

Prebiotic oligosaccharides are defined as nondigestible food ingredients that provide beneficial effects to the host by stimulating the growth of selected bacteria of the gastrointestinal tract. These substances include proteins, fats, oligo and polysaccharides which are not digested in the upper gastrointestinal tract and without any change reaches the large intestine. The effect of the prebiotics is based on the selective stimulation of growth and/or activity of certain species of bacteria in the colon which leads to improved health of the host. Recent reports suggest the potential effect of the prebiotics on inhibiting the development of pathogens belonging to the *Clostridium* genus and strains of the *Campylobacter jejuni*, *Escherichia coli* and *Salmonella enteritidis in vitro*. This action may be related to presenting of the receptors on the oligosaccharides surface, structurally identical to those naturally occurring in epithelial cells of the large intestine. Bacteria recognize specific receptors and adhere to the surface of the prebiotics. Pathogens can't start inflammatory process, and are removed along with the prebiotics with faeces. High anti-adhesive potential exhibit substances such as inulin, fructooligosaccharides (FOS), lactulose, cellobiose, raffinose. A completely separate group of the prebiotics are the oligosaccharides of the human milk. This very important group of substances, which protecting neonates from the viral and bacterial infections. Breastfed infants consume up to 10g of the oligosaccharides daily. These compounds are not digested by human enzymes, so unchanged forms can reach the colon and exert a beneficial effect on the infant's body. Substances that have the greatest influence on inhibition of the pathogen adhesion to the colon epithelial cells include: 2'-fucosyllactose, 3-fucosyllactose and 3'-sialyllactose and 6'-sialyllactose. So far, the effects of these substances on the neutralization of the *Vibrio cholerae* toxin have been described, as well as the anti-adhesion effects of such bacteria as *Escherichia coli* and *Salmonella fytis*. The aim of the study is the potential use of the food and human milk oligosaccharides to inhibit the adhesion of pathogens such as enterotoxigenic *Clostridium perfringens*, *Clostridium difficile*. The newborn's digestive tract is often colonized by *C.difficile*, but relatively rare the infection develops. This may be due to the protective effect of mother's milk. However, the use of prebiotics can lead to the removal of bacteria that form the natural flora of the large intestine. This process is dangerous while antibiotic treatment and in the inflammatory bowel diseases. Therefore needs further research on this subject.

The aim of the research is to determine the anti-adhesion effect of prebiotic substances in food and human milk on selected anaerobic bacteria, which are important elements of the human microbiota such as *Bacteroides* and *Lactobacillus* species and pathogenic *C.difficile* and enterotoxigenic *C.perfringens*. The *in vitro* model of human colon epithelial cell based on HT-29 and/or Caco-2 cell lines will be used. The confocal microscopy methods will be used to illustrate the processes that occur between bacteria, prebiotic molecules and colonic epithelial cells.

In most bacterial diseases, the first step is the biological response and adhesion of the pathogens to the cells. Anti-adhesion therapy are meant to reduce contact between host tissues and pathogens, either by prevention of adhesion of the infectious agent. We hypothesized that the abundantly present food and human milk oligosaccharides may have protective properties by preventing pathogen interactions with host intestinal mucus. So far, the antiadhesive effect of those substances has been described only for few bacteria. This research will provide new data to evaluate the *in vitro* potential of the food and human milk oligosaccharides for inhibiting the adhesion of anaerobic bacteria to the human epithelial cells *in vitro*.