Abstract: Glial cells, such as oligodendrocytes, Schwann cells, NG2 glia, astrocytes, and microglia, play a major role in the homeostasis of the nervous system, including the myelin sheath maintenance. Enveloping myelin sheaths produced by oligodendrocytes and Schwann cells, provide a mechanical, isolating, and trophic support to the axons. Importantly, a disruption of a certain component or a dysregulation of a specific process may lead to the collapse and the loss of the myelin sheath, known as demyelination. Axonal demyelination is a pathological condition characteristic of different neurological diseases, such as multiple sclerosis, acute disseminated encephalomyelitis, Charcot-Marie-Toth disease, or Lyme neuroborreliosis. Since, demyelinating diseases are still more prevalent in the population, a suitable and effective treatment is crucial for the patients. However, treatment is not available, which results from an insufficient understanding of pathological mechanisms, low permeability through the blood-brain barrier, and a limited regenerative capacity of the nervous system. Therefore, further research in the field of demyelinating diseases is necessary.

Key words: oligodendrocyte precursor cell, oligodendrocyte, Schwann cell, myelination,
acute disseminated encephalomyelitis, multiple sclerosis, remyelination