

PROGUT VII

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GUT MICROBIOTA AND PROBIOTIC
SCIENCE FOUNDATION (INDIA)



Prof. N. K. Ganguly
President

Gut Microbiota and
Probiotic Science
Foundation (India)

From The President's Desk

We are delighted to release the seventh issue, of the Foundation newsletter. This issue will reflect on the activities of the Foundation conducted last year and share interesting new science of the gut microbiota and probiotics during the 14th India Probiotic Symposium which was organized at the Rajiv Gandhi Center for Biotechnology (RGCB) in 2024.

At the 14th India Probiotic Symposium, which witnessed a galaxy of International and National experts, we learned that there is a strong connection between the gut and the brain. The gut microbes are deciders of the varied emotions that a human being goes through, and they may play an important role in alleviation of stress, improving sleep disorders and symptoms of depression. We also learned about the role of the gut microbes in precision medicine, and the possible benefit of microbiota directed foods, in overcoming the burden of acute malnutrition in children. Interestingly, differences in the gut microbiota of rural and urban Indians were highlighted, and the isolation of potential probiotic species from fermented foods in Northeast India was shared. Differences in the gut microbiota of Indians with Type 2 Diabetes and Vitamin B12 deficiency was revealed. The revolution in medical science, "Fecal Microbiota Transplants" which have found their way to India and have benefitted patients with recurrent *Clostridium difficile* infections and Inflammatory Bowel Disorders. The effect of non – caloric sweeteners on the gut microbiota and potential benefit of probiotics in different health conditions was also shared. The mechanism of action of specific probiotic strains and their delivery in appropriate carrier matrix, was also discussed.

The Foundation has been promoting research in the country for scientists under 40 years, and it is heartwarming to learn that there is keen interest for research in the area to generate original data. Various research institutes have mushroomed, and budding scientists have forayed into areas of research, which we cannot imagine could be linked to gut health.

We are also pleased to share that every year the Foundation organizes a Probiotic Awareness Day for school students, and the enthusiasm and excitement among them to read and learn about this new concept is overwhelming.

The Newsletter will also provide a peep into the calendar of events for the year 2025.

We hope you enjoy the contents of the newsletter, which also tells us



Nirmal Kumar Ganguly

Prof. N. K. Ganguly
President
Gut Microbiota and Probiotic Science Foundation (India)

About the Gut Microbiota and Probiotic Science Foundation (India)



The Gut Microbiota and Probiotic Science Foundation (India), was registered as a society, on 9th November 2011 by a group of scientists, under the Societies Registration Act XX1 of 1860. The objective of the Foundation is to provide a thrust to the science of Gut Microbiota and Probiotics in the country. It will also channelize International knowledge and expertise in the field and promote collaborative research in the development of probiotics. It aims to foster and maintain research links with scientists of similar interest.

To meet its objectives the Foundation will:

- Organize a Probiotic Awareness Day for school students
 - Organize an Annual International Symposium, for providing a common scientific platform, for basic scientists and clinicians to share and exchange knowledge and views and delve into newer areas of research.
 - Webcast the symposium for wider viewership.
 - Publish the proceedings of the symposium as a book for distribution to libraries and healthcare professionals, across the country.
 - Publish an annual Newsletter that will capture the latest scientific developments in the area.
 - Promote research in the area and felicitate young talent through the Young Investigator Award.
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MEET OUR MEMBERS



Prof. N. K. Ganguly
President



Dr. B. Sesikeran
Vice President



Prof. G. Balakrish Nair
Vice President



Dr. Neerja Hajela
General Secretary



Prof. J. B. Prajapati



Prof. Ajay Bhalla



Prof. A.K. Srivastava



Prof. B.S. Ramakrishna



Prof. Rama Chaudhry



Prof. A.P. Dash



Prof. Keya Lahiri



Prof. S.K. Mittal



**Prof. Jyoti Prakash
Tamang**



Dr. Sarath Gopalan



**Mr. Takeshi
Yoshimoto**



**Dr. Junji
Fujimoto**



**Mr. Tomoyuki
Iwama**



Dr. Obis David

THE YEAR GONE BY.....

14th India Probiotic Symposium

The 14th India Probiotic Symposium was organized by the Gut Microbiota and Probiotic Science Foundation (India), in association with Rajiv Gandhi Center for Biotechnology (RGCB), Thiruvananthapuram and Institute of Advanced Virology (IAV), Thiruvananthapuram.

Theme: "Nutrition, Gut Microbiome and Probiotics- The Triple Connection"

Date: 3rd and 4th February 2024

Venue: Rajiv Gandhi Center for Biotechnology (RGCB), Thiruvananthapuram



Glimpses of the Symposium

What we learned at the 14th India Probiotic Symposium

THE GUT-BRAIN AXIS: PROBIOTICS AND THEIR IMPACT ON HEALTH, UNVEILING EFFECTS ON SLEEP IMPROVEMENT AND STRESS ALLEVIATION

Dr. Kensei Nishida

Associate Professor, MD, PhD, Institute of Biomedical Sciences, Tokushima University Graduate School, Japan

Recent research highlights the microbiota's influence on behavior through the brain-gut-microbiota axis, called these microbes "mind-altering microorganisms." Two double blind trials reported that consuming *Lactocaseibacillusparacasei* strain Shirota (LcS)-fermented milk for 8 weeks, in healthy medical students, showed significantly suppressed abdominal dysfunction and gene expression changes, in leukocytes compared to a placebo group. The LcS group exhibited a higher species count and alpha diversity index in their gut microbiota. Interestingly, LcS treatment positively affected sleep quality

HOW MICROBES AFFECT DEPRESSION: UNDERLYING MECHANISMS VIA THE GUT-BRAIN AXIS AND THE MODULATING ROLE OF PROBIOTICS

Mr. Kazunori Suda

Senior Researcher Yakult Honsha European Research Center for Microbiology VOF, Belgium

Recent findings suggest that the gut microbiota influences brain functions and psychological state of its host via the gut-brain axis and gut dysbiosis has been linked to several mental illnesses, including Major Depressive Disorder (MDD). Short-chain fatty acids such as butyrate produced by the gut microbiota are known to contribute to the up-regulation of Brain-Derived Neurotrophic Factor (BDNF), and gut dysbiosis causes decreased levels of BDNF, which could affect neuronal development and synaptic plasticity. Increased gut permeability causes an influx of gut microbiota-derived components such as lipopolysaccharides, and the resultant systemic inflammation may lead to neuroinflammation in the central nervous system. Butyrate is also known to suppress the inflammation.

MICROBIOTA-DIRECTED FOOD IN THE TREATMENT OF CHILDREN WITH ACUTE MALNUTRITION

Tahmeed Ahmed MBBS, PhD

Executive Director, International Centre for Diarrhoeal Diseases Research (ICDDR), Dhaka, Bangladesh

The immaturity of the gut microbiota in acute malnutrition has an important role in metabolic and immunologic perturbations that result in suboptimal response to therapeutic measures. Through a series of translational, reverse translational and clinical studies, members of the gut microbiota were identified that promote growth in malnourished children. Local food ingredients that help promote the proliferation of growth promoting members of the gut microbiota, were also identified.

A ROLE FOR GUT MICROBIOTA AND HUMAN NUTRIENT HOMEOSTASIS

Prof. Anura Kurpad,

Department of Physiology, St. John's Medical College, Bengaluru, India

The colon which was thought to be a dead-end for nutrient absorption, may not be true, as the colonic absorption of some nutrients has now been shown to occur. As an example, significant quantities of plant protein could enter the colon, where it can be fermented or utilized by the colonic microbiome for their protein synthesis, or it can be digested by the microbial exoproteases and the resulting Intestinal Amino Acids (IAA) absorbed by the colon, thus contributing to the host requirement.

MODULATING THE MICROBIOME TO IMPROVE PRECISION MEDICINE

Dr. Aadra Bhatt

Assistant Professor, Dept. of Medicine, Division of Gastroenterology and Hepatology, School of Medicine, University of North Carolina, USA

Intestinal microbiota are increasingly recognized as modifiable factors that contribute to variable drug responses (efficacy and toxicity). Microbiota directly modify ≥ 271 oral drugs and other xenobiotics like environmental toxins. It was shown that the microbiota can also alter host-derived drug conjugates formed during host Phase II metabolism. Systematic, mechanistic studies of microbial factors that alter host drug metabolism, or pharmacomicrobiomics, are critical to alleviating drug toxicity and enhancing therapeutic efficiency of drugs for multiple indications.

PROBIOTICS FROM TRADITIONAL FERMENTED FOOD FROM NORTH-EAST INDIA: IMPACT ON CARDIOMETABOLIC DISORDERS

Dr. Sanjay K Banerjee

Associate Professor, Biotechnology, National Institute of Pharmaceutical Education and Research (NIPER), Guwahati, India

India is home to nearly 427 tribal communities and almost half of them are residents of Northeast. Since centuries, these tribal communities have been using 'Fermentation' to preserve food and improve nutrient value. Over 250 different types of fermented foods and beverages are produced and consumed by tribal people of North-east India, which are based on vegetables, milk, bamboo shoot, soyabean, cereals and fish. Isolated around 60 colonies and identified by 16S rRNA sequencing. All strains were characterized in-vitro for their probiotic activity. Further research is going on to test them individually or together in a mice model of cardiometabolic disorder.

GUT MICROBIOTA IN INDIANS WITH DIABETES, AND VITAMIN B12 DEFICIENCY

Prof. Dr. Chittaranjan Yajnik

FRCP Professor & Director, Diabetes Unit, KEM Hospital and Research Centre, Pune, India

Diabetes in India exhibits unique genetic, nutritional, developmental, and socio-economic characteristics. The work on gut microbiome of Indian patients with diabetes revealed a dysbiosis of microbes from all three domains - Bacteria, Archaea, and Eukarya in newly diagnosed (New-DMs) and long-standing patients with diabetes (Known-DMs) compared to healthy controls (NGTs). Other studies in India confirm that the microbiome of the New-DMs is highly disturbed and that the antidiabetic treatment, such as metformin treatment, tends to partially recover it toward controls or to a compositionally altered state.

Gut microbiome analysis of 100 B12 deficient and B12 sufficient girls showed that the relative abundance of Firmicutes was reduced, and Proteobacteria increased. Supervised learning method revealed an overall increase in the abundance of *Agathobacter*, *Subdoligranulum*, *Romboutsia*, *Fecalibacterium*, and *Prevotella* in the B12 deficient individuals.

ROLE OF FECAL MICROBIOTA TRANSPLANT IN INFLAMMATORY BOWEL DISORDERS (IBD)

Prof. Vineet Ahuja

Professor, Gastroenterology, Associate Dean (Research), All India Institute of Medical Sciences, New Delhi, India

Microbial Manipulation therapy (MMT) is a promising treatment for Inflammatory Bowel Disorder; existing trials suggest that Fecal Microbiota Transplant (FMT) may be effective in inducing and maintaining remission in patients with Ulcerative Colitis (UC), but its effectiveness in Crohn's Disease (CD) is less clear. FMT appears to be safe with few serious adverse events reported. Further research is needed to optimize the delivery of FMT, identify optimal donor selection criteria, and establish its long-term safety and effectiveness in the treatment of IBD.

SAFETY AND IMPACT OF NON - NUTRITIVE SWEETENERS ON THE GUT MICROBIOTA

Prof. N. K. Ganguly

Former Director General, Indian Council of Medical Research, Senior Advisor- Global Health Strategies, New Delhi, India

Several studies have recently demonstrated that Non Caloric Artificial Sweeteners (NAS) consumption can cause glucose intolerance in animals and specific human subsets by substantially altering the gut flora. Consumption of frequently employed NAS formulations enhances glucose intolerance by altering the composition and functioning of the gut flora. The effect of non-caloric artificial sweeteners (NAS) on the gut flora is an area of extending research, and new findings are being emerged.

IS FERMENTED PRODUCT THE BEST MATRIX FOR PROBIOTIC DELIVERY: IF SO WHY?

Prof. A.K. Srivastava

Vice-chancellor, DUVASU, Mathura, UP, India

There is sufficient scientific evidence to prove that fermented dairy foods and probiotics are a perfect combination to impart the full pharmacological and therapeutic potential of probiotics. The food matrix is ideal for optimal genetic expression of probiotic functionality. Some important genes encoding probiotic functions are induced only on exposure to fermented dairy products. Many bacteria are unable to survive the acidic environment of the stomach. The

fermented dairy products possess inherent properties to buffer acid in the stomach and increase the survival of probiotic strains in gut. The refrigerated storage further provides stability to probiotics. Further, there is consumer's positive perception about dairy products as it is the integral part of diet and considered as healthy. Consumers are also aware of live bacteria used in fermented dairy foods and consumers prefer when functional ingredients are supplemented in natural food products.

MATERNAL GUT FLORA SHAPING CHILD MICROBIOTA FOR LIFE

Dr. Keya Rani Lahiri

Former Professor & Head, Pediatrics, Seth G S Medical College and KEM Hospital Mumbai, Ex. Professor & Head, D.Y. Patil University School of Medicine, Navi Mumbai, India

The first 1000 days of life is crucial for establishing pioneer bacteria and prevent infantile colic, necrotizing enterocolitis and gut infection. Microbial colonization initiates at birth with taxonomic abundances by 2-3 years of life until the achievement of adult like diversity. Hence essential components viz mothers nutrition, low stress levels, exclusive breast feeding, vaginal delivery, judicious use of antibiotics coupled with probiotics would aid enhancement of diverse microbiota in the newborn.

PROBIOTICS IN GASTROINTESTINAL INFECTIONS AND INFLAMMATORY BOWEL DISORDERS AND CLOSTRIDIUM DIFFICILE INFECTION

Prof. Rama Chaudhry,

Dean Research and Sr. Director Professor Microbiology, Ex Dean Research and Former Professor and Head Dept. of Microbiology, AIIMS Delhi

Antibiotics therapy leads to perturbed environment favoring overgrowth of *Clostridioides difficile* infection. Probiotics are considered as an important tool to restore intestinal microbiota following dysbiosis.

CURRENT UNDERSTANDING OF THE ROLE OF THE VIROME ON GUT HEALTH

Dr. E. Sreekumar

Director, Institute of Advanced Virology (IAV), Thiruvananthapuram, Kerala, India

The gut virome begins to accumulate in the early

postnatal life and consists of both lytic and temperate phages; and undergoes continued transition as one grows with inclusion of other DNA and RNA viruses. It develops into a major functional regulator of gut homeostasis, suppresses the inflammation.

NOVEL PROBIOTIC CULTURES AND FOODS

Prof. Jashbhai B. Prajapati

Chairman, Indian Dairy Association (West Zone), Mumbai

Apart from traditional probiotic cultures like *Bifidobacteria*, *Lactobacilli*, some spore former *Bacilli* and one yeast *Saccharomyces boulardii*, researchers are looking for novel cultures with specific health benefits as well as better gut microbiota modifiers. Examples of some of the novel strains are *Akkermansia muciniphila*, *Bacteroides fragilis*, *Faecalibacterium prausnitzii*, *Bacteroides xylanisolvens*, *Eubacterium hallii*, and *Parabacteroides goldsteinii*, *Parabacteroides distasonis*, Butyrate-producing bacteria *Clostridium butyricum* and some *Propionibacteria*. These are mainly targeted to a particular disease along with general immunity.

DIFFERENCE BETWEEN TRIBAL AND RURAL GUT MICROBIOME IN RELATION TO HEALTH

Prof. A.P. Dash

Ex- Vice Chancellor, Central University of Tamil Nadu and Ex- Adviser, World Health Organisation

The gut microbiota in tribal communities is found to harbor significantly higher species diversity and richness as compared to that in rural populations. Tribal Adults (TA) consumed a millets-based diet, ate pork every day, and did not consume milk or milk products. Rural Adults (RA) consumed a rice-based diet with meat intake once a week. In both groups, Firmicutes was the most abundant phylum, followed by Proteobacteria, Bacteroidetes and Actinobacteria. The median Firmicutes-to-Bacteroidetes ratio was 34.0 in TA and 92.9 in RA groups. Actinobacteria were significantly low in TA, possibly due to non-consumption of milk. Genetic studies revealed that the microbiota was distinctly different between TA and RA.

Probiotic Awareness Day

The Probiotic Awareness Day was organized by DUVASU, Mathura by Prof. A.K. Srivastava in collaboration with Gut Microbiota & Probiotic Science Foundation (India). More than 450 students and teachers from 13 schools of Mathura participated in the competition.

This activity helped to create awareness about probiotics among students, thereby enhancing their knowledge and motivating them to study about this new subject.

Theme: *"Probiotics & its Health benefits"*

Date: 24th September 2024

Venue: DUVASU, Mathura



Glimpses of Probiotic Awareness Day (24th September 2024)



Glimpses and Media Coverage of Probiotic Awareness Day

UNLOCKING POTENTIAL YOUNG INVESTIGATORS AWARDS (2024)

Emerging Young Scientists working on
the Gut Microbiota and Probiotics

The 2024 Probiotic Symposium "Nutrition, Gut Microbiome and Probiotics- The Triple Connection" witnessed 20 poster presentations by young scientists under the age of 40 years. Three scientists were awarded the Young Investigators Award.

1st Prize

Ayushi Purohit

**Translational Health Science
and Technology Institute,
Faridabad, India**

A gut signature linked with increased ethanol production and liver inflammation contribute to Nonalcoholic fatty liver disease in Indian patients.



Manisurya Palepu

**National Institute of
Pharmaceutical and Research
(NIPER), Hyderabad, India**

SCFAs supplementation rescues anxiety- and depression-like phenotypes generated by fecal engraftment of treatment-resistant depression rats.



2nd Prize

Akshay Gaike

**National Centre for Cell Science and Department of Zoology, Savitribai
Phule Pune University (SPPU), Pune, India**

Effect of long-term oral glutathione supplementation on gut microbiome of Type 2 Diabetic individuals.



3rd Prize

Aditi Goel

**CSIR- Central Food Technological Research Institute, Mysuru,
Karnataka, India**

Vitamin A enriched probiotic carrot nectar regulates gut microbiota and reduces obesity: a leading cause of cardiovascular diseases.



UNRAVELING THE MYSTERY OF GUT MICROBIOTA

1. Feeding gut microbes to nourish the brain: unravelling the diet-microbiota-gut-brain axis.

Schneider E, O'Riordan KJ, Clarke G, Cryan JF. *Nat Metab.* 2024

To reflect on the interconnection between diet, gut microbiota and brain functioning, it has been proposed that a diet-microbiota-gut-brain axis exists that underpins health and well-being. A comprehensive overview of the interplay between diet and gut microbiota composition and function and the implications for cognition and emotional functioning. Important diet-induced effects on the gut microbiota for the development, prevention and maintenance of neuropsychiatric disorders are described. The diet-microbiota-gut-brain axis represents an uncharted frontier for brain health diagnostics, and therapeutics across the lifespan.

2. Gastrointestinal and brain barriers: unlocking gates of communication across the microbiota-gut-brain axis.

Aburto MR, Cryan JF. *Nat Rev Gastroenterol Hepatol.* 2024 Apr

Barriers present in the gut and brain are specialized cellular interface that maintain strict homeostasis of different compartments across this axis. These barriers include the gut epithelial barrier, the blood-brain barrier and the blood-cerebrospinal fluid barrier. Barriers are ideally positioned to receive and communicate gut microbial signals, constituting a gateway for gut-microbiota-brain communication. The focus of the review, is on how modulation of these barriers, by the gut microbiota can constitute an important channel of communication across the gut-brain axis.

3. Gut microbiota and anti-aging: Focusing on spermidine.

Yu L, Pan J, Guo M, et al., *Crit Rev Food Sci Nutr.* 2024

Polyamines are crucial for cell development, proliferation, and tissue regeneration. They regulate enzyme activity, bind to and stabilize DNA and RNA, have antioxidative properties, and are necessary for the control of translation. All living organisms contain the natural polyamine spermidine, which has anti-inflammatory and antioxidant properties. It can regulate protein expression, prolong life, and improve mitochondrial metabolic activity and respiration. Spermidine levels experience an age-related decrease, and the development of age-related diseases is correlated with decreased endogenous spermidine concentrations. As more than just a consequence, the review explores the connection between polyamine metabolism and aging and identifies advantageous bacteria for anti-aging and metabolites they produce.

4. Emerging role of gut microbiota in autoimmune diseases.

Wang X, Yuan W, et al., *Front Immunol.* 2024

Accumulating studies have indicated that the gut microbiota plays a pivotal role, in the onset of autoimmune diseases, by engaging in complex interactions with the host. The impact and potential mechanisms that underlie the interactions, between the gut microbiota and the host in autoimmune diseases, primarily focusing on Systemic Lupus Erythematosus, Rheumatoid Arthritis, Sjögren's syndrome, Type 1 Diabetes Mellitus, Ulcerative Colitis and Psoriasis are discussed.

5. Interactions between diet and gut microbiota in cancer.

Nakatsu G, Andreeva N, MacDonald MH, Garrett WS. Nat Microbiol. 2024

Studies of diet-microbial interactions, to assess dietary determinants of intestinal colonization, by opportunistic and oncogenic bacteria were conducted. Diet-induced expansion of specific gut bacteria, that might drive colonic epithelial tumorigenesis or create immuno-permissive tumour milieus, and introduce recent findings that provide insight into these processes were explored.

7. Critical role of the gut microbiota in immune responses and cancer immunotherapy.

Li Z, Xiong W, Liang Z, et al., Jhematol Oncol. 2024

Insights from state-of-the-art research to decipher the complicated crosstalk among the gut microbiota, the systemic immune system, and immunotherapy in the context of cancer. Potential interventions to minimize adverse effects and discuss clinical application of five microbiota-targeted strategies, that precisely increase the efficacy of cancer immunotherapy.

9. From Gut to Hormones: Unraveling the Role of Gut Microbiota in (Phyto) Estrogen Modulation in Health and Disease.

Kumari N, Kumari R, et al., Mol Nutr Food Res. 2024

Alterations in gut microbiota composition and estrobolome function have been associated with, estrogen-related diseases like breast cancer, endometrial cancer, and polycystic ovarian syndrome (PCOS). This is likely due to dysregulated estrogen signaling, partly contributed by the microbial impacts on estrogen metabolism. Dietary phytoestrogens also undergo bacterial metabolism into active metabolites, like equol, which binds estrogen receptors and exhibits higher estrogenic potency than its precursor daidzein.

6. The correlation between gut microbiota and both neurotransmitters and mental disorders: A narrative review.

Mhanna A, Martini N, et al., Medicine (Baltimore). 2024

This review describes the modulatory role of the gut microbiota in 4 prominent neurotransmitters (tryptophan and serotonergic system, dopamine, gamma-aminobutyric acid, and glutamate), as well as its association with 4 psychiatric disorders (schizophrenia, depression, anxiety disorders, and autism spectrum disorder).

8. Gut microbiota-host lipid crosstalk in Alzheimer's disease: implications for disease progression and therapeutics.

Luo YX, Yang LL, Yao XQ. Mol Neurodegener. 2024

Alterations in the composition and metabolites, collectively contribute to the progression of Alzheimer's disease. The role of gut microbiota in Alzheimer's disease is diverse and complex, and evidence suggests lipid metabolism may be one of the potential pathways.

PROBIOTIC SCIENCE- WHERE WE STAND TODAY!!

1. Next-generation probiotics: the upcoming biotherapeutics.

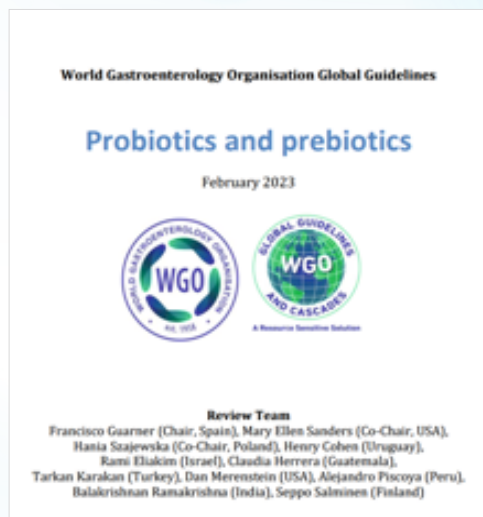
Al-Fakhrany OM, Elekhawy E. Mol Biol Rep. 2024

Some emergent and promising Next Generation Probiotics, specifically *Eubacterium hallii*, *Faecalibacterium prausnitzii*, *Roseburia spp.*, *Akkermansia muciniphila*, and *Bacteroides fragilis*, as their presence in the gut can have an impact on the development of various diseases.....

3. World Gastroenterology Organisation Global Guidelines: Probiotics and Prebiotics.

Guarner F, Sanders ME, et al., J Clin Gastroenterol. 2024

Recommendations of probiotics, especially in a clinical setting, of specific strains to the claimed benefits based on human studies. Some strains will have unique properties that may account for certain neurological, immunological, and antimicrobial activities.



2. Probiotics in Infancy and Childhood for Food Allergy Prevention & Treatment.

Di Costanzo M, Vella A, et al., Nutrients. 2024

Food allergy represents a failure of oral tolerance mechanisms to dietary antigens. Over the past few years, food allergies have become a growing public health problem worldwide. Gut microbiota is believed to have a significant impact on oral tolerance to food antigens and in initiation and maintenance of food allergies. In recent years, results from preclinical and clinical studies suggest a promising role for probiotics in food allergy prevention and treatment.

4. The Efficacy of Probiotics, Prebiotics, Synbiotics, and Fecal Microbiota Transplantation in Irritable Bowel Syndrome: A Systematic Review and Network Meta-Analysis.

Wu Y, Li Y, Zheng Q, Li L. Nutrients. 2024

Out of 6528 articles, 54 were included for probiotics, 7 for prebiotics/synbiotics, and 6 for FMT. Probiotics showed improvement in IBS symptoms, particularly with *Bifidobacterium* and *Lactobacillus* strains. Prebiotics and synbiotics did not show significant improvement. Network meta-analysis indicated the favorable effects of probiotics on IBS, with no serious adverse events reported. In short, probiotics and FMT are effective for managing IBS, with *Bifidobacterium* and *Lactobacillus* being dominant strains.

5. The use of probiotics and prebiotics in decolonizing pathogenic bacteria from the gut; a systematic review and meta-analysis of clinical outcomes.

Rahman MN, Barua N, Tin MCF, Dharmaratne P, Wong SH, Ip M. Gut Microbes. 2024

29 RCTs were eligible, involving 2871 subjects who underwent either probiotics or placebo treatment to decolonize AMR pathogens. The persistence of pathogenic bacteria after treatment was 22%(probiotics) and 30.8%(placebo). The pooled odds ratio was 0.59, favoring probiotics with moderate certainty and low heterogeneity. The funnel plot showed no asymmetry in the study distribution. In subgroup, *C. difficile* showed the highest decolonization (82.4%) in probiotics group. *Lactobacillus*-based probiotics and *Saccharomyces boulardii* decolonize 71% and 77% of pathogens effectively.

6. Evolving Advances in the Cosmetic use of Probiotics and Postbiotics: Health, Regulatory and Marketing Aspects.

Arora R, Kaur R, et al., Curr Pharm Biotechnol. 2024

Ongoing development in cosmetics is increasingly making use of probiotics, which are defined as "live microorganisms with health-enhancing properties mediated through ingestion or topical application to the host". The observation that several bacterial strains augment normal processes of healthy tissue maintenance, particularly for the skin, has opened up new avenues for the use of bacterial strains in cosmetics. A principal feature of such "cosmeceuticals" is an application of increasing insight into the biochemical nature of the skin's normal microbial flora, also called its microbiome. The opportunity of manipulating the skin microbiome to address various skin disorders has revealed novel routes for treatment.

7. Gut Microbiota and Polycystic Ovary Syndrome (PCOS): Understanding the Pathogenesis and the Role of Probiotics as a Therapeutic Strategy.

Salehi S, Allahverdy J, Pourjafar H, Sarabandi K, Jafari SM. Probiotics Antimicrob Proteins. 2024

Gut Dysbiosis of the gut microbiota (GMB) in women with PCOS has attracted the attention of many researchers. *Porphyromonas spp.*, *B. coprophilus*, and *F. prausnitzii* are found in higher numbers in the gut of women with PCOS. Short-chain Fatty Acids (SCFAs), produced by the intestinal microbiota through fermentation, play an essential role in regulating metabolic activities and are helpful in reducing insulin resistance and improving PCOS symptoms. According to studies, the bacteria producing SCFAs in the gut of these women are less abundant than in healthy women. The effectiveness of using probiotic supplements has been proven to improve the condition of women with PCOS.

8. Mind, Mood and Microbiota-Gut-Brain Axis in Psychiatric Disorders.

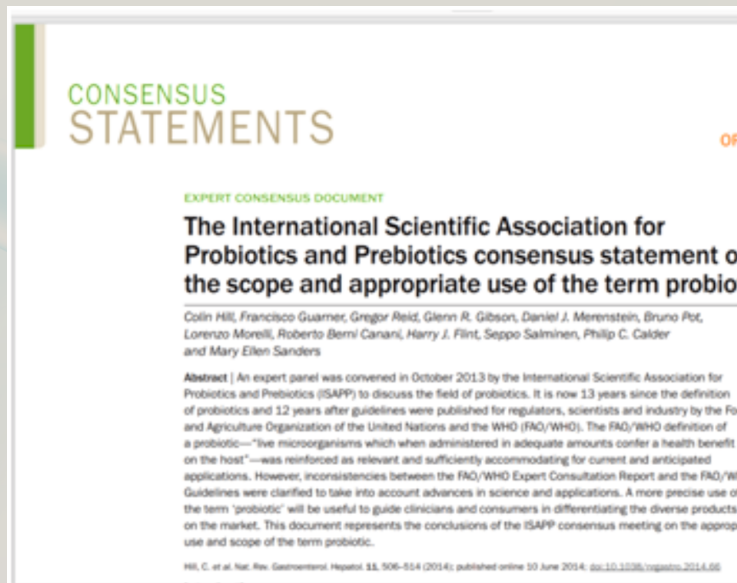
Toader C, Dobrin N, et al., Int J Mol Sci. 2024

The functional and symptomatic ramifications of the brain-gut-microbiota axis are profound. Intestinal activities are subject to modulation by both the central nervous system (through the autonomic nervous system (ANS) and enteric nervous system (ENS)) and the intestinal microbiota. Signaling from microbial entities to the brain is facilitated via vagal and afferent neural pathways, as well as through the mediation of cytokines and neurotransmitters.

INTERNATIONAL SCIENTIFIC ASSOCIATION OF PROBIOTICS & PREBIOTICS (ISAPP)

DEFINITIONS OF PROBIOTICS, PREBIOTICS, SYNBIOTICS & POSTBIOTICS

PROBIOTICS



"live microorganisms that, when administered in adequate amounts, confer a health benefit on the host"

PREBIOTICS



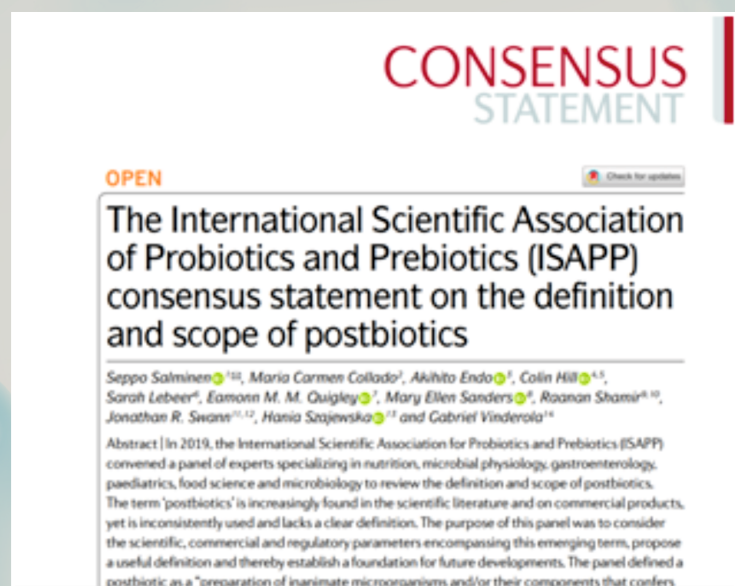
"A substrate that is selectively utilized by host microorganisms conferring a health benefit"

SYNBIOTICS



"mixture comprising live microorganisms and substrate(s) selectively utilized by host microorganisms that confers a health benefit on the host"

POSTPROBIOTICS



"preparation of inanimate microorganisms and/or their components that confers a health benefit on the host"

IN THE SPOTLIGHT

01. Akkermansia – a weight control bacterium

Promotes the growth of the intestinal mucosal layer and is involved in curbing obesity. Pasteurized Akkermansia has been approved as a dietary bacterial supplement for weight control.

02. Efficacy of Levodopa – influenced by Gut bacteria

Research has shown that two bacteria – *Enterococcus faecalis* and *Eggerthella enta* metabolize levodopa preventing the body from absorbing its active ingredients. Effectiveness of levodopa was restored by giving patients a drug that inhibited its metabolism by these bacteria.

03. Veillonella – unique to athletes

Marathon runners have high levels of *Veillonella*. It was observed that feeding *Veillonella* to mice increased their physical endurance.

04. Can Blautia be responsible for the slender physique of the Japanese ?

In a study on Japanese subjects, *Blautia* was identified as a weight control bacterium. People with high levels of *Blautia* had a lower risk of Obesity and Type 2 Diabetes.

**** Blautia produces metabolites called ornithine, S – adenosylmethionine and acetylcholine which promotes metabolism and inhibits inflammation. It also accumulates amylopectin, not digested in the small intestine, feeds intestinal bacteria and becomes food for the beneficial bacteria.**

- *In the intestine dietary fibre and oligosaccharides, are first broken into sugar by amylolytic bacteria. Lactic acid bacteria and Bifidobacteria then convert these sugars into lactic acid and acetic acid, which are used by other intestinal bacteria as materials to produce propionic acid and butyric acid.*
- *Female gut microbiome diversity is 20% higher than males.*
- *Bacteroides level were higher in countries with higher antibiotic usage.*
- *Abundance of Streptococcus increased in patients who used Proton Pump Inhibitors (PPI's) along with an increase in opportunistic pathogens like Enterococcus faecalis.*



DID YOU KNOW?

EVENTS IN 2025

A peep into the calendar of events

March 10-11, 2025

Miami,
United States

International Conference
on Probiotics, Functional
and Pediatrics Foods

March 15-16, 2025

Washington,
DC

13th Annual Gut
Microbiota for Health
(GMFH) World Summit

March 27-29, 2025

Singapore

3rd Edition of
the International
Conference on Probiotics
and Prebiotics
(PROBIOTICS 2025)

May 12-13, 2025

Paris
France

Global Microbiome
Congress

June 24-26, 2025

Athens, Greece

18th International
Scientific Conference on
Probiotics, Prebiotics,
Gut Microbiota & Health
(IPC 2025)

Sept 15-16, 2025

Rome, Italy

International
Conference on
Prebiotics &
Probiotics Food

November 17-18, 2025

Vancouver, Canada

9th International
Conference on
Microbiome, Probiotics &
Gut Nutrition

December 02-03, 2025

Tokyo, Japan

International
Conference
on Lactic Acid
Bacteria



Gut Microbiota and Probiotic Science Foundation (India)

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