USE OF A DYNAMIC IN VITRO SYSTEM TO ASSESS THE ABILITY OF PROBIOTIC BACTERIA TO SURVIVE THE UPPER GI TRACT

K Venema[1],ME Koenen[1], AJH Maathuis[1], MH Dohnalek[2].
[1]TNO Quality of Life, Zeist, the Netherlands, [2]Discovery Technology, Abbott Nutrition, Chicago, IL-USA.

Introduction/aim: The ESPGHAN Committee on Nutrition has established a recommendation that the dose of a probiotic be justified for use in infant formula (J Pediatric Gastroenterol Nutr 2004; 38: 365-374). An important criterion for the selection of probiotic bacteria to be used in infant nutrition is the survival and activity of these micro-organisms in the GI-tract. The aim of this study was to assess the ability of different probiotic strains, with or without a prebiotic, to survive transit through the upper GI tract.
Materials and Methods: We used a validated, dynamic *in vitro* model of the stomach and small intestine (TIM-1), simulating GI tract conditions of 2-4 wk old infants, to assess survival in the upper GI tract of probiotic strains, with and without prebiotics. TIM-1 was given two 200 ml meals at 3 hr intervals. A meal consisted of infant formula containing approx 10^6 CFU per ml of each probiotic strain; some variables also included a prebiotic. Ileum effluent was sampled hourly during a 6 hr experiment, and cumulative survival of the probiotics in time was determined. Variables were tested in duplicate.
Results and Discussion: Survival increased for lactobacilli and bifidobacterium strains when tested in combination *vs* separately (*L. acidophilus* (LA), 17.5%; *B. lactis* (BL), 35.9%; and LA + BL, 31.5% and 53.6%, respectively). For combinations of LA and BL from different suppliers, cumulative survival of probiotic strains could be high (LA 31.5% + BL 53.6%) or low (LA 4.5% + BL 31.5%). Supplier production practices had more influence on survival of probiotic combinations than did strain differences: BL from two suppliers in combination with a *Lactobacillus* varied in survival from 31.5% to 90.0%. For *Lactobacillus* strains, survival in the presence of a *Bifidobacterium* ranged from 4.5% to 38.1%. A prebiotic impacted survival of probiotic strains during passage through the upper GI tract. FOS added to an infant formula that contained a combination of LA and BL reduced survival of the probiotic strains, but this was dependent on the dose of prebiotics added. Only for BL with 2% FOS added, cumulative survival (77.8%) was still higher than without FOS (53.6%).