

Is MS primarily due to genetic or modifiable risk factors? Environmental risk factors

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Genetic predisposition to multiple sclerosis (MS) only explains a fraction of the disease risk. Environmental factors and lifestyle are key contributors to the risk of MS. Environmental rather than genetic factors can account for most epidemiological characteristics as well as the changing natural history of MS observed in recent years. Among environmental risk factors identified, infection with Epstein-Barr Virus (EBV), hypovitaminosis D, smoking, the gut microbiota, high salt intake and obesity in childhood and adolescence seem to contribute significantly to the risk of developing MS. These factors may also interact with each other or with risk genes such as HLA and modulate adaptive and/or innate immunity, pointing at their role in affecting the immune-pathogenesis of MS. Similar to the genetic predisposing elements, the vast majority of environmental factors defined so far exert effects on the immune system, supporting their major contribution to the pathogenesis and etiology of MS. Beyond association, consistent data from epidemiological and experimental studies indicate that EBV, vitamin D and smoking fulfill most Hill criteria for causality and therefore can be considered as causal factors for MS. Additional research into the emerging and exciting field of the microbiome in MS may place it as another central player in the etiology of MS. Unlike genetic factors, many environmental and lifestyle factors can be modified. Protective and preventive measures may contribute to the prevention and treatment of MS and should be incorporated into practical healthcare, in particular for individuals with a family history of this complex and challenging disease