1

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Multiple Sclerosis

Multiple sclerosis (MS) is a debilitating chronic inflammatory demyelinating disease characterized by central nervous system (CNS) lesions (plaques or scars) in the white matter of the CNS that can leave to severe cognitive or physical disability as well as neurological defects. MS affects the muscles, musculoskeletal system, nerves, nervous system, and spine (Ghasemi, Razavi, & Nikzad, 2016).

 Inflammation of the white and gray matter tissues in the CNS due to focal immune cell infiltration and their cytokines are the incipient cause of damage in MS. T helper cell intervention and adaptive immune responses that are initiated by interaction between antigens play an important role in the initiation and progression of MS. Pathogen associated molecules bind to receptor sand produce cytokines that promote inflammation (Ghasemi, 2016).

 Another contributor to MS is the Fas Ligand (FasL) which is produced by lymphocyte cells. This ligand binds to Fas receptors on oligodendroctyes which begins the process of apoptosis causing the reduction of myelin synthesis cells and ultimately impairing the synthesis of the myelin sheath (Ghasemi, 2016).

Multiple sclerosis is caused by the degeneration of the nervous system. Myelin-forming oligodendrocytes (OLGs) become targets of inflammatory and immune attacks. OLG death by apoptosis or necrosis causes the cell loss that is seen in MS plaques. The myelin sheath that

2

surrounds and protects the nerve fibers and spinal cord begin to deteriorate when the body’s autoimmune system starts to attack its own tissues. When the myelin sheath is destroyed, nerve impulses to and from the brain slow down and become interrupted and distorted (Cudrici, Niculescu T, Niculescu F, Shin, & Rus, 2006).

MS affects everyone differently. It is very unpredictable and the disease progresses over time. Symptoms of MS can be mild to severe. Multiple sclerosis affects many areas of the brain and interferes with cognitive functions such as short-term memory, verbal fluency, information processing and abstract reasoning. Other symptoms of MS includes numbness, tingling, slurred speech, doubled or blurred vision, loss of coordination, muscle weakness or tightness, fatigue, incontinence, sexual dysfunction, impaired cognitive functions, and paralysis (Zawada, Michael, Campanella, James, 2019).

Individuals suffering from MS have attacks and relapses of the disease. This is due to active periods of the disease when the nerves are being destroyed by the immune system. The duration and cycle of attacks are unique to each individual. Some may suffer many attacks and take years to accumulate to complete disability and other may suffer few attacks and take decades to accumulate to complete disability (Zawada et al., 2019).

Twice as many women than men are affected with MS and people of Northern European descent appear to be at the highest risk for MS. Although the causes of Multiple Sclerosis are unknown, a combination of environmental and genetic factors are believed to contribute to the disease. Viral infections are also believed to be a possible trigger of MS (Goldenberg, 2012). Other environmental factors include bacterial infections, herpes

3

virus type 6, mycoplasma pneumonia, smoking, vitamin deficiency, diet, and exposure to UV radiation (Ghasemi, 2016).

I have created an example of a healthy cell body and healthy myelin sheath along with a cell body and deteriorating myelin sheath that is seen in multiple sclerosis using common jewelry making supplies and beads. I shattered glass beads to resemble the damaged myelin sheath. Metal wire has been twisted and coiled to recreate the nerve fibers, dendrites and axon terminals. Metal beads have been attached to the ends of the axon terminals to resemble the synapse, and geode is in place of the cell body with a turquoise rock in the middle for the nucleus.

4

Works Cited

Cudrici, C., Niculescu, T., Niculescu, F., Shin, M. L., & Rus, H. (2006). Oligodendrocyte cell death in pathogenesis of multiple sclerosis: Protection of oligodendrocytes from apoptosis by complement. *US National Library of Medicine National Institutes of Health*, 123–132. doi: 10.1682/jrrd.2004.08.0111. Accessed on 24 November 2019.

Ghasemi, nA. Z. E. M., Rasavi, S., & Nikzad, E. (2016). Multiple Sclerosis: Pathogenesis, Symptoms, Diagnoses and Cell-Based Therapy. *CELL JOURNAL (Yakhteh)*, 1–10. doi: 10.22074/cellj.2016.4867. Accessed on 24 November 2019.

Goldenberg, M. M. (2012). Multiple Sclerosis Review. *A Peer-Reviewed Journal for Managed Care and Hospital Formulary Management*, 175–184. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3351877/>. Accessed on 24 November 2019.

Zawada, Michael, W., Campanella, & James, J. (2019). Multiple Sclerosis. *Research Startes*. Retrieved from http://eds.b.ebscohost.com.proxy.library.uaf.edu/eds/detail/detail?vid=3&sid=7bff6217-1289-4a1f-9bbd-62bdbf96aa7e@sdc-v-sessmgr03&bdata=JnNpdGU9ZWRzLWxpdmU=#AN=86194324&db=ers. Accessed on 24 November 2019.