HUMAN MICROBIAL ECOLOGY AND STRESS

S. Starovoitova

National University of Food Technologies,
Kyiv, Ukraine
E-mail: svetik_2014@ukr.net

There is a functional connection between the gastrointestinal tract (GIT) and the central nervous system (CNS) of the host's organism. Recently, more and more experimental evidence has emerged that the other key player in this interaction is the intestinal microbiota [1].

Key words: microbiota, central nervous system, stress, probiotic.

Physical and psychological stress affects not only the immune system, but also hormonal and digestive homeostasis. Immune and neuroendocrine systems provide integrated responses to environmental signals, and the relationship between stress and immune function in many contexts, including a proliferative response to mitogens and cellular activity, has been demonstrated. Stress can lead to an imbalance between pro-and anti-inflammatory cytokines or uncontrolled production of cytokines. Dysregulation of congenital and adaptive intestinal immune responses directed against bacterial flora, including the destruction of oral tolerance to environmental antigens and commensals, are involved in several pathogenetic mechanisms. The integrity of intestinal microbiota can be influenced by some external factors, including the use of antibiotics, radiation, changes in the GIT, changes in the diet, psychological and physical stress. Psychological stress can directly affect the composition of the microflora, in particular with a noticeable decrease in lactic acid bacteria. GIT changes caused by stress factors make the conditions of the intestinal medium less favorable for survival, adhesion and replication of lactic acid bacteria [2].

Classical transmission of CNS-intestine-microbial signals works through central regulation of satiety. Changes in the nature of the diet as a result of CNS control of food intake can affect the availability of nutrients for the intestinal microbiota and its composition. Signal saturation proteins are key molecular mediators that provide this control. CNS can affect intestinal microbiome through the nerve and endocrine pathways both in direct and indirect ways. The autonomic nervous system and the hypothalamus-pituitary-adrenal axis that maintain the connection between CNS and internal organs can modulate intestinal physiology, for example, motility, secretion and permeability of the epithelium, as well as systemic hormones, which in turn affect the environment in the biotopes of microbiota residence and the host-microbial interaction on the mucosa. Stress causes defects in the epithelial barrier and subsequent activation of cells on the mucosa has been experimentally shown.

Long psychological stress also leads to a significant reduction in the production of mucin and the reduction of the presence of acid mucopolysaccharides on the surface of the gut mucosa, which facilitates the colonization of the intestine by pathogenic microorganisms. The balanced intestinal microflora is important not only for the maintenance of intestinal homeostasis, but also for regulating the functionality of the immune system with a direct effect on the intestinal system - the brain.

Thus using of probiotics can be useful for improving bowel homeostasis and preventing the development of dysbiosis associated with physical and psychological stress states.

Conclusions. Microbiome controls the canonical aspects of CNS, immunity and behavior in norm and in pathology. Nevertheless, the details of the role of microbiome in CNS disorders are unknown. The microbiome study has a perspective for prognosis and therapy associated with CNS disorder. Probiotics and functional foods can affect the action of the intestinal microbe on the central nervous system and the brain function. Along with the diet, they can restore intestinal homeostasis to improve cognitive or emotional function, and can be used to prevent, treat neurological disorders and to maintain the function of the immune system in stressful subjects.

Literature

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