

# INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)



Patient Name	Date/Time of Exam	

Examiner Name	Signature
	Signature

RIGHT MOTOR KEY MUSCLES	SENSORY KEY SENSORY POINTS Light Touch (LT) Pin Prick (PP)		SENSORY KEY SENSORY POINTS Light Touch (LT) Pin Prick (PP)	MOTOR LEFT
UER (Upper Extremity Right)    Elbow flexors C5   5	3 2 2 2 2 2 2 2 2 2 2 3 2 2 2 2 3 2 2 2 2 3 4 2 2 2 2	C2  C4  T3  T4  T5  T6  T6  T7  T8  T10  T11  T12  L1  Palm  Palm  Points  L2  Dorsum  L4  L5  L5	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	C2 C3 C4  5 C5 C6 Wrist extensors C7 Elbow extensors C8 Finger flexors T1 Finger abductors (little finger)  T2 MOTOR (SCORING ON REVERSE SIDE)  0 = total paralysis 1 = palpable or visible contraction 2 = active movement, against gravity 4 = active movement, against full resistance 5 = active movement, against full resistance 5 = active movement, against full resistance 5 = normal corrected for pain/disuse NT = not testable  SENSORY (SCORING ON REVERSE SIDE)  10 = absent 2 = normal 1 = altered NT = not testable  L2 Hip flexors L3 Knee extensors L4 Ankle dorsiflexors (Lower Extremity Left) L5 Long toe extensors L5 L4 Ankle plantar flexors  S2 S3 S4-5  No (DAP) Deep anal pressure (Yes/No)  LEFT TOTALS (50) (MAXIMUM)
MOTOR SUBSCORES  UER 25 + UEL 25 = UEMS TOTAL 50  MAX (25) (25) (50)	_ER 0 + LEL 25 = MAX (25) (25)	SENSORY SUI * LEMS TOTAL 25 RLT 38 + LL (50) MAX (56)		
NEUROLOGICAL LEVELS Steps 1-5 for classification as on reverse  1. SENSORY T12 L1 2. MOTOR T12 S1	3. NEUROLOGICAL LEVEL OF INJURY (NLI)	4. COMPLETE OR INCO. Incomplete = Any sensory or motor ful  5. ASIA IMPAIRMENT SC.	MPLETE? C Z	(In complete injuries only) ONE OF PARTIAL PRESERVATION caudal level with any innervation  R L SENSORY L1 L4 MOTOR T12 S1

## **Muscle Function Grading**

 $\mathbf{0}$  = total paralysis

**1** = palpable or visible contraction

**2** = active movement, full range of motion (ROM) with gravity eliminated

**3** = active movement, full ROM against gravity

**4** = active movement, full ROM against gravity and moderate resistance in a muscle specific position

**5** = (normal) active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person

**5\*** = (normal) active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present

**NT** = not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amoutation of limb, or contracture of > 50% of the normal range of motion)

# **Sensory Grading**

 $\mathbf{0} = \mathsf{Absent}$ 

**1** = Altered, either decreased/impaired sensation or hypersensitivity

**2** = Normal

**NT** = Not testable

# **Non Key Muscle Functions (optional)**

May be used to assign a motor level to differentiate AIS B v	/s. C
Movement	<b>Root level</b>
<b>Shoulder:</b> Flexion, extension, abduction, adduction, internal and external rotation <b>Elbow:</b> Supination	C5
Elbow: Pronation Wrist: Flexion	C6
<b>Finger:</b> Flexion at proximal joint, extension. <b>Thumb:</b> Flexion, extension and abduction in plane of thumb	<b>C7</b>
<b>Finger:</b> Flexion at MCP joint <b>Thumb:</b> Opposition, adduction and abduction perpendicular to palm	C8
Finger: Abduction of the index finger	T1
Hip: Adduction	L2
<b>Hip</b> : External rotation	L3
Hip: Extension, abduction, internal rotation Knee: Flexion Ankle: Inversion and eversion Toe: MP and IP extension	L4
Hallux and Toe: DIP and PIP flexion and abduction	L5
Hallux: Adduction	<b>S</b> 1

# **ASIA Impairment Scale (AIS)**

**A = Complete** No sensory or motor function is preserved in the sacral segments S4-5

**B = Sensory Incomplete** Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body

**C** = **Motor Incomplete** Motor function is preserved below the neurological level\*\*, and more than half of key muscle functions below the neurological level of injury (NLI) have a muscle grade less than 3 (Grades 0-2)

**D** = **Motor Incomplete** Motor function is preserved below the neurological level\*\*, and at least half (half or more) of key muscle functions below the NLI have a muscle grade > 3

**E = Normal** If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade

\*\* For an individual to receive a grade of C or D, i.e. motor incomplete status, they must have either (1) voluntary anal sphincter contraction or (2) sacral sensory sparing with sparing of motor function more than three levels below the motor level for that side of the body. The International Standards at this time allows even non-key muscle function more than 3 levels below the motor level to be used in determining motor incomplete status (AIS B versus C)

NOTE: When assessing the extent of motor sparing below the level for distinguishing between AIS B and C, the *motor level* on each side is used; whereas to differentiate between AIS C and D (based on proportion of key muscle functions with strength grade 3 or greater) the **neurological level of injury** is used



## INTERNATIONAL STANDARDS FOR NEUROLOGICAL **CLASSIFICATION OF SPINAL CORD INJURY**



# **Steps in Classification**

The following order is recommended for determining the classification of individuals with SCI

#### 1. Determine sensory levels for right and left sides.

The sensory level is the most caudal, intact dermatome for both pin prick and light touch sensation

#### 2. Determine motor levels for right and left sides.

Defined by the lowest key muscle function that has a grade of at least 3 (on supine testing), providing the key muscle functions represented by segments above that level are judged to be intact (graded as a 5) Note: In regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level, if testable motor function above that level is also normal

#### 3. Determine the neurological level of injury (NLI)

This refers to the most caudal segment of the cord with intact sensation and antigravity (3 or more) muscle function strength, provided that there is normal (intact) sensory and motor function rostrally respectively The NLI is the most cephalad of the sensory and motor levels determined in steps 1 and 2

#### 4. Determine whether the injury is Complete or Incomplete.

(i.e. absence or presence of sacral sparing) If voluntary anal contraction = **No** AND all S4-5 sensory scores =  $\mathbf{0}$ AND deep anal pressure = **No.** then injury is **Complete** Otherwise, injury is **Incomplete** 

## 5. Determine ASIA Impairment Scale (AIS) Grade:

Is injury Complete? If YES, AIS=A and can record

NO

ZPP (lowest dermatome or myotome on each side with some preservation)

#### Is injury Motor Complete? If YES, AIS=B



(No=voluntary anal contraction OR motor function more than three levels below the motor level on a given side, if the patient has sensory incomplete classification)

Are at least half (half or more) of the key muscles below the neurological level of injury graded 3 or better?



### If sensation and motor function is normal in all segments, AIS=E

Note: AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact; the ASIA Impairment Scale does not apply