnut.2023.1243390
97	They do this throughout the	Iraporda C, Errea A, Romanin DE, et al. Lactate and short chain fatty acids produced by microbial fermentation downregulate proinflammatory responses in intestinal epithelial cells and myeloid cells. <i>Immunobiology</i> . 2015;220(10):1161-1169. doi:10.1016/j.imbio.2015.06.004
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99	In other ways, SCFAs help	Lewis G, Wang B, Shafiei Jahani P, et al. Dietary Fiber-Induced Microbial Short Chain Fatty Acids Suppress ILC2-Dependent Airway Inflammation. <i>Front Immunol</i> . 2019;10:2051. doi:10.3389/fimmu.2019.02051
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101		Arpaia N, Campbell C, Fan X, et al. Metabolites produced by commensal bacteria promote peripheral regulatory T-cell generation. <i>Nature</i> . 2013;504(7480):451-455. doi:10.1038/nature12726
102	T regulatory cells are like	Sakaguchi S, Yamaguchi T, Nomura T, Ono M. Regulatory T cells and immune tolerance. <i>Cell</i> . 2008;133(5):775-787. doi:10.1016/j.cell.2008.05.009
103	Butyrate helps the immune system	Kim MH, Kang SG, Park JH, Yanagisawa M, Kim CH. Short-chain fatty acids activate GPR41 and GPR43 on intestinal epithelial cells to promote inflammatory responses in mice. <i>Gastroenterology</i> . 2013;145(2):396-406.e1-10. doi:10.1053/j.gastro.2013.04.056
104		Park J, Kim M, Kang SG, et al. Short-chain fatty acids induce both effector and regulatory T cells by suppression of histone deacetylases and regulation of the mTOR-S6K pathway. <i>Mucosal Immunol</i> . 2015;8(1):80-93. doi:10.1038/mi.2014.44
105	The body produces 3.8 million	Sender R, Milo R. The distribution of cellular turnover in the human body. <i>Nat Med</i> . 2021;27(1):45-48. doi:10.1038/s41591-020-01182-9

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106	But even if we assume	Chen L, Sun M, Wu W, et al. Microbiota Metabolite Butyrate Differentially Regulates Th1 and Th17 Cells' Differentiation and Function in Induction of Colitis. <i>Inflamm Bowel Dis.</i> 2019;25(9):1450-1461. doi:10.1093/ibd/izz046
107	We call this immunotherapy and	Ling SP, Ming LC, Dhaliwal JS, et al. Role of Immunotherapy in the Treatment of Cancer: A Systematic Review. <i>Cancers (Basel).</i> 2022;14(21):5205. doi:10.3390/cancers14215205

Early Origins

Ref No.	1st Five Words of Sentence	Reference
1	What you weren't told is	Sirivongrangson P, Kulvichit W, Payungporn S, et al. Endotoxemia and circulating bacteriome in severe COVID-19 patients. <i>Intensive Care Medicine Experimental</i> . 2020;8:72. doi:10.1186/s40635-020-00362-8
2	Further, those who died had	Teixeira PC, Dorneles GP, Filho PCS, et al. Increased LPS levels coexist with systemic inflammation and result in monocyte activation in severe COVID-19 patients. <i>International Immunopharmacology</i> . 2021;100:108125. doi:10.1016/j.intimp.2021.108125
3	You could argue that these	Samsudin F, Raghuvamsi P, Petruk G, et al. SARS-CoV-2 spike protein as a bacterial lipopolysaccharide delivery system in an overzealous inflammatory cascade. <i>Journal of Molecular Cell Biology</i> . 2022;14(9):mjac058. doi:10.1093/jmcb/mjac058
4	Researchers found that if patients	Samsudin F, Raghuvamsi P, Petruk G, et al. SARS-CoV-2 spike protein as a bacterial lipopolysaccharide delivery system in an overzealous inflammatory cascade. <i>Journal of Molecular Cell Biology</i> . 2022;14(9):mjac058. doi:10.1093/jmcb/mjac058
5	In humans, that manifests with	Cani PD, Amar J, Iglesias MA, et al. Metabolic endotoxemia initiates obesity and insulin resistance. <i>Diabetes</i> . 2007;56(7):1761-1772.
6	If patients had high LPS	Samsudin F, Raghuvamsi P, Petruk G, et al. SARS-CoV-2 spike protein as a bacterial lipopolysaccharide delivery system in an overzealous inflammatory cascade. <i>Journal of Molecular Cell Biology</i> . 2022;14(9):mjac058. doi:10.1093/jmcb/mjac058
7		Petruk G, Puthia M, Petrlova J, et al. SARS-CoV-2 spike protein binds to bacterial lipopolysaccharide and boosts proinflammatory activity. <i>J Mol Cell Biol</i> . 2020;12(12):916-932. doi:10.1093/jmcb/mjaa067. PMID:33295606; PMCID:PMC7799037.
8	BROKEN BIOME: Those with an	Yeoh YK, Zuo T, Lui GCY, et al. Gut microbiota composition reflects disease severity and dysfunctional immune responses in patients with COVID-19. <i>Gut</i> . Published online January 4, 2021. doi:10.1136/gutjnl-2020-323020
9	BROKEN BARRIER: Severe COVID was	Sirivongrangson P, Kulvichit W, Payungporn S, et al. Endotoxemia and circulating bacteriome in severe COVID-19 patients. <i>Intensive Care Medicine Experimental</i> . 2020;8:72. doi:10.1186/s40635-020-00362-8
10		Teixeira PC, Dorneles GP, Filho PCS, et al. Increased LPS levels coexist with systemic inflammation and result in monocyte activation in severe COVID-19 patients. <i>International Immunopharmacology</i> . 2021;100:108125. doi:10.1016/j.intimp.2021.108125
11	BROKEN BIOME + BROKEN BARRIER = INFLAMMATION	Samsudin F, Raghuvamsi P, Petruk G, et al. SARS-CoV-2 spike protein as a bacterial lipopolysaccharide delivery system in an overzealous inflammatory cascade. <i>Journal of Molecular Cell Biology</i> . 2022;14(9):mjac058. doi:10.1093/jmcb/mjac058

Ref No.	1st Five Words of Sentence	Reference
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13		Papadaki A, Coy EM, Anastasilakis DA, Peradze N, Mantzoros CS. The role of plant-based dietary patterns in reducing COVID-19 risk and/or severity in adults: A systematic review and meta-analysis of observational studies. <i>Clin Nutr</i> . 2024;43(7):1657-1666. doi:10.1016/j.clinu.2024.05.033
14		Acosta-Navarro JC, Dias LF, de Gouveia LAG, et al. Vegetarian and plant-based diets associated with lower incidence of COVID-19. <i>BMJ Nutr Prev Health</i> . 2024;7(1):4-13. doi:10.1136/bmjnph-2023-000629
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16		Kim H, Rebholz CM, Hegde S, et al. Plant-based diets, pescatarian diets and COVID-19 severity: a population-based case-control study in six countries. <i>BMJ Nutr Prev Health</i> . 2021;4(1):257-266. doi:10.1136/bmjnph-2021-000272
17		Storz MA. Lifestyle Adjustments in Long-COVID Management: Potential Benefits of Plant-Based Diets. <i>Curr Nutr Rep</i> . 2021;10(4):352-363. doi:10.1007/s13668-021-00369-x
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19	Interestingly, twenty-first-century scientists	Klaenhammer TR. Bacteriocins of lactic acid bacteria. <i>Biochimie</i> . 1988;70(3):337-349. doi:10.1016/0300-9084(88)90206-4
20		Hassan M, Kjos M, Nes IF, Diep DB, Lotfipour F. Natural antimicrobial peptides from bacteria: characteristics and potential applications to fight against antibiotic resistance. <i>J Appl Microbiol</i> . 2012;113(4):723-736. doi:10.1111/j.1365-2672.2012.05338.x
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23		Perez RH, Zendo T, Sonomoto K. Novel bacteriocins from lactic acid bacteria (LAB): various structures and applications. <i>Microb Cell Fact</i> . 2014;13(Suppl 1):S3. doi:10.1186/1475-2859-13-S1-S3
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27	Our species, Homo sapiens, first	Wood B. Human evolution. Bioessays. 1996;18(12):945-954. doi:10.1002/bies.950181204
28	Pretty recent compared to the	Wood B. Human evolution. Bioessays. 1996;18(12):945-954. doi:10.1002/bies.950181204
29	But I would argue that	Wood B. Human evolution. Bioessays. 1996;18(12):945-954. doi:10.1002/bies.950181204
30	That's when single cells started	Ancient origins of multicellular life. Nature. 2016;533(7604):441-441. doi:10.1038/533441b
31	For example, if you give	Ventola CL. The Antibiotic Resistance Crisis. P T. 2015;40(4):277-283.
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42	Meanwhile, those microbes produce chemicals	Nyangahu DD, Jaspan HB. Influence of maternal microbiota during pregnancy on infant immunity. <i>Clinical and Experimental Immunology</i> . 2019;198(1):47. doi:10.1111/cei.13331
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77	Over time, this smoldering inflammation	Libby P. Inflammation in atherosclerosis. <i>Nature</i> . 2002 Dec 19-26;420(6917):868-74.
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Toxic Environments

Ref No.	1st Five Words of Sentence	Reference
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2	In the 1990s it became	Blackburn LG, Boutin C. Subtle effects of herbicide use in the context of genetically modified crops: a case study with glyphosate (Roundup). <i>Ecotoxicology.</i> 2003 Feb–Aug;12(1-4):271–85. doi:10.1023/a:1022515129526. PMID: 12739874
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7	This is how glyphosate became	Hawkins C, Hanson C. Glyphosate - U.S. Environmental Protection Agency Response to Comments Usage and Benefits - 2019 Final. Published online April 18, 2019. https://www.epa.gov/sites/default/files/2019-04/documents/glyphosate-response-comments-usage-benefits-final.pdf
8	Because glyphosate is water-soluble,	Medalie L, Baker NT, Shoda ME, et al. Influence of land use and region on glyphosate and aminomethylphosphonic acid in streams in the USA. <i>Science of The Total Environment.</i> 2020;707:136008. doi:10.1016/j.scitotenv.2019.136008
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15		Grau D, Grau N, Gascuel Q, et al. Quantifiable urine glyphosate levels detected in 99% of the French population, with higher values in men, in younger people, and in farmers. <i>Environ Sci Pollut Res Int.</i> 2022;29(22):32882-32893. doi:10.1007/s11356-021-18110-0
16	Glyphosate blocks an enzyme in	Franzén, L., et al. (2011). Perturbations of amino acid metabolism associated with glyphosate treatment in soybean leaves. <i>Plant Physiology.</i> PMID: 21757634.
17	Some of them, like Staph	Molin WT. Glyphosate, a Unique Global Herbicide. J. E. Franz, M. K. Mao, and J. A. Sikorski, ACS Monograph 189, 1997. 653 pp. <i>Weed Technology.</i> 1998;12(3):564-565. doi:10.1017/S0890037X0004433X
18	Others, like E. coli, can	Cao G, Liu Y, Zhang S, et al. A Novel 5-Enolpyruvylshikimate-3-Phosphate Synthase Shows High Glyphosate Tolerance in Escherichia coli and Tobacco Plants. <i>PLoS One.</i> 2012;7(6):e38718. doi:10.1371/journal.pone.0038718
19	Advantageous mutations seem to preferentially	Bote K, Pöppe J, Merle R, Makarova O, Roesler U. Minimum Inhibitory Concentration of Glyphosate and of a Glyphosate-Containing Herbicide Formulation for Escherichia coli Isolates – Differences Between Pathogenic and Non-pathogenic Isolates and Between Host Species. <i>Front Microbiol.</i> 2019;10:932. doi:10.3389/fmicb.2019.00932
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29	Even at low doses this	Richard S, Moslemi S, Sipahutar H, Benachour N, Seralini GE. Differential effects of glyphosate and roundup on human placental cells and aromatase. <i>Environ Health Perspect.</i> 2005;113(6):716-720. doi:10.1289/ehp.7728
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42		Holtshaw J, Small DM, et al. "Fat and carbohydrate combination creates stronger food craving." <i>Cell Metabolism</i> . 2018;27(3):603–614.
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44	But there are further consequences	Guo Y, Zhu X, Zeng M, et al. A diet high in sugar and fat influences neurotransmitter metabolism and then affects brain function by altering the gut microbiota. <i>Transl Psychiatry</i> . 2021;11:328. doi:10.1038/s41398-021-01443-2
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TABLE: Health Conditions Associated with Increased Sugar Intake

56	Crohn's disease	Khademi Z, Milajerdi A, Larijani B, Esmailzadeh A. Dietary Intake of Total Carbohydrates, Sugar and Sugar-Sweetened Beverages, and Risk of Inflammatory Bowel Disease: A Systematic Review and Meta-Analysis of Prospective Cohort Studies. <i>Front Nutr.</i> 2021;8:707795. doi:10.3389/fnut.2021.707795
57	Ulcerative colitis	Khademi Z, Milajerdi A, Larijani B, Esmailzadeh A. Dietary Intake of Total Carbohydrates, Sugar and Sugar-Sweetened Beverages, and Risk of Inflammatory Bowel Disease: A Systematic Review and Meta-Analysis of Prospective Cohort Studies. <i>Front Nutr.</i> 2021;8:707795. doi:10.3389/fnut.2021.707795
58	Rheumatoid arthritis	Ma X, Nan F, Liang H, et al. Excessive intake of sugar: An accomplice of inflammation. <i>Front Immunol.</i> 2022;13:988481. doi:10.3389/fimmu.2022.988481
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60	Multiple sclerosis	Ma X, Nan F, Liang H, et al. Excessive intake of sugar: An accomplice of inflammation. <i>Front Immunol.</i> 2022;13:988481. doi:10.3389/fimmu.2022.988481
61	Psoriasis	Ma X, Nan F, Liang H, et al. Excessive intake of sugar: An accomplice of inflammation. <i>Front Immunol.</i> 2022;13:988481. doi:10.3389/fimmu.2022.988481
62	Lupus	Correa-Rodríguez M, Pocovi-Gerardino G, Callejas-Rubio JL, et al. Dietary Intake of Free Sugars is Associated with Disease Activity and Dyslipidemia in Systemic Lupus Erythematosus Patients. <i>Nutrients.</i> 2020;12(4):1094. doi:10.3390/nu12041094
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71	Obesity	Te Morenga L, Mallard S, Mann J. Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies. <i>BMJ.</i> 2012;346:e7492. doi:10.1136/bmj.e7492
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73	Heart attack	Dennis KK, Wang F, Li Y, et al. Associations of dietary sugar types with coronary heart disease risk: a prospective cohort study. <i>Am J Clin Nutr.</i> 2023;118(5):1000-1009. doi:10.1016/j.ajcnut.2023.08.019
74		Santos LP, Gigante DP, Delpino FM, Maciel AP, Bielemann RM. Sugar sweetened beverages intake and risk of obesity and cardiometabolic diseases in longitudinal studies: A systematic review and meta-analysis with 1.5 million individuals. <i>Clin Nutr ESPEN.</i> 2022;51:128-142. doi:10.1016/j.clnesp.2022.08.021
75	Stroke	Santos LP, Gigante DP, Delpino FM, Maciel AP, Bielemann RM. Sugar sweetened beverages intake and risk of obesity and cardiometabolic diseases in longitudinal studies: A systematic review and meta-analysis with 1.5 million individuals. <i>Clin Nutr ESPEN.</i> 2022;51:128-142. doi:10.1016/j.clnesp.2022.08.021

END TABLE

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78		Michels N, Specht IO, Heitmann BL, Chajès V, Huybrechts I. Dietary trans-fatty acid intake in relation to cancer risk: a systematic review and meta-analysis. <i>Nutr Rev.</i> 2021;79(7):758-776. doi:10.1093/nutrit/nuaa061
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80	The average American consumes 10,439	What We Eat in America, NHANES 2017-March 2020. https://www.ars.usda.gov/ARUserFiles/80400530/pdf/1720/Table_1_NIN_GEN_1720.pdf
81	According to the USDA, the	Dairy products: Per capita consumption, United States (annual). Published online November 30, 2023. Accessed December 28, 2023. https://www.ers.usda.gov/webdocs/DataFiles/48685/pconsp_1_.xlsx?v=7349.6
82	The average American consumes 223	Per capita meat consumption, retail weight. Accessed December 28, 2023. https://www.usda.gov/sites/default/files/documents/US-Livestock-projections-to-2031.xls
83	Lipopolysaccharide is built on a	Huang S, Rutkowsky JM, Snodgrass RG, et al. Saturated fatty acids activate TLR-mediated proinflammatory signaling pathways. <i>J Lipid Res.</i> 2012;53(9):2002-2013. doi:10.1194/jlr.D029546
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85		Nguyen MTA, Favelyukis S, Nguyen AK, et al. A subpopulation of macrophages infiltrates hypertrophic adipose tissue and is activated by free fatty acids via Toll-like receptors 2 and 4 and JNK-dependent pathways. <i>J Biol Chem.</i> 2007;282(48):35279-35292. doi:10.1074/jbc.M706762200
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87		Reynolds CM, McGillicuddy FC, Harford KA, Finucane OM, Mills KHG, Roche HM. Dietary saturated fatty acids prime the NLRP3 inflammasome via TLR4 in dendritic cells-implications for diet-induced insulin resistance. <i>Mol Nutr Food Res.</i> 2012;56(8):1212-1222. doi:10.1002/mnfr.201200058

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93		Büttner A, Thieme D. Side effects of anabolic androgenic steroids: pathological findings and structure-activity relationships. <i>Handb Exp Pharmacol.</i> 2010;(195):459-484. doi:10.1007/978-3-540-79088-4_19
94		Myles IA, Fontecilla NM, Janelins BM, Vithayathil PJ, Segre JA, Datta SK. Parental dietary fat intake alters offspring microbiome and immunity. <i>J Immunol.</i> 2013;191(6):10.4049/jimmunol.1301057. doi:10.4049/jimmunol.1301057
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96		Deopurkar R, Ghanim H, Friedman J, et al. Differential Effects of Cream, Glucose, and Orange Juice on Inflammation, Endotoxin, and the Expression of Toll-Like Receptor-4 and Suppressor of Cytokine Signaling-3. <i>Diabetes Care.</i> 2010;33(5):991-997. doi:10.2337/dc09-1630
97	When you consume excess saturated	Jamar G, Pisani LP. Inflammatory crosstalk between saturated fatty acids and gut microbiota-white adipose tissue axis. <i>Eur J Nutr.</i> 2023;62(3):1077-1091. doi:10.1007/s00394-022-03062-z
98	Short term: A single serving	Deopurkar R, Ghanim H, Friedman J, et al. Differential Effects of Cream, Glucose, and Orange Juice on Inflammation, Endotoxin, and the Expression of Toll-Like Receptor-4 and Suppressor of Cytokine Signaling-3. <i>Diabetes Care.</i> 2010;33(5):991-997. doi:10.2337/dc09-1630

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99	Medium term: Just five days	David LA, Maurice CF, Carmody RN, et al. Diet rapidly and reproducibly alters the human gut microbiome. <i>Nature</i> . 2014;505(7484):559-563. doi:10.1038/nature12820
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TABLE: Animal Model Effects of Food Additives on Microbiome, Gut Barrier, and Immune System with Human Disease Associations

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276	Aspartame increases invasive E coli, E faecalis	Shil A, Chichger H. Artificial Sweeteners Negatively Regulate Pathogenic Characteristics of Two Model Gut Bacteria, <i>E. coli</i> and <i>E. faecalis</i> . <i>Int J Mol Sci.</i> 2021;22(10):5228. doi:10.3390/ijms22105228
277	Aspartame decreased tight junctions	Shil A, Olusanya O, Ghufloor Z, Forson B, Marks J, Chichger H. Artificial Sweeteners Disrupt Tight Junctions and Barrier Function in the Intestinal Epithelium through Activation of the Sweet Taste Receptor, T1R3. <i>Nutrients.</i> 2020;12(6). doi:10.3390/nu12061862
278	Aspartame increases gut permeability	Shil NN, Topley N, Phillippou M, et al. Artificial sweeteners disrupt tight junctions and barrier function in intestinal epithelial cell models. <i>Front Nutr.</i> 2021;8:746247. doi:10.3389/fnut.2021.746247.

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279	Aspartame increases inflammation	He X, Yang Q, Yu K, et al. Oral exposure to an acceptable daily intake dose of aspartame induced a delayed proinflammatory cytokine response in the cerebrospinal fluid of rats. <i>Food Chem Toxicol.</i> 2023;178:113931. doi:10.1016/j.fct.2023.113931.
280	Aspartame increases intestinal inflammation	Zhong M, Feng X, Li Y, et al. Acceptable daily intake of aspartame aggravates enteritis pathology and systemic inflammation in colitis mouse model. <i>J Food Sci.</i> 2024;89(12):10202-10221. doi:10.1111/1750-3841.17505.
281	Aspartame is associated with cancer	Aspartame hazard and risk assessment results released. Accessed February 9, 2024. https://www.who.int/news/item/14-07-2023-aspartame-hazard-and-risk-assessment-results-released
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285	Aspartame is associated with stroke	Debras C, Chazelas E, Sellem L, et al. Artificial sweeteners and risk of cardiovascular diseases: results from the prospective NutriNet-Santé cohort. <i>BMJ.</i> 2022;378:e071204. doi:10.1136/bmj-2022-071204
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287	Sucralose decreases gut diversity	Rodriguez-Palacios A, Harding A, Menghini P, et al. The Artificial Sweetener Splenda Promotes Gut Proteobacteria, Dysbiosis, and Myeloperoxidase Reactivity in Crohn's Disease-Like Ileitis. <i>Inflamm Bowel Dis.</i> 2018;24(5):1005-1020. doi:10.1093/ibd/izy060
288	Sucralose increases shigella, bilophila	Gerasimidis K, Bryden K, Chen X, et al. The impact of food additives, artificial sweeteners and domestic hygiene products on the human gut microbiome and its fibre fermentation capacity. <i>Eur J Nutr.</i> 2020;59(7):3213-3230. doi:10.1007/s00394-019-02161-8
289	Sucralose increases invasive E coli, E faecalis	Shil A, Chichger H. Artificial Sweeteners Negatively Regulate Pathogenic Characteristics of Two Model Gut Bacteria, <i>E. coli</i> and <i>E. faecalis</i> . <i>Int J Mol Sci.</i> 2021;22(10):5228. doi:10.3390/ijms22105228
290	Sucralose decreases tight junctions	Shil A, Olusanya O, Ghufloor Z, Forson B, Marks J, Chichger H. Artificial Sweeteners Disrupt Tight Junctions and Barrier Function in the Intestinal Epithelium through Activation of the Sweet Taste Receptor, T1R3. <i>Nutrients.</i> 2020;12(6). doi:10.3390/nu12061862

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62	63% percent less likely to	Matsumoto S, Beeson WL, Shavlik DJ, Siapco G, Jaceldo-Siegl K, Fraser GE. Association between vegetarian diets and cardiovascular risk factors in non-Hispanic white participants of the Adventist Health Study-2. <i>J Nutr Sci.</i> 2019;8:e6. doi:10.1017/jns.2019.1
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64	43% percent less likely to	Matsumoto S, Beeson WL, Shavlik DJ, et al. Association between vegetarian diets and cardiovascular risk factors in non-Hispanic white participants of the Adventist Health Study-2. <i>J Nutr Sci.</i> 2019;8:e6. doi:10.1017/jns.2019.1

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79		Lebwohl B, Cao Y, Zong G, et al. Long term gluten consumption in adults without celiac disease and risk of coronary heart disease: prospective cohort study. <i>BMJ</i> . 2017;357:j1892. doi:10.1136/bmj.j1892
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82	TABLE: Sources of Fiber(Grams of fiber per 100 grams)	USDA FoodData Central. Accessed December 9, 2024. https://fdc.nal.usda.gov/
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88	Red wine polyphenols increase Bifidobacteria	Moreno-Indias I, Sánchez-Alcoholado L, Pérez-Martínez P, et al. Red wine polyphenols modulate fecal microbiota and reduce markers of the metabolic syndrome in obese patients. <i>Food Funct</i> . 2016;7(4):1775-1787. doi:10.1039/c5fo00886g
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104	TABLE: Sources of Polyphenols(milligrams of polyphenols per 100 grams)	Database on Polyphenol Content in Foods - Phenol-Explorer. Accessed December 9, 2024. http://phenol-explorer.eu/

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105	Research by Dr. Frank Hu	Zong G, Li Y, Sampson L, et al. Monounsaturated fats from plant and animal sources in relation to risk of coronary heart disease among US men and women. <i>The American Journal of Clinical Nutrition</i> . 2018;107(3):445-453. doi:10.1093/ajcn/nqx004
106	In fact, if you swap	Zong G, Li Y, Sampson L, et al. Monounsaturated fats from plant and animal sources in relation to risk of coronary heart disease among US men and women. <i>The American Journal of Clinical Nutrition</i> . 2018;107(3):445-453. doi:10.1093/ajcn/nqx004
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113	The polyphenol content of extra-virgin	Bayram B, Esatbeyoglu T, Schulze N, Ozcelik B, Frank J, Rimbach G. Comprehensive analysis of polyphenols in 55 extra virgin olive oils by HPLC-ECD and their correlation with antioxidant activities. <i>Plant Foods Hum Nutr</i> . 2012;67(4):326-336. doi:10.1007/s11130-012-0315-z
114	The olives with the highest	Can Olive Oil Really Fight Inflammation and Disease? Allrecipes. Accessed May 27, 2024. https://www.allrecipes.com/article/what-is-high-polyphenol-olive-oil/
115	In a study of olive oil	Bayram B, Esatbeyoglu T, Schulze N, Ozcelik B, Frank J, Rimbach G. Comprehensive analysis of polyphenols in 55 extra virgin olive oils by HPLC-ECD and their correlation with antioxidant activities. <i>Plant Foods Hum Nutr</i> . 2012;67(4):326-336. doi:10.1007/s11130-012-0315-z
116	TABLE: Foods High in MUFAs (Grams of MUFA per 100 grams)	USDA FoodData Central. Accessed December 9, 2024. https://fdc.nal.usda.gov/

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117	Healthy young women can convert	Burdge GC, Wootton SA. Eicosapentaenoic acid (EPA) and docosapentaenoic acid are the principal products of alpha-linolenic acid metabolism in young women. <i>Br J Nutr.</i> 2002;88(4):411–420. doi:10.1079/BJN2002762
118		Burdge GC, Wootton SA. Eicosapentaenoic and docosapentaenoic acids are the principal products of alpha-linolenic acid metabolism in young men. <i>Br J Nutr.</i> 2002;88(4):355–363. doi:10.1079/BJN2002690
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123	Well, try this on for	Tsugawa H, Kabe Y, Kanai A, et al. Short-chain fatty acids bind to apoptosis-associated speck-like protein to activate inflammasome complex to prevent Salmonella infection. <i>PLOS Biology.</i> 2020;18(9):e3000813. doi:10.1371/journal.pbio.3000813
124	Omega -3's are not precursors to	Watson H, Mitra S, Croden FC, et al. A randomized trial of the effect of omega-3 polyunsaturated fatty acid supplementation on the human intestinal microbiota. <i>Gut.</i> 2018;67(11):1974-1983. doi:10.1136/gutjnl-2018-316603
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126	Omega-3 intake has been shown	Ananthakrishnan AN, Khalili H, Konijeti GG, et al. Long-term dietary intake of omega-3-fatty acids and risk of ulcerative colitis in women. <i>JAMA Intern Med.</i> 2014;174(9):1354-1362. doi:10.1001/jamainternmed.2014.2295
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132		Dehghani Firouzabadi F, Shab-Bidar S, Jayedi A. The effects of omega-3 polyunsaturated fatty acids supplementation in pregnancy, lactation, and infancy: an umbrella review of meta-analyses of randomized trials. <i>Pharmacol Res.</i> 2022;177:106100. doi:10.1016/j.phrs.2022.106100
133		Best KP, Gold M, Kennedy D, Martin J, Makrides M. Omega-3 long-chain PUFA intake during pregnancy and allergic disease outcomes in the offspring: a systematic review and meta-analysis of observational studies and randomized controlled trials. <i>Am J Clin Nutr.</i> 2016;103(1):128-143. doi:10.3945/ajcn.115.111807
134	The authors concluded that "Omega-3	Best KP, Gold M, Kennedy D, Martin J, Makrides M. Omega-3 long-chain PUFA intake during pregnancy and allergic disease outcomes in the offspring: a systematic review and meta-analysis of observational studies and randomized controlled trials. <i>Am J Clin Nutr.</i> 2016;103(1):128-143. doi:10.3945/ajcn.115.111104
135	Only about 68% percent of	Papanikolaou Y, Brooks J, Cox KB, Fulgoni VL 3rd. US adults are not meeting recommended levels for fish and omega-3 fatty acid intake: results from an analysis using observational data from NHANES 2003–2008. <i>Nutr J.</i> 2014;13:31. doi:10.1186/1475-2891-13-31
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145		Ping Z, Hu M, Chen J, et al. Micro(nano)plastics in human urine: A surprising contrast between urban and rural regions detected by μ FTIR. <i>Eco-Environ Health.</i> 2024;2024:116208. doi:10.1016/j.ecoenv.2024.116208
146		Ibrahim W, Eris U, Keimling M, et al. Bioaccumulation of microplastics in decedent human brains. <i>Nat Med.</i> 2024;30(4):456-463. doi:10.1038/s41591-024-03453-1
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148	First, nanoplastics bioaccumulate as you	Benson NU, Agboola OD, Fred-Ahmadu OH, de la Torre GE, et al. Micro(nano)plastics prevalence, food web interactions, and toxicity assessment in aquatic organisms. <i>Front Mar Sci.</i> 2022;9:851281. doi:10.3389/fmars.2022.851281
149		Pitt JA, Aluru N, Hahn ME. Microplastics in marine food webs: trophic transfer, bioaccumulation, and biomagnification. In: <i>Advances in Marine Microplastics Research.</i> WHOI; 2024.
150	Second, pollution levels vary by	Wu C, Zhang C, Li G, et al. Comparison of microplastic pollution in different water bodies from estuaries to coastal waters in the Yangtze delta. <i>Sci Total Environ.</i> 2018;630:1394-1400. doi:10.1016/j.scitotenv.2018.02.036
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152	TABLE: Foods High in Omega-3s(Grams of Omega 3 per 100 grams)	USDA FoodData Central. Accessed December 9, 2024. https://fdc.nal.usda.gov/
153	You can also improve the	Emken EA, Livengood CM. Conversion of dietary alpha-linolenic acid to long-chain n-3 polyunsaturated fatty acids in humans is influenced by high dietary linoleic acid intake. <i>Am J Clin Nutr.</i> 2000;71(1):34-40. doi:10.1093/ajcn/71.1.34

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154	However, in Chapter 3, I	Petersen KS, Maki KC, Calder PC, et al. Perspective on the health effects of unsaturated fatty acids and commonly consumed plant oils high in unsaturated fat. <i>British Journal of Nutrition</i> . 2024;132(8):1039-1050. doi:10.1017/S0007114524002459
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156		Masson CJ, Mensink RP. Exchanging saturated fatty acids for (n-6) polyunsaturated fatty acids in a mixed meal may decrease postprandial lipemia and markers of inflammation and endothelial activity in overweight men. <i>J Nutr</i> . 2011;141(5):816-821. doi: 10.3945/jn.110.136432
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Timing Is Everything

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30	In both mice and humans	Thaiss CA, Levy M, Korem T, et al. Trans-kingdom control of microbiota diurnal oscillations promotes metabolic homeostasis. <i>Cell.</i> 2014;159(3):514-529. doi:10.1016/j.cell.2014.10.048.
31	In human studies, the microbiome	Thaiss CA, Levy M, Korem T, et al. Microbiota diurnal rhythmicity programs host transcriptome oscillations. <i>Cell.</i> 2016;167(6):1495-1510.e12. doi:10.1016/j.cell.2016.10.004
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12	Reduced inflammatory markers like C-reactive	Dehghan P, Gargari BP, Jafar-Abadi MA. Oligofructose-enriched inulin improves some inflammatory markers and metabolic endotoxemia in women with type 2 diabetes mellitus: a randomized controlled clinical trial. <i>Nutrition</i> . 2014;30(4):418-423. doi:10.1016/j.nut.2013.09.019.
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14	Improved gut motility	Cook IJ, Irvine EJ, Campbell D, Shannon S, Reddy SN, Collins SM. Effect of dietary fiber on symptoms and rectosigmoid motility in patients with irritable bowel syndrome. A controlled, crossover study. <i>Gastroenterology</i> . 1990;98(1):66-72. doi:10.1016/0016-5085(90)91292-e
15	Less visceral sensitivity	Shulman RJ, Chumpitazi BP, Abdel-Rahman SM, et al. Psyllium fiber reduces abdominal pain in children with irritable bowel syndrome in a randomized, double-blind trial. <i>Clin Gastroenterol Hepatol</i> . 2017;15(5):712-719.e4. doi:10.1016/j.cgh.2016.11.038.
16	Improvement of both diarrhea and	van der Schoot A, Drysdale C, Whelan K, Dimidi E. The Effect of Fiber Supplementation on Chronic Constipation in Adults: An Updated Systematic Review and Meta-Analysis of Randomized Controlled Trials. <i>Am J Clin Nutr</i> . 2022;116(4):953-969. doi:10.1093/ajcn/nqac184
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19	Improvements in irritable bowel syndrome	El-Salhy M, Ystad SO, Mazzawi T, Gundersen D. Dietary fiber in irritable bowel syndrome (Review). <i>Int J Mol Med</i> . 2017;40(3):607-613. doi:10.3892/ijmm.2017.3072
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21	Improvements in blood lipid parameters	Xie Y, Gou L, Peng M, Zheng J, Chen L. Effects of soluble fiber supplementation on lipid parameters in adults with type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. <i>Clin Nutr</i> . 2024;43(4):-. doi:10.1016/j.clnu.2020.10.032
22		Jovanovski E, Yashpal S, Komishon A, et al. Effect of psyllium (<i>Plantago ovata</i>) fiber on LDL cholesterol and alternative lipid targets, non-HDL cholesterol and apolipoprotein B: a systematic review and meta-analysis of randomized controlled trials. <i>Am J Clin Nutr</i> . 2018;108(5):922-932. doi:10.1093/ajcn/nqy115
23	Less fat mass and less	Pokushalov E, Ponomarenko A, Garcia C, et al. The Impact of Glucomannan, Inulin, and Psyllium Supplementation (Soloways™) on Weight Loss in Adults with FTO, LEP, LEPR, and MC4R Polymorphisms: A Randomized, Double-Blind, Placebo-Controlled Trial. <i>Nutrients</i> . 2024;16(4):557. doi:10.3390/nu16040557

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24	Natural increase in satiety hormones	Karhunen L, et al. A psyllium fiber-enriched meal strongly modified postprandial glucose, insulin, ghrelin, GLP-1, and PYY responses. <i>J Nutr.</i> 2010;140(4):737-744. doi:10.3945/jn.109.113987.
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26		Tolhurst G, Heffron H, Lam YS, et al. Short-chain fatty acids stimulate glucagon-like peptide-1 secretion via the G-protein-coupled receptor FFAR2. <i>Diabetes.</i> 2012;61(2):364-371. doi:10.2337/db11-1019
27		Psichas A, Sleeth ML, Murphy KG, et al. The short chain fatty acid propionate stimulates GLP-1 and PYY secretion via free fatty acid receptor 2 in rodents. <i>Int J Obes (Lond).</i> 2015;39(3):424-429. doi:10.1038/ijo.2014.153
28		Christiansen CB, Gabe MBN, Svendsen B, Dragsted LO, Rosenkilde MM, Holst JJ. The impact of short-chain fatty acids on GLP-1 and PYY secretion from the isolated perfused rat colon. <i>Am J Physiol Gastrointest Liver Physiol.</i> 2018;315(1):G53-G65. doi:10.1152/ajpgi.00346.2017
29	Suppression of the hormonal stress	Schmidt K, Cowen PJ, Harmer CJ, Tzortzis G, Errington S, Burnet PW. Prebiotic intake reduces the waking cortisol response and alters emotional bias in healthy volunteers. <i>Psychopharmacology (Berl).</i> 2015;232(10):1793-1801. doi:10.1007/s00213-014-3810-0
30	Improved absorption of calcium and	Whisner CM, Martin BR, Nakatsu CH, et al. Soluble corn fiber increases calcium absorption associated with shifts in the gut microbiota: a randomized dose-response trial in free-living pubertal females. <i>J Nutr.</i> 2016;146(7):1298-1306. doi:10.3945/jn.116.230466.
31	Reduced risk of non-alcoholic fatty	Krawczyk M, Maciejewska D, Ryterska K, et al. Gut permeability might be improved by dietary fiber supplementation in individuals with nonalcoholic fatty liver disease (NAFLD) undergoing weight reduction. <i>Nutrients.</i> 2018;10(11):1793. doi:10.3390/nu10111793.
32	Improved cognitive performance	Berding K, Long-Smith CM, Carbia C, et al. A specific dietary fibre supplementation improves cognitive performance-an exploratory randomised, placebo-controlled, crossover study. <i>Psychopharmacology (Berl).</i> 2021;238(1):149-163. doi:10.1007/s00213-020-05665-y
33	Probiotics don't typically stick around	Zmora N, Zilberman-Schapira G, Suez J, et al. Personalized gut mucosal colonization resistance to empiric probiotics is associated with unique host and microbiome features. <i>Cell.</i> 2018;174(6):1388-1405.e21. doi:10.1016/j.cell.2018.08.041
34	While probiotics don't tend to	Bush JR, Baisley J, Harding SV, Alfa MJ. Consumption of Solnul™ resistant potato starch produces a prebiotic effect in a randomized, placebo-controlled clinical trial. <i>Nutrients.</i> 2023;15(7):1582. doi:10.3390/nu15071582.
35	These microbes play vital roles	Plovier H, Everard A, Druart C, et al. A purified membrane protein from <i>Akkermansia muciniphila</i> or the pasteurized bacterium improves metabolism in obese and diabetic mice. <i>Nat Med.</i> 2017;23(1):107-113. doi:10.1038/nm.4236.
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37	Similarly, fiber from green kiwis	Taladriz-Grimaldo B, Prieto I, Fenoll J, et al. Effects of green kiwifruit powder (<i>Actinidia deliciosa</i> var. Hayward) on colonic fermentation: increased butyrate production and stimulation of beneficial microbes including <i>Akkermansia muciniphila</i> and <i>Faecalibacterium prausnitzii</i> in a SHIME® gut model. <i>J Nutr Sci.</i> 2017;6:e52. doi:10.1017/jns.2017.52
38		Blatchford P, Stoklosinski H, Eady S, et al. Consumption of kiwifruit capsules increases <i>Faecalibacterium prausnitzii</i> abundance in functionally constipated individuals: a randomized, controlled human trial. <i>J Nutr Sci.</i> 2017;6:e52. doi:10.1017/jns.2017.52
39	For example, in patients with	Robin Spiller, Fanny Pélerin, Amélie Cayzeele-Decherf, et al. Randomized, double-blind, placebo-controlled trial of <i>Saccharomyces cerevisiae</i> CNCM I-3856 in patients with irritable bowel syndrome: improvement in abdominal pain and bloating in those with predominant constipation. <i>Clin Exp Gastroenterol.</i> 2016;9:17-28. doi:10.2147/CEG.S97900.
40		Cayzeele-Decherf A, Pélerin F, Leuillet S, et al. <i>Saccharomyces cerevisiae</i> CNCM I-3856 in irritable bowel syndrome: an individual subject meta-analysis. <i>World J Gastroenterol.</i> 2017;23(2):336-344. doi:10.3748/wjg.v23.i2.336.
41	Similarly, for antibiotic-associated diarrhea	Szajewska H, Kotodziej M. Systematic review with meta-analysis: <i>Lactobacillus rhamnosus</i> GG in the prevention of antibiotic-associated diarrhoea in children and adults. <i>Aliment Pharmacol Ther.</i> 2015 Nov;42(10):1149-1157. doi:10.1111/apt.13404. PMID:26365389.

Table: Targeted Probiotics for Specific Conditions

42	Saccharomyces cerevisiae for IBS with bloating	Cayzeele-Decherf A, Pélerin F, Leuillet S, et al. <i>Saccharomyces cerevisiae</i> CNCM I-3856 in irritable bowel syndrome: an individual subject meta-analysis. <i>World J Gastroenterol.</i> 2017;23(2):336-344. doi:10.3748/wjg.v23.i2.336.
43	Saccharomyces boulardii for antibiotic-associated diarrhea	Szajewska H, Kotodziej M. Systematic review with meta-analysis: <i>Saccharomyces boulardii</i> in the prevention of antibiotic-associated diarrhoea in children and adults. <i>Aliment Pharmacol Ther.</i> 2015 Oct;42(8):793-801. doi:10.1111/apt.13404. PMID:26216624.
44	Lactobacillus rhamnosus GG for Acute diarrhea	Huang JCU, Sohn KM, and colleagues. A randomized, double-blind, placebo-controlled trial of <i>Lactobacillus rhamnosus</i> GG in adults with acute infectious diarrhea. <i>Mayo Clin Proc.</i> 2001;76(8):883-889. doi:10.4065/76.8.883.
45	Bifidobacterium lactis DN-173010 for constipation	Yang YX, He M, Hu G, et al. Effect of a fermented milk containing <i>Bifidobacterium lactis</i> DN-173 010 on Chinese constipated women. <i>World J Gastroenterol.</i> 2008;14(40):6237-6243. doi:10.3748/wjg.14.6237.
46	E. coli Nissle 1917 for Ulcerative colitis (remission)	Kruis W, Fric P, Pokrotnieks J, et al. Maintaining remission of ulcerative colitis with the probiotic <i>Escherichia coli</i> Nissle 1917 is as effective as with standard mesalazine. <i>Gut.</i> 2004 Nov;53(11):1617-1623. doi:10.1136/gut.2003.037747.
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Body and Mind Healing

Nourishing the Soul through Connection

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TABLE: Techniques to Stimulate the Vagus Nerve

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The Plant Powered Plus Protocol

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Additional Relevant Research

To support the microbiome-first framework outlined in Plant Powered Plus, we conducted a dedicated mechanistic research study on 38TERA Daily Microbiome Nutrition (DMN). This product is recommended on Page 173 and therefore we are sharing this additional supportive evidence behind that recommendation.

Study Design and Rationale

The research was conducted in 2025 by ProDigest (Belgium) using the validated M-SHIME® (Mucosal Simulator of the Human Intestinal Microbial Ecosystem), an advanced laboratory model that closely replicates conditions of the human colon, including both luminal (gut contents) and mucosal (gut lining) environments.

The model was inoculated with gut microbiota from five healthy adult donors to reflect real-world interindividual variability. DMN was administered over a 15-day period at two dosing levels:

Standard dose: 5.6 g/day (once daily)

High dose: 11.2 g/day (twice daily)

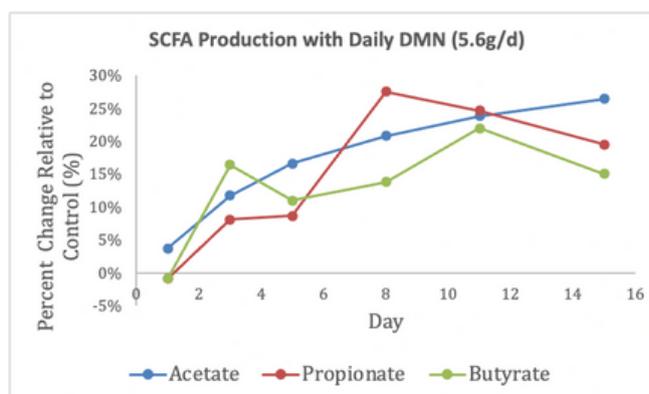
Key outcomes measured included short-chain fatty acid (SCFA) production, microbial composition (via shotgun metagenomics), toxic fermentation byproducts (ammonium), and immune signaling markers.

Key Findings

1. Rapid and Sustained Increases in Beneficial SCFAs

DMN produced a coordinated rise in all three major SCFAs:

- Acetate increased within 3 days
- Propionate rose significantly by Day 8
- Butyrate, critical for gut barrier integrity and immune tolerance, increased by over 20% at standard dose and by 130% at the higher dose



Importantly, SCFA production continued to rise despite a constant daily dose, indicating microbiome adaptation—the microbes became more efficient at fermenting substrates over time.

2. Reduction in Harmful Fermentation Byproducts

DMN shifted microbial metabolism away from proteolytic fermentation, resulting in a 23–24% reduction in ammonium, a toxic byproduct associated with dysbiosis, mucosal irritation, and inflammation.

3. Favorable Microbiome Remodeling

Supplementation led to consistent enrichment of health-associated taxa:

⇧ Bifidobacterium: foundational fiber-fermenting organisms.

⇧ Akkermansia muciniphila: a keystone species linked to gut barrier integrity, metabolic health, and immune regulation.

⇩ Bilophila wadsworthia: an inflammation-associated bacterium linked to high-fat, low-fiber diets, was significantly suppressed.

4. Anti-Inflammatory Immune Signaling

Microbial changes were accompanied by meaningful shifts in immune markers:

- TNF- α decreased by 17%. TNF- α is a key pro-inflammatory immune signal that drives tissue damage when overactive.
- IL-10 increased by 15%. IL-10 is a key anti-inflammatory immune signal that promotes immune calm and healing.

At the higher dose, reductions in TNF- α were amplified and MCP-1, a chemokine involved in chronic inflammation, was also significantly reduced—supporting a clear dose-response effect.

Why This Matters

Together, these findings demonstrate that DMN addresses multiple hallmarks of modern microbiome dysfunction: inadequate SCFA production, toxic fermentation byproducts, loss of beneficial microbes, and low-grade inflammation. The results mechanistically support the book's central premise that feeding the microbiome—consistently and comprehensively—is foundational to gut, immune, and whole-body health.

This research complements human clinical trials on DMN's core ingredients (including Solnul resistant potato starch and Actazin green kiwifruit powder), which have independently shown improvements in microbial composition, bowel function, and digestive health in human studies.

Learn More at <https://www.38tera.com>.