Accelerated Cure Project for MS

September 2018

Accelerating research towards a cure for multiple sclerosis

MS Risk – Can it be influenced?

The causes of MS are unclear. It is generally agreed that some people have a genetic make-up that predisposes them to MS and that one or more environmental factors act as a trigger which leads to them developing MS. MS susceptibility is increased if a family member has MS. In general, a person's risk of developing MS is 1 in 750, or 0.1%. This risk goes up to 2-3% if a first-degree relative (parent, sibling or child) has MS, and to 30% if a person has an identical twin with MS. Interestingly, the chances of developing MS for twins who are not identical is similar to that of other siblings.

MS can be diagnosed at almost any age, from childhood to the elder years. However, it's more likely to occur in people ages 20 to 50. A recent study examined whether there is a pattern to birth month for people with multiple sclerosis. Results showed that spring babies are at a higher risk of developing MS. Specifically, people diagnosed with MS were 6.7% more likely to have been born in April, and 9% less likely to have been born in November.

Gender is also an important risk factor. Recent research suggests women are four times more likely to be diagnosed with MS. The sex hormones, estrogen, progesterone and testosterone, may be partly responsible for this gender gap. As discussed in our May 2018 newsletter, there's growing evidence that the female hormones, estrogen and progesterone, can affect the nervous and immune systems. You'll find an article in our June 2018 newsletter, detailing how testosterone, the primary male hormone, may also affect the immune response.

Geography can influence your chances of being diagnosed with MS. People who live farther from the equator (in more temperate climates) have a higher risk of developing MS than people living in hotter areas near the equator. Individuals living beyond the 40-degree mark north or south of the equator are far more likely to develop MS. This is especially true for people in North America, Europe, and southern Australia. Moving from one location to another seems to alter one's MS susceptibility. If you move as a child (before the ages of 12 to 15), your risk of MS will likely change to match your new residence, whether you move from a low risk to a high risk area, or vice versa. For those who move later in life, the change in risk level may not be seen until in the next generation. This suggests that environmental factors in the place you live before puberty can influence your odds of getting MS.

Ethnicity plays an important role in whether an individual develops MS. It is more common in whites, particularly those with Northern European ancestry. Some groups seem to be at lower risk, for example people with African, Asian, Hispanic, and Native American ancestry. MS is very rare among other groups, including the Inuit (sometimes referred to as Eskimos), Australian Aborigines, and New Zealand Maoris.

One's physique can influence their chances of developing MS. Evidence suggesting that obesity may contribute to the incidence of MS is growing. Scientists also believe obesity may worsen MS in people who already have the disease. In addition, taller women may be at greater risk for MS.

It's a well-established fact that smoking increases the risk of lung cancer and heart disease. As Dr. Farren Briggs explains in our March 2018 newsletter, it's also risk factor for MS. Smokers and ex-smokers are more likely to be diagnosed with MS than people who never smoked, and the more cigarettes you smoke the higher the risk. Individuals with MS who smoke also appear to be at a much greater chance of experiencing a more rapid progression of their disease.

Stress can worsen MS symptoms and research suggests that it can also increase the likelihood of developing MS. One study specifically studied the effect of extreme grief as a risk factor for MS. Results from this study found that parents of children who died were more likely than other parents to develop MS in the next decade. This likelihood doubled if the death was unexpected (such as an accident). Researchers are still trying to determine how much and what type of stress could lead to flare ups, disease progression, or even cause MS.

Preventing brain injuries in young people is important for many reasons. It now appears that preventing MS may be among those reasons. A recent study looked at associations between concussions during childhood or adolescence and development of MS later in life. Data from this study showed no link between concussion occurring from birth to age 10 and MS. However, concussion during adolescence (between the ages of 11 and 20) was associated with a higher risk of MS. In addition, individuals who'd had more than one concussion had an even higher chance of being diagnosed with MS than those with just one recorded concussion.

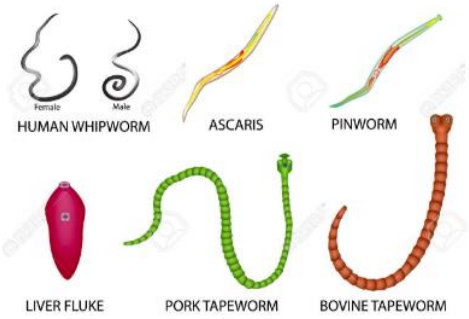
Having another autoimmune disease may also increase the likelihood developing MS, as autoimmune diseases tend to cluster. For example, if you have type 1 diabetes, autoimmune thyroid disease, or systemic lupus erythematosus (SLE), you may have a slightly higher risk of being diagnosed with MS, too.

While no particular diet or food has been shown to prevent MS, researchers continue to study the ways in which nutrition might affect disease risk. What you eat has a strong influence on the gut microbiome. As Dr. Farren Briggs explains in our September 2017 newsletter, this plays a strong role in MS, both at onset and on severity. Research also shows diet affects metabolic and inflammatory pathways. Inflammation is increased by high-calorie diets, which include foods that are low in fiber, and high in salt, sugar, fried food, red meat and animal fat. On the other hand, low-calorie diets that include vegetables, fruit, legumes, fish, and grains reduce inflammation and restore or maintain a healthy gut microbiome. Studies also confirm vitamin D is a key diet-related factor in the possible prevention of MS. Vitamin D is naturally present in fatty fish and is added to milk, some cereal products, and a few other foods. The most natural way to get vitamin D is through exposure to sunlight. Epidemiologists have determined that populations exposed to greater amounts of sunshine or ultraviolet radiation have lower rates of MS. A Swedish study recently found that a high consumption of coffee is associated with a lower risk of developing MS. In addition, Researchers have determined resveratrol (a compound in red wine) may exhibit anti-inflammatory effects in the brain and may also promote restoration of the myelin coating that surrounds nerve cells in mouse models. Another study showed that periodic cycles of a fasting-mimicking diet had beneficial effects in both mice and human participants with relapsing-remitting MS. Human subjects in this study reported improvements in their health and quality of life. Whether such a diet could help prevent MS is not known.

The hygiene hypothesis is based on the premise that our efforts to stay healthy by killing germs with surface sprays, antibacterial soaps and hand sanitizers has lead to an increase in the incidence of allergic and autoimmune disorders (such as MS). According to this theory, by cleaning and sanitizing ourselves and our environment, we're no longer exposed to infections, parasites and microorganisms that would otherwise help to prime our immune system. Without this exposure, the immune system fails to develop fully and becomes overly sensitive, leading to increased risk of allergies and autoimmune diseases later in life. A recent Norwegian study determined, among other things, owning a cat during childhood was associated with a greatly reduced risk of developing MS in later life. The researchers concluded this was consistent with the hygiene hypothesis, since cats bring with them a number of microorganisms that may well help prime the immune system.

Researchers are considering the possibility that certain viruses and bacteria may be involved in the MS disease process, or even cause MS. Specifically, there is evidence that the development of MS may be due, at least in part, to exposure to the measles virus. If exposure occurs late in childhood or near adolescence, the risk of MS is increased. Investigators believe the human herpesvirus 6 (HHV-6) may be involved in the MS disease process. A recent study found that HHV-6 antibodies were associated with a higher risk of relapse and possibly with progressive courses of MS. Data from another study showed women with the common gut infection Helicobacter pylori (H. pylori) were less likely to develop MS than those without these bacteria. In addition, a 2003 study published in the Journal of the American Medical Association associates infection with Epstein-Barr virus (EBV) with an increased risk for MS.

Parasites may also play a role in the development of MS by regulating the immune system and reducing its responses. Studies show MS is less frequent in people infected with worm-like parasites called helminths. Furthermore, parasitic infections provide protection against the disease in mouse models. There have been several small studies looking at whether deliberately exposing people with MS to parasitic worms can reduce their levels of inflammation and reduce their MS disease activity. More research is needed to fully understand this new approach to immune therapy.



It's important to mention what scientists have ruled out as MS risk factors. At one point, people believed that allergies might cause MS. Allergies are common in the general population and can occur in people with MS. However, there is no scientific evidence that MS is triggered by a reaction to a specific environmental allergen. There is also no scientific evidence to support claims that artificial sweeteners (such as aspartame) increase one's risk for developing MS. Some years ago, canine distemper (a virus carried by dogs) was proposed as a cause of MS, but research has since proven this to be incorrect. There are no data to support the belief that heavy metal exposure, such as mercury, lead or manganese, causes MS. Although poisoning with heavy metals can damage the nervous system and produce symptoms

such as tremor and weakness, both the process and the symptoms are different from those associated with MS.

The ACP Repository is an unparalleled resource for studies aimed at understanding the causes and mechanisms of MS. In addition to valuable blood samples from people with MS and healthy controls, it also contains a comprehensive set of related data. According to epidemiologist, Dr. Farren Briggs, "The ACP Repository is unique because it has several aspects that are really rare. Generally, you'll find large studies of MS that have only genetic information, you'll have several studies that have clinical data, and a few with environmental history and more nuanced questions. Here we have all three data types captured within one single data set. It is quite a unique resource that creates a lot of unparalleled opportunities to look at many different questions."

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