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The relevance of probiotics in therapy

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ABSTRACT

Probiotics are live microorganisms that have a positive effect on human health, in particular on the intestinal microbiota. It turned out that they not only perform an important role in the intestinal microbiota, but also affect the functioning of the immune system, reduce the incidence of allergies or significantly reduce the risk of certain types of cancer. Thanks to the proven benefits of probiotics, scientists are now looking into their use in the treatment of many diseases. The examples are *Helicobacter pylori* infection, Irritable Bowel Syndrome and Respiratory Tract Infection, where the significant benefits of probiotics have been proved.

Until recently it was thought that they were only useful in gastrointestinal diseases, but the use of probiotics in Respiratory Tract Infection shows that probiotics can also be used to treat other diseases. Further research into the impact of probiotics on therapy is highly desirable in order to match the effects of specific strains to specific diseases.

Key words: Probiotics; microbiota; microorganisms

Probiotics are live microorganisms that have a positive effect on human health, in particular on the intestinal microbiota (Kim et al., 2019). Microorganisms have always been a component of human food, but only recently have they become the aim of many studies conducted by scientists (Suez et al., 2019). It turned out that they not only perform an important role in the intestinal microbiota, but also affect the functioning of the immune system, reduce the incidence of allergies or significantly reduce the risk of certain types of cancer (Williams et al. 2010). The mechanism by which probiotics work is not fully known. This is probably done by opposing pathogens, changing the pH of the intestines or stimulating immunomodulatory cells (Kopp-Hoolihan 2001). Thanks to the proven benefits of probiotics, scientists are now looking into their use in the treatment of many diseases.

Helicobacter pylori is a Gram negative bacilli equipped with several flagella, which allow it to overcome the layer of mucus present on the surface of the gastric mucous membrane. The bacterium is also resistant to high pH in the stomach (Camilo et al., 2017). These features make *Helicobacter pylori* infection increasingly common and affect around 50% of people, especially those living in developing countries (Nagy et al., 2016). The consequences of infection with this pathogen can be chronic gastritis, peptic ulcers and even stomach cancer or mucosal cancer (Sitas et al., 2016). *H. pylori* eradication therapy is usually based on antibiotic treatment. However, in recent years, the percentage of patients in whom *H. pylori* was eradicated after treatment has significantly decreased. This is mainly due to the drug resistance of this microorganism to antibiotics and, although to a lesser extent, the negative side effects of medication such as abdominal pain, nausea and diarrhoea (Hu et al., 2016). In consideration of these problems, it was decided to implement into therapy probiotics (*L. salivarius*, *L. salivarius*), which, as living microorganisms, could competitively

inhibit the growth of *Helicobacter pylori* (Gotteland et al., 2006). Thanks to this innovative approach, a significantly higher elimination rate of *H. pylori* was observed, as well as a lower number of side effects occurring, which only confirms that the use of probiotics in the treatment of *H. pylori* infection is extremely beneficial (Gong et al., 2016).

Irritable bowel syndrome (IBS) is a functional disorder of the gastrointestinal tract that affects approximately 11% of the world's population (Lovell and Ford 2012). The exact cause of this condition is not fully understood, but is believed to be multifactorial. There are genetic and environmental factors, but also psychosocial (Barbara et al., 2016). Symptoms include mainly abdominal pain, flatulence or a change in the rhythm of defecation - from constipation to diarrhea (Chey et al., 2015). The treatment of IBS is very difficult as it is mainly based on changing eating habits. In some clinical situations pharmacotherapy is also used (Wall et al., 2014). Many researchers believe that the use of probiotics in the treatment of IBS may have a positive effect. They may reduce cytokine production in the intestines, which may result in improved function of the epithelial barrier (O'Mahony et al., 2005). Additionally, probiotics can alleviate abdominal pain and significantly reduce sensitivity in the viscera by modulating the expression of receptors and neurotransmitters that are involved in pain formation - opioid receptor or cannabinoid receptor (Rousseaux et al., 2007) In the future, the discovery of specific strains that may help to reduce discomfort in IBS will result in even better and more effective therapeutic options.

Respiratory Tract infections are a major cause of morbidity and mortality worldwide. Usually viral pathogens are responsible for these diseases (Tapparel et al., 2012). Prevention of these diseases is of great epidemiological importance, as current pharmacotherapy and vaccinology is not effective against all microorganisms. In addition, the constantly increasing number of new pathogens and resistance to the antibiotics used contribute to the failure of current therapies for respiratory tract infections (Guiton and Wright, 2018). Therapeutic benefits are sought in probiotics. It is thought that they can significantly reduce the duration of infection in children and adults (King et al., 2014). In addition, the use of probiotics may also contribute to a lower incidence of respiratory tract infections and therefore to a reduction in antibiotic therapy (Liu et al., 2013). Research also supports the fact that probiotics can also have a positive effect on the severity of the infection being passed (Vouloumanou et al., 2008).

In conclusion, the examples presented in this article show that the use of probiotics can be important in the treatment of many diseases. Until recently they were thought to be useful only in gastrointestinal disorders, but the latest example described in this article

confirms that probiotics can also be used to treat other diseases. Further research into the impact of probiotics on therapy is highly desirable in order to match the effects of specific strains to specific diseases.

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