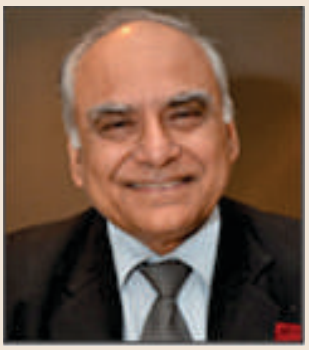
PRO GUT IV

FEBRUARY 2020 :: VOLUME IV

GUT MICROBIOTA AND PROBIOTIC
SCIENCE FOUNDATION (INDIA)

FROM
THE PRESIDENT'S DESK



Prof. Nirmal Kumar Ganguly
Former Director General, Indian Council of Medical Research
Senior Research Professor, Institute of Liver and Biliary Sciences, New Delhi
President, Gut Microbiota and Probiotic Science Foundation (India)

It is with much excitement and anticipation that we release the fourth issue of the Foundation Newsletter! This issue will reflect on the latest science of intestinal microbiota and probiotics highlighting some of the important studies that have been published in peer review journals in the last year. It will also highlight events that were conducted by the Foundation in the last two years and give a glimpse of what we can expect in the coming year.

The highlights of the last two year a include the 9th India Probiotic Symposium, "Probiotics through the life span" was organized on 24th & 25th November 2018 by the Foundation in association with Amity University Kolkata; Dr. Elie Metchnikoff Day Event which was organized on 15th May 2019 by Lotus Valley International School, Gurugram; Foundation Guest Lecture on 28th September 2019 by a distinguished speaker, Prof. K. K. Talwar, Chairman, Department of Cardiology, Max Hospitals. The release of the book "Probiotics in Health – Emerging Opportunities" published by Wiley India Pvt. Ltd. This book was edited by Prof. Anura Kurpad, *Department of Physiology & Nutrition* (St. John's Medical College, Bengaluru, Karnataka), Prof. G. Balakrish Nair *Distinguished Professor* (Rajiv Gandhi Centre for Biotechnology) and Prof. Yoshifumi Takeda, *Emeritus Member* (National Institute of Infectious Diseases, Japan).

One of the most debatable questions remains the difference between traditional fermented foods and scientifically tested probiotic products, this issue will clearly explain the difference.

Over the years the Foundation has been promoting research in the country by inviting the brightest minds to present their research in the area of intestinal microbiota and probiotics in the form of posters during the symposium. The researchers were highly appreciated for their novel work and three young scientists have been awarded Young Investigator Awards at every symposium.

We are also happy to announce that we have redesigned the Foundation website which is now mobile friendly and a one stop source of valuable information for students, scientists and researchers interested in the emerging science. You can visit it @ *www.gutfoundation.org*.in and share your views.

As we organize the 10th India Probiotic Symposium this year, I look back at our journey and realize we have come a long way.

I hope you all enjoy reading the newsletter that has been brought out by the Gut Microbiota and Probiotic Science Foundation (India).

With best wishes

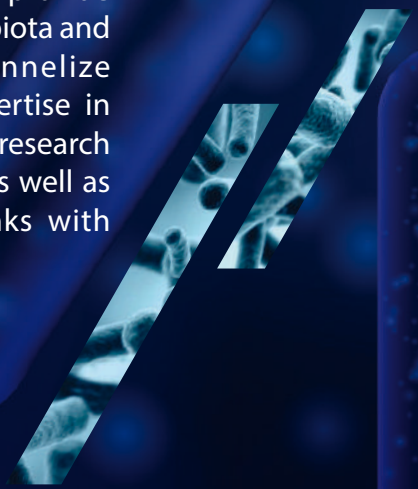
Nirmal Kumar Ganguly

N.K. Ganguly

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, channelize International knowledge and expertise in the field and promote collaborative research in the development of probiotics as well as foster and maintain research links with scientists of similar interest.



MEMBERS

The Gut Microbiota and Probiotic Science Foundation (India) is governed by eminent scientists, who are experts in the area of Gut Microbiota and Probiotics. They bring with them a diversity of disciplines including Nutrition, Clinical Research, Microbiology, Dairy Technology and Gastroenterology. Together the members provide the latest scientific knowledge and expertise and give direction and guidance for the activities of the Foundation.

Governing Body Members

Prof. N. K. Ganguly
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Dr. B. Sesikeran
Vice President

Prof. G. Balakrish Nair
Vice President

Prof. J. B. Prajapati

Prof. B.S. Ramakrishna

Prof. Rakesh Tandon

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Dr. Neerja Hajela
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Scientific Advisory Committee Members

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Prof. S.K. Mittal

Prof. Jyoti Prakash Tamang

Co- ofted Member

Mr. Shinji Hashimoto

Dr. Sara Thompson

Mr. Tomoyuki Iwama

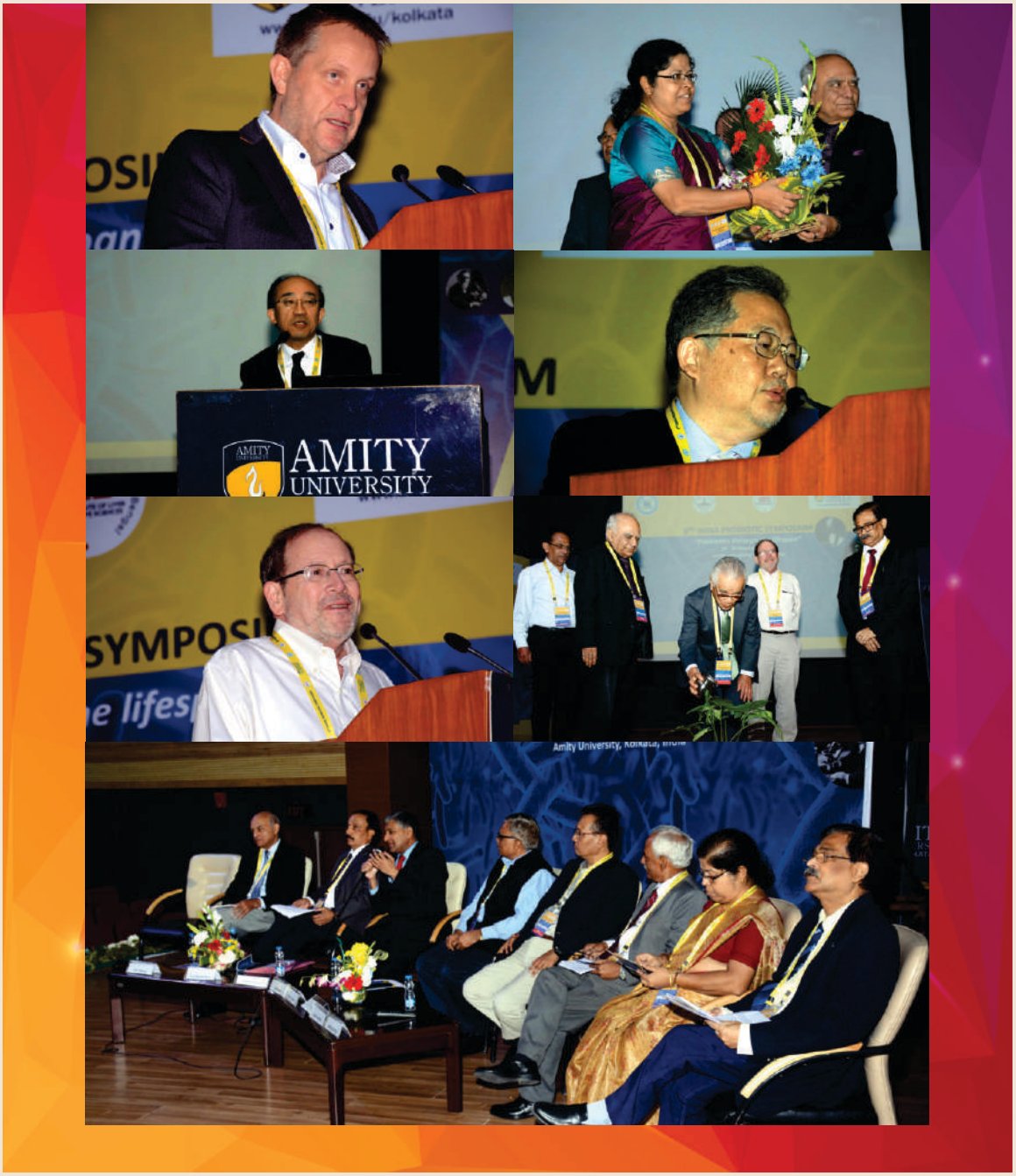
Mr. Shintaro Yui

Last Two Years

9th India Probiotic Symposium

The 9th India Probiotic Symposium, "Probiotics through the lifespan" was organized in 2018 by the Foundation in association with Amity University Kolkata. National and International experts highlighted the changes in the microbiome and the benefits of probiotics right from pregnancy through old age.

Probiotics through the lifespan
24 - 25 November, 2018
Amity University, Kolkata



Glimpses of the Symposium

Young Investigator Awards (2018)

Emerging Young Scientists Working on The Gut Microbiota and Probiotics

To promote research in the area, the Foundation has instituted the Young Investigator Award for scientists who are working in the area of intestinal microbiota and probiotics in India.

Twenty young scientists were selected after a stringent evaluation process and presented posters during the symposium.

Three scientists were awarded the Young Investigator Award.

2 prize

Ms. Forum Bhanushali

Modulation of peanut-induced allergic immune responses by oral designer probiotic based vaccines in mice.

Research Fellow

Department of Biochemistry, Madurai Kamaraj University Tamil Nadu, India

3 prize

Ms. TarosiSenapati

Role of Gut Microbiota in the Emergence of Colistin Resistant Enteric Pathogens.

Research Fellow

Translational Health Science and Technology Institute, NCR Biotech Science Cluster, Faridabad, Haryana

1 prize

Mr. Vikas Chandrashekhar Ghattargi

"ProBioPred" an Online Server for Prediction of a Potential Probiotic Candidate.

Research Fellow

National Centre for Microbial Resource, National Centre for Cell Science (NCMR-NCCS), Pune

3 prize

Ms. Jyoti Verma

Gut Microbiome is the Epicenter for Dissemination of Antimicrobial Resistance Traits.

Research Fellow

Translational Health Science and Technology Institute, NCR Biotech Science Cluster, Faridabad, Haryana

Last Two Years

Dr. Elie Metchnikoff Day Event and Book Relaese

The Probiotic Workshop
15th May, 2019
Lotus Valley International School, Gurugram

In order to create better awareness and understanding about Probiotics among school children, the Foundation organized Dr. Elie Metchnikoff Day event at Lotus Valley International School, Noida.
28 schools with more than 300 students and teachers participated in the event.

The Foundation Guest Lecture and Book Release

Role of Gut Microbiota and Probiotics in Cardiovascular diseases and Metabolic Disorders

In an endeavor to reach out to a wider audience and the public at large the Foundation organizes the Foundation Guest lecture every year where an eminent speaker presents on a topic of common interest and concern.
The Book, "Probiotic in Health: Emerging opportunities" was also released during the event.

The Suryaa, New Delhi
28th September 2019

ESTEEMED SPEAKER

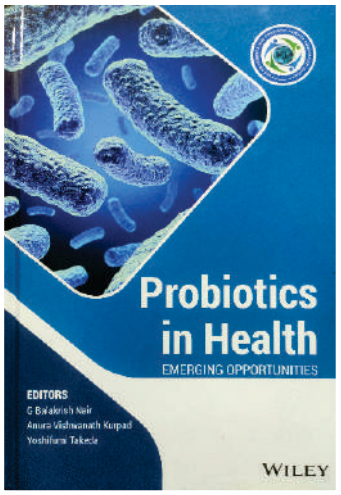
Prof. K.K. Talwar
Chairman
Cardiology, Max Healthcare, New Delhi &
Former Director, Post Graduate Institute of
Medical Education & Research,
Chandigarh.

More About The Foundation

Archived Talk of Past Symposia

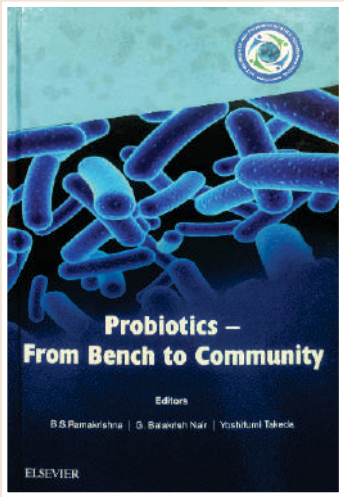
Prof. Uday Ghoshal
Professor, Department of Gastroenterology,
Sanjay Gandhi Postgraduate Institute of
Medical Sciences, Lucknow, Uttar Pradesh

PUBLICATIONS



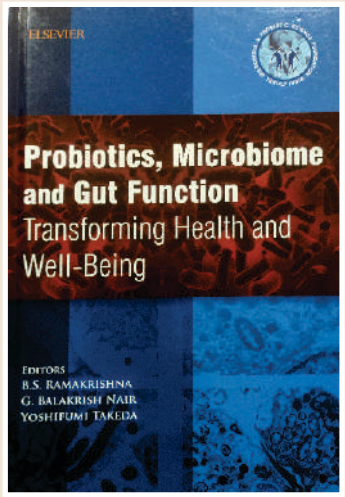
Probiotics in Health-Emerging Opportunities

Edited By: Prof. G Balakrish Nair, Prof. Anura Vishwanath Kurpad, Prof. Yoshifumi Takeda
Publisher: Wiley India Pvt. Ltd.



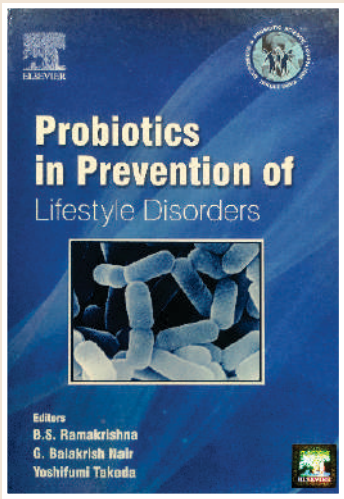
Probiotics-From Bench to Community

Edited By: Prof. B. S. Ramakrishna, Prof. G. Balakrish Nair, Prof. Yoshifumi Takeda
Publisher: Reed Elsevier



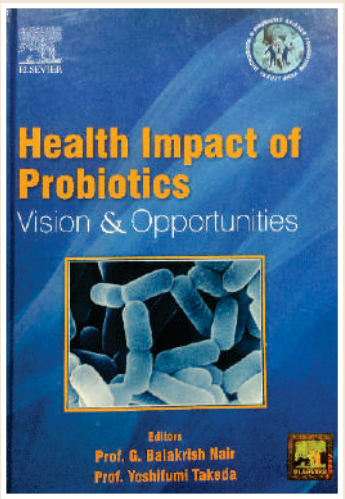
Probiotics, Microbiome and Gut Function - Transforming Health and Well - Being

Edited By : Prof. B. S. Ramakrishna, Prof. G. Balakrish Nair, Prof. Yoshifumi Takeda
Publisher: Reed Elsevier



Probiotics in Prevention of Lifestyle Disorders

Edited By: Prof. B. S. Ramakrishna, Prof. G. Balakrish Nair, Prof. Yoshifumi Takeda
Publisher: Reed Elsevier



Health Impact of Probiotics – Vision and Opportunities

Edited By: Prof. G. Balakrish Nair, Prof. Yoshifumi Takeda
Publisher: Reed Elsevier

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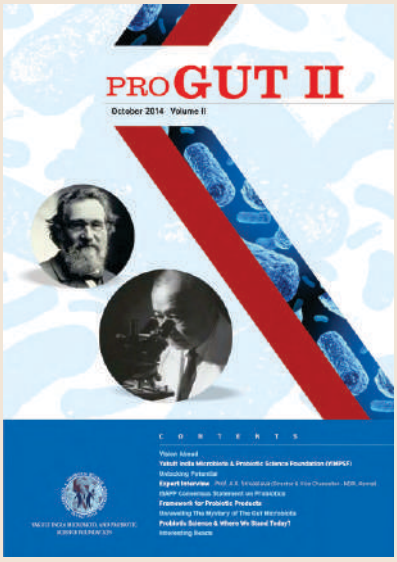
ProGut I
December 2012



ProGut II
December 2014

ProGut III
December 2016

NEWSLETTERS

LATEST SCIENCE OF GUT MICROBIOTA

1

Gut feelings: Gut bacteria are linked to our personalities

Katerina V.A Johnson, Human Microbiome Journal (2020)

Sociable people have a higher abundance of certain types of gut bacteria and also more diverse bacteria, an Oxford University study has found. In a large human study, Dr. Katerina Johnson found that both gut microbiome composition and diversity were related to differences in personality, including sociability and neuroticism.She said, my key interest was to look in the general population to see how variation in the types of bacteria living in the gut may be related to personality."

2

Teens with obesity and Poly Cystic Ovary Syndrome (PCOS) have more 'unhealthy' bacteria

Melanie Cree Green, The Journal of Clinical Endocrinology and Metabolism (2020)

Gut microbiome may play a role in PCOS and its related metabolic complications

Teens with obesity and polycystic ovary syndrome (PCOS) have more "unhealthy" gut bacteria suggesting the microbiome may play a role in the disorder, according to new research published in the Journal of Clinical Endocrinology & Metabolism. In adolescents with PCOS and obesity, the bacterial profile (microbiome) from stool has more "unhealthy" bacteria compared to teens without PCOS," said the study's corresponding author, Dr. Melanie Cree Green of Children's Hospital Colorado in Aurora, Colo. "The unhealthy bacteria related to higher testosterone concentrations and markers of metabolic complications.

3

Novel communication between intestinal microbes and developing immune cells in the thymus

Maria Ennamorati *et al*, Proceedings of the National Academy of Sciences (2020)

Research shows that effective "crosstalk" or communication between early microbes and mucosal immune cells is essential to the formation of healthy microbial communities and promotion of a well-functioning immune system. The cells of the immune system that participate in mucosal immunity develop in an organ called the thymus located under the breastbone above the heart. Researchers at the Mucosal and Immunology Biology Research Center (MIBRC) at Massachusetts General Hospital now report that gut microbes regulate the development of specialized immune cells in the thymus that play a critical role in mucosal tolerance.

4

Red wine consumption associated with increased Gut Microbiota (GM) αdiversity in 3 independent cohorts

Coroline I. Le Roy *et al,* Gastroenterology (2019*)*

Red wine's rich and varied polyphenols have antimicrobial properties that can beneficially affect the Gut Microbiota (GM). This study compared the effect of different alcoholic beverages on the alpha diversity of the GM in a discovery cohort of 916 UK female individuals. Red wine (rich in anthocyanin, resveratrol and gallic acid) consumption was positively associated with gut microbiota α diversity and even rare consumption may be sufficient to increase α diversity.

5 Reduce obesity-related gut bacteria with a vaccine

K. Fujimto, *et al,* Gastroenterology (2019)

Interestingly obese people have higher numbers of the gut bacteria - *Clostridium ramosum*. A novel vaccine which when inoculated into mice before receiving the gut microbiota of obese mice who were then given a high fat diet showed that the inoculated mice put on less weight than those who were not inoculated with the vaccine. A vaccine against *Pneumococcus* was also shown to be effective. This was reported in the media in Japan as being an "anti-obesity vaccine!"

6 Gut Microbes are different In depressed people

Valles - Colomer *et al,* Nature Microbiology(2019)

A study on 1054 individuals who were enrolled in the Flemish Gut Flora project found that two bacterial genera *Coprococcus* and *Dialister* were constantly depleted in individuals with depression. This was observed regardless of the anti depressant treatment given to them.

7 Intestinal bacteria may consume Parkinson's drug

Rekdal *et al,* Science(2019)

Researchers from Harvard University, Cambridge identified that differences in the microbiota could result in differences in drug efficacy from person to person. Increased *Enterococcus faecalis sp in* the microbiota consumes Dopamine allowing only a small fraction to reach the brain.

8 Gut Microbes are different In depressed people

Saha *et al,* International Journal of Systemic and Evolutionary Microbiology (2019)

A new genus of bacteria that can degrade a potent neurotoxin responsible for several food poisoning outbreaks was identified by researchers at the North Bengal University, Siliguri.

LATEST SCIENCE PROBIOTICS

1 Probiotic drink could offer new way to combat antibiotic resistance, mouse study finds

Alessandro Lazdins *et al,* PLOS ONE (2020)

A probiotic drink could become a promising new weapon in the battle against antibiotic resistant bacteria, A team of scientists at the University of Birmingham engineered and patented a key genetic element pCURE plasmid that can prevent the resistance plasmids from replicating and tackle the genetic basis of resistance. The team is now seeking funding for a clinical trial for the drink which has potential to work against many resistant bacteria commonly found in the human gut including *E. coli*, *Salmonella and Klebsiella pneumoniae*...

2 Medical students benefit in reducing stress and improving sleep quality by consumption of a probiotic bacteria

Takada *et al,* Neurogastroenterlogy and Motility (2016)

Eight week supplementation of *Lactobacillus casei* strain (LCS) Shirota to medical students of Tokushima University, Japan, before a National Medical Examination helped to preserve the diversity of the gut microbiota, reduced the participants stress response by reducing levels of cortisol (salivary stress marker) and improved sleep quality. The incidence of physical symptoms like abdominal pain, cold and flu were significantly suppressed in the LcS group.

L. casei strain Shirota administration significantly reduced the number of stress-responsive genes one day before (86 genes in the *L. casei* strain Shirota group versus 179 genes in placebo group (P _ 0.001, Fisher's exact test). Previous studies have demonstrated that *L. casei* strain Shirota improves mood disturbances in the elderly and decreases anxiety symptoms in patients with *chronic fatigue syndrome*.

3

Restitution of Gut Microbiota in Ugandan children administered with probiotics (*Lactobacillus rhamnosus* GG and *Bifidobacterium animalis* subsp. lactis BB-12) during treatment for Severe Acute Malnutrition

Josue L. Castro – Mejia *et al,* Gut Microbes (2020)

Severe Acute Malnutrition (SAM) is a major challenge in low-income countries and Gut Microbiota (GM) dysbiosis may play a role in its etiology. The gut microbiota evolution during rehabilitation from SAM and the impact of probiotics (*Lactobacillus rhamnosus* GG and *Bifidobacterium animalis* subsp. lactis BB-12) showed that the gut microbiota (16S rRNA gene amplicon sequencing) of children admitted to hospital with SAM showed distinct composition during admission (e.g. *Klebsiella* spp., and *Enterobacteriaceae* spp.), discharge (e.g. *Clostridiaceae* spp., *Veillonella*) and follow-up (e.g. *Lactobacillus ruminis*, *Blautia* spp., *Faecalibacterium prausnitzii*), reaching similar β and α-diversity as healthy individuals. Probiotic treatment also reduced the cumulative incidence of diarrhea during the outpatient phase.

4

Probiotic strain may protect against Parkinson's Disease, early data suggests

Michal Wegrzynowicz *et al,* Neuropathologica (2019)

An exciting new study on a specific probiotic strain has suggested its ability to slow, and perhaps even reverse build ups of a protein α synuclein protein associated with the development of Parkinson's Disease. Building on previous research linking brain function to the gut, the new study in roundworms found that *Bacillus subtilis* MXN21 prevents the formation of toxic clumps that starve the brain of dopamine, a key chemical that coordinates movement.

5

A probiotic strain modulates and aids immunity in marathon runners

Vaisberg *et al.,* Nutrients (2019)

Daily ingestion of fermented milk containing 40 billion live *Lactobacillus casei* strain (LcS) Shirota before a marathon led to reductions in several proinflammatory cytokines and increased anti -inflammatory response in the systemic and upper airway after a marathon. This study shows for the first time that ingestion of a probiotic drink before a marathon can modulate immunological and inflammatory response in the blood and in the upper airway mucosa of amateurs after a marathon said scientists from the Federal University of Sao Paulo and Cruzeiro of Sul University.

6

Probiotics may boost the efficacy of peanut allergy treatment in children

Grezeskowiak *et al,* Scientific Reports (2019)

Desensitising children to peanut allergies through oral immunotherapy is more effective when done in conjunction with antihistamines and probiotics, according to a new review involving 1500 children. Dr. Luke Grezeskowiak , the lead researcher found a 10% increase in number of children who could tolerate oral immune therapy when given anti histamines and probiotics.

7

Postbiotics: facts and open questions. A position paper on the need for a consensus definition.

Collado MC *et al,* Benef Microbes (2019)

The tentative term postbiotics has been the most used one so far. However, no definition of the term has gained international consensus to date. Review aims to provide information on the facts and the open questions about so-called postbiotics.

INTERESTING
STUDIES FROM INDIA

1

Analysis of the Gut Microbiome of Rural and Urban Healthy Indians living in Sea level and high altitude areas.
Bhabatosh Das *et al*, Scientific reports, (2018)

2

Altered intestinal microbiota in patients with chronic pancreatitis: implications in diabetes and metabolic abnormalities.
Rupjyoti Talukdar *et al*, Scientific reports, (2017)

3

Molecular characterization and Metaanalysis of Gut Microbial Communities illustrate enrichment of Prevotella and Meghasphaera in Indian subjects.
Shrikant Bhute *et al* Frontiers in Microbiology, (2016).

4

Gut Bacterial diversity of the tribes of India and comparison with worldwide data.
Madhusmita Dehingia *et al*, Scientific Reports, (2015)

5

Gut Microbiome of Indian children of varying nutritional status
Tarini Shankar Ghosh *et al,* PLOS One, (2014)

6

Metagenome of the gut of a malnourished child
Sourav Sen Gupta *et al,* Gut pathogens, (2011)

7

Role of probiotic in preventing acute diarrhoea in children : A community based, randomized, double- blind, placebo controlled, field trial in an urban slum.
Dipika Sur *et al,* Epidemiology and Infection (2011)

RESEARCH FROM INDIA

Bhabatosh Das
Assistant Professor

Translational Health Science and Technology Institute
NCR Biotech Science Cluster, Faridabad - 121001, India

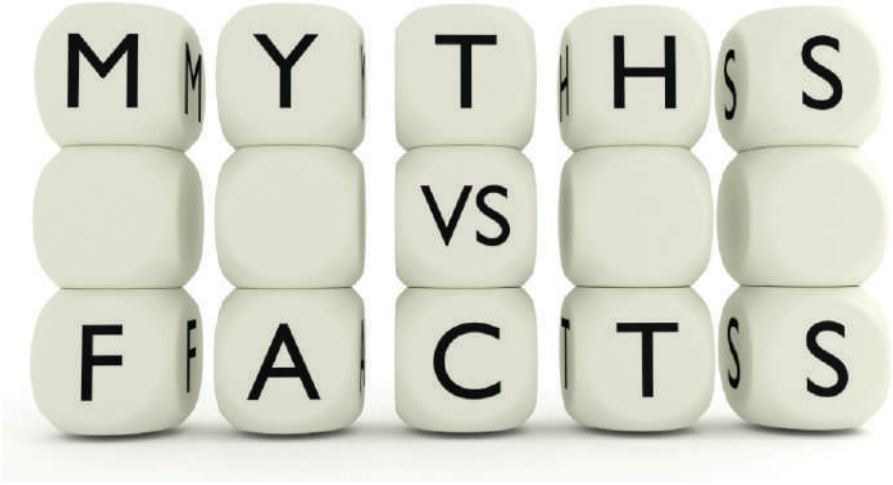
Diet dependent inter-kingdom interactions between bacterial and fungal microbiota in the human intestine

The microbes (bacterial and fungal species) living in the human gastrointestinal (GI) tract play important role in nutrient assimilation from the complex plant polysaccharides and maturation of host adaptive immunity. However, the interactions between bacterial and fungal species in the GI tract for mutual coexistence remain largely unknown. Our recent study "A comparative analysis of intestinal microbiota diversity between Japanese and Indian populations shows diet-dependent interaction of bacteria and fungi" revealeda mechanism ofinterkingdom interactions between bacterial and fungal microbiota in the human intestine. Japanese and Indian populations showed distinct bacterial and fungal compositions in the GI tract. The *Prevotella* and *Candida* dominate GI tract of the Indian populationdue to consumption of more plant polysaccharides, while the GI tract of the Japanese population are mostly dominated by the *Bacteroides* and *Saccharomyces* sp. We observed that the plant polysaccharide, arabinoxylan, promotesin vitro growth of Candida spp. Furthermore, the culture supernatants of *Candida* spp. grown with arabinoxylanpromoted rapid proliferation of *Prevotella copri*. Arabinose was identified as a growth-inducing factor in the Candida culture supernatants. *Candida* spp., but not *P. copri*, can colonize in the GI tract of Germ free mice. However, *P. copri* can colonize in the mouse intestine in the presence of Candida. Our findings determine the molecular basis of coexistence of *P. copri* and *Candida* spp. in the intestine through the mutual consumption of dietary components.

CLEARING THE MYTH

Most people confuse
traditional fermented foods for probiotics.
Are they the same or is there a difference?

Traditional Fermented Foods and Probiotics - The Difference



In India traditional fermented foods have often been confused for probiotics. This is not surprising since curd, lassi and such foods which contain lactic acid bacteria are an inherent part of our culture and an integral part of our diet. However, these products are not standardized for their probiotic content in terms of the strain of bacteria, live number of bacteria, viability of the bacteria at the target site (intestine) and their ability to impart scientifically proven strain specific health benefits. Therefore, while one cannot undermine the nutritional benefit of traditional fermented foods, they cannot be classified as true probiotics.

According to the definition of Probiotics given by Food Agricultural Organization (FAO) and the World Health Organization (WHO), probiotics are scientifically tested bacteria that reach the intestine live in large numbers to impart a scientifically proven health benefit for better intestinal health and immunity. Probiotic benefits are strain specific.

Therefore, traditional fermented foods provide nutrition in the form of Calcium, Proteins, Vitamins and Minerals whereas scientifically proven probiotics help to improve intestinal health and ensure better digestion of food and absorption of nutrients. They also help build immunity and reduce risk of diseases.

The two categories cannot be compared but go hand-in-hand for better overall health.

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DID YOU KNOW?

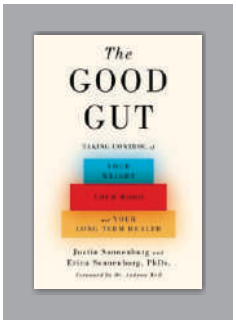
1. The gut microbiome of professional Irish rugby players had higher proportions of *Akkermansia* which has been linked to better metabolic profiles and also has an anti - obesity effect.
2. John Cryan, a biochemist at University College Cork in Ireland was among the first researchers to investigate how gut microbes affect social behavior. He reported that germ free mice lacking typical mix of gut microbes avoided other mice and shunned new social situations. He and other scientists proposed the existence of a gut – brain axis in which gut microbes produce bioactive compounds that influence brain function.
3. A recent study published in Nature showed that athletes/ runners have more numbers of *Veillonella* bacteria. This bacterium has a gene which can metabolize lactic acid produced by muscle after exercise. When mice were given *Veillonella* isolated from marathon runners, their endurance increased by 13% compared to a control group.
4. The gut microbiome of a pregnant woman in her third trimester resembles that of a patient with Inflammatory Bowel Disease (IBD) with more *Proteobacteria* and opportunistic pathogens.
5. The placenta bridging a woman's blood stream with that of her baby's is full of microbes.
6. Babies born to mothers who gained excess weight during pregnancy have different types of bacteria in their intestinal tract – more harmful *Staphylococcus* and less *Bifidobacteria*.
7. The infant gut takes about 21 days to completely mature from an unstable environment to amore predictable adult like community.
8. 20% mothers have a non - functional fucosyl transfers 2 gene and don't fucosylate glycans found in mother's milk –infants lacked *Bifidobacteria* and had more *E. coli* and *Streptococcus* as compared to other babies.
9. Trimethylamine produced by gut microbes is elevated in chronic kidney disease.
10. A recent review published in the Harvard Review of Psychiatry showed that a general trend is that Bacteroides and Blautia are often over represented in Major Depressive Disorder patients while *Bifidobacterium*, *Faecalibacterium* and *Dialister* are under represented.

INTERESTING READS

Emerging research on the gut microbiota may inspire you to pick up one of these books to read. Who knows, it might lead to the next big discovery.

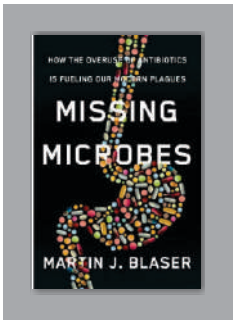
1

The Good Gut
Justin Sonnenburg and Erica Sonnenburg



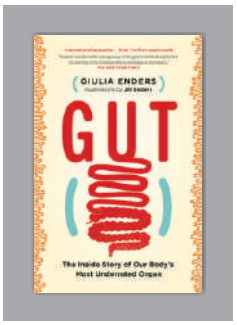
2

Missing Microbes
Martin J Blaser



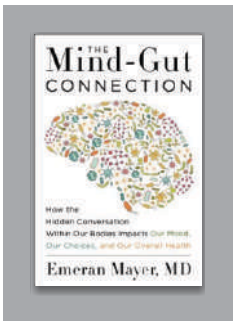
3

Gut: The inside story of our Body's most underrated organ
Glulia Enders



4

The Mind - Gut connection
Emeran Mayer



Forthcoming Events

Gen-Next Probiotics and Microbiome Congress
February, 6-7th, 2020
San Diego, United States

Probiota 2020
February 10 –12th, 2020
Dublin, Ireland

31st World Congress on Nutrition & Food Sciences
February 12-13th, 2020
Auckland, New Zealand

9th World Congres on Probiotics, Functional foods & Nutraceuticals
February 17-18th, 2020
Osaka, Japan

Gut Microbiota for Health World Summit 2020
March 7-8th, 2020
Madrid, Spain

5th Probiotics & Prebiotics Congress: Asia
March 26-27th,2020
Taipei, Taiwan

Microbiome and Probiotics R & D and Business Collaboration Forum
May 18-20th, 2020
Rotterdam, The Netherlands

14th International Scientific Conference on Probiotics, Prebiotics, Gut Microbiota and Health – IPC 2020
June 22-25th,2020
Prague, Czech Republic

Euro-Global Summit on Probiotics
August 03-04th, 2020
Zurich, Switzerland

2nd International Conference and Exhibition on Probiotics, Nutrition and Functional Foods
August 24-25th, 2020
Chicago, USA

4th International Conference on Probiotics and Prebiotics
September 25-26th, 2020
Vancouver, Canada

4th International Conference on Probiotics, Prebiotics, Synbiotics & Gut Nutrition
December 07-08th, 2020
Vancouver, Canada

For more information on
the science of
Gut Microbiota and Probiotics,
Please visit the website

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