Diet

1-Short-chain fatty acids: linking diet, the microbiome and immunity

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By Mann, ER (Mann, Elizabeth R.) [1] ; Lam, YK (Lam, Ying Ka) [2] ; Uhlig, HH (Uhlig, Holm H.) [2] , [3] , [4] (provided by Clarivate) Source NATURE REVIEWS IMMUNOLOGY Volume 24 Issue 8 Page 577-595 DOI 10.1038/s41577-024-01014-8 Published AUG 2024 Early Access APR 2024 Indexed 2024-04-12 Document Type Review

Abstract

The short-chain fatty acids (SCFAs) butyrate, propionate and acetate are microbial metabolites and their availability in the gut and other organs is determined by environmental factors, such as diet and use of antibiotics, that shape the diversity and metabolism of the microbiota. SCFAs regulate epithelial barrier function as well as mucosal and systemic immunity via evolutionary conserved processes that involve G protein-coupled receptor signalling or histone deacetylase activity. Indicatively, the anti-inflammatory role of butyrate is mediated through direct effects on the differentiation of intestinal epithelial cells, phagocytes, B cells and plasma cells, and regulatory and effector T cells. Intestinally derived SCFAs also directly and indirectly affect immunity at extra-intestinal sites, such as the liver, the lungs, the reproductive tract and the brain, and have been implicated in a range of disorders, including infections, intestinal inflammation, autoimmunity, food allergies, asthma and responses to cancer therapies. An ecological understanding of microbial communities and their interrelated metabolic states, as well as the engineering of butyrogenic bacteria may support SCFA-focused interventions for the prevention and treatment of immune-mediated diseases. Short-chain fatty acids (SCFAs) are microbial metabolites that regulate mucosal barrier integrity and immune cell functions. This Review summarizes latest insights into how SCFA levels might determine inflammatory and allergic disease outcomes by controlling the crosstalk between diet, the microbiome and immunity.

Keywords

Keywords Plus

HUMAN GUT MICROBIOMEBUTYRATE PROTECTS MICEVERSUS-HOST-DISEASEHIGH-FIBER DIETINFANT GUTULCERATIVE-COLITISINTESTINAL MICROBIOTAMETABOLITE BUTYRATEEPITHELIAL-CELLSBARRIER FUNCTION

Diet

2-The interplay between diet and the gut microbiome: implications for health and disease

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By Ross, FC (Ross, Fiona C.) [1] , [2] , [3] ; Patangia, D (Patangia, Dhrati) [2] , [4] ; Grimaud, G (Grimaud, Ghjuvan) [2] , [4] ; Lavelle, A (Lavelle, Aonghus) [1] , [2] ; Dempsey, EM (Dempsey, Eugene M.) [2] , [3] , [5] ; Ross, RP (Ross, R. Paul) [2] ; Stanton, C (Stanton, Catherine) [2] , [4] (provided by Clarivate) **Source NATURE REVIEWS MICROBIOLOGY Volume 22 Issue 11 Page 671-686 DOI 10.1038/s41579-024-01068-4 Published NOV 2024 Early Access JUL 2024 Indexed 2024-07-24 Document Type Review**

Abstract

Diet has a pivotal role in shaping the composition, function and diversity of the gut microbiome, with various diets having a profound impact on the stability, functionality and diversity of the microbial community within our gut. Understanding the profound impact of varied diets on the microbiome is crucial, as it will enable us not only to make well-informed dietary decisions for better metabolic and intestinal health, but also to prevent and slow the onset of specific diet-related diseases that stem from suboptimal diets. In this Review, we explore how geographical location affects the gut microbiome and how different diets shape its composition and function. We examine the mechanisms by which whole dietary regimes, such as the Mediterranean diet, high-fibre diet, plant-based diet, high-protein diet, ketogenic diet and Western diet, influence the gut microbiome. Furthermore, we underscore the need for exhaustive studies to better understand the causal relationship between diet, host and microorganisms for the development of precision nutrition and microbiome-based therapies.
In this Review, Stanton and colleagues examine the effect of different whole diets on the composition and function of the gut microbiome and explore how the diet-microbiome relationship influences human health and the progression of different chronic diseases.

Keywords

Keywords Plus

CHAIN FATTY-ACIDSMEDITERRANEAN DIETINDUCED OBESITYINTERVENTIONMETABOLOMERESISTANCECHILDRENALTERSIMPACT

Diet

3-Short-chain fatty acid metabolites propionate and butyrate are unique epigenetic regulatory elements linking diet, metabolism and gene expression

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By Nshanian, M (Nshanian, Michael) [1] ; Gruber, JJ (Gruber, Joshua J.) [1] ; Geller, BS (Geller, Benjamin S.) [1] ; Chleilat, F (Chleilat, Faye) [1] ; Lancaster, SM (Lancaster, Samuel M.) [1] ; White, SM (White, Shannon M.) [1] ; Alexandrova, L (Alexandrova, Ludmila) [2] ; Camarillo, JM (Camarillo, Jeannie M.) [3] ; Kelleher, NL (Kelleher, Neil L.) [3] , [4] ; Zhao, YM (Zhao, Yingming) [5] ; **(provided by Clarivate) Source NATURE METABOLISM Volume 7 Issue 1 DOI 10.1038/s42255-024-01191-9 Published JAN 2025 Early Access JAN 2025 Indexed 2025-01-13 Document Type Article**

Abstract

The short-chain fatty acids (SCFAs) propionate and butyrate have beneficial health effects, are produced in large amounts by microbial metabolism and have been identified as unique acyl lysine histone marks. To better understand the function of these modifications, we used chromatin immunoprecipitation followed by sequencing to map the genome-wide location of four short-chain acyl histone marks, H3K18pr, H3K18bu, H4K12pr and H4K12bu, in treated and untreated colorectal cancer (CRC) and normal cells as well as in mouse intestines in vivo. We correlate these marks with open chromatin regions and gene expression to access the function of the target regions. Our data demonstrate that propionate and butyrate bind and act as promoters of genes involved in growth, differentiation and ion transport. We propose a mechanism involving direct modification of specific genomic regions by SCFAs resulting in increased chromatin accessibility and, in the case of butyrate, opposing effects on the proliferation of normal versus CRC cells.

Keywords

Keywords Plus

HISTONEACETYLATIONPROPIONYLATIONBUTYRYLATIONCHROMATIN

Diet

4-Global Food Security and Sustainability Issues: The Road to 2030 from Nutrition and Sustainable Healthy Diets to Food Systems Change

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By Varzakas, T (Varzakas, Theodoros) [1] ; Smaoui, S (Smaoui, Slim) [2] (provided by Clarivate) **Source FOODS Volume 13 Issue 2 DOI 10.3390/foods13020306 Article Number 306 Published JAN 2024 Indexed 2024-02-05 Document Type Review**

Abstract

The accomplishment of food/nutrition security for all across sustainable food systems (SFS) is tied to the Sustainable Development Goals (SDGs). SFS is connected to all SDGs via the traditional framework of social inclusion, economic development, environmental safety, inclusivity, and the development of sustainable food systems. We suggest that, for the world to achieve sustainable development, a shift to SFS is necessary to guarantee food/nutrition security for all, while operating within planetary boundaries to protect ecosystems and adapt to and mitigate climate change. Therefore, there is a requirement for original approaches that implement systemic and more participatory methods to engage with a wider range of food system stakeholders. However, the lack of skills and tools regarding novel methodologies for food system transformation is a key obstacle to the deployment of such approaches in practice. In the first part of this review, a summary of some challenges that occur in the governance of food system transformation is given. Through a case study of plant-based proteins and their biological and chemical modification as diets shift towards alternative proteins, we demonstrate that resource-efficient food systems and food waste, through system transformation, are useful in understanding both (i) how food system transformation has ensued and (ii) how the required transformation is prohibited. Finally, we discuss the implications of food system transformation in terms of nutrition and sustainable healthy diets, which are needed to achieve changes in food safety systems in the future. The linkage of food and the environment is evident, focusing on nutrition and sustainable healthy diets. This cannot be accomplished without system change and research towards new foods and, more specifically, new proteins such as plant-based ones and their biological and chemical modification.

Keywords

Author Keywords

governancefood safetyfood system transformationsustainability transitions

Keywords Plus

CLIMATE-CHANGEFUNCTIONAL-PROPERTIESOAT PROTEINSTRUCTURAL CHARACTERISTICSPHYSICOCHEMICAL PROPERTIESEMULSIFYING PROPERTIESMAILLARD REACTIONDEAMIDATIONGLYCATIONGLYCOSYLATION

Diet

5-Regional variations in Mediterranean diet adherence: a sociodemographic and lifestyle analysis across Mediterranean and non-Mediterranean regions within the MEDIET4ALL project

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By Boujelbane, MA (Boujelbane, Mohamed Ali) [1] , [2] ; Ammar, A (Ammar, Achraf) [1] , [2] , [3] ; Salem, A (Salem, Atef) [1] , [2] ; Kerkeni, M (Kerkeni, Mohamed) [2] , [4] ; Trabelsi, K (Trabelsi, Khaled) [4] , [5] ; Bouaziz, B (Bouaziz, Bassem) [6] , [7] ; Masmoudi, L (Masmoudi, Liwa) [2] ; Heydenreich, J (Heydenreich, Juliane) [8] ; Schallhorn, C (Schallhorn, Christiana) [9] ; Müller, G (Mueller, Gabriel) [1] ; (provided by Clarivate) **Source FRONTIERS IN PUBLIC HEALTH Volume 13 DOI 10.3389/fpubh.2025.1596681 Article Number 1596681 Published JUN 10 2025 Indexed 2025-06-28 Document Type Article**

Abstract

Introduction The Mediterranean diet (MedDiet) is acknowledged for its health advantages; however, compliance with its principles differs by region and is influenced by geographical, cultural, economic, and life-style factors. This research examines regional differences in sociodemographic and lifestyle factors between Mediterranean (MC) and non-Mediterranean (NMC) countries, with a particular focus on adherence to the Mediterranean diet and lifestyle, as well as the associated barriers in each region.Methods The MEDIET4ALL international survey was conducted across 10 countries, and data were collected from 4,010 participants. Dietary adherence was assessed via the MedLife Index, and additional lifestyle measures included physical activity (IPAQ-SF), sleep patterns (PSQI), mental health (DASS-21), and social participation (SSPQL). Statistical analyses included chi-square tests, Mann-Whitney U tests, and standardized residual analyses to identify significant regional variations.Results The study revealed distinct dietary patterns, with MC participants showing stronger adherence to traditional MedDiet components (legumes, fish) while NMC participants favored modern adaptations (whole grains). Both regions exhibited low physical activities dominance (60%-62%), although MC participants engaged more (21.1% vs. 18.5%) in moderate physical activity. MC maintained higher proportions of "sometimes socially active" individuals, NMC showed greater representation in the "always socially active" category. Sleep quality was poorer in MC (45% below recommended duration vs. 40% in NMC), while NMC reported higher insomnia rates. Mental health symptoms were comparable (33%-35% moderate depression/anxiety in both), reflecting post-pandemic global trends. Barriers differed regionally with MC faced economic/access constraints while NMC struggled with knowledge gaps and time limitations.Conclusion Our findings highlight that while Mediterranean regions maintain traditional dietary patterns, globalization and modern lifestyle shifts are narrowing regional health behaviors. Public health strategies should address region-specific barriers, including economic constraints in MC regions and knowledge gaps in NMC regions, while promoting MedDiet adherence. Future research should explore the impact of cultural, socio-economic, and digital factors on dietary behaviors and mental health to develop tailored, effective interventions for improving overall well-being.

Keywords
Author Keywords

Diet

Mediterranean regions differencesMedLife Indexphysical activitymental healthpublic healthpsychological distresshealth predictors

Keywords Plus

PHYSICAL-ACTIVITYSLEEPRISKINSTRUMENTEDUCATIONBARRIERSBEHAVIORINDEX

Diet

6-Elucidating the role of diet in maintaining gut health to reduce the risk of obesity, cardiovascular and other age-related inflammatory diseases: recent challenges and future recommendations

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By Aziz, T (Aziz, Tariq) [1] ; Hussain, N (Hussain, Nageen) [2] ; Hameed, Z (Hameed, Zunaira) [2] ; Lin, L (Lin, Lin) [1] , [3] (provided by Clarivate) **Source GUT MICROBES Volume 16 Issue 1 DOI 10.1080/19490976.2023.2297864 Article Number 2297864 Published DEC 31 2024 Indexed 2024-01-20 Document Type Review**

Abstract

A healthy balanced diet is crucial in protecting the immune system against infections and diseases. Poor diets, such as the Western diet, contribute to the development of metabolic diseases, hypertension, and obesity. Microbiota, primarily composed of different microorganisms and residing in the gastrointestinal tract (GIT), also play a significant role in maintaining gut health. Polyphenols and probiotics found in fruits, vegetables, whole grains, legumes, nuts, and seeds promote gut health and support the growth of beneficial bacteria. Different types of diets, their categories, and their impact on health are also mentioned. The relationship between diet, gut health, and the risk of developing obesity, cardiovascular diseases, and inflammatory diseases is discussed in this review article. The rationale behind the review concludes future recommendations for maintaining gut health and reducing the occurrence of obesity, cardiometabolic diseases, and other inflammatory diseases. There is also the need for standardized research methods, long-term studies, and translating scientific knowledge into practical dietary recommendations.

Keywords
Author Keywords
Inflammatory diseasesmicrobiotaobesityprobioticspolyphenols

Keywords Plus
IN-SILICO CHARACTERIZATIONSPINAL MUSCULAR-ATROPHYMEDITERRANEAN DIETRHEUMATOID-ARTHRITISMETABOLIC SYNDROMECROHNS-DISEASELINOLEIC-ACIDMICROBIOTAMARKERSOVERWEIGHT