

# Multiple Sclerosis Fact Sheet

## What is Multiple Sclerosis (MS)?

While its exact cause is unknown, MS is a disease of the central nervous system (CNS) – the brain and spinal cord. As with other autoimmune diseases, in MS the body turns against itself by mistaking normal cells for intruders. T cells, key components of the immune system, attack normal cells. Specifically, in MS, the body's immune system attacks the myelin in the CNS.

Myelin is a fatty layer, or sheath, that surrounds and protects nerve fibres in the CNS that are responsible for transmitting signals to other parts of the body. Myelin speeds up the communication between the brain and other parts of the body. If it is damaged or destroyed, the nerve impulses get slower or do not transmit at all.

The result of an immune attack and the loss of myelin leaves patches of scar tissue called sclerosis. A region showing destroyed myelin is called a lesion or inflammatory plaque. These lesions can also block or slow nerve impulses, producing MS symptoms of various kinds and severity.

MS can cause a range of physical and mental problems including loss of muscle control and strength, vision, balance, sensation and mental function<sup>1</sup>. Over time, with repeated attacks, damage accumulates leading to permanent nerve damage and loss of neurological function.

## How common is MS?

- Up to 2.5 million people worldwide are affected by MS, a neurodegenerative condition that often begins between the ages of 20 and 40 when patients are in the prime of their lives<sup>1</sup>. Women are twice as likely to develop MS as men<sup>1</sup>.
- The incidence of MS varies geographically, with a higher incidence in temperate zones and lower incidence in equatorial zones. In Europe, the incidence of MS steadily increases from south to north<sup>1</sup>.

## What are the symptoms of MS?

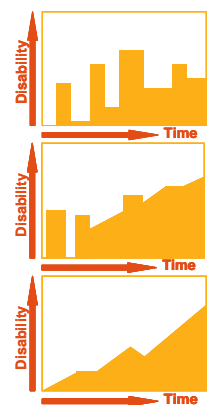
- MS symptoms are unpredictable and vary from person to person<sup>2</sup>.
- MS can affect all functions of the brain, including movement, vision and sexual function. Over the course of the disease, some symptoms may be temporary while others can be more lasting<sup>2</sup>.
- Frequent symptoms include<sup>2</sup>:
  - Fatigue, one of the most common symptoms, can seriously interfere with a person's ability to function productively.
  - Numbness affecting the face, body and limbs.
  - Sexual problems that can affect arousal and orgasm.
  - Balance problems that can stem from dizziness or vertigo.
  - Spasticity can vary from mild muscle tightness to painful, uncontrollable spasms of the arms and legs.
  - Chronic pain affects more than half of people with MS.
  - Depression is common among people with MS.
  - Incontinence affects the majority of people with MS.
  - Difficulty in walking limits mobility and frequently leads to a need for assistance, including wheelchair use.

## What are the types of MS?

**Relapsing-Remitting MS (RRMS)** is a form of MS which attacks or relapses with worsening neurological function, followed by periods of remission where they partially or fully recover, during which the disease remains stable. Approximately 85% of people with MS have RRMS when first diagnosed<sup>3</sup>.

**Secondary-Progressive MS (SPMS)** is characterized by gradual worsening of the disease between relapses. Before disease modifying therapies (DMTs), 50% of people with RRMS developed SPMS within 10 years of their initial diagnosis but long-term data are not yet available to determine if treatment significantly delays this transition<sup>3</sup>.

**Primary-Progressive MS (PPMS)** affects about 10% of people with MS. It follows a steady course of worsening neurological function. Patients with this form of MS do not experience relapses or remissions<sup>3</sup>.



## What is the impact of MS?

Quality of life is frequently poor in people with MS,<sup>5,6</sup> lower on average than for people with other chronic diseases such as diabetes and epilepsy<sup>7</sup>.

Nearly 85% of people with MS are affected by fatigue regardless of their disability or clinical course, which interferes with their quality of life and productivity<sup>8</sup>. About 50% of people with MS need a wheelchair within 20 years of developing MS<sup>9</sup>.

## How is MS diagnosed?

There is no single test that confirms a clinical diagnosis of MS. In general, doctors diagnose MS by evaluating patients in whom typical symptoms of MS occur together with results of imaging data of the brain and other measurements, such as cerebrospinal fluid evaluation. The aim is to see whether the episodes could be due to MS or to another disorder affecting the CNS. The diagnosis of MS is based on:

- Episodes of neurological symptoms and signs that are consistent with an MS attack (relapse). These episodes generally last for at least 24 hours and resolve, partially or completely, over days to weeks.
- Magnetic resonance imaging (MRI) of the brain and spinal cord can detect inflammation and scarring in the CNS caused by MS.
- Cerebrospinal fluid (CSF, the liquid surrounding the brain and spinal cord) is collected and tested for markers typical of MS in order to support the diagnosis.
- Evoked potential (EP) tests measure conduction speed of nerve tracts in the CNS and may be helpful in determining the presence of demyelinating lesions, even in the absence of neurological symptoms. Since the advent of MRI, EPs are less frequently used for diagnostic purposes.

## How is MS treated?

MS can be treated in different ways according to the individual's status. For example, corticosteroids are used to treat acute attacks, but are not recommended for an extended period of time.

In contrast, drugs that affect the course of the disease, so-called Disease-Modifying Therapies (DMTs) are used in an attempt to alter the natural course of MS by modifying the immune response, so reducing inflammatory activity in the brain. DMTs help prevent attacks and may slow the progressive worsening of MS.

## First-line Disease Modifying Therapies (DMTs)

Currently there are five first-line DMTs approved as treatments for RRMS (the most common form of MS<sup>7</sup>): Avonex<sup>®</sup> (interferon beta-1a), Betaseron<sup>®</sup> (interferon beta-1b), Extavia<sup>®</sup> (interferon beta-1b), Rebif<sup>®</sup> (interferon beta-1a) and Copaxone<sup>®</sup> (glatiramer acetate). These therapies modify how the immune system functions. All five have been shown to be effective in preventing attacks, and interferon beta-1a has demonstrated the ability to slow the progressive worsening of the disease. These drugs reduce relapse rate by approximately one-third in two-year studies<sup>10</sup>. All require injections (ranging from daily to weekly). To date, there are no approved oral DMTs for MS.

## Second-line DMTs

Tysabri<sup>®</sup> (natalizumab) is a monoclonal antibody, approved in the EU and US since 2006 for the treatment of RRMS. Tysabri reduces relapses by about two-thirds and reduces disability progression by about 42% relative to placebo. It is administered by a monthly intravenous infusion. Tysabri is generally used only where other drugs have failed, due to safety considerations regarding the occurrence of progressive multifocal leukoencephalopathy (PML), a rare and potentially fatal infection of the brain, at an incidence of 1/1,000 treated patients. Mitoxantrone is a chemotherapeutic drug that is approved in US, and some European countries for treatment of relapsing and progressive MS but use is limited by safety concerns such as cumulative dose-related cardiotoxicity and induction of acute myelogenous leukemia.

## Symptomatic therapies

In addition, there are therapies available to treat individual MS symptoms, such as spasticity, tremor, bladder and bowel dysfunction, pain, cognitive dysfunction, vertigo, nausea, vomiting and fatigue. Additionally, corticosteroids are used to treat acute attacks. Taken orally or by injection, corticosteroids reduce inflammation by suppressing the immune system and may reduce the severity and duration of an attack.

## References

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