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53-58 **RECOMBINANT PROBIOTICS AND THEIR POTENTIAL IN HUMAN HEALTH**

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ABSTRACT: ***The use of probiotics in the form of whole bacteria to achieve health benefits in humans is evolving by the development of recombinant probiotic bacteria as carriers of specific genes achieving a probiotic effect. Studies have demonstrated that bacteria carrying either the gene for IL-10 or for trefoil factors when given in an animal model or as part of a human trial can ameliorate inflammatory conditions of the colon. Such an approach has the advantages of a long-term delivery, the potential for fewer side effects and utility in many other conditions including other autoimmune diseases, dental caries, candidiasis and allergies. Other health benefits are also under investigation in relation to altering the fatty acid composition of adipose tissue by colonizing the intestine with a bacterium carrying the gene involved in fatty acid metabolism. Not only is the lean body mass advantageously affected but the enzyme is active in inducing apoptosis in cancer cells. Benefits may also be obtained not only by adding a gene but deletion of a gene from a bacterium which modulates the production of pro-inflammatory cytokines or may make the probiotic bacterium act as a more effective delivery system by enhancing colonization.***

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59-64 **EFFECTS OF ORALLY ADMINISTERED MILK FERMENTED BY *STREPTOCOCCUS THERMOPHILUS* MN-ZLW-002 ON MURINE CELL-MEDIATED IMMUNE RESPONSES**

Xiaohong Kang, Guoqing Sun, Jian Sun, Nan Ling, Qi Zhou, Lanwei Zhang and Qinghai Sheng

ABSTRACT: ***This study was conducted to investigate whether milk fermented by Streptococcus thermophilus MN-ZLW-002 (MN-ZLW-002) can alter the immune responses in mice. Fermented milk prepared with MN-ZLW-002 was orally administrated to male Kunming mice for two weeks followed by profiling of serum pro-inflammatory and anti-inflammatory cytokine and pulmonary cell cytokine mRNA expression. Fermented milk significantly stimulated the production of serum interferon (IFN)-g, interleukin (IL)-2 and IL-6 in a dose-dependant manner ($P < 0.05$). Serum IL-10 production did not change significantly. Pulmonary IFN-α, IL-2 and IL-6 mRNA expression levels were significantly increased ($P < 0.05$). These results indicate that MN-ZLW-002 fermented milk may stimulate non-specific cell-mediated immunity involved in the protection of the mammals from respiratory infections and that the milk fermented by MN-ZLW-002 could contribute to health and well being of mammal by modifying their immune responses.***

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65-80 **REVIEW: CAN MICROENCAPSULATION BE A MEANS TO INCREASE SURVIVAL OF PROBIOTICS IN CHEESE?**

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ABSTRACT: ***Foods are no longer regarded by consumers only in terms of taste andimmediate nutritional needs but also in terms of their ability to provide specific benefits beyond their basic nutritional value. In many parts of the world, cheese is consumed at least once daily, making it a potentially excellent carrier for probiotics. Probiotic bacteria can be defined as live microorganisms which, administered in adequate amounts, confer a beneficial physiological effect to the host. As the market for functional foods continues to expand, research in the development of food products containing bifidobacteria and other probiotic bacteria will also continue to grow. Innovations are prospected in future technological advances finding solutions for the stability and viability of probiotics in new food environments. Current research on novel probiotic formulations and microencapsulation technologies regarding systems for enteric release is providing promising results. The purpose of this review is to discuss the potential for cheese as an effective vehicle for incorporation of probiotics into the food supply, to outline the processing conditions necessary to incorporate them into cheese and to describe materials and methods for the microencapsulation of probiotics.***

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81-90 **PROBIOTICS MODULATE TIGHT JUNCTION INTEGRITY AND EXPRESSION OF JUNCTIONAL PROTEINS IN CULTURED NORMAL HUMAN EPIDERMAL KERATINOCYTES**

Heli Putaala, Kirsti Tiihonen, Arthur C. Ouwehand and Nina Rautonen

ABSTRACT: ***The epidermis is one of the most important barriers of the body between the individual and the outside world. Tight junctions between keratinocytes are important for regulating both the inside-outside as well as the outside-inside barrier. Normal human epidermal keratinocytes were differentiated in a high Ca2+ medium, and the transepithelial electrical resistance and expression of tight junction proteins; claudin-4, occludin, and zonula occludens-1 were monitored for 4 days. Concomitant to the differentiation, an increased resistance as well as increased expression of claudin-4 was observed. We treated differentiated keratinocytes with probiotics, Lactobacillus acidophilus NCFM®, Bifidobacterium lactis 420, Lactobacillus acidophilus La-14, Lactobacillus salivarius Ls-33, and Propionibacterium jensenii P63, both soluble metabolites, whole probiotic cells as well as their lysates. The soluble metabolites and probiotics, either as intact or lysed form, regulated resistance values and expression of claudin-4, occludin, and zonula occludens-1 in a strain-and species-dependent manner, and depending on the method of application. Soluble metabolites especially up regulated the expression of claudin-4, while L. acidophilus NCFM as lysed cells was able up regulate ZO-1 and occludin. These results increase understanding of how probiotics could modulate tight junctions in epidermis, which participate in part in epidermal barrier formation.***

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ABSTRACT: ***We analyzed the composition of Bifidobacterium and Lactobacillus colonized in the human neonatal intestine and compared it with that in the mother. Forty-three healthy mothers and their neonates born by trans-vaginal delivery were enrolled in the study. We used reverse transcription –quantitative PCR targeting 16S rRNA to examine the population levels of Bifidobacterium and Lactobacillus in maternal feces (within 1 h after delivery), vaginal fluid (day 56 before delivery), breast milk (days 4 and 28 after delivery), and skin around the nipples (days 4 and 28 after delivery), and in neonatal meconium (within 1 h after birth) and feces (days 4 and 28 after birth). In the delivery period, Bifidobacterium and Lactobacillus were detected in the meconium at frequencies of 10% and 54%, respectively. Three out of the 4 species detected in the meconium were the same as those detected in the corresponding maternal feces and/or vaginal fluid. In contrast, detection rates of both Bifidobacterium and Lactobacillus in breast milk and on the skin around the nipples were far lower than in the maternal feces. From the results, it is expected that Bifidobacterium and Lactobacillus in neonates originate in the maternal feces and vaginal fluid.***

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ABSTRACT: ***Mitigating bone loss due to microgravity is critical for maintaining functionality. Dietary interventions that enhance bone mineralization or inhibit resorption offer a simple, low-risk approach to this problem. This study tested the efficacy of dietary synbiotics (prebiotics + probiotics) in protecting bone exposed to unloading followed by reambulation. The experiment followed a 2x2 factorial design with forty adult male rats randomly assigned to a weight loading condition (hindlimb-unloaded or normally loaded) and diet condition (synbiotic or control). Twenty rats were hindlimb-unloaded for 14 d followed by 14 d of reambulation. Rats maintained on the synbiotic diet were supplemented with fructooligosaccharides and lyophilized probiotic cultures (1 x 1011 CFU/g of equal parts Lactobacillus acidophilus and Lactococcus lactis lactis). After 28 days, the femur, tibia, and humerus were removed and trabecular and cortical structural parameters were measured using micro-computed tomography. Results showed a significant (P<0.05) beneficial main effect of synbiotics on femoral trabecular parameters including BV/TV, Tb.Sp and Tb.Pf. The interaction of diet x load condition was significant for several measures of femoral cortical bone in the unloaded synbiotic vs. unloaded control group. These results provide evidence suggesting dietary synbiotics as a moderately protective treatment against bone loss due to skeletal unloading.***