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Scientific Tracks & Abstracts
(Day 1)
**Track 1, 2 & 3**

**1: Introduction to Probiotics**

**2: Probiotics, Functional Foods in Economy and Business**

**3: Current Research and Future Research Perspectives on Probiotics**

**Session Chair**
Cristina Stewart Bogsan  
University of Sao Paulo, Brazil

**Session Co-Chair**
Svetla T Danova  
Institute Pasteur International Network, Bulgaria

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**Session Introduction**

**Title:** Kefir administration reduced progression of renal injury in STZ-diabetic rats  
Cristina Stewart Bogsan, University of Sao Paulo, Brazil

**Title:** Potential Clinical Applications of Probiotics  
Vikas Kumar, Indian Institute of Technology, India

**Title:** Lactobacillus Paracasei CBA L74 prevents entrance of undigested gliadin peptides and rotavirus in Caco-2 cells  
Maria Vittoria Barone, University of Naples Federico II, Italy

**Title:** Characterization of the intestinal microbiome of Hirschsprung’s disease with and without enterocolitis  
Li Hong, Shanghai Children’s Medical Centre, China

**Title:** Probiotic beverage from black carrot juice fermented with Lactobacillus casei  
Nihat Akin, Selcuk University, Turkey

**Title:** Exopolysaccharide production of Lactic Acid Bacteria: Genetic background and future perspectives  
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**Title:** In vitro selection of vaginal lactobacilli for urogenital application  
Svetla Trifonova Danova  
The Stephan Angeloff Institute of Microbiology associated with the Institute Pasteur International Network, Bulgaria
Kefir administration reduced progression of renal injury in STZ-diabetic rats

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Diabetes mellitus has become a serious public health problem that affects millions of individuals worldwide. The World Health Organization predicts that 439 million people will have this disease in 2030, and Brazil was listed 5th of 10 countries estimated to have the highest number of people with diabetes, affecting approximately 12.7 million Brazilians in 2030. Kefir is a beverage made from milk that is fermented by a complex mixture of bacteria, including various species of lactobacilli and yeasts. It has been considered a probiotic due to its antioxidant and anti-inflammatory properties. The aim of this study was to investigate the effects of Kefir on the production of nitric oxide and oxidative stress and renal damage in STZ-induced diabetic rats. Diabetes was induced in adult male Wistar rats with streptozotocin (45 mg/Kg, iv). The animals received Kefir (K) or its vehicle 1.8 mL/day by gavage, starting from 5th day after induction of DM for 8 weeks. The animals were distributed into 4 groups (n=4 each): control (CTL); control Kefir (CTRK); diabetic (DM) and diabetic Kefir (DMK). Before and after treatment, blood and urine were collected for 24 hours to determine the thiobarbituric acid reactive substances (TBARS), NO, C-reactive protein (CRP), creatinine, urea and proteinuria. The data were processed statistically by one-way ANOVA with post-Newman-Keuls test (P<0.05). After sacrificing the animals, the renal cortex was removed for histology, oxidative stress and NOS evaluation. Comparing to CTL rats, DM rats had shown increased levels of glycemia, plasmatic urea, proteinuria, renal NO, superoxide anion, TBARS, and plasmatic CRP; also had been demonstrated a reduction in urinary urea, creatinine, and NO. However, DMK rats had shown a significant improvement in most of these parameters. Despite of lack of differences observed in the expression of endothelial NO synthase (eNOS), the expression of inducible NO synthase (iNOS) was significantly lower in DMK group when compared to DM rats, as assessed by Western blot analysis. Besides that the DMK group presented a significant reduction of glycogen accumulation within the renal tubules when compared to the DM group. These results indicate that Kefir treatment may contribute to better control of glycemia and oxidative stress, which is associated with the amelioration of renal function, suggesting its use as a non-pharmacological adjuvant to delay the progression of diabetic complications. Thus, Kefir may play a role in slowing the metabolic changes that contribute to DN.

Biography
Cristina Stewart Bogsan, Professor of Food Technology, Department of Biochemical Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, University of São Paulo and Researcher from TecLaFA, Technology of Dairy Functional Food and Analogues Lab, has graduated at Pharmacy and Biochemistry from Universidade Paulista in 1999, obtained her Master’s degree at Immunology and Microbiology from Universidade Federal de São Paulo in 2002 and has completed her PhD from Universidade de São Paulo in 2012. She has experience in Science and Food Technology, Microbiology and Immunology, focusing on Immunology and in Science and Technology of the Food, for the most part on Science and Technology of the Dairy Functional Food, acting on the following subjects: fermented milk, matrix-probiotic-mucosa interaction, Bifidobacterium animalis subsp. lactis, B-1 cells, immune stimulation and inflammation.

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Potential clinical applications of probiotics

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In the beginning of the twentieth century, the beneficial roles of nonpathogenic bacteria in the gastrointestinal tract were studied. A significant number of scientific studies have been apprised in support of the concept and evidences for the use of nonpathogenic organisms (probiotics) for clinical benefits. The cases of gastrointestinal diseases are growing around the world, and most of the gastrointestinal diseases occur because of alteration of intestinal microbiota ecosystem. Modification of the intestinal flora by increasing the predominance of specific probiotics would seem a reasonable approach of attaining a prophylactic or therapeutic effect against enteropathogens. The potential benefits of modifying the intestinal flora composition of certain high-risk groups, viz. premature infants, travelers, and children receiving antibiotics are emerging in modern days. An increasing number of healthcare professionals now routinely use condition-specific probiotic products against different diseases, either to treat them or for prophylactic purposes. Probiotics seem to play an important role in the gut that produces antibacterial peptides such as acidophilin bacteriocins to inhibit pathogenic microorganisms and improve the abnormalities of both the colonic flora and the intestinal microflora. Even though there was some evidence of the safety and efficacy of probiotics for treatment of diseases, recent clinical trials have proven its efficacies against many disease conditions.

Biography

Vikas Kumar completed his PhD from Banaras Hindu University, India, and Postdoctoral studies from School of Pharmacy, Texas Tech University, Amarillo, TX. He is now an Associate Professor of Pharmacology at IIT (BHU), Varanasi, India. He has published more than 100 papers in national and international journals and has been serving as an editorial board member of many scientific journals. He has mentored several PhD and MPharm students. He is recipient of many national and international awards and is a consultant to some pharmaceutical companies and research institutes. He has visited nine countries for his professional projects.

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Lactobacillus paracasei CBA L74 prevents entrance of undigested gliadin peptides and rotavirus in Caco-2 cells

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Objectives and Study: Recent reports describe a role of probiotics as therapeutic approach for Celiac Disease (CD). Besides, rotavirus (RV) infections are described as a potential risk factor for CD development. Undigested A-gliadin peptides P31-43 and P57-68 are central to CD pathogenesis, entering in enterocytes in vesicular compartments by endocytosis and inducing an innate and an adaptive immune response respectively. Aim of the study was to test the effect of probiotic Heinz proprietary strain Lactobacillus paracasei CBA L74 (International Depository Accession Number LMG P-24778) and its supernatant on P31-43, P57-68 and RV entrance in Caco-2 cells to verify its protective effect. The effect of supernatant on ROS production in RV infected Caco-2 was also tested.

Methods: LP CBA L74, obtaining 108 CFU/ml was cultivated and its supernatant was obtained by centrifugation and filtration. Caco-2 cells were treated with LP CBA L74 or with its filtered supernatant at 37°, CO2 5%, for 30 minutes, and then labeled P31-43/P57-68 or RV were added to cells cultures. We studied entrance of labeled peptides by fluorescence assay. RV entrance was assessed by direct immunofluorescence and the reactive oxygen species (ROS) production by dichlorofluorescein fluorimetric assay in Caco-2 cells infected with RV with or without bacterial supernatant.

Results: LP CBA L74 inhibited both P31-43 (FI reduction: 67.28%, P<0.001) and P57-68 (FI reduction: 37.05%, P<0.001) entrance respect to control. LP CBA L74 supernatant was also able to induce decrease of both gliadin peptides entrance in Caco-2 cells (FI reduction: 49.38% and 29.67% respectively, P<0.001), indicating that this biological effect was due to some product included in LP CBA L74 supernatant. Supernatant significantly prevented RV entrance and ROS production (reduction of 56%, P<0.001) in RV infected Caco-2 cells, showing a potential protective effect in RV infections.

Conclusion: LP CBA L74 and its supernatant reduce P31-43, P57-68 and RV entrance in Caco-2 cells probably acting on the endocytic trafficking. Moreover supernatant can protect Caco2 cells from RV mediated increase of ROS.
Characterization of the intestinal microbiome of Hirschsprung’s disease with and without enterocolitis

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Hirschsprung's disease (HD) is a congenital malformation of the gastrointestinal tract characterized by the absence of the distal enteric nervous system. Hirschsprung-associated enterocolitis (HAEC) is a severe life threatening complication of HD. The disease pathogenesis is still unclear, but evidences suggest that the intestinal microbiota may play important role in the development of HAEC. Because microbial abundance and diversity might differ in HD patients with enterocolitis, we sought to generate comparative metagenomic signatures to characterize the structure of the microbiome in HD patients with and without enterocolitis. Our experimental design is to enroll four HD patients (two with enterocolitis and two without enterocolitis). The microbiome was characterized by 16S rRNA gene, and the data obtained will be used to taxonomically classify and compare community structure among different samples. We found that the structure of the microbiome within HAEC patients differ from those without enterocolitis. Identifying the microbiome differences between HAEC and HD patients provides us a framework for future researches of determining the role of specific bacteria in inducing inflammation in HAEC. This study helps us to understand microbial contributions to the etiology of Hirschsprung associated enterocolitis, and provide a basis for early intervention of HAEC risk in Hirschsprung's disease.

Biography
Li Hong is Associate Professor of Pediatrics, and the Director of the Department of Clinical Nutrition. She graduated from Fu-Dan University School of Medicine in 1994, following which she continued her pediatric surgical training until 1997. She has played a major role in the development of Nutrition support strategies for Children in China. She has consequently received many awards for her work, and published widely in peer reviewed journals. Her special interests include nutrition support in critical ill children, congenital GI malformations and intestinal rehabilitation, and microbiome research in children.

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Probiotic beverage from black carrot juice fermented with *Lactobacillus casei*

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Several fruit and vegetable juices have just been trying for probiotic vehicle. For this purpose pineapple juice, cabbage juice, cashew apple and carrot juices etc. were tried in the past. Study aimed to investigate the suitability of black carrot juice as *Lb. Casei* vehicle. Black carrots were provided by black carrot producers as a concentrate and it was diluted (1:10). Pasterization were applied to freshly prepared black carrot juices at 80°C for 20 min. For the purpose of decrease microbial population to be low the detection limit. 30°C and 48 hours were used for fermentation temperature and duration, respectively. Inoculum quantity were detected as 6.53 log CFU/ml. After two days of fermentation this number reached to 7.97 log CFU/ml. Optical density were determined before, after and at the end of the first day fermentation at 590 nm and by the way microbial growth was monitored during fermentation. After that storage was made at +4°C for 42 days. Analysis of viable cell count, color, Ph and titre table acidity were performed at each days. While pH was measured as 3.785 after inoculation, it was 3.695 at the end of the storage. Any loss was not observed for characteristic black carrot colour. Viable cell count of *Lb. Casei* were higher than 7.40 log CFU/ml during the storage period. This study shows that black carrot juice is convenient medium for *L.casei* and it could be used in functional food industry.

Biography

Nihat Akin has finished his PhD at Loughborough University of Technology, Chemical Engineering Department-United Kingdom. He has been working as Professor for about fifteen years and been working as Head of the Department of Food Engineering in Selcuk University. He has published more than 100 scientific papers about milk products and microbiology.

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Exopolysaccharide production of lactic acid bacteria: Genetic background and future perspectives

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Several lactic acid bacteria (LAB) were shown to produce exopolysaccharides (EPS) which either forms a capsular layer around them or being directly secreted to the environment. These biopolymers were shown to be important for LAB for their putative roles in colonisation, adhesion, stress resistance, immunomodulation and host-bacteria interactions. They are also of considerable interest to food industry due to their essential roles in rheological properties of food products and food formulations. Bacterial EPS structure has a wide diversity among different LAB species due to the different sugar monomers in their repeating units and the glycosidic linkages present among these sugar monomers. Structurally, EPS are divided into two groups as homopolysaccharides which are formed by only one type of sugar molecule and heteropolysaccharides which consists of several sugar monomers such as glucose, galactose and rhamnose. Recent studies revealed that only single gene is responsible for the homopolymeric EPS production whereas eps gene clusters were shown to be responsible for the heteropolymeric EPS production. The structural properties of EPS are crucial for their role in colonisation and regulation of host responses as well as their role in food rheological properties. Several factors such as incubation temperature and time, sugar source and environmental conditions affect the levels of EPS production by LAB. This study will summarise recent findings in genetic and structural analysis of EPS production by LAB and their role in potential probiotic properties as well as recent applications in the food industry.

Biography

Enes Dertli conducts research in the field of microbiology. His aim is to gain a better understanding of how probiotics show their beneficial effects and what are the molecular factors behind these effects. His research is focused on finding new strains for human consumption as probiotics and potential new starter cultures for food industry. After studying Food Engineering at Selcuk University, he finished his Master with the scholarship of Turkish National Science Council at same university (2008). Then he received a scholarship from Turkish National Education Ministry and moved to Institute of Food Research, UK where he finished his PhD in Molecular Biology and Microbiology (2014). At present he works as an Assistant Professor in Bayburt University, Turkey.

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In vitro selection of vaginal lactobacilli for urogenital application

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Vaginal and urogenital flora plays a central role in maintaining both the wellbeing and illnesses of women. Recently, the lactobacilli that commonly are presented in the healthy vagina have attracted considerable attention. The understanding of protective role and probiotic properties of these beneficial bacteria is a promising way to advance the prevention, therapy and prophylaxis of urogenital infections (UTI) and related with risks. A complex study on Lactobacillus microbiota of healthy Bulgarian volunteers at childbearing age is presented. Using different culturable and non-culturable DNA methods, the Lactobacillus biodiversity were characterized. In addition, 35 newly isolated lactobacilli have been identified. Among the dominant species (Lactobacillus fermentum, Lactobacillus gasseri, Lactobacillus crispatus and Lactobacillus salivarius), several active strains, with a broad spectrum of antagonistic activity were pre-selected. In vitro tests in simulated vaginal fluid media showed the capacity of two vaginal strains to inhibit the growth and the biofilm-formation of uro-pathogenic Escherichia coli. The antagonistic and immunomodulation effects, established in vitro, were dose- and strain-dependent. The strain-specific antibiotic susceptibility, together with the adhesion ability to HeLa cell-line and the capacity for protective biofilm-formation, in conditions similar to those in vivo, were estimated as important part of mechanisms of stable colonization in the vagina. Moreover, some of vaginal lactobacilli combine biological activity with technological relevance. Obtained in vitro results implied that selected vaginal lactobacilli are appropriate as new multifunctional compounds for vaginal probiotic formula, with potential to maintain the urogenital health.

Biography

Svetla T Danova is a molecular biologist with a strong background in microbiology and genetics of medically and industrially important groups of microorganisms (beneficial Lactic acid bacteria; antibiotic producing Streptomyces). She has graduated and completed her MSc and PhD thesis at the Biological Faculty, Sofia University, Sofia, Bulgaria. After the post-doc training in France, South Africa and Belgium she become a head of the laboratory “Genetics of Lactic Acid bacteria & Probiotics” at the Department of General Microbiology, The Stephan Angeloff Institute of Microbiology, a member of the International Network of the Institute Pasteur, France. She has published more than 50 articles on taxonomy, physiology and biological activity of lactic acid bacteria and probiotics and a student book “The Probiotics”.

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4: Probiotics Role in Control of Disease
5: Probiotics in Gastroenterology

Session Chair
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Session Introduction

Title: Probiotics for mitigation of heat stress-related complications
Iryna Sorokulova, Auburn University, USA

Title: Efficacy of ready-to-eat probiotic artichokes in modulating faecal microbial parameters in healthy subjects and patients with functional constipation
Paola Lavernicocca, National Research Council (CNR-ISPA), Italy

Title: Immunohematopoietic modulation by the alga Chlorella in obese mice
Mary de Souza Queiroz, State University of Campinas, Brazil

Title: Research and development new symbiotic product and its clinical effect
Almagul Kushugulova, Nazarbayev University, Kazakhstan

Title: Bacteriophage-based probiotic preparations for maintaining healthy gut microflora
Alexander Sulakvelidze, Intralytix Inc., USA

Title: Bacteriophages: Gently modifying food microflora for improving food safety
Joelle Woolston, Intralytix Inc., USA

Title: Bacteriophages as probiotics: The veterinary perspective
Lawrence D Goodridge, Intralytix Inc., USA
Exposure to high environmental temperatures is considered to be one of the most deadly conditions, affecting human and animal health. Relatively small increase in internal temperature can lead to injury and even death. It was shown that heat stress results in a significant damage of the barrier function of the gut causing increased permeability of the gut epithelium. This increased gastrointestinal permeability is a key factor in producing symptoms of heatstroke by triggering the systemic inflammatory response, which lead to necrosis of organ tissues and multi-organ failure. Prevention of the gut permeability would offer a significant benefit in mitigation of the heat stress impact. Gut microbiota is critical in keeping mucosal barrier function. Stability of gut microbiota determines the ability of the organism to tolerate stress. Thus, modulating the intestinal microbiota by probiotics may be a novel, non-invasive therapeutic approach for prevention of heat stress-related adverse effects. We demonstrated that oral pretreatment of rats with *Bacillus subtilis* probiotic before exposure to heat protects animals from damage of intestine, translocation of bacteria from the gut, elevation of lipopolysaccharides and cytokines levels in the blood, increasing vesiculation of erythrocytes. We can speculate that some substances, produced by *B. subtilis* strain can contribute to the gut integrity and protection of the mucosal barrier function.

**Biography**

Iryna Sorokulova, Professor of Microbiology received her MS degree in Microbiology from Taras Shevchenko Kiev State University (Ukraine), PhD and DSc degrees in Microbiology from the Institute of Microbiology and Virology, National Academy of Sciences of Ukraine. She has received a solid background in formulation and regulation of biological products during the training courses in Bureau of Biologics (Ottawa, Canada) and Massachusetts Biologic Laboratories (Boston, USA). She is an editorial board member of several reputed journals. She is the author of 82 refereed scientific publications, 4 books, and 23 patents.

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Efficacy of ready-to-eat probiotic artichokes in modulating faecal microbial parameters in healthy subjects and patients with functional constipation

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A new line of probiotic products has been developed as an appealing option to the milk-based products to allow the daily consumption of probiotics. To evaluate the effects of ready-to-eat artichokes containing the probiotic strain *Lactobacillus paracasei* LMGP22043 on fecal microbial composition, biochemical parameters and symptom profile, clinical trials on healthy subjects and patients suffering from functional constipation were performed. Preliminary results provided evidences on the ability of the ready-to-eat probiotic food (daily dose of about 1x10^10 CFU live probiotic cells) in modulating microbial parameters in constipated subjects. The administration for 15 days of the probiotic product to healthy volunteers demonstrated that the *L. paracasei* strain transiently colonized the gut of 17/20 subjects (median 6.87 log CFU/g feces), determined a general reduction in Enterobacteriaceae, antagonized *Escherichia coli* and *Clostridium spp.* and increased the genetic diversity of lactic population (Valerio et al., 2011). As concerns the patient group, 20 constipated patients were studied. Symptom profile was investigated using the Bristol stool form chart and the Gastrointestinal Symptom Rating Scale (GSRS) questionnaire. After 15-day administration of probiotic ready-to-eat artichokes, satisfactory relief of symptoms was recorded. Besides, Bristol chart cluster scores were significantly higher and GSRS constipation scores significantly lower at the end of administration compared to baseline. As for SCFAs production, a significant increase in propionic acid concentration was found. Present results suggest that the association of the probiotic *L. paracasei* with a food carrier rich in fibers such as artichokes, may represent a new strategy for favoring a daily supply of probiotics and attracting more consumers to vegetable food fortified with probiotic strains.

Biography
Paola Lavermicocca is a Biologist, Research Director and Leader of the Research Unit “Microbiology and quality of food productions”. She is responsible for more than 20 scientific projects in the field of agro-food microbiology funded by European Commission/MIUR/Italian Regional Bodies/Foundations/private funding bodies. Her research activities are focused on the microbiological aspects of food to improve their nutritional/functional quality and shelf life. She is an expert for European Commission, GSRT of Greece, Italian Ministry of Education, University and Research, Italian Ministry for Productive Activities and for Italian Regional Bodies. She is an author of about 140 publications (most ISI ranked) and has patent ownership on the application of bacterial strains in the field of functional foods.

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Immunohematopoietic modulation by the alga Chlorella in obese mice

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Purpose: Investigation of modulating effects of Chlorella on the medullar and extramedullar hematopoiesis and cytokine production of obese mice.

Methods: Interaction between stromal cells and hematopoietic progenitor cells by long-term bone marrow culture. Growth and differentiation of bone marrow and spleen progenitors (CFU-GM) were obtained by clonal culture and cytokines by ELISA.

Results: In obese mice we observed reduced capacity of stromal cell layer to support CFU-GM, decreased numbers of total non-adherent stromal cells, increased levels of IL-1, IL-6, TNF-alfa, TGF-beta, reduced levels of IL-10, and extramedular hematopoiesis. This latter finding is pioneer in the literature and might be related to the accumulation of macrophage in adipose tissue, a common feature in human and experimental obesity, which is considered responsible for the majority of complications observed in this disease. CV treatment restored all these changes to normal values.

Conclusion: Additional findings, already published, were also pioneer in literature showing that prevention by CV of high-fat diet-induced insulin resistance in obese mice is due to improvement in insulin signaling pathway by increasing phosphorylation levels of IR, IRS-1 and Akt and reducing phosphorylation levels of IRS-1ser307. We also found that CV prevents high-fat diet-induced dyslipidemia by reducing triglyceride, cholesterol and free fatty acid levels. Altogether our findings suggest that prevention by CV of the deleterious effects induced by high-fat diet is a good indicator for its use as a prophylactic agent against obesity-related complications.

Biography
Mary de Souza Queiroz has completed her PhD from the University of Manchester, England, and her postdoctoral studies from WEHI, Melbourne, Australia. She is Full professor, director of the Laboratory of Immunopharmacology, Medical Faculty, UNICAMP, Campinas, Brasil. She has published more than 80 papers in reputed journals and presented several pioneer and original results in the literature, starting with the focus of her studies on the modulation by medicinal plants of immunohematopoietic regulatory mechanisms, aiming to increase or restore the host’s own defenses which can inhibit infectious and malignant processes.

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Research and development new synbiotic product and its clinical effect

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Introduction: Currently, the functional food is recognized as an alternative to pharmacotherapy. The objective of research is a synbiotic product "NAR", which includes probiotics and prebiotics. Probiotics are presented by cultures of Lactobacillus plantarum, Lactobacillus fermentum, Lactobacillus acidophilus, Bifidobacterium longum, Bifidobacterium bifidum. The product is also enriched with fish collagen. The goal of this work is to investigate the clinical efficacy of a new synbiotic.

Method: Double-blind, randomised, placebo-controlled trial, including 180 adult (age 30-89) with symptoms of metabolic syndrome who were allocated to placebo or synbiotic group. We enrolled 90 adult in placebo group and 90 in synbiotic group. The two groups were similar for demographic and clinical characteristics. All patients signed a consent letter. The main criteria for inclusion were: Blood pressure: 130/90 mmHg; Raised fasting plasma glucose (FPG): >100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes; Dyslipidemia: triglycerides (TG): =1.695 mmol/L and high-density lipoprotein cholesterol (HDL-C) =0.9 mmol/L (male), =1.0 mmol/L (female); Central obesity: waist:hip ratio >0.90 (male); >0.85 (female), or body mass index >30 kg/m2. All patients underwent clinical and laboratory evaluation, including complete blood tests, glucose test, glycosylated hemoglobin, total cholesterol + triglycerides, cholesterol, LDL, HDL plasma, immunogram, co-program. All patients were interviewed, the questionnaire included 200 questions related to diet, lifestyle and health. Synbiotic were used by patients in dose of 200 grams twice a day. The duration of applying the symbiotic were 90 days.

Results: In the study group the percentage of colds were significantly lower than in placebo group, the majority of patients reported an improvement in abdominal discomfort, reduction in serum total cholesterol and low-density lipoprotein, weight loss of 8-9 percent in different age groups, stabilized frequency and consistency of stool (judging by the Bristol scale).

Conclusion: As a result was exhibited the efficacy of a new synbiotic in adult with metabolic syndrome.

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Bacteriophage-based probiotic preparations for maintaining healthy gut microflora

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The human gastrointestinal (GI) tract is colonized by an abundant and diverse microbiota that has a significant role in mucosal protection, regulation of GI immune tolerance, digestion of fecal matter, and vitamin K synthesis. However, numerous factors (e.g., antibiotic treatment, diet, psychological and physical stress, etc.) may lead to physiological disturbances in the gut's microflora. Such alterations may contribute to many chronic and degenerative diseases (e.g., Crohn's disease, ulcerative colitis, rheumatoid arthritis, irritable bowel syndrome, inflammatory bowel disease, and other “intestinal dysbioses”) that often are particularly problematic in young children and the elderly. One of the approaches used to alleviate those disorders has been the ingestion of probiotic microorganisms; i.e., nonpathogenic microorganisms that improve health when ingested in sufficient quantities, presumably by beneficially altering the microbial balance of the human GI tract. Traditionally, various bacterial species have been used as components of such “probiotic cocktails,” with lactobacilli and bifidobacteria being the most commonly used. These preparations are usually delivered in various commercial products and dietary supplements, healthy drinks (e.g., tomato juice), infant formulas, and other foods. A probiotic approach is possibly one of the most natural and environmentally-friendly prophylactic and therapeutic approaches available today, and it has been gaining in popularity in the United States and other countries. However, one approach for a “probiotic intervention” that has received very little, if any, attention in the past is to use lytic bacteriophages/phages to target and kill specific “problem” bacterial pathogens in the GI tract. Lytic phages are viruses that attach to and kill their bacterial hosts by lysing them during their internal replication cycle. The process is very specific; i.e., the phages only attack their targeted bacterial hosts, and they cannot infect human or other eukaryotic cells. The approach of using lytic phages as part of a probiotic diet is similar to that used for bacteria-based probiotics, which are administered during a period of time and act by favorably conditioning the gut's microflora. The key difference between bacteria-based probiotics and lytic phage-based probiotics is that the former introduce nonpathogenic bacteria into the GI tract (in order to interfere with the ability of pathogenic bacteria to colonize the GI tract and cross the intestinal mucosa); whereas, the latter target and kill specific pathogenic bacteria in the GI tract. The presentation will describe the history of phages and phage therapy, pros and cons of the approach, and focus on the use of Shigella phages as part of probiotic intervention for managing shigellosis in humans. It will also explore the impact of phages on normal gut microflora and how it compares to that triggered by antibiotic therapy. Because of their high specificity, phage-based probiotics have a very gentle effect on the overall gut microflora, which may further enhance their protective effect. The approach may serve as a platform technology for developing a new class of prophylactic and/or therapeutic products for managing shigellosis and other infections whose etiologic agents have an oral portal of entry and require GI tract colonization in order to cause disease. Moreover, because of their ability to kill specific bacteria without affecting other bacteria, phage-based probiotics may be valuable tools for advancing our understanding of the important physiological roles that some normal flora bacteria have in the mammalian GI tract. That knowledge may help to identify new strategies for improving human health in areas not involving the prevention and treatment of bacterial diseases; e.g., reducing the occurrence of obesity and some forms of cancer, where the GI tract's normal microbiota may have a role.

Biography

Alexander Sulakvelidze, PhD, is Chief Scientist of Intralytix, and an internationally recognized expert in phage technology. He has published extensively on the subject of phage therapy, including co-editing a major book about bacteriophages in 2005. He is the author of several issued and pending patents in the field of phage therapy. He is currently serving as Editor-in-Chief of the journal Bacteriophage, and as an ad hoc reviewer for several other journals and funding agencies.

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Bacteriophages: Gently modifying food microflora for improving food safety

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The use of bacteriophages as biocontrol agents is an environmentally friendly, all-natural method to eliminate or significantly reduce contamination of food by pathogenic bacteria. Bacteriophages, arguably the oldest and most ubiquitous organisms on Earth, are viruses that kill bacteria. They play a key role in maintaining the microbial balance in any ecosystem where bacteria exist and are part of the normal microflora of all fresh, unprocessed foods. Interest in bacteriophages has been gaining momentum in recent years, as reflected in the both the number of regulatory approvals for bacteriophage products and the number of published studies. Because of the specificity of bacteriophages, their application only affects the target bacteria (the pathogen) but will not affect the other naturally present and potentially beneficial microflora. Bacteriophage products that target *Listeria monocytogenes*, *Salmonella*, and *E. coli* have been shown to reduce or completely eliminate the specific pathogen on a variety of foods, including beef, chicken, seafood, fruits and vegetables, and dairy products. In the US, several have been cleared as GRAS, with others receiving FCN and FAP approvals. Furthermore, none of the phage preparations affect the treated foods’ flavors, aromas, or appearances. The presentation will review information about the use of bacteriophages in foods and food processing settings, as well as discuss regulatory and safety issues concerning the use of bacteriophages in the food industry.

Biography

Joelle Woolston is a research scientist and laboratory manager at Intralytix, where she provides hands-on research, directs and supervises laboratory staff, and assists in the regulatory approval process. Prior to joining Intralytix, she worked on metabolic transporters at the Children’s Hospital in Washington, D.C. and co-developed a patented phage-based vector system at the University of Maryland.

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Bacteriophages (phages) are viruses that specifically infect bacteria. Since their discovery almost a century ago, they have played a vital role in many scientific discoveries. The current concerns related to antibiotic resistant bacteria have thrust phages into the spotlight as potential ways to control bacterial pathogens, or generally modulate immune responses. Pre-harvest agents used to control pathogens in animals include probiotics and vaccines. Successful pre-harvest strategies should reduce or eliminate harmful bacteria without having a negative effect on the animal or environment. The development of a biocontrol strategy, based on the use of phages, would seem to be ideal, due to the fact that they are natural, are ubiquitous in the environment and are nontoxic to animals. In addition, they are often highly specific to their host, unlike antibiotics which are not specific and can lead to the destruction of beneficial bacteria. Furthermore, phages are able to infect a single cell and produce multiple copies of themselves which, when released through lysis of the host cell, allows for infection of other uninfected cells. In this way, phages can be thought of as a natural, self amplifiable antimicrobial treatment. The potential uses of phages in veterinary applications will be discussed. These include their uses to eliminate or reduce the numbers of specific bacteria, but also their potential use in modulating the immune system of animals. The regulatory aspects of phage based probiotics will also be discussed, as phage-based antimicrobials do not readily fall into the scope of the existing regulatory guidelines.

Biography
Lawrence D Goodridge currently holds the Ian and Jayne Munro Chair in Food Safety at McGill University in Montreal, Quebec, Canada. He is a native of Hamilton, Ontario, Canada, and received his PhD from the University of Guelph with a major emphasis in Food Microbiology and Food Safety in 2002. His primary research interests include the use of bacteriophages to solve issues associated with food safety including control, source tracking and detection of foodborne pathogens. He has authored 43 publications and 13 book chapters, and holds two patents related to phage-based bacterial detection.

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211th OMICS Group Conference
3rd International Conference and Exhibition on
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Scientific Tracks & Abstracts
(Day 2)
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Antiproliferative bacteriocins active against MRSA from coagulase negative *Ent. Mundii* strain C4L10 isolated from non-broiler chicken

Tengku Haziyamin, Moshood A Yusuf and Solachuddin Jaichwan
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Bacteriocins produced by a variety of microbes are gaining more attention for not only as alternative food preservative but also as therapeutics agent. A bacteriocin, Ent C4L10, was produced by coagulase negative *Enterococcus mundtii* strain C4L10 (Accession No. KC731423) previously isolated from Malaysian non-broiler chicken. Based on agar diffusion assay, it showed antimicrobial activities against Methicillin resistance *Staphylococcus aureus* (MRSA) used as an indicator organism. Approximately 10 kDa protein was purified employing three-phase partitioning (TPP) method and it was shown to be highly thermostable, retaining activities at 121°C for 15 min, and was stable in a pH range of 4-9. There was however a loss in activity after protease treatment. PCR amplification using enterocin gene primers showed that Ent C4L10 sequence is highly similar to bacteriocinL-1077 (83% identity). In order to study its anti-proliferative potential, purified Ent C4L10 was also tested against four human cell lines; i.e., lung cancer (H1299), breast cancer (MCF 7), colon cancer (HCT116) and oral cancer (HSC3). It was found that oral cancer cell line was the most sensitive with a cytotoxic index of IC50 of 9.009 µg/ml, followed by breast cancer IC50 (11.51 µg/ml), and the least sensitive was with colon cancer cell line (IC50 of 20.57 µg/ml). In conclusion, putative 10KDaEnt C4L10 is a class II bacteriocin isolated from coagulase negative *Enterococcus mundtii* strain C4L10 shown to have antiproliferative properties. Therefore, this bacteriocin has not only great potential for use in food preservation, its future use as an antitumor agent should also be explored.

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Safety aspects of application of lactic acid bacteria

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In last decades, lactic acid bacteria (LAB) have been subject of intensive research in isolation and identification with aim of their application as producer of antimicrobial peptides and beneficial properties. It is well known that many LAB are capable of producing a variety of antimicrobial compounds, which may contribute to their colonization of habitats and their competitive advantage over other bacteria. Besides production of lactic acid, which causes a drop in pH enough to inhibit certain strains, as its non-dissociated form triggers a lowering of the internal pH in sensitive bacteria that causes a collapse in the electrochemical proton gradient resulting in a bacteriostatic or bactericidal effect, LAB can produce other organic acids, diacetyl, hydrogen peroxide, and bacteriocins. LAB constitute a phylogenetically heterogeneous group of ubiquitous microorganisms that are naturally present in high nutrient containing organic products such as foods and occupy a wide range of ecological niches ranging from the surface of plants to the gastro-urogenital tract of animals. Currently, the LAB group includes a large number of cocci and bacilli, such as species of the genera Carnobacterium, Enterococcus, Lactobacillus, Lactococcus, Leuconostoc, Oenococcus, Pediococcus, Streptococcus, Tetragenococcus, Vagococcus, Weissella etc. From a historical point of view, LAB has been used since ancient times in food fermentation processes and preservation. Due to their lack of pathogenicity, most LAB species have received the GRAS (Generally Recognized as Safe) status by the U.S. Food and Drug Administration. In addition to their important technological properties in food production (production of lactic acid, decrease of lactose, improvement of organoleptic and physical characteristics), various species of LAB have been shown to possess therapeutic properties since they are able to prevent the development of some diseases as shown mostly using animal models and have the capacity to promote beneficial effects in human and animal health. In recent years, the number of functional food products enriched with live probiotic microorganisms, has increased exponentially since it is known that these can confer health benefits on the host. Besides all beneficial properties studied for various LAB, a special attention need to be pay on the possible presence of virulence factors, production of biogenic amines and antibiotic resistance. This virulence determinants have been well detected and studied in Enterococci and Streptococci, however, in last few years report on presence of virulence factors in otherwise GRAS Lactobacilli have been showing the potential upcoming problems. Horizontal gene transfer of virulence factors between pathogenic and LAB, including probiotics is a highly possible scenario in case of uncontrolled application of probiotics. In addition, some of the antimicrobial peptides expressed by LAB may be a high cytotoxic. Besides all beneficial properties studied for various LAB, a special attention need to be pay on the possible cytotoxicity levels of the expressed bacteriocins in order to drown conclusion for the safe application of the producer or antimicrobial peptides in the bio-preservation.

Biography

Svetoslav Dimirov Todorov has completed his PhD at ENITIAA, Nantes, France and Sofia University, Sofia, Bulgaria (financed by French Government) and postdoctoral studies from Stellenbosch University, Matieland, South Africa. In last 12 years, he was researcher and invited lecture at University of Stellenbosch, Matieland, Republic of South Africa and University of Sao Paulo, Sao Paulo, Brazil. In the period between 2008-2013, he was visiting professor at Sao Paulo University, Faculty of Pharmaceutical Sciences, Sao Paulo, Brazil. He has published more than 100 papers in reputed journals and serving as a member of the editorial board. He is reviewer for more than 50 international journals.

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Cytokine analysis to differentiate immunomodulatory properties of *Lactobacillus paracasei* strains and for the identification of potentially unsafe strains

Angelo Sisto, Palmira De Bellis, Lucia Treppiccione, Paola Lavermicocca and Mauro Rossi
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A number of studies provided evidence that the probiotic aptitude of bacteria is strictly strain-specific; therefore even strains of the same species may show peculiar behaviors inducing different immune responses. The aim of this study was the comparison of five genetically characterized *Lactobacillus paracasei* strains to reveal their immunomodulatory properties and the potential relationship between the immune response and their different behaviors. Based on their characteristics, probiotic strains IMPC2.1 (LMGP-22043) and LMGP-17806, strains ATCC334 and IMPC4.1 (with unknown potential probiotic features) and strain LMG23554 (isolated from a blood culture of a patient with infective endocarditis) were included in the study and their ability to modulate the immune response of mouse dendritic cells (DCs) was evaluated. The results indicated that all strains stimulated maturation of DCs but they induced secretion of different cytokine profiles. The highest levels of IL-2 and IL-10 were stimulated by strains ATCC334 and IMPC4.1; the cytokine profile also indicated the latter as a particularly efficient anti-inflammatory strain; probiotic strains IMPC2.1 and LMGP-17806 were characterized by an intermediate ability to induce cytokine secretion. On the contrary, strain LMG23554 showed low ability to induce both IL-10 and IL-12 secretions. This feature could be related to the potential pathogenic behavior of that strain which was also able to translocate to extra-intestinal organs. In conclusion, our data suggest that the cytokine pattern analysis of DCs can be considered as an useful in vitro screening method before embarking on time-consuming clinical studies and, more relevant, to preliminarily define unsafe features of potential probiotic strains.

Biography

Angelo Sisto graduated in Agricultural Science and has a permanent position as a Researcher of the Italian National Research Council in the Institute of Sciences of Food Production. His studies and research interests is focused on microbiology and molecular biology of agri-food relevant bacteria such as plant pathogenic bacteria and bacteria associated to different food matrices. He has been responsible for Research Projects, reviewer for many international scientific journals and of BARD (United States-Israel Binational) Research Projects. He is author of more than 70 publications, many of which are in international journals quoted by ISI. angelo.sisto@ispa.cnr.it
Physician perceptions on probiotics: Results of a multinational survey

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Objective: The aim of this study was to evaluate the knowledge, attitudes and current practices of physicians with regards to probiotics in 10 countries.

Methods: A closed-ended structured questionnaire was implemented in 10 different countries (Argentina, Peru, Spain, Italy, Hungary, Morocco, Turkey, Pakistan, India and China). Target and Sample Size: 90 to 190 physicians interviewed per country (General Practitioners-GP-, Pediatricians-P-, Gastroenterologists-G-). Total sample: 1670. Representativeness: adapted criteria according to each country’s reality (quota method).

Results: 85% doctors in 10 countries felt that they were somewhat or absolutely informed about probiotics, with the highest prevalence among G in China (100%) and GP in China (93%), India (91%). However 39% Moroccan physicians expressed a lack of information. Concerning probiotic definition 94% of Turkish doctors responded according to FAO/WHO criteria while in Pakistan only 39% of doctors did. Saccharomyces boulardii and Lactobacillus rhamnosus GG have been scientifically proven to work in acute infectious diarrhea and antibiotic associated diarrhea (46% and 30%) showing very different scores with no parallel with global guidelines. GPs are less aware of proofs on these strains in these indications whereas P remain the most aware target in the sample (36% boulardii/20% GG in GPs vs 51%/35% in P population). There is an international consensus on safety (84%) with no differences per target. Doctors do recommend probiotics to their family (82%) or themselves (68%). P recommend more frequently probiotics in acute diarrhea (in average 62,4 patients/100).

Conclusions: Most doctors feel well informed about probiotics.

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Probiotic vegetable foods containing health promoting molecules

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The vegetable matrix - table olives, artichokes and cabbage can act as biological carrier for delivering probiotic populations to the gut. The use of a probiotic strain as a starter can allow the consumption of probiotics in fermented vegetables as an alternative to the milk-based products. The functional benefits of probiotic vegetable foods are linked to the presence of health promoting molecules - polyphenols, glucosinolates, vitamins, monounsaturated fatty acids, prebiotic sugars, etc. - as well as to the high count of live probiotic cells able to colonize the human gut. The efficacy of a probiotic food mainly depends on the ability of the probiotic strain to survive during processing and/or to compete with metabolically active microorganisms occurring in the food matrix. The probiotic human isolate Lactobacillus paracasei LMG-P22043 was successfully used to pilot the fermentation of vegetables such as debittered green olives, artichokes or blanched white cabbage leading to final products containing about log 8 CFU/g live cells. During fermentation, the probiotic strain colonized the vegetable surface dominating the natural lactic acid bacterial population thus decreasing the pH of brines to a safe pH value. Interestingly, in blanched cabbage the fermentation process preserved the content of glucosinolates otherwise completely lost during conventional fermentation of sauerkraut. We can conclude that L. paracasei LMG-P22043 can be used in the dual role of starter and probiotic culture which allows the control of fermentation processes and the realization of final products with functional appeal.

Biography

Francesca Valerio is a food microbiologist mainly working on the microbiological aspects of food quality, on the improvement of nutritional quality and shelf life of traditional foods. She has contributed to the development of new functional and probiotic foods by studying the role of beneficial bacteria during the food process and the modulatory activity that microbes and their metabolites explain in the human gut. Her current research activities also concern the control of growth of microbial pathogens and food contaminants by biopreservatives. She has published more than 21 papers in reputed journals.

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Anti microbial agents in milk and dairy products

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Milk and milk products contain several antimicrobial activities including naturally occurring antimicrobial agents, for instance, lactoferrin and lysozyme, and other antimicrobial factors especially those produced as a result of microbial and probiotic activities. Lysozyme for example is a bacteriolytic enzyme naturally present in milk and in the albumen of birds’ eggs, which helps to protect the developing egg from microbial attack. Like nisin, lysozyme has been found to be effective against the clostridia that cause late blowing in cheese. It can also inhibit growth of Gram-positive spoilage organisms and pathogens, including Listeria and Bacillus cereus. Lysozyme has been commercialized and is available in purified preparations like inovapure™ marketed by Neova Technologies. Another example the lactoperoxidase system which relies on reactivating the enzyme lactoperoxidase, naturally present in raw milk, by adding thiocyanate and a source of peroxide. The effect is to block bacterial metabolism and inhibit growth, so extending the shelf life of raw milk. Thus the mode of action, the health beneficial impact, and the applications of different antimicrobial agents may be present in milk and milk products will be considered in this lecture.

Biography

Hussein Azzaz Murad studied continuous cultivation of microorganisms in the Institute of Microbiology, Prague, Czechoslovakia before obtaining his PhD from Zagazig University, Egypt in Food Microbiology. He is Professor of Food Microbiology, National Research Center, Egypt. He prepared and manage several training courses in food safety, HACCP, ISO 22000 and fermentations. He supervised several MSc and PhD studies in Food Microbiology. He is the reviewer/editor of five journals of Science Alert and has published over 50 papers in national and international journals and conferences.

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Impact of natural antioxidant on reduction of oxidative stress in hyperglycemic rat fed germinated pigeon pea diet

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The present study investigated antioxidant activity of extract of germinated pigeon pea (Cajanus cajan) in diet fed-alloxan induced diabetic rats. Germination was done in controlled dark chambers (100% RH, 28°C). The phenolic compound, DPPH radical scavenging activity and the inhibition of α-glucosidase and α-amylase activity before and after germination were investigated. Blood glucose levels of the rats before and after the feeding trials were measured by using blood glucose measuring strips. Oxidative parameters like lipid peroxidation (LPO) and reduced glutathione (GSH) were determined spectrophotometrically in the diabetic rats for four weeks. Germination increased the total phenolic and antioxidant activity by 30.12% and 63.52% respectively. Germination also increased the inhibitory potential of pigeon pea extract against α-glucosidase and α-amylase compared with the non-germinated pigeon pea extract. Induction of rats with alloxan led to significant (p<0.05) increase in fasting blood glucose level. Consumption of germinated pigeon pea extract led to a significant reduction in the fasting blood glucose level in the diabetic rats (P<0.05). On administration of germinated pigeon pea extract, LPO reduced to almost normal and increased the levels of GSH. The present study concluded that consumption of germinated pigeon pea can be good dietary supplement for diabetes and dyslipidemia.

Biography
Uchegbu Nneka N is currently doing her PhD at Enugu State University of Science and Technology. She is at present lecturing at the Institute of Management and Technology Enugu Nigeria and has risen to the rank of senior lecturer. She has published many papers in reputed journals.

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Effect of Bacillus subtilis spore (Gallipro) nutrients equivalency value on broiler chicken performance

Mojtaba Zaghari, Nahid Zahroojian, Mohammad Riahi and Sudabeh Parhizkar
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The experiment was conducted to evaluate the nutrients equivalency value of Bacillus subtilis spore (Gallipro) for broiler chicken and its potential for decreasing feed nutrients concentration and cost. A total of 720 day old Ross 308 broiler chicks were allocated in 6 treatments (2 sexes×3 diets) with 6 replication for 7 wk. Dietary treatments; Main treatment (MT) was routine broiler diet added by 0.2 g/kg Gallipro (Bacillus Subtilis 4×10⁹ CFU/g DSM 17299) and using nutrients equivalency of Gallipro for feed formulation, Negative control (NC) diet was the same as main treatment without Gallipro and Positive control (PC) diet was the same as MT diet in nutrients content but without Gallipro. Body weight and feed consumption were measured weekly. Carcass characteristics were measured at the end of experiment. Effect of dietary treatments on body weight was not significant. However, numerically the average body weight of male and female chicks received negative control diet was 2% (68 g) lower than PC and MT groups. Dietary treatments had no significant effect on average daily feed intake. Feed conversion ratio of chicks received PC and MT diets was 2.7% better than NC chicks (P<0.01). Male chicks was superior to female in all measured traits (P<0.01). Effect of treatments on carcass characteristics was not significant. There was no interaction between factors on measured parameters. Performance of chicks received diet contained Gallipro compared with positive control showed that Gallipro liberate 0.4% crude protein from MT diet and consequently decreased the broiler feeding cost.

Biography

Mojtaba Zaghari has completed his PhD at the age of 38 years from University of Tehran. He is the Associate Professor of Poultry Nutrition at University of Tehran. He has published more than 70 papers in scientific journals and 100 papers presented in international conferences, also has been serving as an editorial board member of Journal of Livestock Science and Technologies.

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Probiotic effects of *Saccharomyces cerevisiae* on pullets fed palm kernel cake-based diets

Chuka Ezema
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The study investigated the probiotic effects of *Saccharomyces cerevisiae* on pullets development and hen-day egg performance of the layers. A total of 120 chicks were brooded for 4 weeks, after which 100 pullets were randomly selected and placed in 4 groups (A-D) of 25 birds each. Each group was subdivided into 5 replicates of 5 birds in each replicate. Groups A, B and C had their feed supplemented with *S. cerevisiae* at graded levels of 0.6, 0.8 and 1.0 g/kg of feed respectively. Group D diet did not contain *S. cerevisiae* (control). The diets for all the groups contained 25% PKC and they were isocaloric and isonitrogenous. The pullets were weighed weekly. Probiotic supplemented groups recorded significantly (p≤0.05) higher weekly weight gain than the control up to the 10th week of age. Mean weight at 10th week were 0.866±0.033, 0.946±0.016, 0.914±0.041 and 0.856±0.013 kg/bird for groups A, B, C and D respectively. After the 10th week, there was no significant difference (p>0.05) in weekly weight gain until point-of-lay. Group C had an overall significantly (p<0.05) higher hen-day egg performance of followed by groups B and A, while group D had the least hen-day egg performance. Birds in the supplemented groups had significantly higher (p<0.05) serum total proteins and significantly lower serum cholesterol compared to the control. Eggs from the supplemented groups had significantly (p<0.05) lower cholesterol content compared to the control. Group C birds had a significantly (p<0.05) longer colon than the control. There was no significant difference (p>0.05) in egg qualities (egg size, egg weight and shell thickness) between the supplemented groups and the control. It was concluded that supplementation with probiotic *S. cerevisiae* significantly (p<0.05) enhanced pullet development, hen-day egg performance and significantly (p<0.05) lowered serum and egg cholesterol levels. The probiotic supplementation was most effective at the level of 1.0 g/kg of feed, and this level was recommended.

Biography

Chuka Ezema have DVM, MSc and PhD in animal health and production from University of Nigeria, Nsukka. The title of his MSc. Dissertation was “Performance of broiler chicken fed low cost palm kernel cake-based diets supplemented with probiotic”, while that of his PhD thesis was “Probiotic effects of saccharomyces cerevisiae on laying chicken fed palm kernel cake-based diets”. He was the Head of Department of Animal Health and Production, Faculty of Veterinary Medicine, University of Nigeria, Nsukka. He has published more than 20 papers on probiotic research in reputed journals. He has also presented papers on probiotic research findings in many international conferences.

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Carbohydrate-enzyme interaction increases stability and reusability of maltase in entrapped environment

Shah Ali Ul Qader, Muhammad Asif Nawaz and Afsheen Aman
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Maltase (α-glucosidase) catalyzes the degradation of maltose into glucose and plays a central role in food industries. Partially purified maltase from Bacillus licheniformis KIBGE-IB4 was used for strong interaction within anionic polysaccharide (alginate) in the form of beads. The calcium alginate beads having 2.0 mm bead size showed higher activity. The stability of maltase against different temperatures was increased after entrapment and entrapped maltase showed higher resistance against different temperatures as compared to free maltase. The entrapped maltase showed admirable recycling efficiency and retained more than 60% of its initial activity even after third cycle. The results suggest that the approach of matrix entrapment within calcium alginate beads of maltase is a promising bioprocess technology to construct bioreactor for practical food industrial application.

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The chemistry and applications of antimicrobial polymers

El-Refaie Kenawy
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Microbial infection remains one of the most serious complications in several areas, particularly in medical devices, drugs, health care and hygienic applications, water purification systems, hospital and dental surgery equipment, textiles, food packaging and food storage. Antimicrobials gain interest from both the academic research and industry due to their potential to provide quality and safety benefits to many materials. However, low molecular weight antimicrobial agents suffer from so many disadvantages such as toxicity to the environment, and short-term antimicrobial ability. To overcome problems associated with the low molecular weight antimicrobial agents, they are prepared by introducing antimicrobial functional groups into the polymer molecules. The use of antimicrobial polymers offers promise for enhancing the efficacy of some existing antimicrobial agents and minimizing the environmental problems accompanying conventional antimicrobial agents by reducing the residual toxicity of the agents, increasing their efficiency and selectivity, and prolonging the lifetime of the antimicrobial agents. Research concerning the development of antimicrobial polymer represents a great challenge for both academic world and industry. This lecture reviews the state of the art of the antimicrobial polymers. In particular, it is discussing the requirements of antimicrobial polymers, factors affecting the antimicrobial activities, methods of synthesizing antimicrobial polymers, major fields of applications and future and perspectives in the field of antimicrobial polymers.

Biography

El-Refaie Kenawy is distinguished Professor of polymer chemistry at University of Tanta, Egypt. He is a graduate of Tanta University, Egypt. He did his PhD work according to channel Scheme at Strathclyde University, UK. He worked as Postdoctoral fellow and visiting Professor at many international universities as Pisa University, Gent University, Virginia Commonwealth University, Tokyo Institute of Technology, and Tanta University. He is a member of editorial board of many international journals and participated actively in many international conferences. He received the most cited award from Miser El-Kher Foundation, Egypt. His research interest mainly focuses on bioactive polymers, biomedical applications of polymers, antimicrobial polymers, electrospinning of polymers nanofibers, etc.

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The effect of replacing sugars with date syrup (Dips) on the properties of probiotic ice cream

Farag Ali Saleh, Al-Otaibi M M and Al-Obaid R
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The effect of replacing sugars with date syrup (Dips) at 25, 50, 75 and 100% on the physical properties of probiotic ice cream, as well as the survival of Lactobacillus acidophilus La-5 and Bifidobacterium lactis Bb-12 during 12 weeks of storage were studied. The obtained results were compared with control treatment which does not contain Dips. Overrun of ice cream was decreased with the increase of Dips percentage in both ice creams containing L. acidophilus or B. lactis. By increasing the percentage of sugar replacement by Dips, increase in specific gravity as well as weight per gallon in both ice creams containing L. acidophilus or B. lactis were found. An increase in melting rate with the increase degree of sugar replaced was found. The viable count of L. acidophilus or B. lactis decreased in all treatments during the freezing process and storage time. However, Dips prevents both the probiotic bacteria from death during the freezing process so that the death rate was low compared to the control sample which did not contain Dips. The statistical analysis of sensory evaluation revealed an increase in the percentage of replacement values with less flavors. The results obtained indicates that date syrup (Dips) can be used as a substitute for sweeten of ice cream, which showed the acceptance of consumers of the product's preparation while retaining the appropriate viable count of probiotic bacteria directly after processing or after few a week of storage according to the ratio of replacement.

Biography
Farag Ali Saleh has completed his PhD at the age of 32 years from Cairo University. He is the Prof of Food Science and Nutrition. He has published more than 26 papers in reputed journals and serving as an editorial board member of repute. He is member in many professional societies. He has attended more than 17 national and international conferences and scientific symposia.

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Probiotics in food: Recent developments and future challenges

Shahzad Zafar Iqbal
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Probiotics are recognized as safe ingredient to be use in formulating different food including food, drugs and dietary supplements. Studies have confirmed that probiotics are associated to several health benefits i.e. in maintaning a good balance and composition of intestinal flora as well as to increase the resistance against invasion of pathogens. Recently, some probiotics like lactic acid bacteria (LAB) are reported to reduce mold growth and aflatoxins production. Therefore, their use in food products will also effective to avoid the production of harmful food toxins during preservation and storage. Furthermore, the presence of probiotics in food products may also adversely affect their quality and sensory properties. Recently, studies have been focused to protect the microorganisms through encapsulation technique using different protectants, and by improving the processing and storage conditions. The present presentation will focus to discuss the current development in food probiotics, and future challenges and potential of using probiotics in food products.

Biography
Shahzad Zafar Iqbal has completed his PhD from the Department of Chemistry & Biochemistry, University of Agriculture Faisalabad, Pakistan at the age of 29 years. He has got Government of Pakistan funded fellowship during his PhD to work in the Department of Food Science, Cornell University, NY, USA for 6 months. He served as Assistant Professor in Department of Applied Chemistry, Government College University Faisalabad, Pakistan for 18 months. He is currently working as postdoctoral fellow/ senior lecture in Food Safety Research center, Universiti Putra Malaysia, Malaysia since 2013. He has published more than 26 publications including 24 research article, one book chapter, and one book.

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Determination of biochemical changes of low oil cured beef after drying and storage period

Cem Baltacioglu, Hasan Ibrahim Kozan and Cemalettin Saricoban
Selcuk University, Turkey

Meat is produced from skeletal muscle of slaughtered animals as a foodstuff. It is important in human nutrition in terms of nutritional value and special taste. Beef contains all essential amino acids. Furthermore, it includes Fe, Zn and groups of vitamin B. The aims of this study are to provide new products, extend the shelf life, increase the quality criteria, promote the consumption of meat and measure the stability of dried meat. Low oil beef are provided as material from local market in Konya, Turkey. Beef was obtained from the thigh of two years old animals. It was then dried at 60°C for 7.5 hours after curing processes. Salt, sugar, sodium erythrobate, sodium nitrite, and water were used for curing operation. Moisture, size, water activity, protein content, fat content, pH, thiobarbituric acid, and color analysis were performed to determine quality parameter of dried beef samples. While water content, size parameters, water activity, L* and a* values decreased after drying during storage period, pH and TBA values of dried samples increased during storage. b* values first increased and then decreased during storage process. According to these results, positive effects on shelf life were observed, biochemical degradation could be prevented during storage period after dying. Due to these advantages, meat consumption is expected to increase in future.

Biography
Cem Baltacioglu has completed his PhD in 2012 at Middle East Technical University. He studied in Selcuk University Food Engineering Department as a Teaching Assistant. He teaches Unit Operation, Heat and Mass Transfer lectures and is working on drying of food materials in conventional and microwave methods. He is studying in Nigde University, Food Engineering Department as an Assistant Professor.

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The effects of various milk by-products on microbial properties of beef patties

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Selcuk University, Turkey

This study was conducted with the purpose of determining its effects of dairy by-products on some microbial properties of meatball. For this purpose, whey protein concentrate powder, buttermilk powder and lactose powder were used as dairy by-product. In this study, in addition, the meat used as the raw materials, meatballs were prepared by using different combination (1-2, 5-5%) and of whey protein concentrate powder, buttermilk powder, lactose powder and some physical-chemical, textural and sensorial analyses were applied on these meatballs. pH, moisture, water activity, and total mesophilic bacteria contents were analyzed at 0, 5 and 10 days. Days for raw and cooked meatballs; protein and ash contents were analyzed at 0. Day for raw meatballs. The control samples have the highest total mesophilic aerobic bacteria count. It is observed that milk by-products decrease the total mesophilic aerobic bacteria countwith a positive correlation by the concentration. As a result; it may be advised that the dairy by-products can be used to reduce total aerobic bacteria count without any negative effect on sensory.

Biography
Cemalettin Saricoban has completed his Master and PhD in meat science and technology at the age of 32 years from Selcuk University and is working as Associate Professor in the same field at Selcuk University. He has published 18 papers in the SCI indexed journals and has presented more than 40 scientific papers.

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Physico-chemical, microbiological and sensory characteristics of stirred yoghurt supplemented with myrtle berries

Aysun Orac, Cigdem Konak Goktepe and Nihat Akin
Selcuk University, Turkey

Myrtus communis (Myrtaceae) is a plant that has been used since ancient times for medicinal, food and spice purposes in Mediterranean area. In this study the effect of the addition of myrtle berries (5, 10, 15% w/w) on the fermentation kinetics, texture parameters, antioxidant capacity, post acidification, sensory profiles and microbial counts of stirred yoghurts were determined during 28 days of refrigerated storage. The results showed that the antioxidant capacity of yoghurts supplemented with fruits was higher than in their controls and highest antioxidant activity was monitored in yogurts produced with 15% fruits addition. The average pH of samples decreased from 4.6 to 4.3 after 28 days storage. The water holding capacity in 15% fruit supplemented yoghurts were significantly higher than all other samples. Yoghurts fortified with 5% fruit resulted in the highest syneresis during 28 days. So addition of fruits significantly decreased syneresis and increased water holding capacity of yoghurts (p<0.05). Fruit supplementation positively influenced the count of yogurt starters compared with the plain yoghurt. With respect to color ‘a’ and ‘b’ values increased depending on the ratio of fruit added whereas ‘L’ values decreased. The results obtained from this study showed that myrtle fruits have a potential to play a role in increasing antioxidant activity, water holding capacity and reducing syneresis in yoghurts. In addition to these sensory profiles of yogurt supplemented with fruits are found acceptable.

Biography

Aysun Orac began her career with BS in Food Engineering from the Agricultural Faculty of Selcuk University, Turkey, in 2003. She has completed her Master in the Department of Dairy Science and Technology in 2010 from Selcuk University and started PhD in the same field at Selcuk University, in 2012. She is a Lecturer in Karapinar Aydoganlar Vocational School in Turkey. She published 10 papers in various journals.

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Scientific Tracks & Abstracts (Day 3)
6: Probiotics in Paediatric nutrition  
7: Probiotics in Obesity and Weight Management  
8: Microbial Pathogenesis

Session Chair  
Franco Scaldaferri  
Università Cattolica del Sacro Cuore, Italy

Session Co-Chair  
Lorenzo Morelli  
University of Bologna, Italy

### Session Introduction

- **Title:** Which role for probiotics in celiac disease  
  Ruggiero Francavilla, University of Bari, Italy

- **Title:** Bacterial spores as Probiotics: Mode of action  
  Simon M Cutting, University of London, United Kingdom

- **Title:** Interactions between gut microbiota and intestinal epithelium  
  Salvatore Cucchiara, University of Rome, Italy

- **Title:** Will be Updated Soon  
  Lorenzo Morelli, University of Bologna, Italy

- **Title:** The Probiotics age: From E. Metchnikoff to the human microbiome project. Inflammations, infections, functional diseases  
  Franco Scaldaferri, Università Cattolica del Sacro Cuore, Italy

- **Title:** Nutraceutical potential of artichoke (Cynara scolymus) edible and waste portions  
  Alberto Ritieni, University of Naples Federico II, Italy

- **Title:** *Lactobacillus rhamnosus* GG expands gut immunoregulatory bacteria in children with cow’s milk allergy  
  Roberto Berni Canani, University of Naples Federico II, Italy
Bacterial spores as probiotics: Mode of action

Simon M Cutting
University of London, UK

Members of the spore-forming genus Bacilllus have long been used as probiotic supplements for human and animal use. Species such as Bacillus clausii, Bacillus coagulans, Bacillus subtilis and Bacillus licheniformis are found in a number of products and some, such as B. clausii that are produced as GMP products with proven efficacy in the prevention of gastrointestinal illness. The compelling aspect of spore forming bacteria is the spore which is produced at the end of the life cycle of this organism and enables a product to be produced that is both heat and desiccation resistant. This enables a product to be produced that can restored indefinitely at ambient temperature and survive passage through the gastro-intestinal tract. This in turn simplifies storage and distribution of these products and enables spores to be used in ways that are not possible with the more common products such as the lactobacilli etc. For example, spores can be stored in aqueous solution, incorporated in foods included baked products and used in animal feed products where the formulation process requires extensive incubation at high temperatures. Despite these attributes our understanding of spores and how they exert a probiotic effect is less apparent. What we do know and which will be covered in this presentation is as follows: Innate Immunity: Spores are able to interact with Toll-like Receptors and induce an innate immune response leading to the production of IFN-γ and other cytokines. In animal studies as few as two nasal doses of B. subtilis spores can provide 100% protection to influenza (H5N2). Interestingly, this protection can be achieved using inactivated or killed spores. Clostridium difficile: B. subtilis spores have been used to evaluate protection against C. difficile infection in animal models. Our data shows that pre-dosing and concurrent dosing of mice infected with C. difficile provides varied levels of protection and illuminates the potential of using spores for treatment of this important nosocomial infection.
Nutraceutical potential of artichoke (*Cynarascolymus*) edible and waste portions

Alberto Ritieni
University di Napoli Federico II, Italy

*Cynarascolymus* is a plant belonging to the Asteraceae family, native of Sicily. The edible portion, the head, is widely consumed all over the world, raw or boiled, not only as a tasty food but also because of its known health properties. The artichoke is rich in natural fiber, minerals, vitamins and has a low lipid content; it is also rich in polyphenolic compounds, mainly caffeoylquinic acids and flavonoids, responsible for its healthy properties. The agro-food industries are involved in the selection of products that can be sold as fresh-cut products, so genotype is the most important factor to consider. According to the different genotypes, grown products will differ for size, color, flavor, texture, nutrition, pest resistance, eating quality and yield; in particular, artichoke heads should have some quality traits (fullness, safety, freshness, cleanness) defined by the European legislation. The choice of the best genotype is based on the assessment of physiological and biochemical parameters that can increase the storage, because this is the main characteristic sought by manufacturers and retailers in order to sell fresh produce. The aim of the present work was to evaluate the polyphenolic profile and nutraceutical potential of some commercially interesting artichoke genotypes. In addition, since particular attention has been recently given to the waste products resulting from the industrial processing of fruits and vegetables as sources of bioactive compounds, the attention was also focused on artichoke stems and leaves, in order to discover promising new sources of natural antioxidants, functional foods, and nutraceuticals, both from edible and waste food products.

Biography

Alberto Ritieni has a degree in Biology, 1985 and received a degree Honor in ‘Cause in Agricultural and Natural Sciences’, 2010 from the University of Constantain Romania. His scientific responsible search focuses on food safety for the presence of natural contaminants, mycotoxins, pesticides, plasticizers, etc. and development of new functional foods dedicated to the prevention of cardio-vascular and metabolic diseases through a nutraceutical approach. He is the author of over 180 scientific publications in international journals, book chapters devoted to food chemistry. He is part of several Editorial Boards including the Journal of Chemistry and Food Chemistry prestigious journal published by Elsevier.

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Lactobacillus rhamnosus GG expands gut immunoregulatory bacteria in children with cow’s milk allergy

Roberto Berni Canani
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Cow’s milk allergy (CMA) is the most common food allergy in early childhood with an estimated prevalence of 2-3% worldwide. We have demonstrated that treatment with an extensively hydrolyzed casein formula (EHCF) containing the probiotic Lactobacillus rhamnosus GG (LGG) results in a higher rate of tolerance acquisition in infants with CMA. The mechanistic basis for this effect is certainly multifactorial and not completely defined. Lactobacillus rhamnosus GG could contribute to oral tolerance acquisition through a modulation of gut permeability and the expression of cytokines involved in IgE- or non-IgE-mediated CMA. At the same time LGG could act as modulator of selective component of gut microbiota composition. Treatment with EHCF plus LGG does not restore the Lactobacillales-predominant microbiota characteristic of the healthy neonatal infant gut. However, it expands bacterial populations associated with homeostatic immunoregulatory function. We showed that dietary management with an LGG-supplemented EHCF leads to an expansion of bacterial genera in the order Clostridiales (Faecalibacterium, Blautia, Roseburia, and Coprococcus) with a concomitant increase in levels of fecal butyrate. Moreover, a protective role for butyrate was confirmed in a murine model of CMA. Our findings open the light on a new opportunity for effective preventive and therapeutic strategies against food allergy.

Biography
Roberto Berni Canani completed his PhD in Pediatric Sciences at the University of Naples “Federico II”, Italy. Chief of the Pediatric Food Allergy Unit at the Department of Translational Medical Science at the University of Naples Federico II. Author of 170 scientific publications. Member of main national and international scientific societies. He obtained several scientific prizes for the research activity. Associate editor of Journal of Pediatric Gastroenterology and Nutrition (2005-2010) and of World Journal of Gastroenterology (from 2010). Member of the Dietetic products, Nutrition and Allergies Panel of the European Food Safety Authority. Visiting Professor at the Division of Pediatric Gastroenterology, Mass General Hospital, Harvard Medical School, Boston Massachusetts, USA (2012). Visiting Professor at the Division of Pediatric Digestive Diseases, Chicago Children’s Hospital, Chicago University, Chicago Illinois USA (2014).

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