



the actual trigger to the disease has not yet been discovered. Interestingly, some studies report a lower risk for MS in people with asthma and allergies, suggesting that the immune imbalances causing these conditions may protect against the immunological processes leading to MS.

**Risk factors** for MS include:

**Gender:** In Australia, about three times as many women as men have MS. This gender bias may be related to variation in a gene that controls a powerful immune messenger chemical called *interferon (IFN) gamma*.<sup>4</sup> There are also many demonstrated links between MS and the sex hormones – testosterone and oestrogen (eg, helping to explain why pregnant women with MS do not have relapses).

**Genetic factors:** Studies indicate that genetic factors may make certain individuals more susceptible to the disease, but there is no evidence that MS is directly inherited. New research continues to uncover genes involved in MS (Zhang et al, 2005). The risk for someone inheriting all the genetic factors contributing to MS is only about 2% to 4%. Nevertheless, when siblings have the disease, they are more likely to have the same degree of severity. Among identical twins the risk is about 25% to 30%.

**Ethnicity:** MS occurs more commonly among Caucasians, especially those of northern European ancestry, but people of African, Asian and Hispanic backgrounds are also affected.

**Geography:** MS prevalence increases with distance from the equator in both hemispheres. Specifically, prevalence is highest in northern and central Europe (except northern Scandinavia), Italy, southern Australia, and northern regions of North America. Middle-risk areas are southern Europe (except Italy), southern US, northern Australia, northern Scandinavia, the Caucasian sections of South Africa, and possibly Central America. Low-risk areas include tropical parts of Africa and Asia, the Caribbean, Mexico, and possibly northern South America. It is unclear whether this pattern is attributable to environmental factors – **sunlight (vitamin D, UV radiation)** – genetics, or both.

**Smoking:** A single new research study suggests that smoking may increase the risk of MS for those who do not yet have it, and increase the risk of converting to secondary progressive, versus a non-smoker with RRMS (Hernan et al, 2005).

**Cow's milk during early infancy:** Breast milk contains factors that may help regulate immune responses; there is some evidence that infants fed only on cow's milk may have higher risk for either MS or diabetes type 1 later in life. Studies on national differences in diabetes indicate risk may vary with different milk proteins, suggesting that not all cow's milk is identical and some proteins carry higher risks than others.

A large amount of research has been directed towards whether the geographical distribution of MS is due to environmental or genetic factors. Poser (1994) suggested

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<sup>4</sup> Unlike interferon betas, which are used to treat MS, IFN gamma has been linked to immune attacks in MS, and preliminary findings suggest this variant may be more frequent or more active in women than men. IFN gamma appears to be a new key variable – perhaps one piece in a puzzle – in understanding who gets MS. People who have a gene that produces high levels of IFN gamma may be predisposed. This finding provides a possible target for further investigation (Jan. 27 online publication of *Genes and Immunity*).