



## CENTER FOR THE DEVELOPMENT OF PROFESSIONAL QUALIFICATION OF MEDICAL WORKERS

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The Influence of Gut Microbiome on the Clinical Course of Attention Deficit Hyperactivity Disorder (ADHD) in Children

**Relevance.** In recent years, the role of the gut microbiome as a key regulator of the "gut-brain" axis has been actively studied. For children with ADHD, who experience imbalances in neurotransmitters, specific neuroinflammation patterns, and increased sensitivity to metabolic disturbances, the state of the gut microbiocenosis becomes especially important. Emerging data suggest that dysbiosis may exacerbate hyperactivity, impulsivity, anxiety, and impair cognitive regulation of behavior.

**Objective.** The aim of this study was to assess the influence of the composition and functional state of the gut microbiocenosis on the clinical manifestations of ADHD in children.

**Materials and Methods.** Children aged 6–14 years were examined, divided into a main group with a confirmed diagnosis of ADHD (n=60) and a control group (n=30). The gut microbiocenosis was studied using quantitative PCR and cultural analysis of the main bifidobacteria, lactobacilli, *Escherichia coli*, clostridia, and yeast-like fungi.

**Results.** The most significant differences concerned the number of protective representatives of the normal flora—*Bifidobacterium* spp. and *Lactobacillus* spp., the concentration of which was reduced in children with ADHD by more than 1–1.3 lg CFU/g ( $p < 0.001$ ). The level of typical *E. coli* was also reduced in children with ADHD ( $6.10 \pm 0.14$  vs.  $7.20 \pm 0.11$  lg CFU/g;  $p < 0.01$ ), reflecting a decrease in the normal aerobic component of the microbiota and a disruption of its metabolic activity. Hemolytic strains, which were almost absent in the control group, were found in children with ADHD at a level of  $3.10 \pm 0.10$  lg CFU/g ( $p < 0.05$ ), which may indicate a pronounced structural rearrangement of intestinal colonization stability. The level of *Clostridium* spp. was more than 1.2 lg CFU/g higher in children with ADHD ( $5.00 \pm 0.14$  vs.  $3.80 \pm 0.08$ ;  $p < 0.001$ ). Attention was also drawn to the increase in yeast-like fungi of the genus *Candida* spp., the level of which was significantly higher in the ADHD group ( $3.40 \pm 0.11$  vs.  $2.10 \pm 0.06$ ;  $p < 0.01$ ). The reduction in bifidobacteria concentration was significantly correlated with the severity of inattention ( $r = -0.43$ ;  $p < 0.01$ ), while the increase in clostridia was correlated with the level of hyperactivity ( $r = 0.39$ ;  $p < 0.05$ ).

**Conclusion.** The obtained data confirm the significant influence of gut microbiocenosis on the clinical course of ADHD. Dysbiosis, and the reduction of



protective strains, may contribute to the intensification of hyperactivity and attention disorders, as well as support chronic neuroinflammation. The microbiota may be considered a promising target for the correction of ADHD symptoms and the enhancement of therapy efficacy.