Researchers find further evidence linking Epstein-Barr virus and risk of multiple sclerosis

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Researchers from the Harvard School of Public Health, Walter Reed Army Institute of Research, and a team of collaborators have observed for the first time that the risk of multiple sclerosis (MS) increases by many folds following infection with the Epstein-Barr virus (EBV). This finding implicates EBV as a contributory cause to multiple sclerosis. The study appears in an advance online edition of the journal Annals of Neurology and will appear in a later print edition.

Hundred of thousands of individuals not infected with EBV were followed up for several years through repeated blood samples collections. Researchers were then able to determine the time when individuals developed an EBV infection and its relation to MS onset. "The recruitment of individuals before they were infected with EBV and following up with them for several years is the critical methodological aspect that makes this study qualitatively different from all previous work," said Alberto Ascherio, senior author of the study and professor of epidemiology and nutrition at Harvard School of Public Health and professor of medicine at Harvard Medical School.

MS is a chronic degenerative disease of the central nervous system. Women are more likely than men to get the disease and it is the most common neurologically disabling disease in young adults. Although genetic predisposition plays an important role in determining susceptibility, past studies have shown that environmental factors are equally important.

EBV is a herpes virus and one of the most common human viruses worldwide. Infection in early childhood is common and usually asymptomatic. Late age at infection, however, often causes infectious mononucleosis. In the U.S., upwards of 95% of adults are infected with the virus, but free of symptoms. EBV has been associated with some types of cancer and can cause serious complications when the immune system is suppressed, for example, in transplant recipients. There is no effective treatment for EBV.

This is the first study based on the longitudinal follow-up of several thousand individuals who were not infected with EBV at the time of recruitment. The study population was made up of active-duty US Army, Navy, and Marines personnel who have at least one blood sample in the Department of Defense Serum Repository. The electronic databases of the Physical Disability Agencies of the US Army and Navy were then searched for individuals whose records indicated a possible diagnosis of MS reported between 1992 and 2004.

The researchers selected 305 individuals diagnosed with MS and who had blood specimens collected before the date of their diagnosis. Two controls for each case were then selected from the serum database and matched by branch of service, sex, date of blood collection, and age at time of blood collection.

The study found that MS risk is extremely low among individuals not infected with EBV, but it increases sharply in the same individuals following EBV infection.

"The observation that MS occurred only after EBV is a big step forward," said Alberto Ascherio. "Until now we knew that virtually all MS patients are infected with EBV, but we could not exclude two non-causal explanations for this finding: that EBV infection is a consequence rather than a cause of MS, and that individuals who are EBV negative could be genetically resistant to MS. Both of these explanations are inconsistent with the present findings," said Ascherio.

"The evidence is now sufficiently compelling to justify the allocation of more resources to the development of interventions targeting EBV infection, or the immune response to EBV infection, as these may contribute to MS prevention," he said.

More information: "Primary Infection with the Epstein-Barr Virus and Risk of Multiple Sclerosis," Lynn I. Levin, Kassandra L. Munger, Eilis J. O'Reilly, Kerstin I. Falk, Alberto Ascherio, Annals of Neurology, online January 20, 2010

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