About Multiple sclerosis

Fast Facts

- Multiple sclerosis (MS) is an autoimmune, chronic and inflammatory condition that affects the central nervous system (CNS) and is the most common, non-traumatic, disabling neurological disease in young adults.
- Relapsing remitting MS (RRMS) is the most common form of MS, and around 85% of people with MS are diagnosed with this type.[1]
- The exact cause of MS is unknown but it is thought that the body's immune system attacks myelin, disrupting the information flow along the nerves.
- There is currently no cure for MS, but treatments are available to help slow the course of the disease.

Symptoms

The **symptoms of MS vary widely from person to person** and can affect any part of the body.

Common symptoms of MS include:[2,3]

- Fatigue
- Difficulty walking
- Vision problems, such as blurred vision
- Incontinence
- Numbness or tingling in different parts of the body
- Muscle spasms
- Problems with balance and coordination
- Problems with thinking, learning and planning

MS produces significant physical disability within 20 to 25 years in more than 30% of patients.[3]

How common is MS?

2.3 million people suffer from MS **WORLDWIDE**[7]

ABOUT 15% of those with MS also have a relative with MS.[4]

Incidence of MS is **more than twice as high** in women compared with men[4]

Most people are diagnosed in the prime of their life, between the ages of **20 & 40**[4]

Often meaning women of child-bearing age are affected

Cause

MS is an autoimmune disease, where it is believed that **the body's immune system attacks myelin**, an insulating coating around the nerve cells in the brain and/or spinal cord, mistaking it for a foreign substance.[4]

- It is likely that a combination of **genetic and environmental factors** may trigger the condition[5]

MS causes the myelin sheath to become inflamed in patches (**plaques or lesions**) and these patches of inflammation can disrupt information flow along the nerves, leading to the symptoms and signs of MS.

- It is thought that when the inflammation subsides, it can result in scarring of the myelin sheath (**sclerosis**). The attacks, particularly if frequent and repeated, can eventually lead to permanent damage to the underlying nerves

Pathophysiology:

- **B and T lymphocytes** and **cytokines** have a central role in normal immune function and in the pathophysiology of MS[6]
- Lymphocyte- and cytokine-mediated neuroinflammation and myelin injury in the CNS compartment underlie clinical relapses and MS progression

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Types of MS

Relapsing remitting MS (RRMS), which 85% of newly diagnosed patients suffer from, is a life-long autoimmune disease that affects the CNS and is characterised by attacks of new or increasing neurological symptoms.[7]

Around 60-70% of people with RRMS eventually develop **secondary-progressive MS (SPMS)**, a progressive worsening of neurologic function over time, with or without evidence of disease activity.[7,8]

Primary progressive MS (PPMS) causes people to experience worsening neurologic function from the onset of symptoms, without any early remission/relapse cycles. It affects 10% of people with an MS diagnosis, generally starting between the ages of 35 and 39.[7]

Diagnosis

- Diagnosing MS is complicated because no single test can positively diagnose it – other possible causes may need to be ruled out first.
- Some of the tests used to confirm MS include neurological examinations, magnetic resonance imaging (MRI) scans, as well as lumbar punctures.[3]
- Once a diagnosis of MS has been made, the type of MS can often be identified based on:

  The pattern of symptoms – such as whether people experience relapses, remissions, or whether symptoms progressively worsen.

  The results of an MRI scan – such as whether there is evidence that lesions have developed at different times and at different places in the body.

Burden of Disease

- MS is associated with a substantial clinical and economic burden on patients, caregivers and the healthcare system, and is more pronounced in patients with high disease activity.
- The burden of severe MS – such as disability and unemployment – is among the highest of common diseases.
  - **50%** of MS patients become **unemployed 3-10 years after diagnosis**[9, 10]
  - **High costs** associated with medication, relapses and disability progression[9]
  - **25%** will require a **wheelchair 15 years after diagnosis**[11]
  - **Life expectancy** is **reduced** by an average of **10 years**[12, 13]

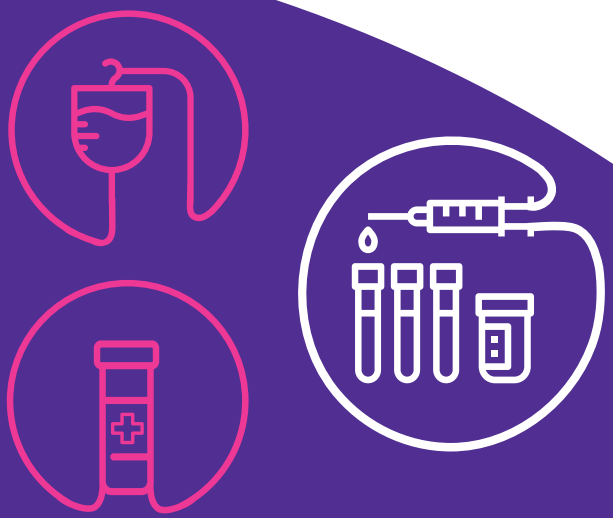
Treatment

Therapies approved for the treatment of RRMS include:

Treating acute relapses of MS symptoms with steroid medication or plasma exchange (plasmapheresis)

Disease-modifying drugs (DMDs) which treat the underlying immune disorder and reduce the number of relapses and their severity. These DMDs can be further classified as immunomodulating (receptor modulating) or immunosuppressive therapies, such as those that target lymphocytes to disrupt the disease activity

These types of treatments can involve **a substantial treatment administration and monitoring burden**, for example regular blood tests to check immune cell changes, and regular liver function tests



1. MS Society. Relapsing Remitting (RRMS). https://www.mssociety.org.uk/what-is-ms/types-of-ms/relapsing-remitting-rrms Accessed March 7, 2017. 2.Multiple Sclerosis: MedlinePlus Medical Encyclopedia. U.S National Library of Medicine. https://medlineplus.gov/ency/article/000737.htm Accessed May 3, 2016. 3. Luzzio C, Dangond F. Multiple Sclerosis. Medscape. http://emedicine.medscape.com/article/1146199-overview. Accessed February 22, 2017. 4. National Institute of Neurology Disorders and Strokes. Multiple Sclerosis: Hope Through Research. http://www.ninds.nih.gov/disorders/multiple_sclerosis/detail_multiple_sclerosis.htm. Accessed May 3, 2016. 5. MS Society. Causes of MS. https://www.mssociety.org.uk/what-is-ms/information-about-ms/causes. Accessed February 22, 2017. 6. Lehmann-Horn K, Kronsbein HC, Weber MS. Ther Adv in Neuro Disord 2013; 6: 161-173 7. Mayo Clinic Staff. Multiple Sclerosis. Overview. 2015. Mayo Clinic. http://www.mayoclinic.org/diseases-conditions/multi¬ple-sclerosis/home/ovc-20131882. Accessed May 3, 2016. 8. University of Maryland Medical Center. Multiple Sclerosis. University of Maryland Medical Center. http://umm.edu/health/medical/reports/articles/multiple-sclerosis. Accessed March 7, 2017. 9. Naci H et al. Pharmacoeconomics 2010;28:363–379 10. Rahn KR et al. Cerebrum 2012 http://www.dana.org/Cerebrum/2012/Cognitive_Impairment_in_Multiple_Sclerosis__A_Forgotten_Disability_Remembered/ [Accessed 2 November 2016] 11. Myhr KM et al. Mult Scler 2001;7:59–65 12. Scalfari A et al. Neurology. 2013;81:184–192. 13. Capkun G et al. Mult Scler Rel Disor 2015;4:546–554 14. Francis G. Mult Scler. 2014; 20: 471-480 15. Stuve O. Ann Neurol. 2006; 59: 743-747

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