POLYMORPHISM OF *DLA-DRB1* GENE IN CANIS LUPUS FAMILIARIS

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The major histocompatibility complex (MHC) is a complex of proteins that have the ability to present antigens to T lymphocytes on their surface, often called "antigen presenting cells". This ability is dependent on the MHC genotype of the individual, namely the immune response genes located within the MHC. MHCs are divided into 3 classes: Class I, II and III. The classes differ in structure and function. The DLA-DRB1 gene belonging to MHC class II, responsible for the presentation of extracellular pathogens on APC cells, such as macrophages, dendritic cells, B lymphocytes, is located on chromosome 12 (on 6 chromosome in humans). MHC class II genes show high polymorphism - both allelic and haplotype. Many authors' studies have shown the relationship of DR MHC class II genes also with production and reproductive traits.
The aim of our study was to determine the polymorphism of DLA genes, primarily in DLA-DRB1 gene.
The research material were sequences taken from GenBank (https://www.ncbi.nlm.nih.gov/genbank/). The following bioinformatic softwares were used to compare the sequences: Muscle, EMBL-EBI, BLAST and BioEdit. A total of 346 sequences were shown and analyzed. A total of 161 DLA-DRB1 alleles, 79 DLA-DQB1 alleles, 30 DLA-DQA1 alleles belonging to MHC class II and 73 DLA-88 alleles belonging to MHC class I were found in Canis lupus.
The DLA-DRB1 gene showed high polymorphism, especially exon 2, which is built of 267 nucleotides. The biggest changes were observed in the region responsible for encoding the place of antigen binding. Not all alleles occured in every species. For example, DRB1*00101 was present in 16 breeds of dogs, DRB1*01501 in 19 breeds of dogs, DRB1*01502 in 11 breeds of dogs.Comparing the polymorphism of the DLA-DRB1 gene in a dog with the HLA-DRB gene found in humans, a great similarity to the whole dog population, not to a specific species can be observed. Based on the 18 compared alleles, it can be seen that the amino acid sequence is identical for at least one dog allele except for a few items: 6, 11, 28, 31, 34, 63 and 66.
The diversity and polymorphism of MHC genes is linked to health. A high degree of polymorphism of the DLA-DRB1 gene has been shown in domestic dogs. The interpretation of the result of the bioinformatic analysis in combination with the results at the phenotypic level will allow to identify the haplotypes that may be responsible for resistance and susceptibility to different types of pathogens in domestic dog. The greater the polymorphism is, the greater the resistance of population to various pathogens. Once a new pathogen or epidemiological agent has been introduced, it is likely that genetic variability within the MHC (especially at the antigen binding site) will increase.

Keywords - Canis lupus familiaris, DLA-DRB1, polymorphism

Acknowledgement
Research funded by the project "The best of the best! 4.0" as a part of the Knowledge, Education and Development Operational Program co-financed by the European Social Fund.