

The well-balanced composition of human digestive system microflora is an important factor which determines the appropriate development of an individual and affects life quality since birth till old age. Some works have been published in the last two decades which indicate various health-promoting effects attributable to the proper composition of the intestinal microflora. In the case of children, noteworthy is most of all the impact of microbiota on the development of their immunological and nervous systems, on extinguishing food allergies and alleviating food intolerances. Although the composition of strains colonizing the gastrointestinal tract is personalized, it includes a few genera of microorganisms which have a significant effect on human body functions. One of them is the genus *Bifidobacterium*, represented by several species whose presence in the alimentary tract depends on the human age. Intestinal microbiota of small children has been shown to be represented by numerous bacteria of the species: *Bifidobacterium breve*, *B. bifidum* and *B. longum*, while that of adults apart from *B. longum* was also predominated by *B. catenulatum* and *B. adolescentis*. It is worth mentioning that bifidobacteria may constitute even 75% of all strains colonizing the digestive system of healthy breast-fed children. It is related to their presence in milk and on the skin of the mother. In the later life, counts of these bacteria will decrease significantly as a result of change of diet and will reach ca. 3 % of all enteral microorganisms. It however does not change the fact that their presence determines the proper functions of the digestive system of man and, resultantly, of the entire organism. In addition, in view of thus far conducted investigations, some bifidobacteria strains are known to exhibit anticarcinogenic properties against colon cancer cells, which gives them a special status among bacteria with probiotic potential.

Today, Polish and international markets offer a wide array of probiotic products based mainly on *Lactobacillus* genus bacteria. Few of them contain a popular and best characterized, but isolated from yoghurt and typical of animal microbiota, strain of *Bifidobacterium animalis* subsp. *lactis* Bb-12 bacteria. Some preparations contain even up to twenty bacterial species. However, their efficacy may be doubtful because their detailed characteristics and basic information concerning, e.g., the origin of strains isolation or even full name of the strain, are often not provided. Nonetheless, preparations containing well-characterized and well-scrutinized probiotic strains, i.e. *Bifidobacterium longum* subsp. *lactis* BB536 (used in adults) and *B. longum* subsp. *infantis* M-63 (used in newborns and small children), are slowly becoming available on the Polish market. However, these preparations offer strains in single bacterial cultures. A higher number of characterized and studied strains in new-generation preparations would be expected to ensure their higher efficacy, which is especially important for infants and young children.

This Project aims include isolation of bifidobacteria strains specific to the gastrointestinal tract of children and their in-depth characteristics at both physiological and molecular level. Investigations will be divided into four stages and conducted in the aspect of key physiological traits and health-promoting properties expected from an effective probiotic preparation (i.a. survivability at low pH, adherence to intestinal epithelium in vitro). The first two stages will result in establishment of a rank list of 100 isolates, the first 10 of which will be subjected to biochemical and genetic tests to check their health-promoting traits and their technological utility (i.a. tolerance to oxygen, growth rate, survival rate). Two bifidobacteria strains used most often in probiotic preparations and products for children will be included into analyses for comparative purposes. Finally, 5 most promising strains will be subjected to genome sequencing, and sequences achieved will be published in the NCBI GenBank data base, after earlier submission of a patent application. Results to be obtained in this Project will provide many useful information which in the future may be used for rational production of probiotic preparations with desired health-promoting properties.