Oligodendrocytes are the most numerous glial cells of the nervous system. Their main function is to protect neurons, provide metabolic support for nerve cells, accumulate iron necessary for biochemical processes occurring in all cells of the nervous system and provide them with a shield necessary for proper conduction of impulses in neurons. In this paper, the morphometric and morphological analysis of oligodendrocytes in three areas of the human and canine brains was performed: hippocampus, lobus frontalis and corpus callosum. Based on standard and special histological studies, morphological and morphometric analysis of oligodendrocytes in selected areas of the human and canine brains was performed.

The obtained results indicate the lack of significant morphological differences between the two species, confirming that the process of myelination itself is an evolutionarily stable phenomenon in most groups of vertebrate animals. The results of this part of the work also confirm that the dog can be a natural model of diseases associated with damage to oligodendrocytes.

In the second part of the work, an attempt was made to explain the evolutionary origin of the proteins crucial for the functioning of oligodendrocytes: MBP, MOG and FTH. Analyzes were performed using typical bioinformatics methods – phylogenetic comparisons and modeling of potential catalytic properties of proteins

The obtained results allow us to hypothesize that the various groups of ferritins observed in chordates come from one common protein. The results of the analyzes also allowed to propose a new classification of ferritins, based on their potential catalytic properties and evolutionary origin.

For the MBP protein, the results allow us to hypothesize that it was formed as a result of the fusion of two fragments of separate genes.

In the case of MOG, the hypothesis of its potential origin from one of the proteins of the butyrophyllin family has not been confirmed. Observations indicating differential expression of this protein in particular groups of mammals were also explained - only in the brain in the case of humans and other primates, and in the brain and peripheral organs in other groups of mammals, including rodents. The factor responsible for these differences are polymorphisms of MOG gene promoter sequences in particular groups of animals.