

Risk factors multiple sclerosis

Lifestyle and Environment in MS

Table 1. Summary of established and tentative lifestyle/environmental factors and their potential interaction with multiple sclerosis (MS) human leukocyte antigen (HLA) risk genes

Factor	OR	HLA gene interaction	Combined OR	Effect mainly during adolescence	Immune system implied
Smoking	~1.6	+	14	No	+
EBV serology	~3.6	+	~15	Yes	+
Vitamin D <50 nM	~1.4	No	-	Probably	+
Adolescent obesity/ BMI >27	~2	+	~15	Yes	+
Night work	~1.7	No	-	Yes	+
Low sun exposure	~2	No	-	Probably	+
Infectious mononucleosis	~2	+	7	Yes	+
Passive smoking	~1.3	+	6	No	+
Oral tobacco/nicotine	0.5	nd	-	Unknown	+
Alcohol	~0.6	nd	-	Unknown	+
Coffee	~0.7	nd	-	Unknown	+

OR, Odds ratio; EBV, Epstein–Barr virus; BMI, body mass index; nd, not determined.

There is a clear dose–response relationship,
in which the cumulative dose of smoking is related to a risk
increase

Cotinine levels in sera/plasma (≥ 10 ng/mL),

Second-hand exposure to smoke has also been associated with increased risk for MS, which suggests that even **minor “lung-irritation”** may be important .If the association is because of nonspecific irritation, one might even consider a factor such **as air pollution**

smoking also increases
the risk of developing **neutralizing antibodies**
against biologics used in treatment of MS, including
natalizumab (Hedstrom et al. 2013a) and **interferon β**

To distinguish between roles of nicotine from other tobacco constituents that are inhaled in the lung, the **Swedish population** is suitable because the use of **oral tobacco** in the form of moist snuff is very common. **Oral tobacco (snuff) shows a dose-dependent association with a lessened risk of MS** (Hedstrom et al. 2009, 2013c). Nicotine is the primary candidate for such possible protection in view of its action on the **$\alpha 7$ subunit of the acetylcholine receptor present on immune cells,**