Multiple Sclerosis Trust

MS

Multiple sclerosis information

for health and social care professionals

Fourth Edition

Diagnosis

Myelin is a fatty substance, which coats the axon of nerves in the central nervous system (CNS) and has an insulating effect enabling electrical impulses to move faster. Damage to myelin results in a disturbed transfer of information along the axons. In MS, patches of inflammation may occur in the myelin, this can result in the myelin itself becoming damaged. If the inflammation covers a wide area it can leave a scar (sclerosis); a lesion. These lesions can appear in many sites throughout the CNS - hence 'multiple'. Demyelination occurs when myelin around axons deteriorates and is lost.

There is also an increasing body of evidence to demonstrate that the axons themselves become damaged, this axonal loss is a cause of impairment. Once lost, an axon can never regenerate and this is thought to account for the progressive disability which is often part of the condition. Axonal loss is now believed to occur much earlier in the disease process than was once thought.

MS can affect any part of the CNS, giving rise to a variety of physical and sometimes cognitive symptoms, in addition to the psychosocial problems that can also result.

Onset

Onset of MS rarely occurs before puberty and is usually in early adult life. The incidence of onset rises during the 20s, reaching its peak in the late 20s and early 30s. Initial symptoms are, most commonly, visual disturbances, including pain in and around the eyes, blurred or double vision, sensory problems that take the form of 'pins and needles' in the hands and feet, weakness, numbness, balance disorders and fatigue. Symptoms vary enormously, not only from one person to another, but also in the same person from one time of day to another.

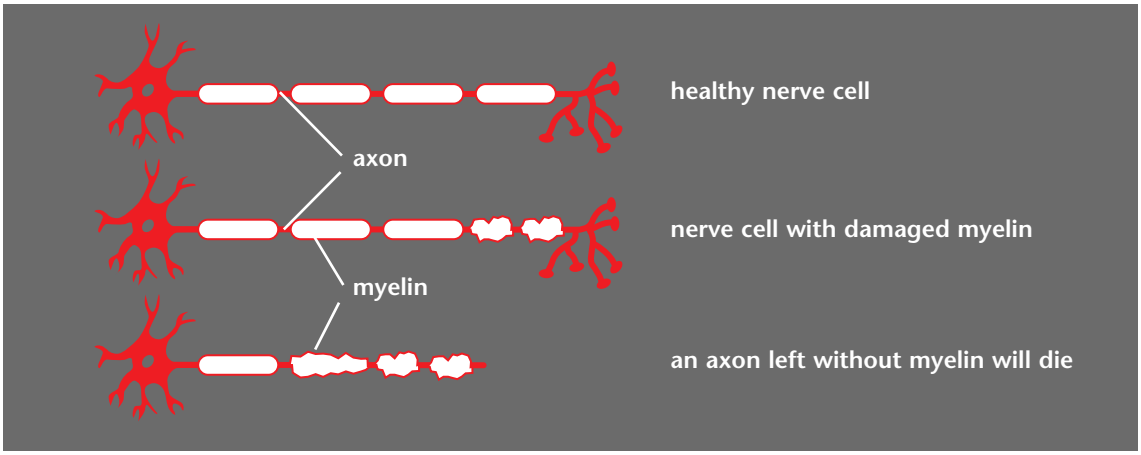
Clinically isolated syndrome

85% of people experience an initial onset of symptoms that is known as clinically isolated syndrome (CIS). This inaugural event is defined as an individual's first episode of neurological symptoms lasting at least 24 hours. Damage may be monofocal resulting in the experience of a single symptom (eg optic neuritis) or multifocal when multiple symptoms might be experienced (eg incoordination and bladder problems).

Not everyone who experiences CIS will go on to develop MS and for some there may be no further symptoms. However, if MRI findings show brain lesions that are indicative of MS then the chances of having further relapses and a definite diagnosis of MS are high[1].

Paediatric MS

The onset of MS in childhood and adolescence is being increasingly recognised[2]. 3-5% of patients have onset of MS before the age of 16 with 1% before the age of 11. Male to female ratio is equal before puberty, after which it is most common in females and mirrors the adult ratio of 3:1. 95% of patients with paediatric MS follow a relapsing remitting course. Diagnosis in this age group can however be problematic as symptoms often resemble acute disseminated encephalomyelitis (ADEM).



Diagnosis

A diagnosis of definite MS is based upon objective evidence of lesions separated in time and space, ie relapsing and remitting symptoms affecting at least two separate areas of the brain or spinal cord. MS can be difficult to diagnose since there is no single test, or clinical feature which is exclusive to the condition, and so other possible causes must be eliminated. Confirmation of the condition can therefore take some time.

There are established criteria that have to be met to positively identify MS. These are known as the 'McDonald Criteria' and are relevant in diagnosis of both relapsing remitting and primary progressive MS[3]. Revision of these criteria in 2010[4] allows for earlier diagnosis of MS without any loss of accuracy. This facilitates earlier use of disease modifying drugs that may have an impact on later accumulation of disability for people experiencing relapses.

NICE guidance[5] states that the individual should be involved in the diagnostic process and should be informed as soon as a diagnosis of MS is considered reasonably likely. In a study of patient satisfaction and timing of diagnosis patients themselves preferred early diagnosis[6]. See page 10 - *Delivering a diagnosis of MS*.

The typical diagnostic process

The GP is usually the first health professional a person will consult when they are experiencing neurological problems. GPs see on average one new diagnosis of MS every 15 years and are likely to have only three or four patients with MS in their case load. There is no single clinical feature exclusive to MS and where there are unexplained neurological symptoms the GP will refer the patient to a neurologist for full neurological examination and paraclinical tests. The neurologist will make the diagnosis of MS.

There are specialist MS centres throughout the UK with access to neurologists who have expertise in treating MS and a specialist MS team including MS specialist nurses. Find these on the *MS Trust map of MS services* www.mstrust.org.uk/map.

Clinical evidence

A thorough physical examination of the current function of the nervous system is made. Specifically, signs of weakness or stiffness in the limbs and areas of abnormal/reduced sensitivity on the body surface will be looked for. Evidence of current or previous damage in the optic nerve is important (and can be detected through an ophthalmoscope) as this is a common site of lesions in MS. However, it is rare to make a certain diagnosis of MS on clinical evidence alone, since in many cases such evidence is subjective.

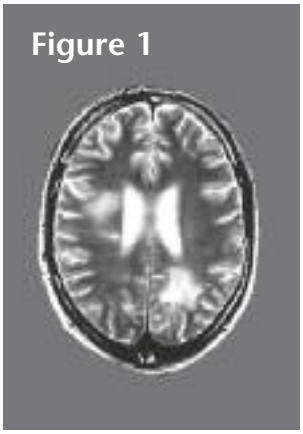
Diagnostic tests

There are three major investigations, all or some of which may be carried out when MS is suspected though none are 100% conclusive without supporting clinical evidence and robust clinical history:

- magnetic resonance imaging (MRI)
- neurophysiological tests
- examination of cerebrospinal fluid (CSF).

Magnetic resonance imaging (MRI)

MRI is the most sensitive investigation with the ability to highlight areas of active and non-active demyelination. MRI creates images by using magnetic fields and radio waves to monitor the behavior of hydrogen atoms in the body, these are converted to create cross-sectional images. The chemical make up of the scars caused by MS means that they show up as white patches on MRI images, giving a very clear picture of the effects of MS on the brain and spinal cord (Figure 1).



The use of an enhancing agent, such as gadolinium, will show whether a lesion is active or not. In active inflammatory lesions the blood-brain barrier is disrupted and the gadolinium leaks into the surrounding brain tissue and can be detected on the MRI image.

It can be problematic to establish a correlation between the lesions as revealed by MRI and the clinical presentation at any given time.

Neurologists use MRI for the following purposes:

- to observe abnormalities that are suggestive of multiple sclerosis
- to rule out alternative diagnoses such as tumours or stroke
- to help in the evaluation of patients who have subjective complaints but few objective signs of abnormality
- as a surrogate marker for disease activity in clinical trials.

The 2010 revised McDonald criteria for diagnosis of MS[4]

Clinical presentation (person presenting to neurologist)	Additional data needed for MS diagnosis
Two or more attacks; objective clinical evidence of two or more lesions	None
Two or more attacks; objective clinical evidence of one lesion	Dissemination in space shown on MRI **or** Up to two MRI detected lesions typical of MS plus positive cerebrospinal fluid. **or** Await a further relapse suggestive of dissemination in space (ie affecting another part of the body)
One attack; objective clinical evidence of two or more lesions	Dissemination in time demonstrated by MRI **or** Second clinical attack (relapse)
One attack; objective clinical evidence of one lesion (known as 'clinically isolated syndrome')	Dissemination in space demonstrated by MRI **or** Up to two MRI detected lesions typical of MS plus positive cerebrospinal fluid **AND** dissemination in time demonstrated by MRI **or** Dissemination in time demonstrated by MRI (ie new lesion seen on MRI at least three months after the original scan) **or** Second clinical attack (relapse)
Insidious neurological progression suggestive of multiple sclerosis (typical for primary progressive MS)	Positive cerebrospinal fluid **AND** dissemination in space, shown on MRI **or** Abnormal visual evoked potential plus abnormal MRI **AND** dissemination in time demonstrated by MRI **or** Continued progression for one year (determined retrospectively or by ongoing observation)

Neurophysiological tests

These relatively simple, non-invasive investigations are carried out on vision, hearing or sensation to look specifically for delay in the conduction of nerve impulses to and from the brain.

The most common test is the visual evoked potential (VEP). Visual tests involve watching a television screen that has alternating black and white squares. An electrode is placed over the visual cortex and a computer analyses the received visual signal from the television set. The length of time it takes for the signal to leave the television set and reach the visual cortex is known and thus a delay in the signal transmission can be identified. Such a delay may be indicative of damage due to an MS lesion.

Cerebrospinal fluid examination

Examination of the cerebrospinal fluid (CSF) used to be an important diagnostic aid but the increased use of MRI has reduced the need for this invasive procedure. Fluid is drawn off the spinal cord by means of a lumbar puncture. NICE guidance states that this should only be used when the situation is clinically uncertain; however it is still of importance in the diagnosis of primary progressive MS.

The sample of CSF is analysed by electrophoresis for its protein level and leucocyte count. Approximately 80% of people with MS have an elevated immunoglobulin G (IgG) index or oligoclonal immunoglobulin bands present in the spinal fluid but not in the serum, indicating inflammation and immunological disturbance.

Deliviering a diagnosis of MS

A critical element in the diagnostic process is the provision and pacing of information. It is recognised that how a diagnosis is communicated and the information and support received at this time will impact on subsequent adjustment to MS[7]. The health professional should find out how much and what information the individual wants to receive[8]. Explanations of diagnostic tests should be given. A diagnosis given badly will be remembered throughout the life of a patient and can impact negatively on their adjustment to living with MS.

The importance of patient information in the management of MS is further highlighted in the recommendation by NICE that:

'People with MS should be enabled to play an active part in making informed decisions in all aspects of their MS healthcare by being given relevant and accurate information about each choice and decision'.

The Information Standard was devised by the Department of Health to allow people to recognise organisations that produce information that is accurate, evidence-based and unbiased. Certified organisations can be recognised by the quality mark below. The MS Trust is a certified organisation.

References

1. Miller D, Barkhof F, Montalban X, et al. Clinically isolated syndromes suggestive of multiple sclerosis, part 1: natural history, pathogenesis, diagnosis and prognosis. Lancet Neurol 2005;4(6):281-8.
2. Huppke P, Gartner J. A practical guide to paediatric multiple sclerosis. Neuropediatrics 2010;41(4):157-62.
3. McDonald WI, Compston A, Edan G, et al. Recommended diagnostic criteria for multiple sclerosis: guidelines from the International Panel on the diagnosis of multiple sclerosis. Ann Neurol 2001;50(1);121-7.
4. Polman CH, Reingold SC, Banwell B, et al. Diagnostic criteria for multiple sclerosis: 2010 revisions to the McDonald criteria. Ann Neurol 2011;69(2):292-302.
5. National Institute for Health and Clinical Excellence. Multiple sclerosis - management of multiple sclerosis in primary and secondary care. NICE Clinical Guideline 8. London: NICE; 2003.
6. Janssens ACJW, de Boer JB, Kalkers NF, et al. Patients with multiple sclerosis prefer early diagnosis. Eur J Neurol 2004;11(5):335-7.
7. Burgess M. The process of adjustment: providing support after a diagnosis of multiple sclerosis. Br J Neurosci Nurs 2010;6(4):156-60.
8. Box V, Hepworth M, Harrison J. Identifying the information needs of people with multiple sclerosis. Nurs Times 2003;99(49):32-6.

MS Trust resources

MS Explained
MS: What does it mean for me?

Clinically isolated syndrome (CIS) factsheet

Map of services www.mstrust.org.uk/map

Further resources

Compston A, Coles A. Multiple sclerosis. Lancet 2008;372(9648):1502-17.

Zajicek J, Freeman J, Porter B. Multiple sclerosis care: a practical manual. Oxford: Oxford University Press; 2007.

We hope you find the information in this book helpful. If you would like to speak with someone about any aspect of MS, contact the MS Trust information team and they will help find answers to your questions.

This book has been provided free by the Multiple Sclerosis Trust, a small UK charity which works to improve the lives of people affected by MS. We rely on donations, fundraising and gifts in wills to be able to fund our services and are extremely grateful for every donation received, no matter what size.

MS Trust information service

Helping you find the information you need

The MS Trust offers a wide range of publications, including a newsletter for health and social care professionals Way Ahead and the MS Information Update, which provides an ongoing update on research and developments in MS management.

For a full list of MS Trust publications, to sign up for Way Ahead and much more visit our website at
www.mstrust.org.uk

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This publication will be reviewed in three years

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