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Dysbiosis of the digestive tract after antibiotics treatment

Dysbioza przewodu pokarmowego po leczeniu antybiotykami

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Key words: dysbiosis, antibiotic therapy, Clostridium difficile

Słowa klucz: dysbioza, antybiotkoterapia, Clostridium difficile

Abstract

A human organism is a great place for living a huge and very diverse microflora. The most colonized seems to be the digestive tract. The balance between the host organism and the microbiome is extremely important. One of the causes of homeostasis disorders may be treatment with antibiotics. During antibiotic therapy, the natural intestinal microbiota is depleted. As a consequence, the risk of uncontrolled development of Clostridium difficile is significantly increased. Intestinal infections due to this pathogenic rote are a serious health problem.

Abstrakt

Ludzki organizm jest doskonałym miejscem bytowania ogromnej i bardzo zróżnicowanej mikroflory. Najliczniej skolonizowany wydaje się być przewód pokarmowy. Niezwykle ważna jest równowaga między organizmem gospodarza, a mikrobiomem. Jedną z przyczyn zaburzeń homeostazy może być leczenie antybiotykami. W trakcie antybiotykoterapii dochodzi do zubożenia naturalnej mikrobioty jelit. W konsekwencji znacznie zwiększa się ryzyko niekontrolowanego rozwoju Clostridium difficile. Zakażenia jelit wywołane tą patogenną laseczką stanowią poważny problem zdrowotny.

Introduction

The human body is a very complicated system, inhabited by numerous organisms: bacterias, viruses and eukaryotes. The entire ecosystem of microorganisms present in the human body is known as the microbiome. It resides the skin, epithelium of the mouth, nose, vagina and especially the digestive system.[1]

[1] Wołkowicz T., Januszkiewicz A., Szych J.: Mikrobiom przewodu pokarmowego i jego dysbiozy jako istotny czynnik wpływający na kondycję zdrowotną organizmu człowieka, MED. DOŚW. MIKROBIOL., 2014, 66: 223 - 235

Microbiome, which is present in a digestive tract is a complicated complex that combines host cells with a microbiota. It provides stable terms of humidity, temperature, and because of its function, it is very rich in compounds that can be used as nutrients by bacteria. The shape of the microbial ecosystem in the gastrointestinal tract depends on many factors. These include not only the environment, lifestyle and diet, but also genetic determinants of the host. Due to the proper interaction between the microbiome and the human genome, intestinal homeostasis is achieved.

Intestinal microbial balance disturbances is mentioned as the one of the factors of many disorders, especially autoimmune diseases like diabetes type 1, obesity, multiple sclerosis, celiac disease or chronic fatigue syndrome.[2]

Antibiotic therapy

Antibiotic therapy is causative treatment which leads to cure the patient suffering from the infection, by eliminating the cause of the disease. This is due to two mechanisms. The first one is based on bactericidal action, i.e. by directly killing the microorganism. The second mechanism - bacteriostatic - stops growth and multiplication of microorganisms, but do not directly kills existing microorganism. Undoubtedly, antibiotic treatment has its beneficial effects in some cases. However, it should be remembered that during antibiotic therapy large intestinal disturbances may occur.

Antibiotics, which kill pathogenic bacteria, could also cause deficiency of bacteria physiologically present in the gastrointestinal tract. Studies on human biocenosis proves that antibiotic therapy rapidly reduces the number of bacteria like Lactobacillus and Bifidobacteriumi Bacteroides. During treatment, the number of enterobacteria and yeast Candida albicans increases significantly.[3] The consequence of the imbalance between symbiotic and pathogenic microflora is the deterioration of well-being or disease.[4] The depletion of natural intestinal microbiota creates conditions for uncontrolled development and colonization of the intestinal walls by a particularly dangerous pathogenic, for example

[2] Sun X., Jia Z.: Microbiome modulates intestinal homeostasis against inflammatory diseases [w:] Vet Immunol Immunopathol. 2018 Nov;205:97-105
[3] Gawęcki J., Libudzisz Z. Mikroorganizmy w żywności I żywieniu. Poznań 2010
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Clostridium difficile.[5] This dysbiosis may consequently increases the occurrence of inflammatory bowel diseases.[6]

Clostridium difficile

Infections caused by Clostridium difficile are a global health problem.[7] The number of patients with intestinal inflammation caused by Clostridum difficile - both Europe and the US - has doubled in recent years.[8] Recent study shows that the vegetative form of Clostridium is the most pathogenic. Its characteristic features are: the ability to divide, produce toxins and the ability to colonize the intestines.[9] Additional unfavorable factors which are connected with a poor prognosis for the patients are high resistance to antibiotics and disinfectants. These are the factors that significantly increases mortality rate in infected patients.

Methods of treating intestinal inflammation

Effective methods of treatment of inflammatory bowel diseases include: change of diet and the use of pro- and prebiotics that modulate intestinal microflora and has a beneficial effect on metabolism. Increasingly, intestinal microflora transplantation is used more and more frequently, especially in the group of patients in whom previous treatment of clostridium difficile infection was ineffective. Polák et al. studies demonstrate the high efficiency of faecal transplantation in Clostridium difficile colitis.[10] Data Stebel et al. published in 2018 indicate that intestinal microflora transplantation in patients with recurrent

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[6] Sun X., Jia Z.: Microbiome modulates intestinal homeostasis against inflammatory diseases [w:] Vet Immunol Immunopathol. 2018 Nov;205:97-105

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Clostridium difficile infections is a effective and safe treatment alternative.[11] Many studies try to prove the efficacy of intestinal flora transplantation in dysbiosis patients after anticancer treatment.

Summary

Microbiome is very important in the human body. It is necessary to understand the interaction between the microbiome and host cells to prevent the formation of dysbiosis which is well known factor of many disease, including serious infections, and autoimmune disorders.[12]

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