

# neuroSTATUS

Standardised Neurological Examination and Assessment of Kurtzke's *Functional Systems*<sup>1</sup> and *Expanded Disability Status Scale*<sup>1</sup>

## SOURCE DOCUMENT

**SUBJECT NO/SUBJECT INITIALS**


**COUNTRY/CENTRE NO**


**NAME OF EDSS RATER**

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**DATE OF EXAMINATION**

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<sup>1</sup>slightly modified from J. F. Kurtzke, *Neurology* 1983;33,1444-52  
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*To ensure unbiased EDSS assessment, the EDSS rater should not inquire about the patients' condition except as necessary to perform the EDSS assessment.*

*Patients must be observed to walk the required distance.*

**NEUROSTATUS (NS)**

In the Neurostatus «signs only» is noted when the examination reveals signs of which the patient is unaware.

**FUNCTIONAL SYSTEMS (FS)**

A score of 1 in the Functional Systems implies that the patient is not aware of the deficit and that the deficit or sign does not interfere with normal daily activities (with the exceptions of optic, vegetative and cerebral functions).

**EXPANDED DISABILITY STATUS SCALE (EDSS)**

EDSS should not be lower than the highest score of the FS.

Symptoms which are not MS-related will not be taken into consideration for assessments, but should be noted.

In the definitions of EDSS grades 6.0 and 6.5 both a description of assistance required and of the walking range are included. In general, the distinction of bilateral versus unilateral assistance required to walk overrules the walking range.

However, the following exceptions are suggested,

If a patient is able to walk considerably longer than 100 m with two sticks, crutches or braces he is in grade 6.0.

If a patient is able to walk more than 10 m and less than 100 m with two sticks, crutches or braces he is in grade 6.5.

If a patient needs assistance by another person (as opposed to one stick, crutch or brace) and/or is not able to walk more than 50 m with one stick, crutch or brace he is in grade 6.5.

Definitions

**Visual acuity**

The visual acuity score is based upon the line on the Snellen chart at 20 feet (5 m) for which the patient makes no more than one error (use best available correction).

**Fields**

- 0 = normal
- 1 = signs only, deficits present only on formal testing
- 2 = moderate, patient aware of deficit, but incomplete hemianopsia on examination
- 3 = marked, complete homonymous hemianopsia or equivalent

**Scotoma**

- 0 = none
- 1 = small, detectable only on formal (confrontational) testing
- 2 = large, spontaneously reported by patient

**Disc pallor**

- 0 = not present
- 1 = present

OPTIC FUNCTIONS	OD	OS
Visual acuity (corrected)		
Visual fields		
Scotoma		
Disc pallor		

FUNCTIONAL SYSTEM SCORE	
0	0 = normal
1	1 = disc pallor and/or mild scotoma and/or visual acuity of worse eye (corrected) less than 30/30 (1.0) but better than 20/30 (0.67)
2	2 = worse eye with large scotoma and/or maximal visual acuity (corrected) of 20/30 to 20/59 (0.67–0.34)
3	3 = worse eye with large scotoma or moderate decrease in fields and/or maximal visual acuity (corrected) of 20/60 to 20/99 (0.33–0.2)
4	4 = worse eye with marked decrease of fields and/or maximal visual acuity (corrected) of 20/100 to 20/200 (0.1–0.2); grade 3 plus maximal acuity of better eye of 20/60 (0.3) or less
5	5 = worse eye with maximal visual acuity (corrected) less than 20/200 (0.1); grade 4 plus maximal acuity of better eye of 20/60 (0.3) or less
6	6 = grade 5 plus maximal visual acuity of better eye of 20/60 (0.3) or less

## Definitions

**Assessment of impairment/disability**

0 = normal

1 = signs only

2 = mild, clinically detectable numbness, facial weakness, dysarthria or cranial nerve deficits of which patient is aware

3 = moderate, diplopia with incomplete paralysis of any eye movement, impaired discrimination of sharp/dull in 1 or 2 trigeminal branches, trigeminal neuralgia, weakness of eye closure, cannot hear finger rub and/or misses several whispered numbers, obvious dysarthria during ordinary conversation impairing comprehensibility

4 = severe, complete loss of movement of either eye in one direction, impaired discrimination of sharp/dull or complete loss of sensation in the entire distribution of one or both trigeminal nerves, unilateral or bilateral facial palsy with lagophthalmus or difficulty with liquids, sustained difficulty with swallowing, incomprehensible voice

**Nystagmus**

0 = normal

1 = signs only

2 = mild, patient feels disturbed

3 = moderate, sustained nystagmus on 30° horizontal or vertical gaze, but not in primary position

4 = severe, sustained nystagmus in primary position or coarse persistent nystagmus in any direction interfering with visual acuity, complete internuclear ophthalmoplegia with sustained nystagmus of abducting eye, oscillopsia

**CRANIAL NERVE EXAMINATION**

EOM (extra ocular movements) impaired

Nystagmus

Trigeminal damage

Facial weakness

Hearing loss

Dysarthria

Dysphagia

Other bulbar signs

**FUNCTIONAL SYSTEM SCORE**

0 = normal

1 = signs only

2a = moderate nystagmus

2b = other mild disability

3a = severe nystagmus

3b = marked extraocular weakness

3c = moderate disability of other cranial nerves

4a = marked dysarthria

4b = other marked disability

5 = inability to swallow or speak

Definitions

\* = optional

**REFLEXES**

0 = absent, 1 = weak, 2 = normal, 3 = exaggerated, 4 = cloniform, 5 = inexhaustible (indicate difference between R & L by < or >)

**Plantar response**

0 = flexor, 1 = neutral, 2 = extensor

**Cutaneous reflexes**

0 = normal, 1 = weak, 2 = absent

**\*Palmomental reflex**

0 = absent, 1 = present

**LIMB STRENGTH**

The weakest muscle in each group defines the score for that group. Each movement should be tested, but only pathological findings should be noted using the BMRC grades. Use of functional tests like jumping with one foot, walking on toes or heels are recommended in order to assess grades 3-5 BMRC.

**BMRC Rating scale**

0 = no activity, 1 = visible contraction without visible joint movement, 2 = visible movements with elimination of gravity, 3 = movements against gravity possible but impaired, 4 = movements against resistance possible but impaired, 5 = normal strength

**FUNCTIONAL TESTS**

\*Position test UE (upper extremities)

Sinking, 0 = none, 1 = mild, 2 = evident

**\*Position test LE (lower extremities)**

Sinking, 0 = none, 1 = mild, 2 = evident

1 = only separate lifting possible (grades from horizontal position in hip joints...°)

2 = even separate lifting not possible

**\*Walking on heels/tiptoes**

0 = normal, 1 = impaired, 2 = not possible

**\*Monopodal hopping**

0 = normal, 1 = 6–10 times, 2 = 1–5 times, 3 = not possible

**LIMB SPASTICITY**

0 = normal, 1 = mild, barely increased muscular tone after rapid flexion of an extremity, 2 = moderate, 3 = severe, barely surmountable increased spastic tonus after rapid flexion of an extremity, 4 = contracted

**Gait spasticity**

0 = normal, 1 = barely perceptible, 2 = evident, minor interference with function, 3 = permanent shuffling, major interference with function

REFLEXES	R	><	L
Biceps			
Triceps			
Radial			
Knee			
Ankle			
Plantar response			
Cutaneous reflexes			
*Palmomental reflex			

**LIMB STRENGTH**

Shoulder			
Elbow flexors			
Elbow extensors			
Hand/finger flexors			
Hand/finger extensors			
Hip flexion			
Knee flexors			
Knee extensors			
Foot/toe flexors			
Foot/toe extensors			
*Position test UE, pronation			
*Position test UE, sinking			
*Position test LE, sinking			
only lifting of single leg possible		°	°
*Walking on heels			
*Walking on tiptoes			
*Hopping on one foot			

**SPASTICITY**

Arm		
Leg		
Gait		

**FUNCTIONAL SYSTEM SCORE**

0 = normal
1 = abnormal signs without disability
2 = minimal disability, patient complains about fatiguability in motor tasks and/or BMRC grade 4 in one or two muscle groups
3a = mild to moderate paraparesis or hemiparesis, full range of movement against gravity
3b = severe monoparesis, refers to BMRC grade 2 or less in one muscle group
4a = marked paraparesis or hemiparesis
4b = moderate tetraparesis (refers to BMRC grade 3)
4c = Monoplegia
5a = Paraplegia, grade 0 or 1 in all muscle groups of the lower limbs
5b = Hemiplegia
5c = Marked tetraparesis (BMRC grade 2 or less)
6 = Tetraplegia (grade 0 or 1 in all muscle groups of upper and lower limbs)

## Definitions

UE = upper extremities

LE = lower extremities

EO = eyes open

EC = eyes closed

**Head tremor, rebound**

0 = normal

1 = mild abnormality

2 = moderate abnormality

3 = severe abnormality

**Truncal ataxia**

0 = none

1 = signs only

2 = mild, swaying with EC

3 = moderate, swaying with EO

4 = severe, unable to sit without assistance

**Limb ataxia**

0 = none

1 = signs only

2 = mild, tremor or clumsy movements seen easily, minor interference with function

3 = moderate, tremor or clumsy movements interfere with function in all spheres

4 = severe, most functions are very difficult

**Gait ataxia**

0 = none

1 = signs only

2 = mild, abnormal balance only on heel or toe walking, or walking along a line

3 = moderate, abnormal balance on ordinary walking or while seated

4 = severe, unable to walk more than a few steps or requires support by another person or walking aid because of ataxia

**Romberg test**

0 = normal

1 = mild, mild insecurity with EC

2 = moderate, not stable with EC

3 = severe, not stable with EO

**Straight line walking**

0 = without problems

1 = impaired

2 = not possible

**Note**

The presence of severe gait ataxia alone results in a grade of 3 in the cerebellar FS. If weakness interferes with the testing of ataxia, score the patient's actual performance, but also indicate the possible role of weakness by marking the box marked 'X'.

**CEREBELLAR EXAMINATION**

Head tremor

Truncal ataxia, EO

Truncal ataxia, EC

	R	L
Tremor/dysmetria UE		
Tremor/dysmetria LE		
Rapid alternate movements impaired UE		
Rapid alternate movements impaired LE		
Gait ataxia, EO		
Straight line walking, EO		
Other, e.g. rebound		
Romberg test		

**FUNCTIONAL SYSTEM SCORE**

0 = normal

1 = abnormal signs without disability

2 = mild ataxia

3a = moderate truncal ataxia

3b = moderate limb ataxia

4 = severe ataxia in all limbs or trunk

5 = unable to perform coordinated movements due to ataxia

X = weakness (grade 3 or more on pyramidal) interferes with testing

## Definitions

\* = optional

UE = upper extremities

LE = lower extremities

**Superficial sensation – Touch/pain**

0 = normal

1 = mild, patient is aware of impaired light touch or pain, but able to discriminate sharp/dull

2 = moderate, impaired discrimination of sharp/dull

3 = severe, no discrimination of sharp/dull and/or unable to feel light touch

4 = complete loss, anaesthesia

**Vibration sense**

0 = normal

1 = mild, graded tuning fork 5–7 of 8 (alternatively) detects more than 10 sec. but less than examiner

2 = moderate, graded tuning fork 1–4 of 8 (alternatively) detects more than 2 sec. but less than 11 sec.

3 = marked, complete loss of vibration sense

**Position sense / Romberg test**

0 = normal

1 = mild, 1–2 incorrect responses on testing, only distal joints affected/slight stagger during Romberg testing

2 = moderate, misses many movements of fingers or toes, proximal joints affected/unable to stand during Romberg testing without assistance

3 = marked, no perception of movement/astasia

**\*Lhermitte**

0 = negative

1 = positive

**\*Paraesthesia (tingling)**

0 = none

1 = present

SENSORY EXAMINATION	R	L
Superficial sensation (touch/pain) UE		
Superficial sensation trunk		
Superficial sensation LE		
Vibration sense UE		
Vibration sense LE		
Position sense UE		
Position sense LE		
*Lhermitte		
*Paraesthesiae UE		
*Paraesthesiae trunk		
*Paraesthesiae LE		

**FUNCTIONAL SYSTEM SCORE**

0 = normal
1 = mild vibration or figure-writing decrease only in 1 or 2 limbs
2a = mild decrease in touch or pain or position sense and/or moderate decrease in vibration in 1 or 2 limbs 2b = vibration or figure-writing decrease, alone or in 3 or 4 limbs
3a = moderate decrease in touch or pain or position sense and/or essentially lost vibration in 1 or 2 limbs 3b = mild decrease in touch or pain and/or moderated decrease in all proprioceptive tests in 3 or 4 limbs
4a = marked decrease in touch or pain or loss of proprioception, alone or combined in 1 or 2 limbs 4b = moderate decrease in touch or pain and/or severe proprioceptive decrease in more than 2 limbs
5a = loss (essentially) of sensation in 1 or 2 limbs 5b = moderate decrease in touch or pain and/or loss or proprioception for most of the body below the head
6 = sensation essentially lost below the head

Definitions

\* = optional

**BLADDER**

**Hesitancy/retention**

- 0 = none
- 1 = mild, no major impact on lifestyle
- 2 = moderate, urine retention, frequent UTI
- 3 = severe, requires catheterisation
- 4 = loss of function, overflow incontinence

**Urgency/incontinence**

- 0 = none
- 1 = mild, no major impact on lifestyle
- 2 = moderate, rare incontinence, no more than once a week, must wear pads
- 3 = severe, frequent incontinence, several times a week up to once daily, must wear urinal
- 4 = loss of function, loss of bladder control

**Catheterisation**

- 0 = none
- 1 = intermittent, up to twice daily
- 2 = intermittent, > twice daily
- 3 = constant

**Bowel**

- 0 = none
- 1 = mild, no incontinence, no major impact on lifestyle, constipation
- 2 = moderate, must wear pads or alter lifestyle to be near lavatory
- 3 = severe, in need of intermittent enemata
- 4 = complete loss of function

**\*Sexual dysfunction**

- 0 = none
- 1 = mild
- 2 = moderate
- 3 = severe
- 4 = loss

<b>BLADDER AND BOWEL FUNCTIONS</b>	
Hesitancy/retention	
Urgency/incontinence	
Catheterisation	
Bowel dysfunction	
* Sexual dysfunction	

<b>FUNCTIONAL SYSTEM SCORE</b>	
0	0 = normal
1	1 = mild urinary hesitancy, urgency and/or constipation
2	2 = moderate urinary hesitancy and/or urgency and/or rare incontinence and/or severe constipation
3	3 = frequent urinary incontinence or intermittent self catheterisation once or twice a day, needs constantly enemata or manual measures to evacuate bowel
4	4 = in need of almost constant catheterisation, intermittent self catheterisation more than twice a day
5	5 = loss of bladder function, external or indwelling catheter
6	6 = loss of bowel and bladder function



**Definitions**

The presence of depression and/or euphoria alone results in a score of 1 on the cerebral FS, but does not affect the EDSS score.

**Depression/euphoria**

0 = none

1 = present

Patient complains of depression or is considered depressed or euphoric by the investigator or «significant other».

**Decrease in mentation**

0 = none

1 = mild, difficulties apparent to patient and «significant other» such as impaired ability to follow a rapid course of association and of surveying complex matters, impaired judgement in certain demanding situations, able to handle the daily routine, but no tolerance for additional stressors, intermittently symptomatic to even normal levels of stress, reduced performance, tendency toward negligence due to obliviousness or fatigue.

However, not apparent while taking the history or performing the routine neurological examination.

2 = moderate, definite abnormalities on formal mental status testing, but still oriented to time, place and person

3 = marked, not oriented in 1 or 2 spheres of time, place or person, marked effect on lifestyle

4 = dementia, confusion and/or complete disorientation

**Fatigue**

0 = none

1 = present

Fatigue that interferes with daily activity will be scored with a maximum of 2 in the FS.

**MENTAL STATUS EXAMINATION**

<b>MENTAL STATUS EXAMINATION</b>	
Depression	
Euphoria	
Decrease in mentation	
Fatigue	

**FUNCTIONAL SYSTEM SCORE**

0 = normal
1 = mood alteration only (does not affect EDSS score)
2 = mild decrease in mentation/fatigue
3 = moderate decrease in mentation
4 = marked decrease in mentation
5 = dementia

**Definitions**

Actual walking distance without assistance obligatory up to 500 m (if possible). Actual walking distance with assistance obligatory up to 150 m (if possible).

In the definitions of EDSS grades 6.0 and 6.5 both a description of assistance required and of the walking range are included. In general, the distinction of bilateral versus unilateral assistance required to walk overrules the walking range.

However, the following exceptions are suggested,

If a patient is able to walk considerably longer than 100 m (> 120) with two sticks, crutches or braces he is in grade 6.0.

If a patient is able to walk more than 10 m and less than 100 m with two sticks, crutches or braces he is in grade 6.5.

If a patient needs assistance by another person (as opposed to one stick, crutch or brace) and/or is not able to walk more than 50 m with one stick, crutch or brace he is in grade 6.5.

**AMBULATION**

**Walking range as reported (without help or sticks)**

	meters
in	min

**Able to walk without rest or assistance**

<input type="checkbox"/>	> 100 meters, but < 200 meters
<input type="checkbox"/>	> 200 meters, but < 300 meters
<input type="checkbox"/>	> 300 meters, but < 500 meters
<input type="checkbox"/>	> 500 meters
<input type="checkbox"/>	Unrestricted

Actual distance (obligatory up to 500 m if possible)

	meters
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**Unable to walk 100 m without constant assistance**

Unilateral assistance		meters
	Cane/crutch	
	Other	
Bilateral assistance		meters
	Cane/crutch	
	Other	
Other person		

**SYNOPSIS OF FS SCORES**

	Visual <sup>1</sup>
	Brainstem
	Pyramidal
	Cerebellar
	Sensory
	Bladder/Bowel <sup>2</sup>
	Mental

<sup>1</sup> For calculation of the EDSS the score of the visual FS is to be converted as follows, 6=4; 5=3; 4=3; 3=2; 2=2; 1=1.

<sup>2</sup> Scores 5 and 6 in the bowel/bladder FS are converted to 4 and 5 respectively.

EDSS steps below 4 refer to patients who are fully ambulatory, and the precise step is defined by the functional systems (FS) score(s). EDSS steps between 4.0 and 5.0 are defined by both FS-scores and walking range. In general, the worst of both should determine the score. Steps 5.5-8.0 are exclusively defined by ability to ambulate or use wheelchair.

EDSS should not change by 1.0 step unless there is a change in same direction of at least one step in at least one FS. EDSS should not be lower than each of FS (excepted visual and bowel/bladder FS).

<p>0 normal neurological exam (all grade 0 in FS)</p> <p>1.0 no disability, minimal signs in one FS1 (i.e. grade 1)</p> <p>1.5 no disability, minimal signs in more than one FS1 (more than one grade 1)</p> <p>2.0 minimal disability in one FS (one FS grade 2, others 0 or 1)</p> <p>2.5 minimal disability in two FS (two FS grade 2, others 0 or 1)</p> <p>3.0 moderate disability in one FS (one FS grade 3, others 0 or 1) or mild disability in three or four FS (three/four FS grade 2, others 0 or 1) though fully ambulatory</p> <p>3.5 fully ambulatory but with moderate disability in one FS (one grade 3) and one or two FS grade 2; or two FS grade 3; or five FS grade 2 (others 0 or 1)</p> <p>4.0 ambulatory without aid or rest for &gt; 500 m; up and about some 12 hours a day despite relatively severe disability consisting of one FS grade 4 (others 0 or 1), or combinations of lesser grades exceeding limits of previous steps</p> <p>4.5 ambulatory without aid or rest for &gt; 300 m; up and about much of the day; characterised by relatively severe disability usually consisting of one FS grade 4 or combinations of lesser grades exceeding limits of previous steps</p>	<p>5.0 ambulatory without aid or rest for &gt;200 m (usual FS equivalents are one grade 5 alone, others 0 or 1; or combinations of lesser grades usually exceeding specifications for step 4.5)</p> <p>5.5 ambulatory without aid or rest &gt; 100 m</p> <p>6.0 unilateral assistance (cane or crutch) required to walk at least 100m with or without resting</p> <p>6.5 constant bilateral assistance (canes or crutches) required to walk at least 20 m without resting</p> <p>7.0 unable to walk 20m even with aid, essentially restricted to wheelchair; wheels self and transfers alone; up and about in wheelchair some 12 h a day</p> <p>7.5 unable to take more than a few steps; restricted to wheelchair; may need some help in transfer and in wheeling self</p> <p>8.0 essentially restricted to bed or chair or perambulated in wheelchair, but out of bed most of day; retains many self-care functions; generally has effective use of arms</p> <p>8.5 essentially restricted to bed much of the day; has some effective use of arm(s); retains some self-care functions</p> <p>9.0 helpless bed patient; can communicate and eat</p> <p>9.5 totally helpless bed patient; unable to communicate effectively or eat/swallow</p> <p>10.0 death due to MS</p>
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Actual EDSS
Signature

<sup>1</sup> Mental function's grade 1 does not contribute to EDSS-step definitions