

Microbiota and metabolic profiles of children with cow's milk protein allergy and celiac disease determined by an "omics" approach

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Complementary genomic and metabonomic approaches based on culture-independent (e.g., pyrosequencing, FISH, DGGE) and culture-dependent methods together with ¹H-NMR and GC-MS/SPME analyses were used to determine the metabolic changes triggered by gut microbiota and dietary variation. This new "integrated" approach lead to understand the "collaboration" between human host and microorganisms in relation to phenotype, diet and diseases. The impact of the diet on the gut microbiota of children having cow's milk protein allergy (CMPA) and celiac disease (CD) was determined. Fecal slurry and urine of two groups of children were analyzed: the first one is CMPA children before and after 2 months of the hydrolyzed and ultra-filtered whey protein formula (eHF) with lactose intake in the diet; and the second one, symptom-free CD children, who had been on a gluten free diet (GFD) for at least 2 years. Children without known food intolerance (healthy children; HC) were also studied. The addition of lactose to eHF formula is able to positively modulate the composition of microbiota by increasing the total fecal counts of *Lactobacillus/Bifidobacteria* and decreasing that of *Bacteroides/Clostridia*. The GFD lasting at least two years did not completely restore the microbiota of the CD children. The levels of *Lactobacillus*, *Enterococcus* and *Bifidobacteria* were significantly higher in HC than in CD children. On the contrary, *Bacteroides*, *Staphylococcus*, *Salmonella*, *Shigella* and *Klebsiella* were higher in CD compared to HC children. As showed by GC-MS/SPME and ¹H-NMR, significant differences between molecules belonging to short chain fatty acids (SCFAs), esters, alcohols, aldehydes, ketones, monosaccharides and amino acids, before and after the lactose intake or GFD were found. Some molecules seems to be metabolic signatures of food allergy and intolerance.

Biography

Maria De Angelis received her Ph.D. degree in food biotechnology in 2001. After that, she did three-year of researcher at the Institute of Science of Food Production of CNR of Bari. From 2005 she was researcher at the Biotechnology Faculty of the University of Bari. In the 2010 she got the habilitation for associate professor. She is member of the National PhD on "Food Microbiology, Technology, Safety and Chemistry". Her main research work is focused on food microbiology and, especially, on genomics, proteomics, enzymology and physiology of bacteria, functional foods, food intolerance and food allergies. She participated as a speaker to International Congresses. She is frequently used as a referee by international journal and she is Editorial Board Member of the Open Agriculture Journal. She is author or co-author of ca. 215 papers, 105 of them are full research papers published in journals quoted by ISI with impact factor and 9 patents.