



Probiotic Association of India

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From Editor's desk

A very warm welcome and season's choicest greetings to our esteemed viewers and readers! The editorial board of Probiotic Newsletter is immensely pleased to launch its fourth issue (March, 2013) just on time with the active support of our PAi members who contributed substantially for this issue in spite of their other preoccupations. We greatly appreciate and value their contributions. As you all may be aware, the role of probiotics in human life of late has expanded beyond gut health maintenance needs and supplementation by bringing about homeostasis of the aberrant gut flora as a result of antibiotic therapy and other lifestyle changes to their application as personalized biotherapeutics in the management of chronic gut related diseases. With the incredible advancements in the knowledge and quality research on proven probiotics and newly emerging novel strains, future trends envisage the use of these strains in dietary supplements and functional health food formulation specifically designed to manage the chronic medical conditions including inflammatory metabolic disorders and life style diseases such as diabetes, obesity, CVDs and cancer etc. Current innovations in functional/health foods particularly fermented and non fermented dairy products like dahi, yogurt, cheese, ice-cream and beverages along with other foods and convenience products supplemented with probiotics present attractive delivery options for these healthful ingredients so that the consumers and the affected target population benefit from their enormous curing power. Some of the articles figuring in this electronic issue of the Probiotic Newsletter clearly point towards the efficacy of probiotic interventions in augmenting human health and wellbeing besides disease management. The interest of the consumers in the incredible power of these magic bugs

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continue to grow more and more and was not unduly dampened despite rejection of some health claims by EFSA due to lack of sufficient clinical scientific data. In fact, the unprecedented growth in the probiotic based health food and pharma products is strongly placed at the moment and continue to boom across the world particularly in Asian countries including India as can be reflected from some recent market trends. Let us hope this trend continues and the full health benefit of the probiotic products reach every individual in our society in a meaningful manner. In the end, we once again acknowledge our heart-felt thanks to the esteemed authors who provided their valuable inputs for this particular issue. We also call upon all the members of PAi including our corporate members to kindly contribute some exciting story or article on some new developments in probiotic research and product formulations in the context of human health. Our humble request to all the concerned is that they may kindly submit the soft copy of their contributions directly to Dr. S.G. Prapulla chief editor, Probiotic Newsletter at her email address. Your kind cooperation in this regard will be highly appreciated.

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PROBIOTICS - Our Little Ammunition Against Diseases

Mr. Bridreth khokhare, M.tech Biotech



Nature is full of mesmerizing things and yet there is plenty to discover. One such amazing case is Symbiotic association of Human Gut Microbiota. Human gastro intestinal tract (GIT) is a vast surface that is tolerant to and flooded with complex and diverse community of micro organisms. This is possible due to thousand years of co-evolution.

The microbial colonization of gastrointestinal tract begins immediately after birth. For first few months of birth, it is *E. coli* and *Streptococcus* spp. that dominate the gut, but afterwards it is *Bifidobacterium* that surpasses all other microbes. There are certain well studied bacteria that improve our health (*Bifidobacterium* and *Lactobacilli*) while other (*H. pylori*, *Clostridium* etc) that

GIT is a vast surface that is tolerant to & flooded with complex & diverse community of micro organisms.

spoils the health. Many bacterial strains found in diary products interact with our immune system and strengthen it in many ways. Probiotics compete with entero-pathogens for space leading to reduction of pathogens and secrete anti-pathogen substance that enhances mucosal barrier. These compounds include porin OmpC by *E.coli*, Protein 12 by *Pseudomonas fluorescens*, flagellin from *Clostridium coccoides*.

Probiotics are generally consumed as a part of fermented foods. Many brands like Nestle already have many products in the market. New and serious players like British Biologicals Pvt Ltd., Hindustan Unilever Ltd., ITC Ltd. etc. are working on launch of new products.

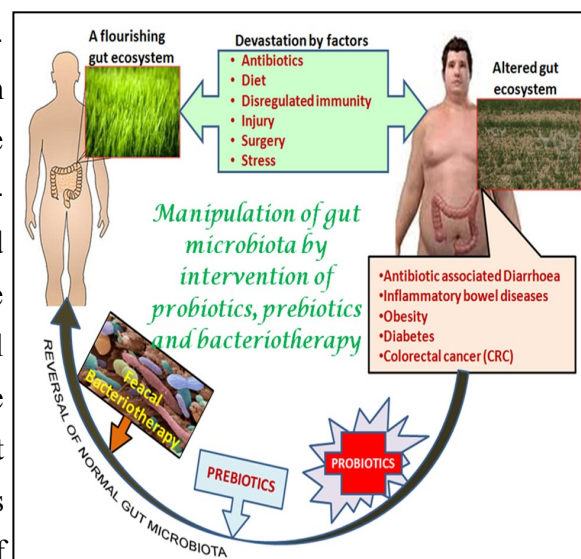
There are countless advantages of using probiotics along with regular diet. Recent studies have shown that Probiotics reduce hypertension and detoxify the body leading to reduction of allergies. They help in synthesis of micro nutrients like folic acid, niacin, Vitamin B₆, Vitamin B₁₂ and riboflavin. Many Probiotics strains produce lactase, reduce symptoms of lactose intolerance and malabsorption. Relieves constipation and reduces colitis and promote recovery from diarrhea. Different strains has been tested including *Lactobacillus*, *rhamnosus* strain GG, *L.acidophilus*, *L.bulgaricus*, *L.reuteri* appears to shorten the diarrhea and sensitivity associated diarrhea in children .

Probiotics: Restore the normal flora and combat the health impacts of altered gut microflora

Bhupesh Kumar Thakur, Piu Saha and Santasabuj Das

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The human gut is a complex consortium of trillions of microbes belonging to thousands of phylotypes, constituting an active and diverse microbial ecosystem colonizing the entire length of the gastrointestinal tract. Emerging 'omics' technologies such as metagenomics and metabonomics coupled with network modelling are now being applied to study the gut microbial ecology at the molecular level and its crucial role in energy metabolism, metabolic diseases, autoimmune diseases and colorectal cancer (CRC). Culture-independent sequencing demonstrated that major gut microbiota belongs to Bacteroidetes and Firmicutes (*Lactobacillus* is one of



them), whereas Actinobacteria (*bifidobacterium* is one of them) and Proteobacteria are minor constituents. Different resident members of microbiota can have a positive or negative impact on host depending on their relative abundance, community structure and also the host. In immunocompromized host, normal microbiota is replaced by an outgrowth of detrimental microorganisms. While we cannot change the human genome to cure diseases, the plasticity of gut microbiome can be taken advantage of to restore health through dietary interventions or administration of probiotics, prebiotics or symbiotics. Probiotics are beneficial bacteria or yeast that exerts health-promoting effects by multiple mechanisms. One such mechanism may be the generation of regulatory T-cells (Immune cells that suppress inflammation by keeping the immune system in check), which protect from autoimmune and inflammatory diseases, such as inflammatory bowel disease, diabetes, atherosclerosis etc. However, the beneficial effects of probiotics not only depend on the properties of the microorganisms, but also geographical area of their isolation. Reports suggest that probiotic strains isolated in western countries may or may not be useful in the developing countries due to difference in the food habits. Our data also underscored the necessity of isolation and characterization of indigenous probiotic strains, as some of our indigenous *Lactobacillus* strains showed significantly high regulatory responses and suppressed colitis in a TNBS-treated mice model of inflammatory bowel disease whereas *Lactobacillus rhamnosus* GG, a reference strain from the western population had minimal effects. Probiotics are exciting novel candidates for a large number of human diseases

Non-Dairy Probiotic Food: An Emerging Trend in the Development of Functional Foods

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Probiotics represent one of the largest functional food markets. Most probiotic foods available today are milk based such as milk, ice cream, yogurt, cheese, and frozen desserts, but lactose intolerance, cholesterol content, and allergenic milk proteins are the major concerns related to the intake of dairy products. Traditions and economic reasons that limit the use of dairy fermented products in some developing countries promote the idea of utilizing plant sources as vehicles for the probiotic agents. Indeed, technological advances have made possible altering some structural characteristics of non-dairy matrices by modifying food components in a controlled way such as pH modification, fortification of culture media, etc. This could make them ideal substrates for probiotics culture, since they already contain beneficial nutrients, such as minerals, vitamins, dietary fibers, and antioxidants, while lacking in the dairy allergens that might prevent consumption by certain segments of the population. Non-dairy probiotic products represent a huge growth potential for the food industry, and may be widely explored through the development of new ingredients, processes, and products. Among the non-dairy probiotic products, those made with soy stand out because of the inherently health benefits of soy, linked to the presence of isoflavones, and the beneficial changes in bacterial populations in the gastrointestinal tract, caused by the presence of probiotic microorganisms. Sales and marketing of probiotic soy products, such as yogurt-like blends with fruit juices and fermented beverages, have increased during the past decade, showing a trend of development of new products with suitable sensory and nutritional appeal, and beneficial properties, when regularly consumed.

Lactose intolerance, cholesterol content & allergenic milk proteins are the major concerns related to the intake of dairy products.

In the times of modern lifestyle and diet,

Probiotics are the tiny warriors you need to stay beside.

Report on Probiotic Research at MSU Baroda- 2011-2012:

Dr. T Bagchi

Continuing our attempts to understand adhesion of various *Lactobacillus* isolates to Caco-2 cells, the putative adhesion factor MapA from *L. plantarum* CS24.2 was cloned and expressed in *E. coli* pET28c. The purified recombinant MapA was used to study its ability to inhibit various isolates adhesion to CaCo-2 cells and was found to have an inhibitory effect on *L. rhamnosus* GG (LGG), ATCC 8014, *L. plantarum* CS23 and CS24.2 besides others. The strains CS23 and CS24.2 were further shown to inhibit *E. coli* adhesion to Caco-2 cells, much better than the standard strain LGG. Furthermore, strain CS24.3 was also shown to attenuate the effect of *E. coli* induced IL-8 and TNF- α expression using HT-29 intestinal cells. A mouse model of in vitro colitis using dextran sodium sulphate was used to study the performance of strain CS24.2 and it was seen that it had the ability to lower the degree of inflammation and crypt damage when compared to DSS treated control group. Further work is in progress with other isolates on their adhesion, immunomodulatory properties and ability to provide protection against colitis condition.

Functional Prebiotic Ingredients - Promoters for Probiotics

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In addition to the probiotic approach of directly introducing live bacteria to the colon through dietary supplementation, another approach to increase the number of beneficial intestinal microbiota is through the use of prebiotics. Prebiotics are non-digestible dietary components which selectively stimulate the proliferation and/or activity desirable bacteria *in situ*. Due to the potential synergy between probiotics and prebiotics, foods containing a combination of these ingredients are often referred to as synbiotics. Prebiotics might influence the growth and survival of the probiotic by influencing the growth and metabolites of both the probiotic and the starter. This has to be kept in mind while considering interactions between probiotics and starters in fermented dairy products. Interaction between the probiotic and the prebiotic *in vivo* might be favoured by an adaptation of the probiotic to the prebiotic substrate prior to consumption. This might result in a competitive advantage for the probiotic, if it is consumed concurrently with the prebiotic. The prebiotics identified thus far are non-digestible carbohydrates including lactulose, inulin, and a range of oligosaccharides that supply a source of fermentable carbohydrate for beneficial bacteria in the colon.

Food Formats and Probiotic Efficacy

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Recently, there has been an increased trend in the addition of probiotic cultures in foods in order to develop products with health-promoting properties. This has led to the introduction of a variety of products claiming to have various health effects. Dairy products are the most common food matrix used for delivery of probiotics, although other non-dairy matrices are also increasingly used in recent times to serve the purpose. However, very little information is available regarding the effect of food matrix and product formulation on probiotic functionality, although such information is important in order to substantiate the health effects at the final stage. The delivery vehicle is likely to influence probiotic functionality in different ways which may affect probiotic survival, physiology, and potentially efficacy. The delivery vehicle may also provide other complementary physiologically active ingredients

Looking into the deep interactions between food molecules & Probiotic cells which might have a profound effect on Probiotic Functionality.

such as prebiotics which may potentiate the probiotic functionality. These factors could also be expected to affect cell health throughout product shelf life. On the other hand probiotics may introduce fermentation end-products such as organic acids, bacteriocins or bioactive peptides, which could add value to the product or alternatively may negatively influence the product parameters that might affect its palatability. Studies also need to investigate whether the probiotic efficacy is well maintained throughout the shelf life of the product. The advancement in technology can in this regard provide an important insight into the various interactions between the food molecules and probiotics. Strangely modern genomic tools targeting the molecular communication between the host and probiotic have largely ignored the relevance of food matrix. Integrated approach using the modern tools of postgenomic technologies such as transcriptomics, proteomics, and metabolomics combined with state-of-the-art bioinformatic tool scan all be directed to study the various interactions between the food components and probiotics. It has been shown recently that the physiological status of probiotic cells at the time of ingestion directly influences human transcriptome response profiles to probiotics. In this regard it may be stated that the effect of various food matrices on the probiotic efficacy cannot be completely ignored and thorough investigation must be carried on before appropriate health benefits can be suitably claimed.



Life membership fee : Rs. 3500(Ten years)
 Student member : Rs 500(annually)
 Ordinary Members : Rs 1000 (annually)
 Institutional Membership: Rs 10000(annually)
 Corporate Membership : Rs 25000(annually)

Contact us :

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Announcement

As per our new rules and guidelines, we have now decided to renew the registration of all our old and enrollment of the new members with effect from 1st March, 2013 to bring uniformity. As PAi is a highly specialized scientific body, we always give preference to our life members for participation in the upcoming PAi activities wherein attendance is restricted. Besides this, we encourage young scholars to contribute scientific articles on probiotics in our PAi Newsletter issues and participation in various competitive programs and awards from time to time.

Awards & Honours

Dr. V.N. Bachhil has been awarded as a Young Scientist Award for research paper entitled "In vivo and in vitro protective effects of probiotics, *L. rhamnosus* and *S. boulardii*; inulin and their symbiotic combinations on *S. Typhimurium*" at International Symposium on "One health: Way forward to Challenges in Food Safety and Zoonoses in 21st century" and XIth Annual Conference of Indian Association of Veterinary Public Health Specialists held in collaboration with University of Saskatchewan, Saskatoon, Canada and Indian Association of Veterinary Public Health Specialists, December 13-14th, 2012 at School of Public Health and Zoonoses, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab 141004.



PAi Family Details (New members)

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O32	Dr. B. K. Saha

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Zytex Biotech Pvt. Ltd.
Mr. Jayraj Ashwin Doshi
Jayraj@zytex.com

Student Members

S72	Mr. N. Arunkumar
S73	Mr. Bam Bam Kumar Singh

We are pleased to inform you that the forthcoming 2nd annual conference of PAi along with the National Symposium on "Probiotics & gut health" is going to be held on 31st August, 2013 at NASC complex, DPS Marg, Pusa, New Delhi, India. The programme details will follow soon. Please keep checking PAi website for further details.

The technical support rendered by Ms. Namita Rokana, Mr. Diwas Pradhan, Ms Vinny Bajaj from DM Division, NDRI, Karnal in compilation of this issue of the Probiotic Newsletter is duly acknowledged. The editorial board also expresses thanks to all the authors who contributed their inputs for the newsletter.

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