

## **The role of microorganisms and other factors in the process of autoimmune uveitis**

### **Abstract**

The aim of this work was to gain new knowledge about the influence and the mechanisms of the effect of microorganisms in the process of autoimmune uveitis. A mouse model of experimental autoimmune uveitis (EAU) was used and the influence of oral broad-spectrum antibiotic, i.e. metronidazole, as well as probiotic bacteria *Escherichia coli* O83:K24:H31 (EcO) and *Escherichia coli* Nissle 1917 (EcN) were tested in preventive and therapeutic regimens. The grade of inflammation was assessed clinically *in vivo* and histologically *post mortem*. Immunological analysis of lymph nodes and Peyer's patches were performed. Evaluation of the effect of metronidazole proved significant reduction of inflammatory activity in both regimes - initiation 1 week or 2 weeks before the EAU induction. In case of probiotics, protective effect was proved only in case of live EcN administered 2 weeks before or from the time of EAU induction. Its protective effect was accompanied with decreased interphotoreceptor retinoid-binding protein (IRBP)-specific T-lymphocyte response in the sentinel lymph nodes of the site of immunization 7 days after the induction of EAU and cervical lymph nodes as soon as there were apparent clinical signs of intraocular inflammation. Moreover, EcN led to increased antiinflammatory response in Peyer's patches and gut antimicrobial peptide expression and decrease of the inducible nitric oxide synthase in macrophages. The achieved results show significant influence of microbiome in the immune regulation of processes in the eye. Both metronidazole and probiotics EcN prove to have a beneficial effect, even though both of them influence microbiome through different mechanisms. The following research in this field could bring new therapeutic possibilities and thus reduction of incidence of blindness of patients with uveitis.

Key words: antibiotics, metronidazole, probiotics, *Escherichia coli* Nissle 1917, microbiome, microbiota, experimental autoimmune uveitis