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133-140 **PROBIOTICS - THE ROAD MAP**
Ronald Levin

ABSTRACT: *The path defined by the probiotics road map began in the mist of time. Almost stationary for over four millennia, the first discernable change occurred in the mid 16th C. Progress thereafter was stimulated by a series of very important steps in the development of general science. The timely arrival of a giant advocate at the end of the 19thC led directly to a spasmodic series of developments in Europe, followed by USA and thence to Japan where it largely remained until 1974 when Parker gave identity and visibility to that small, remarkable, highly specific range of bacteria with important common properties, by naming them “probiotics”.*

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141-146 **ENHANCEMENT OF NATURAL KILLER CELL ACTIVITY IN IMMUNO-COMPROMISED ELDERLY SUBJECTS BY *BACILLUS COAGULANS***
Smitha Upadhyaya and Gautam Banerjee

ABSTRACT: *The objective of this study was to assess the immunomodulatory effect of Bacillus coagulans supplementation in immune compromised elderly subjects. A food supplement was formulated containing Bacillus coagulans (previously known as Lactobacillus sporogenes) and was given in a randomized manner to normal healthy human volunteers (58-67 years; male: 32 female: 43 selected based on their health profile and low Natural Killer cell activity) for 8 weeks. The Natural Killer cell activity was measured before and after the intervention. A significant improvement in Natural Killer cell activity of B. coagulans consumers was observed as compared to placebo or milk consuming groups at the end of 8 weeks. The enhancement in Natural Killer cell activity in immune-compromised elderly subjects indicates immunomodulatory effect of B. coagulans in human volunteers.*

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147-158 **BUTYRATE REGULATION OF DISTINCT MACROPHAGE SUBSETS: OPPOSING EFFECTS ON M1 AND M2 MACROPHAGES**
Andrew D. Foey

ABSTRACT: *Mucosal tolerance is central to efficient gastrointestinal tract function, tolerating food and commensal bacteria, whilst maintaining immune responsiveness to pathogens. Mucosal macrophages play a pivotal role in tolerance; whereas in inflammatory bowel disease, dysfunctional macrophages lead to tolerance breakdown, whereby commensals perpetuate inflammation. Macrophage subsets however, determine effector function: M1s are pro-inflammatory whereas M2s are anti-inflammatory/regulatory. In addition to commensal bacteria, butyrate, a short chain fatty acid probiotic metabolite, may also modulate macrophage-mediated tolerance. The human monocytic cell line, THP-1, was used to investigate butyrate immunoregulation in M1 and M2 macrophages, generated by monocyte differentiation in the presence of PMA or vitamin D₃, respectively. Butyrate modulation of*

LPS- and PGN-induced TNF α , IL-1 β , IL-10 and NF κ B was measured by sandwich ELISA and reporter gene assay, respectively. Data indicated butyrate suppresses LPS- and PGN-induced monocyte and M2 production of IL-1 β and TNF α , M1-induced TNF α and IL-10 but failed to modulate M1-induced IL-1 β . Additionally, butyrate augmented M2 IL-10 production, LPS- and PGN-stimulated M1 and LPS-induced M2 NF κ B activity but failed to regulate PGN-induced M2 NF- κ B. In conclusion, butyrate differentially regulates macrophage cytokine production and NF κ B activation, which is subset-dependent and suggestive of a cautionary approach to butyrate use in treatment of mucosal inflammation.

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159-172 **USE OF PROBIOTICS IN BURN PATIENTS TO IMPROVE
NUTRITIONAL STATUS AND CLINICAL OUTCOMES: A HYPOTHESIS**
R. Rastmanesh

ABSTRACT: *Mounting evidence correlate low serum albumin level to higher mortality, morbidity and poor outcome in a range of medical situations including burns. Serum albumin might be corrected via administration of human albumin solution (HAS) or, nutritionally, through promotion of hepatic albumin synthesis and /or suppressing acute phase response (APR). While results of a meta-analysis concluded that a trend toward reduced morbidity could be discerned in trials of burns, and hypoalbuminemia, a Cochrane Database Systematic Reviews suggested albumin administration might increase the risk of death. In this paper, I hypothesize that when serum albumin is being kept continuously normal by providing adequate nutrition/and or probiotics, problems with rapid systemic changes are better avoided than when albumin is rapidly "administered" or "normalized" with HAS. Probiotics have shown no harm in ICU patients (except for an increased bacterial translocation and enterocyte damage in postburn acute pancreatitis), and their use has shown numerous beneficial effects in the critically ill. At present there are no clinical trials investigating the effect of a probiotic on the nutritional status of burn patients and their clinical outcomes. Large clinical trials of the efficacy of probiotics in improving nutritional status and clinical outcomes in burn are warranted.*

International Journal of Probiotics & Prebiotics 6(3/4): 173-178

173-178 **COMPARISON OF PREBIOTICS FOR THE FUNCTIONAL
ATTRIBUTES OF AN INDIGENOUS ISOLATE OF *LACTOBACILLUS
ACIDOPHILUS***
S. Saran, K. Singh, MS Bisht, UVS Teotia and AK Dobriyal

ABSTRACT: *Functional attributes of *L. acidophilus* were studied for adhesion to hydrocarbons, aggregation abilities and autolysis to evaluate different prebiotics. Autoaggregation correlates with adhesion, which is a prerequisite for colonization and infection of the gastrointestinal tract by many pathogens and coaggregation has been related to the ability to interact closely with pathogens where autolysis decreases the adhesiveness. Hydrophobicity affects adhesion to intestinal surfaces. The strain *L. acidophilus* NCDC 13 showed changes in aggregation abilities and adhesion properties in the presence of prebiotics, honey and inulin. The results indicate that the ability to autoaggregate and cell surface hydrophobicity, increased in the presence of inulin. While the ability to coaggregate increased*

in presence of honey and autolytic activity reduced highly in presence of inulin. This study suggest the importance to identify the useful prebiotic so as to enhance the effect of probiotic properties of lactobacillus strain, and also the relevance to future synbiotic food development from the strain studied.

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179-186 ***IN VIVO* ANTIGENOTOXIC PROPERTIES OF A COMMERCIAL PROBIOTIC SUPPLEMENT CONTAINING BIFIDOBACTERIA**
Luca Dominici, Massimo Moretti, Milena Villarini, Samuele Vannini, Giovanni Cenci, Claudio Zampino, Giovanna Traina

ABSTRACT: *The aim of the present study was to investigate the impact of a probiotic product commercially distributed, consisting of a mix of four different species of Bifidobacterium [i.e. (B. bifidum, B. breve, B. longum, B. infants) (Bifiselle)] , on the DNA-damaging effects of 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) or acrylamide. Male CD1 mice were treated orally with PhIP or acrylamide. Suspensions of bifidobacteria were given by gavage to the animals 3 h before administration of model genotoxins. Subsequently, the extent of DNA migration was measured in colon and liver cells by the single-cell microgel-electrophoresis (comet) assay. The Bifidobacterium strains mix suspension caused a significant inhibition of DNA damage induced by PhIP in the colon and by acrylamide in the liver.*

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187-192 ***LACTOBACILLUS CASEI* AMELIORATES THE JEJUNUM BRUSH BORDER MICROVILLUS ALTERATIONS IN *GIARDIA LAMBLIA* INFECTED BALB/C MICE**
Geeta Shukla, Akshita Kapila and Lalita Sharma

ABSTRACT: *Giardiasis is one of the major contributors of diarrheal cases globally with a higher prevalence rate amongst children. Over the past few years, the widespread use of drugs has lead to an emergence of drug resistance in Giardia lamblia. Thus, a major shift has been witnessed in search of natural biocompatible substances that could effectively counteract the problem. Thus, the present study was aimed to evaluate the protective effect of Lactobacillus casei in murine giardiasis. The protective efficacy of L. casei was monitored in BALB/c mice infected with Giardia trophozoites. Experimentally, it was observed that oral administration of probiotic both prior and simultaneously with Giardia trophozoites reduced the severity of Giardia infection. Interestingly, transmission electron microscopy clearly showed the rapid restoration of gut atrophy as well as adherent lactobacilli to the intestinal epithelial cells in probiotic treated mice compare to Giardia infected mice. Moreover, nitrite levels decreased and anti Giardia serum IgG levels increased significantly in probiotic treated mice after peak infection. Thus, the data supports the protective effect of L. casei that can limit the jejunum brush border atrophy by alleviating the immune response and can be useful as an oral adjuvant.*

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193-196 SURVIVAL OF *LACTOBACILLUS SALIVARIUS* NCIMB 41606 IN AN *IN VITRO* MODEL OF THE CHICKEN DIGESTIVE PROCESS AND ITS EFFECT ON THE SURVIVAL OF *SALMONELLA TYPHIMURIUM* NAL_R SAL 1344

N. Ali Wali and J. Beal

ABSTRACT: *Probiotics may be a viable alternative to antibiotic growth promoters in controlling gastrointestinal infections in chickens. In order to be effective probiotics must be able to survive conditions in the gastrointestinal tract. This study investigated the survival of Lactobacillus plantarum NCIMB 41606 in an in vitro model of the chicken digestive process and the effect on the survival of Salmonella typhimurium nal^r Sal1344. Lb. salivarius was administered either as a dry feed treatment (DF) or as fermented moist feed (FMF). Lb. salivarius survived passage through the digestive process with no loss of viability for control and dry feed. The presence of Lb. salivarius administered in dry feed had no significant effect on the survival of S. typhimurium compared with the control, in both cases there was a 1.3 log reduction in S. typhimurium numbers over the course of the digestive process. However, with FMF no S. typhimurium were detectable from the end of the gastric stage. FMF contained 175mmol/l lactic acid and it is likely that this contributed to its anti-salmonella activity.*

International Journal of Probiotics & Prebiotics 6(3/4): 197-204

197-204 VIABILITY OF ENCAPSULATED *BIFIDOBACTERIUM LACTIS* (BB-12) IN SYNBIOTIC UF CHEESE AND IT'S SURVIVAL UNDER *IN VITRO* SIMULATED GASTROINTESTINAL CONDITIONS

Roghayeh Nejati, Hamidreza Gheisari, Saeid Hosseinzadeh and Hosein Amin

ABSTRACT: *In the current study, effects of inulin and microencapsulation on the survival time of Bifidobacterium lactis (Bb-12) (B. lactis (Bb-12)) and its resistance to the gastric and enteric simulated conditions in the synbiotic Ultra Filtered (UF) cheese were investigated. The survival of B.lactis (Bb-12) was monitored during the storage for 60 days at 4 ± 1 °C and also under an in vitro gastro-intestinal model. Results showed the significant decrease in B.lactis (Bb-12) survival during storage and in vitro gastrointestinal simulation for all the samples. However, survival time of microencapsulated probiotic bacteria was enhanced during storage and in vitro gastrointestinal simulation, but addition of inulin did not improve the viability of it during shelf life and in vitro gastrointestinal simulation. Encapsulated probiotic bacteria exhibited a satisfactory resistance to low pH values and high concentrations of bile salts . In general, the results indicated that encapsulation can significantly increase the survival rate of probiotic bacteria in UF-cheese over its shelf life and in vitro simulated gastrointestinal conditions.*