EXPERIMENTAL INTESTINAL DYSBIOSIS IN RATS INCREASES THE PERMEABILITY OF THE BLOOD-BRAIN BARRIER AND INDUCES NEUROINFLAMMATION

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The mammalian intestinal microbiota consists of bacteria, fungi and viruses, including bacteriophages. This complex ecosystem has dynamic stability. It is assumed that changes in the composition of the microbiota can cause intestinal barrier dysfunction and the development of a number of pathologies, including neurodegenerative diseases accompanied by neuroinflammation. The molecular and cellular mechanisms underlying such a relationship remain poorly understood. We hypothesized that bacteriophages cause intestinal dysbiosis, increased intestinal permeability and local inflammation. Bacterial factors (endotoxins, zonulin-like proteins) and local inflammation products (cytokines, alpha-synuclein protein) can enter the circulation and increase the permeability of the blood-brain barrier (BBB), which will cause neuro-inflammation and damage to neurons. In this study, we observed an increase in BBB permeability and induction of neuroinflammation in the brain after rectal administration of a bacteriophage cocktail (Microgen, Russia). The permeability of the BBB was judged by the volume of the vital dye (Evans blue) emerging from the bloodstream into the brain parenchyma, and the development of the neuroinflammatory response by increasing the number of immunohistochemically stained microglial and astroglial cells.

Keywords: neurodegenerative diseases; neuroinflammation; intestinal dysbiosis; bacteriophages.