

## Early criteria (pre-Allison & Millar)

### Ipsen criteria: 1939-48, Boston, MA USA<sup>1</sup>

- **Probable MS**
  - Those cases with records presenting convincing evidence
- **Possible MS**
  - Those cases whose evidence was more doubtful.

Ipsen acknowledges these allocations are fairly arbitrary but also notes that absolutely certainty of diagnosis is impossible except by autopsy, a limitation we are similarly affected by even today.

### Westlund & Kurland: 1951, Winnipeg, MT Canada & New Orleans, LA USA<sup>2</sup>

Diagnostic groupings as follows, with no explicit requirements for each, rather deferring to the discretion of the examining neurologist:

- Certain MS
- Probable MS
- Possible MS
  - In this class, the changes for and against MS were considered approximately even
- Doubtful, unlikely or definitely-not MS<sup>2</sup>

### Sutherland criteria: 1954, Northern Scotland<sup>3</sup>

- **Probable MS**
  - This category for patients in whom the history, the results of clinical examination and, where available, hospital investigations, indicated that the diagnosis of MS was beyond reasonable doubt.
- **Possible MS**
  - Patients in whom a diagnosis of MS appears justifiable but in which the diagnosis could not be established beyond reasonable doubt;
  - This group also included patients who did not wish to be examined or could not be seen – review of hospital records for these patients suggested a diagnosis of MS
- **Rejected cases**
  - Patients found to be suffering from a disease other than MS

## Allison & Millar Criteria and variants

### Allison & Millar criteria: 1954, Northern Ireland<sup>4</sup>

- **Early disseminated sclerosis:**
  - 1) this category for patients with little in the way of symptomatic presentation but with a recent history consistent with disease onset, i.e. optic neuritis, ophthalmoplegia (double vision), vertigo, sensory problems like pins & needles or numbness, or motor problems like weakness.
- **Probable disseminated sclerosis**

- 1) this category for patients “in which there was no reasonable doubt about the diagnosis”, “usually a remitting quality”, with patients presenting with physical disability “explicable only on the basis of multiple lesions”<sup>4</sup>.
  - **Possible disseminated sclerosis**
- 1) this category for patients in which the diagnosis was suggested by the findings but without evidence of multiple lesions in the CNS.
  - **Discarded cases**
- 1) This category for patients in which the results of clinical examination suggested some other disease.

#### Siedler Criteria: 1957, Missoula County, MT USA<sup>5</sup>

- **Probable MS**
  - 1) Patients whose objective documented neurologic findings were explainable only by the assumption of multiple lesions in the CNS. Historic evidence, laboratory findings and examination results could be used as supporting evidence where they supported the impression of MS and were against other diagnoses. Patients had neurologic signs and symptoms characterized by
    - exacerbations and remissions
    - or*
    - slow progression of lesions
- **Possible MS**
  - 1) Patients who had insufficient evidence of multiple lesions in the CNS on the basis of neurologic examination
- **Not MS**
  - 1) Patients in whom another diagnosis was more likely<sup>5</sup>

#### Deacon Criteria: 1958, Duxbury, MA USA<sup>6</sup>

- **Probable MS w/ disability**
  - 1) This include patients with neurological signs and symptoms characterized by exacerbations and remissions or by slow progression. Patients’ neurological exams were only explainable by multiple lesions in the CNS, and patients’ histories, and laboratory and neurological findings indicated MS over another diagnosis.
- **Probable MS w/o disability**
  - 1) In this patients, clinical records revealed signs and symptoms compatible with MS which had been present in the past, but at exam there was no clear evidence of multiple lesions in the CNS
- **Possible MS**
  - 1) This included patients in whom a diagnosis had not been entirely established.
- **Not MS**
  - 1) This included patients in whom another diagnosis was made.

#### Dean Criteria: 1960, South Africa<sup>7</sup>

- **Probable MS**

- 1) Patients with a multiplicity of lesions in the CNS (DIS), usually exacerbations and remissions, and the necessary investigations to exclude other pathology had been carried out.
- **Possible MS**
- 1) Those patients in whom there was any doubt about the diagnosis
- **Not MS**
- 1) Those whose condition could be otherwise explained as non-MS<sup>7</sup>

### World Federation of Neurology criteria and variants

#### Allison/World Federation of Neurology Criteria: 1960<sup>8</sup>

- **Latent or Early Probable MS**
- 1) Patients whose histories left little doubt as to the diagnosis but in whom there was as yet little or no disability and few neurological signs.
- **Probable MS**
- 1) Cases in which there was no reasonable clinical doubt as to the diagnosis; patients had to have evidence of physical disablement, usually a remitting character to their history and on examination definite physical signs explicable only on the basis of multiplicity of lesions within the neuraxis.
- **Possible MS**
- 1) Cases had to have some physical disablement and definite physical signs indicative of white matter disease and clinically suggestive of MS, but cases had later age of onset relative to those in probable MS group and histories were progressive or static, rather than remitting and their physical signs did not indicate such a sufficiency of lesions at different levels as was found in probable cases.
- **Discarded cases**
- 1) Cases in which there were no physical signs and in which documentary proof of former symptoms having occurred were deemed inadequate, or cases in which symptoms were better explained by another condition.

#### Alter Criteria: 1960, Halifax County, NS Canada & Charleston County, SC USA<sup>9 10</sup>

- **Early Probable and Latent MS**
- 1) Patients showed slight or no disability and few physical signs but who had histories (presented) of remitting symptoms and signs commonly associated with the disease; patients must exhibit at least one physical sign typical of MS; patients unavailable for exam must present documented proof that signs and symptoms had occurred; optic neuritis alone was not considered MS
- **Probable MS**
- 1) Patients in whom there was no reasonable doubt as to the diagnosis and in whom some physical disability was found; history was usually that of remitting disease; on examination, definite physical signs that could be explained only by multiple lesions of the neuraxis were found; supporting (paraclinical) evidence such as change in colloidal gold curve (characteristic CSF) or a negative myelogram were required for acceptance of patients whose history were unreliable.

- **Possible MS**

- 1) Patients showing physical disability and definite physical signs indicative of CNS disease and suggestive of MS; these patients usually had progressive rather than remitting course and did not have sufficient evidence of multiple lesions at varying levels; however no other cause for the condition could be established.

### Gilland criteria: 1965<sup>11</sup>

In 1965, Gilland proposed a modification of the WFN diagnostic criteria which would make better use of CSF-based evidence, which he felt were underrepresented in the Allison/WFN criteria. These criteria proposed a hybrid between the three groups in the WFN criteria (early probable, probable and possible) and three groupings based upon CSF findings (typical (MS characteristic), gamma-normal (found in 10-15% MS cases), and atypical (indicative of non-MS, likely infection) CSF)<sup>11</sup>. These hybrid groupings would be thus allocated into two main groups:

- **MS Diagnostic:**

- 1) Probable – CSF Typical
- 2) Probable – CSF gamma normal
- 3) Probable – CSF Atypical
- 4) Early Probable – CSF Typical
- 5) Early Probable – CSF gamma normal
- 6) Early Possible – CSF Typical

- **MS Observation:**

- 1) Early Probable – CSF Atypical
- 2) Clinical Possible – CSF gamma normal
- 3) Clinical Possible – CSF Atypical

### Poskanzer criteria and variants

#### Poskanzer Criteria: 1963, Northeast UK<sup>12</sup>

- **Probable MS**

- 1) Patients were included in this category when they unequivocally satisfied the DIT/DIS criteria and when there was little reasonable doubt about the diagnosis

- **Latent MS**

- 1) Patients in which there was little doubt about the diagnosis; however patients were asymptomatic at the time of examination, but gave a characteristic history of episodic multifocal neurological disease which defied alternative explanation

- **Possible MS**

- 1) Patients in which alternative diagnoses had been excluded as far as practicable and where the clinical picture was more suggestive of multiple sclerosis than other known neurological disorders<sup>12</sup>.

#### Cendrowski Criteria : 1965, Western Poland<sup>13</sup>

- **Probable MS**

- 1) Patients unequivocally satisfied clinical criteria of the progressive disease with dissemination of lesions in time and space, leaving only little doubt about the diagnosis.
- **Possible MS**
- 1) For those patients where alternative diagnoses had been excluded as far as practicable and when the clinical picture was more suggestive for MS than of other neurological disease<sup>13</sup>.

#### **Hornabrook Criteria: 1971, Wellington, New Zealand<sup>14</sup>**

- **Probable MS**
  - a. Patients presenting with neurological symptoms suggestive of MS, with at least one relapse at the same site or elsewhere (DIT); neurological exam provided evidence of the presence of more than one physical lesions within the CNS, these lesions were anatomically separate (DIS)
  - or*
  - b. Patients in whom a progressive single lesion had been succeeded by a history of relapses and scattered lesions (DIT/DIS), provided examination demonstrated the presence of physical signs consistent with various sites of damage within the CNS (DIS).
- **Latent MS**
  - c. Patients presenting with a history of variable duration in which there were indications of scattered lesions in the CNS (DIS), the presence of structural damage confirmed by neurological exam, but in whom there were only mild fluctuating signs of the development of new symptoms and signs without distinctly recognizable relapses.
- **Possible MS**
  - d. Patients with many of the neurological symptoms or history suggestive of MS but in whom some slightly atypical feature, such as late age of onset, made them uncertain to be MS<sup>14</sup>.

#### **Other intervening criteria**

#### **Chipman Criteria: 1959, Houston, TX USA<sup>15</sup>**

In his 1959 study of MS in Houston, TX, Chipman made use of a standardised set of criteria for use by the various physicians providing subjects for the study, these criteria effectively being for definite/probable MS and required:

- History of remissions/relapse or temporary exacerbations of neurological symptoms
- Evidence of multiple symptomatology which could only be explained on the basis of multiple anatomical nervous system lesions
- In cases where no history or physical findings were available, the diagnosis of the examining neurologist or internist was accepted.

- Patients who were listed by the MS Society as MS cases but who had no available professional diagnosis and who refused to give a history were excluded from the study.

### Behrend criteria: 1960, Marseille, France & Hamburg, Germany<sup>16</sup>

Cases were classified by a combination of elements including:

- 1) Localization of the clinically detectable foci;
  - Cerebral
  - Spinal
  - Cerebrospinal
- 2) Number of the clinically detectable foci;
  - One
  - Two or more
  - Uncertain
- 3) Course of the disease;
  - One remission
  - Two or more remissions
  - Chronic progressive
  - Mixed
- 4) CSF changes
  - Typical
  - Atypical
  - Normal
  - Unknown
- 5) Presence of optic nerve lesion

Into groups of

- **Clinically unequivocal**
- **Probable**
- **Possible**

### Dassel Criteria: 1960, Groningen Province, Netherlands<sup>17</sup>

The criteria for definite MS used in the study are as follows:

- Symptoms must indicate multiple lesions of the CNS
- Clinical remissions
- Changes in the CSF, i.e. a positive colloidal gold reaction, normal or slightly raised protein content, increase number of cells, negative syphilitic serological reaction
- The age of symptom onset must be under 40years; if over 40, the diagnosis must be regarded with suspicion
- Subacute combined degeneration of the spinal cord must be eliminated
- No changes in the spinal column which might cause lesions of the spinal cord<sup>17</sup>.

### McAlpine Criteria: 1961, Middlesex Hospital, UK<sup>18</sup>

- **Definite MS**
- 1) A history of an acute retrobulbar neuritis or of an episode of paraesthesiae, motor weakness, double vision, unsteadiness in walking or other symptoms typical of

MS which tended to improve, followed by one or more relapses during the course of years with, in addition, the presence of pyramidal and other signs indicative of multiple lesions in the CNS, when the patient was first seen or subsequently.

*or*

- 2) A gradual onset of a paraplegia later followed by relapse and signs indicative of disease in brainstem, cerebrum, or optic nerve.
- **Probable MS**
- 1) During the original attack, clinical evidence of multiple lesions which, at the time, suggested the probability or possibility of MS, followed by good recovery. During the follow-up interval, relative or complete absence of fresh symptoms after the first year but with a tendency to variability in pyramidal and other signs originally present or the occasional late appearance of an extensor plantar response, nystagmus, tremor or temporal pallor of a disc.
  - 2) A history of one or more attacks of acute retrobulbar neuritis accompanied or followed by pyramidal signs, usually mild in degree. Subsequently no clinical evidence of relapse.
- **Possible MS**
- 1) A history similar to that described under Probable (1) but with unusual features or a paucity of signs, or lack of follow-up information.
  - 2) A history of a progressive paraplegia usually in early middle age without evidence of relapse or remission or of a lesion outside the spinal cord, appropriate investigation, including myelography, having excluded other causes of progressive paraplegia<sup>18-20</sup>.

### Schumacher Criteria: 1965<sup>21</sup>

6 criteria required for a diagnosis of clinically-definite MS:

- Objective abnormalities on neurological examination attributable to dysfunction of the CNS; symptoms alone are not sufficient for a diagnosis.
- At neurological exam or in medical history, there must be evidence of involvement in 2 or more separate parts of the CNS
- Objective evidence of CNS disease must be predominantly of the white matter, with more than minor gray matter involvement disqualifying.
- Involvement of the neuraxis must have occurred temporally in one of the following patterns:
  - 2 or more episode of worsening [relapse], separate by a period of one month or more, each episode lasting at least 24hrs.
  - Slow or step-wise progression of signs and symptoms over at least 6-months.
- The age of the patient must be within 10-50yrs.
- The signs and symptoms cannot be explained better by another disease process.

### Danish MS Registry Criteria: 1948-64, Denmark<sup>22</sup>

- **Clinically-definite MS**

- 1) Patients satisfying the requirements for probable MS but in whom the diagnosis is maintained through the presence of additional neurological findings or symptoms.

- **Probable MS**

- 1) Patients with clinical signs of involvement of the CNS, which cannot be explained from a single lesion wherever it might be situated. Unequivocal physical signs of at least one lesion must be present but may for other lesions be substituted by abnormal evoked potentials or reliable information of symptoms or physical signs in the past, adequate to localize a lesion typical of MS at a different location (DIS).

*and*

- The patient must show some physical disablement, a remitting quality of the history

*or*

- A stepwise or steady progression over at least 6-months.

- **Latent Probable MS**

- 1) Patients satisfying nearly all the requirements for probable MS except show slight or no disability.

*and*

- 2) A clinical history of at least 2 episodes of remitting symptoms separated by a period of at least one month (DIT)

*and*

- Unequivocal neurological findings, confirmed by hospital/specialist records, must fulfill the conditions of being explicable only on the basis of multiple lesions (DIS).

*or*

- If no subjective or objective physical signs were present at the time of the last examination, the evidence of a lesion and the documentation must be so strong that it cannot be ignored. Abnormal evoked potentials are acceptable as neurological findings, but they do not indicate self-contained lesions, if they are associated with physical signs from the same region of the white matter.

- **Possible MS**

- 1) Patients in whom the clinical signs of lesion of the white matter fail to prove involvement at different levels of the neuraxis (DIS), or the documentation of such involvement is insufficient.

*or*

- 2) If the course has been steady progressive from the start and symptoms and physical signs are confined to the spinal cord

*and*

- The progression has lasted for at least 6 months

*and*

- Oligoclonal bands or increased IgG –index have been detected in the CSF.

- **Discarded cases**



- 1) Cases in which the symptoms or findings may as well be caused by other neurological disease or cases in which the physical signs of CNS-involvement are equivocal and patients in which the suspicion of MS is unwarranted<sup>22</sup>.

### Detels Criteria: 1970, Los Angeles County, CA & King-Pierce County, WA USA<sup>23</sup>

- **Definite & Probable MS**

- 1) Symptoms referable to at least 2 areas of CNS located above and below the foramen magnum

*and*

- 2) Physician diagnosis of MS, disseminated sclerosis or demyelinating disease

*and*

- 3) Signs referable to at least 2 areas of the CNS (DIS)

*and*

- 4) Onset of symptoms at 2 separate times (DIT)

*or*

- 5) Distinct remissions and exacerbations (DIT)

- **Possible MS**

- 1) Symptoms referable to at least 2 areas of the CNS located above and below the foramen magnum

*and*

- 2) Diagnosis of MS by physicians

*and*

- 3) Presence of 2 signs not indicated

*and*

- 4) Onset of symptoms at 2 separate times or distinct remissions and exacerbations

- **Insufficient information**

- 1) Deceased, unable to complete long or short questionnaire

*or*

- 2) No physician report

- **Not MS**

- 1) Participants whose symptoms are better defined by another non-MS neurological condition as determined by study neurologist.<sup>23</sup>

### Japanese MS Research Committee Criteria: 1972

The criteria described in the prevalence study by Shibasaki et al in their 1975 prevalence study of MS in Hawaii were developed by the MS Research Committee of Japan in 1972. These criteria describe MS as a condition in which:

- Probable MS

- 1) The age of onset is between 15-50 years
- 2) Symptoms and signs due to multifocal lesions in the CNS (more than two lesions in the CNS, e.g. cerebrum, spinal cord, optic nerve, etc. (DIS)
- 3) Remissions and exacerbations (DIT)
- 4) Other diseases can be excluded

- Possible MS
- 1) When not all the criteria required for Probable MS are met

*and/or*

- 1) In patients presenting with:
  - Optic neuritis combined with other neurological symptoms such as abnormal deep reflexes, paralysis, numbness ataxia
  - Myelopathy associated with ophthalmoplegia or nystagmus
  - Cerebellar symptoms, spinal cord symptoms and cerebral symptoms occur successively
  - Recurrent myelitis
  - Recurrent optic neuritis

### **Bauer committee criteria: 1972<sup>24</sup>**

In 1972, Bauer and others came together to discuss possible improvements on the Schumacher criteria, including expansion to a continuous diagnostic scale and the use of CSF-based paraclinical evidence, as well as other matters pertaining to MS diagnosis. This yielded the following generally agreed criteria:

The Schumacher criteria used in the diagnostic criteria were modified to ignore the upper age of onset limit and CSF-based diagnostic criteria were allowed as paraclinical evidence.

- Autopsy proven
- Definite
  - 1) Meet all Schumacher criteria
- Probable/strong possible
  - 1) Where case cannot be convincingly be made for satisfying all the Schumacher criteria
- Poor possible
  - 1) Where MS diagnosis not really indicated but where full exclusion of case as not-MS cannot be justified and a better explanation for symptoms/history cannot be made.
- Not MS
- Unknown

### **German Poser: 1973,Gottingen, Germany<sup>25-27</sup>**

S. Poser and colleagues developed a system of diagnosis using optical mark forms which included data on a variety of clinical elements, including neurological symptoms and clinical history, the inputted data at the judgement of the neurologist. These factors were read by an optical mark form reader and patients allocated to:

- **Clinically-definite MS**
- **Probable MS**
- **Possible MS**

### Borri Criteria: 1976, Italy<sup>28</sup>

- **Clinically-definite MS**
  - 1) Patients in whom the diagnosis cannot be doubted, given their “typical” onset, disease course and symptoms at presentation.
- **Probable MS**
  - 1) Patients with typical onset and clinical course, but no symptoms at presentation
- **Possible MS**
  - 1) Patients with an atypical onset, course and/or symptoms, but in whom another explanation cannot be proved.

### Rose Criteria: 1976<sup>29</sup>

- **Clinically-definite MS**
  - 1) Relapsing-remitting course with at least two bouts separated by no less than one month
    - or*
    - Slow or stepwise progressive course extending over at least 6-months.
  - 2) Documented neurologic signs attributable to more than one site of predominantly white matter CNS pathology
  - 3) Onset of symptoms usually between 10-50yo, inclusive
  - 4) No better neurologic explanation
- **Probable MS**
  - 1) History of relapsing-remitting symptoms but without documentation of signs and presenting with only one neurologic sign commonly associated with MS
    - or*
    - Documented single bout of symptoms with signs of multifocal white matter disease with good recovery and followed by variable symptoms and signs.
  - 2) No better neurological explanation
- **Possible MS**
  - 1) History of relapsing-remitting symptoms without documentation or signs
    - or*
    - Objective neurologic signs insufficient to establish more than one site of CNS white matter pathology
  - 2) No better neurological explanation

### Hader criteria: 1977, Saskatoon, Sask. Canada<sup>30</sup>

Criteria developed from Allison & Millar criteria, with a category for probable MS derived from the Schumacher criteria:

- Probable (clinically-definite)
  - Objective abnormalities on neurological examination attributable to dysfunction of the CNS; symptoms alone are not sufficient for a diagnosis.
  - At neurological exam or in medical history, there must be evidence of involvement in 2 or more separate parts of the CNS

- Objective evidence of CNS disease must be predominantly of the white matter, with more than minor gray matter involvement disqualifying.
  - Involvement of the neuraxis must have occurred temporally in one of the following patterns:
    - 2 or more episode of worsening [relapse], separate by a period of one month or more, each episode lasting at least 24hrs.
    - Slow or step-wise progression of signs and symptoms over at least 6-months.
  - The age of the patient must be within 10-50yrs.
  - The signs and symptoms cannot be explained better by another disease process<sup>21</sup>.
- Possible
    - Includes cases in which there is some doubt as to the history or symptom evaluation, or there were other unusual or atypical features
  - Suspect
    - Includes cases which primarily had a single neurologic episode, for which there was insufficient information, that were not referred to a neurologist for diagnosis, or those in which the patient refused interview/examination

### McDonald-Halliday Criteria: 1977<sup>31</sup>

- **Proven MS**
  - 1) diagnosis at necroscopy
- **Clinically definite MS**
  - 1) All of the following:
    - RRMS history with two of more episodes [relapse]
    - Evidence of lesions at two or more necessarily separate sites in the CNS
    - Lesions predominantly in the white matter
    - Age at symptom onset between 10-50yo
    - History of signs and symptoms for at least one year
    - No better explanation for the observed abnormalities
- **Early probable or latent MS**
  - 1) Single episode suggestive of MS
 

&
  - 2) Evidence of lesions at two or more necessarily separate sites in the CNS
 

OR
  - 3) Relapsing/remitting course
 

&
  - 4) Evidence of only one lesion associated with MS
- **Progressive probable MS**
  - 1) All of the following:
    - Progressive history of paraplegia

- Evidence of lesions at two or more necessarily separate sites in the CNS
- Other causes excluded
- **Progressive possible MS**
  - 1) All of the following:
    - Progressive history of paraplegia
    - Evidence of only one lesion
    - Other causes excluded
- **Suspected MS**
  - 1) Single episode suggestive of MS without evidence of any lesion or evidence of a single lesion only

OR

  - 2) Recurrent optic neuritis (unilateral or bilateral) with one additional episode not involving the optic nerve but without evidence of lesions outside the eye

**Numerical Poser criteria: 1979<sup>32</sup>**

Poser proposed a system of classifying cases to probable and definite categories on the basis of a number of factors which were allotted points, with the total number of points present allowing the allocation of cases to a diagnostic group:

	Points
Age at MS symptom onset (years)	
10-19	1
20-29	3
30-39	4
40-49	1
First symptom (where multiple symptoms occur, highest scoring symptom should be chosen)	
Weakness (refers to specific pareses, not generalized fatigue; includes facial and/or limb weakness)	4
Ocular (refers to any and all signs/symptoms involving visual/oculomotor systems, including loss or diminution of visual acuity, blurring of vision, hemianopsia, double vision, ptosis, or loss of colour vision)	3
Paresthesiae (symptoms described by patients as numbness, pins & needles, formication, Lhermitte's sign; pain symptoms including trigeminal neuroglial and tabetics-like pains may be included as well)	2
Cerebellar (disturbance of equilibrium or difficulties in coordination)	1
Signs and symptoms at exam	
Remission (defines as the <i>complete</i> disappearance for at least one month of symptoms which had previously lasted at least 24hours)	7
Ocular (refers to any and all signs/symptoms involving	9

visual/oculomotor systems, including loss or diminution of visual acuity, blurring of vision, hemianopsia, double vision, ptosis, or loss of colour vision, as well as evidence of optic atrophy, abnormalities of flash/pattern reversal or alteration of colour vision testing)	
Nystagmus (also includes positive results of electronystagmography)	7
Weakness (scored regardless of the number of limbs involved; scored if it is a patient complaint or determined by testing; also includes facial muscle weakness)	10
Spasticity/hyperreflexia (scored regardless of the number of limbs involved; hyperreflexia must be definite; also includes sustained clonus or unilateral transient clonus)	10
Babinski sign (scored even if present on one side only)	9
Absent abdominal reflex (scored only if reflexes are absent on one or both sides; does not include easy fatigability of abdominal reflexes)	8
Gait ataxia (scored only when disturbance represents cerebellar ataxia, as determined by history/examination)	6
Incoordination (should clearly reflect cerebellar involvement, including intention tremor, dysmetria, disorganization of movement, etc.)	8
Dysarthria (includes scanning speech or other articulatory disturbance but not cortical, aphasic problems; speech content should be normal)	6
Urinary disturbance (refers to frequency, urgency and stress incontinence and urinary retention; similar problems involving the bowel may also be scored)	8
Paresthesiae	7
Diminished vibratory sense	6
Diminished position sense	6
Diminished pain sense	5
Mental changes (scored only if the observed mental changes exceed the commonly observed reactive depression seen with MS; only blatant euphoria should be scored; evidence of cognitive impairment, either clinically or by psychological testing, should be obtained; also includes signs of dementia)	5

### Poser criteria & modifications

#### Poser criteria: 1983<sup>33</sup>

- A) Clinically-definite MS

- 1) Two attacks each lasting at least 24hrs, affecting different parts of the CNS and clinically evidence of two separate lesions
  - 2) Two attacks each lasting at least 24hrs, affecting different parts of the CNS; clinical evidence of one lesion and paraclinical evidence of another separate lesion
- **B) Laboratory-supported definite MS** (IgG oligoclonal bands in the CSF or increased IgG synthesis in the CNS, with normal levels of IgG in the serum)
    - 1) Two attacks each lasting at least 24hrs, affecting different parts of the CNS; either clinical or paraclinical evidence of one lesion; CSF oligoclonal bands or elevated IgG in the CNS
    - 2) One attack; clinical evidence of two separate lesions; CSF oligoclonal bands or elevated IgG in the CNS
    - 3) One attack; clinical evidence of one lesion and paraclinical evidence of another, separate lesion; CSF oligoclonal bands or elevated IgG in the CNS
  - **C) Clinically-probable MS**
    - 1) Two attacks each lasting at least 24hrs, affecting different parts of the CNS and clinical evidence of one lesion
    - 2) One attack and clinical evidence of two separate lesions
    - 3) One attack; clinical evidence of one lesion and paraclinical evidence of another, separate lesion
  - **D) Laboratory-supported probable MS**
    - 1) Two attacks, each lasting at least 24hrs, affecting different parts of the CNS and CSF oligoclonal bands or elevated IgG in the CNS

#### Paty modifications to Poser criteria: 1988

The Paty requirements for dissemination in space by MRI diagnostic for MS were:

- At least 4 lesions at least 3mm in diameter
- or*
- 3 lesions, of which at least one is periventricular<sup>34</sup>.

#### Fazekas modifications to Poser criteria: 1988<sup>35</sup>

Fazekas requirements for diagnosis of clinically-definite MS using MRI:

3 or more lesions with 2 of the following 3 properties:

- An infratentorial lesion
- A periventricular lesion
- Any lesions >6mm in diameter<sup>35</sup>

#### Barkhof modifications to Poser criteria: 1997<sup>36</sup>

Barkhof requirements for diagnosis of clinically-definite MS using MRI:

- At least one gadolinium-enhancing lesion or at least 9 T2-hyperintense lesions
- At least one intratentorial lesion

- At least one juxtacortical lesion
- At least three periventricular lesion

**Chancellor modifications to Poser criteria: 2003, northern New Zealand<sup>37</sup>**

Requirements for clinically-definite MS:

- i) At least two attacks typical of a demyelinating episode (symptoms lasting at least 36hours) and neurological examination evidence of two lesions  
*or*
- ii) At least two attacks, examination evidence of one lesion and a MRI scan with more than three white-matter abnormalities (combination of axial and sagittal T2 and FLAIR), at least one lesion periventricular  
*or*
- iii) One relapse of MS, clinical evidence of one lesion and a positive MRI, with new MR lesions developing over time  
*or*
- iv) Primary progressive myelopathy with a negative cranial MRI

**McDonald Criteria: 2001<sup>38</sup>**



Clinical Presentation	Additional Data Needed for MS Diagnosis
Two or more attacks; objective clinical evidence of 2 or more lesions	None <sup>a</sup>
Two or more attacks; objective clinical evidence of 1 lesions	Dissemination in space, demonstrated by MRI  <i>or</i>  Two or more MRI-detected lesions consistent with MS, plus positive CSF <sup>c</sup>  <i>or</i>  Await further clinical attack implicating a different site
One attack; objective clinical evidence of 2 or more lesions	Dissemination in time, demonstrated by MRI  <i>or</i>  Second clinical attack
One attack; objective clinical evidence of 1 lesion (monosymptomatic presentation; clinically isolated syndrome)	Dissemination in space, demonstrated by MRI  <i>or</i>  Two or more MRI-detected lesions consistent with MS plus positive CSF <sup>c</sup>  <i>and</i>  Dissemination in time, demonstrated by MRI  <i>or</i>  Second clinical attack
Insidious neurological progression suggestive of MS	Positive CSF <sup>c</sup>  <i>and</i>  Dissemination in space demonstrated by MRI as:  1) Nine or more T2 lesions in brain <i>or</i> 2) 2 or more lesions in spinal cord, <i>or</i> 3) 4-8 brain

	<p>plus 1 spinal cord lesion</p> <p><i>or</i></p> <p>Abnormal VEP<sup>e</sup> associated with 4-8 brain lesions, or with fewer than 4 brain lesions plus 1 spinal cord lesion demonstrated by MRI</p> <p><i>and</i></p> <p>Dissemination in time, demonstrated by MRI</p> <p><i>or</i></p> <p>Continued progression for 1 year</p>
<p>If criteria indicated are fulfilled, the diagnosis is Multiple Sclerosis (MS); if the criteria are not completely met, the diagnosis is “possible MS”; if the criteria are fully explored and not met, the diagnosis is “not MS”.</p> <p><sup>a</sup> No additional tests are required; however if tests (MRI, CSF) are undertaken and are negative, extreme caution should be taken before making a diagnosis of MS. Alternative diagnoses must be considered. There must be no better explanation for the clinical picture.</p> <p><sup>c</sup> Positive CSF determined by oligoclonal bands detected by established methods (preferably isoelectric focusing) different from any such bands in serum or by a raised IgG index</p> <p><sup>e</sup> Abnormal visual evoked potential of the type seen in MS (delay with a well-preserved wave form.)</p>	

**Polman criteria – revisions to McDonald criteria: 2005<sup>39</sup>**

Clinical Presentation	Additional Data Needed for MS Diagnosis
Two or more attacks; objective clinical evidence of 2 or more lesions	None <sup>a</sup>
Two or more attacks; objective clinical evidence of 1 lesion	<p>Dissemination in space, demonstrated by MRI</p> <p><i>or</i></p> <p>Two or more MRI-detected lesions consistent with MS, plus positive CSF<sup>c</sup></p>

	<p><i>or</i></p> <p>Await further clinical attack implicating a different site</p>
One attack; objective clinical evidence of 2 or more lesions	<p>Dissemination in time, demonstrated by MRI</p> <p><i>or</i></p> <p>Second clinical attack</p>
One attack; objective clinical evidence of 1 lesion (monosymptomatic presentation; clinically isolated syndrome)	<p>Dissemination in space, demonstrated by MRI</p> <p><i>or</i></p> <p>Two or more MRI-detected lesions consistent with MS plus positive CSF<sup>c</sup></p> <p><i>and</i></p> <p>Dissemination in time, demonstrated by MRI</p> <p><i>or</i></p> <p>Second clinical attack</p>
Insidious neurological progression suggestive of MS	<p>One year of disease progression (retrospectively or prospectively determined)</p> <p>and</p> <p>Two of the following:</p> <ul style="list-style-type: none"> <li>a) Positive brain MRI (nine T2 lesions or four or more T2 lesions with positive VEP)<sup>e</sup></li> <li>b) Positive spinal cord MRI (two focal T2 lesions)</li> <li>c) Positive CSF<sup>c</sup></li> </ul>
<p>If criteria indicated are fulfilled, the diagnosis is Multiple Sclerosis (MS); if the criteria are not completely met, the diagnosis is “possible MS”; if the criteria are fully explored and not met, the diagnosis is “not MS”.</p>	
<p><sup>a</sup>No additional test are required; however if tests (MRI, CSF) are undertaken and are negative, extreme caution should be taken before making a diagnosis of MS. Alternative</p>	

diagnoses must be considered. There must be no better explanation for the clinical picture.

<sup>c</sup> Positive CSF determined by oligoclonal bands detected by established methods (preferably isoelectric focusing) different from any such bands in serum or by a raised IgG index

<sup>e</sup> Abnormal visual evoked potential of the type seen in MS (delay with a well-preserved wave form).

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