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Human Endogenous Retrovirus Link With Multiple Sclerosis Disease Progression

Authors : Sina Mahdavi

Abstract : Background and Objective: Multiple sclerosis (MS) is an inflammatory autoimmune disease of the CNS that affects the myelination process in the central nervous system (CNS). Complex interactions of various "environmental or infectious" factors may act as triggers in autoimmunity and disease progression. The association between viral infections, especially human endogenous retrovirus (HERV) and MS is one potential cause that is not well understood. This study aims to summarize the available data on HERV infection in MS disease progression. Materials and Methods: For this study, the keywords "Multiple sclerosis", "Human endogenous retrovirus", and "central nervous system" in the databases PubMed, Google Scholar, Sid, and MagIran between 2016 and 2022 were searched and 14 articles chosen, studied, and analyzed. Results: In the leptomeningeal cells of MS patients, a retrovirus-like element associated with reverse transcriptase (RT) activity called multiple sclerosis-associated retroviruses (MSRV) has been identified. HERVs are expressed in the human CNS despite mechanisms to suppress their expression. External factors, especially viral infections such as influenza virus, Epstein-Barr virus, and herpes simplex virus type 1, can activate HERV gene expression. The MSRV coat protein is activated by activating TLR4 at the brain surface, particularly in oligodendroglial progenitor cells and macrophages, leading to immune cascades followed by the downregulation of myelin protein expression. The HERV-K18 envelope gene (env) acts as a superantigen and induces inflammatory responses in patients with MS. Conclusion: There is a high expression of endogenous retroviruses during the course of MS, which indicates the relationship between HERV and MS, that this virus can play a role in the development of MS by creating an inflammatory state. Therefore, measures to modulate the expression of endogenous retroviruses may be effective in reducing inflammatory processes in demyelinated areas of MS patients.

Keywords : multiple sclerosis, human endogenous retrovirus, central nervous system, MSRV
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