MULTIPLE SCLEROSIS AND IMMUNE SYSTEM

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Multiple sclerosis (MS) is an inflammatory disease that affects the central nervous system, causing a variety of symptoms and signs due to the differential involvement of various systems, including motor, sensory, visual, and autonomic functions. There are different types of MS, and in this article, we will focus on the most common one. Clinically isolated syndrome (CIS), which accounts for 80% of initial presentations in MS cases, is characterized by an acute clinical attack that affects one or more sites in the CNS and can later develop into relapsing-remitting MS (RRMS).The rate of conversion from clinically isolated syndrome (CIS) to relapsing-remitting multiple sclerosis (RRMS) at 20 years is 21% of patients with a normal magnetic resonance imaging (MRI) scan at baseline, compared to 82% if there is one or more clinically silent white matter lesions on the MRI. It has been shown that the 2010 McDonald criteria and increased use of MRI are revolutionizing the diagnosis of clinically definite multiple sclerosis for the CIS group. With RRMS, there is usually good recovery from each clinical episode or relapse. These early stages of multiple sclerosis with underlying demyelination are thought to have an inflammatory pathological basis with the migration of autoreactive lymphocytes across the blood-brain barrier, triggering a cascade of inflammation, T- and B-cell clonal expansion, microglial activation, oxidative damage, mitochondrial dysfunction, and energy failure leading to the formation of characteristic plaques. The female-to-male ratio of multiple sclerosis patients with relapse-onset is approximately 2:1, and the average age of onset is around 30 years. Over time, there is an accumulation of disability and an incomplete recovery from each relapse. Within 10-15 years of being diagnosed with RRMS, up to 80% of people will develop secondary progressive MS (SPMS). This is due to further axonal injury and atrophy in both the white and grey matter, as well as a likely underlying neurodegenerative process, although there is less inflammation compared to other forms of MS. These subtypes of MS can be further defined as active or inactive. If active, it means that there has been a clinical relapse, or new T2 or Gadolinium-enhanced lesions on MRI within the last year. Disease progression refers to when patients experience worsening disability over time, compared to those who have had a relapse. Approximately 10-15% of people with MS have progressive disability from the start, usually due to damage to the spinal cord. This is known as primary progressive MS (PPMS). It typically affects people in their 40s, about a decade later than the average age of onset for relapsing-remitting MS, and there is usually no difference in the number of men and women affected. Due to spinal cord damage, patients with PPMS often develop spastic paraplegia. The underlying cause of this seems to be more widespread damage to brain axons and further activation of microglia, leading to atrophy. Anterograde and retrograde degeneration, oxidative damage, and energy failure are also involved. Therefore, SPMS and PPMS are likely to have a common pathological basis. The etiology of the disease is considered to be the interaction of genetic, epigenetic, environmental, and endogenous factors, which lead to demyelination and neuronal degeneration. Inflammation can develop in both directions, "from the periphery to the central nervous system" through T-cell mechanisms, or it can be initiated in the central nervous system through primary damage to brain tissue, with later stages including the formation of ectopic B-cell follicles and cortical demyelization.