# *Spinal Cord Injury - Functional Rehabilitation 4th edition Somers Test Bank*

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Chapter 2 Spinal Cord Injuries

Multiple Choice

1. A patient has a spinal cord injury. The motor levels are right C5 and left C6. The sensory levels are right C7 and left C8. What is the single neurological level of injury?
a. C5
b. C6
c. C7
d. C8

Answer: a

| | Rationale |
|---|---|
| **a** | If a lesion is asymmetrical, a person may have as many as four sensory and motor levels: right sensory, left sensory, right motor, and left motor. The single neurological level of injury (NLI) is the most *rostral* (highest) of these four levels. In this case, C5 is the most rostral of the patient's motor and sensory levels. |
| b | C6 is not the most rostral of the patient's motor and sensory levels. |
| c | C7 is not the most rostral of the patient's motor and sensory levels. |
| d | C8 is not the most rostral of the patient's motor and sensory levels. |

2. A patient who has a spinal cord injury tests 0 in all key muscles, as well as all key sensory points, on both sides of the body. They are able to contract the anus voluntarily and can sense deep anal pressure. What is the correct American Spinal Injury Association (ASIA) Impairment Scale (AIS) classification for this patient's lesion?
a. A
b. B
c. C
d. D

Answer: c

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| | Rationale |
|---|---|
| **c** | Because the patient exhibits motor sparing in the lowest sacral segment (voluntary anal contraction), the AIS classification is C. |
| a | The AIS A classification requires absent motor and sensory sparing in the lowest sacral segment. This patient has both motor (voluntary anal contraction) and sensory (deep anal pressure) sparing. |
| b | The AIS B classification requires that no motor function is preserved more than three levels below the motor level on either side of the body. The voluntary motor function shown with voluntary anal contraction indicates that the AIS classification is C, not B. |
| d | The AIS D classification requires at least half of key muscle functions below the NLI to have a muscle grade of 3 or greater. This patient exhibits 0 strength in all key muscles. |

3. Of the following options, which is **MOST** likely to trigger an episode of autonomic dysreflexia?
a. Moving from supine to sitting
b. Moving from sitting to supine
c. Fatigue
d. Full bladder

Answer: d

| | Rationale |
|---|---|
| **d** | Any noxious stimulus below the lesion can cause autonomic dysreflexia (AD). Common origins of this noxious stimulus include bladder or rectal distention, urinary tract infection, and bowel impaction. |
| a | Change in position is not a noxious stimulus below the lesion. Moving from supine to sitting can cause orthostatic hypotension (OH), not AD. |
| b | Change in position is not a noxious stimulus below the lesion. |
| c | Fatigue is not a noxious stimulus below the lesion. |

4. A patient has more severe weakness in the upper extremities than in the lower extremities. These findings are **MOST** consistent with

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a. Brown-Séquard syndrome
b. Anterior cord syndrome
c. Central cord syndrome
d. Posterior cord syndrome

Answer: c

| | Rationale |
|---|---|
| **c** | People with central cord syndrome exhibit more pronounced weakness in their upper extremities than in their lower extremities. |
| a | People with Brown-Séquard syndrome exhibit more severe motor and proprioceptive deficits on the side of the lesion and more severe loss of sensitivity to pin prick and temperature on the contralateral side. |
| b | Anterior cord syndrome is associated with preserved proprioception and light touch combined with variable loss of motor function and pain and temperature sensation. |
| d | Posterior cord syndrome is associated with loss of proprioception, vibratory sensation, and two-point discrimination. Deep pressure may also be impaired. |

5. Which of the following muscles or muscle groups is the C6 key muscle for International Standards for Neurological Classification of Spinal Cord Injuries (ISNCSCI) classification?
a. Elbow extensors
b. Wrist extensors
c. Finger flexors
d. Elbow flexors

Answer: b

| | Rationale |
|---|---|
| **b** | Wrist extensors are the C6 key muscles. |
| a | Elbow extensors are the C7 key muscles. |
| c | Finger flexors are the C8 key muscles. |
| d | Elbow flexors are the C5 key muscles. |

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6. A patient has T3 paraplegia resulting from an injury 1 week ago. After the therapist assists them into a short-sitting position at the edge of the bed, the patient reports feeling as if they are about to pass out. Which of the following conditions should the therapist suspect based on the patient's report?
a. Autonomic dysreflexia
b. Reduced exercise tolerance
c. Myocardial infarction
d. Orthostatic hypotension

Answer: d

| | Rationale |
|---|---|
| **d** | Orthostatic hypotension (OH) is characterized by a drop in blood pressure that occurs when the individual moves from a horizontal to an upright position. A person with OH may experience, among other things, dizziness, lightheadedness, ringing in the ears, and loss of consciousness. OH typically is transient and resolves within a few weeks of injury. The patient's reported symptoms, time since injury, and apparent triggering by a change of position are all consistent with OH. |
| a | Autonomic dysreflexia (AD) is triggered by a noxious stimulus below the lesion, not a change in position as described in this question. Symptoms of AD include a pounding headache, blurred vision, spots in the visual fields, nasal congestion, paresthesias in the neck and shoulders, and anxiety. Typically, AD first appears 6 or more months after the injury. The patient's reported symptoms, time since injury, and apparent triggering by a change of position are all consistent with OH, not AD. |
| b | This patient's symptoms are brought on by a change in position, not exercise. |
| c | The patient's reported symptoms, time since injury, and apparent triggering by a change of position are all consistent with OH. Although lightheadedness and sudden dizziness can be associated with myocardial infarction (MI), this question does not describe any other signs or symptoms that could indicate an MI. |

7. Which of the following options **BEST** describes spinal shock?
a. Demyelination of axons in the peripheral portion of the spinal cord
b. Destruction of cell bodies in the central portion of the spinal cord
c. Permanent cessation of spinal cord function below the lesion
d. Temporary cessation of spinal cord function below the lesion

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Answer: d

| | Rationale |
|---|---|
| **d** | Spinal shock is a transient phenomenon that occurs after trauma to the spinal cord. Spinal reflexes, voluntary motor and sensory function, and autonomic control are absent or depressed caudal to the lesion during spinal shock. |
| a | Demyelination of axons is one of the mechanisms of secondary tissue destruction that follows spinal cord injury, but it is not an accurate description of spinal shock. |
| b | Destruction of cell bodies within the spinal cord is a mechanism of the primary injury to the cord caused by blunt trauma, but it is not an accurate description of spinal shock. |
| c | Spinal shock involves temporary, not permanent, cessation of spinal cord function below the lesion. |

8. **Case-Based Scenario:** A patient who has sustained a traumatic spinal cord injury presents with the following motor and sensory examination results.

**Voluntary Motor Function:**

| | R | L | | R | L |
|---|---|---|---|---|---|
| Quadriceps | 3/5 | 4/5 | Gluteus maximus | 0/5 | 0/5 |
| | 5/5 | 5/5 | Anterior tibialis | 2/5 | 3/5 |
| Plantar flexors | 0/5 | 0/5 | Hamstrings | 0/5 | 0/5 |
| Long toe extensors | 0/5 | 0/5 | Gluteus medius | 0/5 | 0/5 |

- All upper extremity muscle strength is 5/5.
- Rectus abdominis contraction is palpable from the ribs to the pubis.
- Voluntary anal contraction is absent.

**Sensation:**

- In key sensory points bilaterally, light touch and pin prick are intact in C1 to L4, diminished in L5, and absent below L5. Deep anal pressure sensation is absent.

What are the patient's motor levels using ISNCSCI classification?
a. Right L2, left L2
b. Right L3, left L3
c. Right L2, left L3
d. Right L3, left L4

Answer: b

| | Rationale |
|---|---|

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| | |
|---|---|
| **b** | On both the right and left, the L3 key muscles (knee extensors) are the most caudally innervated muscles that exhibit grade 3 or higher muscle strength with all key muscles rostral to that level (hip flexors, upper extremity muscles) exhibiting grade 5 strength. |
| a | On both the right and left, the L3 key muscles (knee extensors), not the L2 key muscles (hip flexors), are the most caudally innervated muscles that exhibit grade 3 or higher muscle strength with all key muscles rostral to that level exhibiting grade 5 strength. |
| c | L2 on the right is incorrect because the L3 key muscle on that side has grade 3 strength and all key muscles rostral to L3 have grade 5 strength. |
| d | L4 on the left is incorrect because, although the L4 key muscle (dorsiflexors) test grade 3, the next more rostral muscle (quadriceps, L3) exhibits only grade 4 strength. |

**9. Case-Based Scenario:** A patient who has sustained a traumatic spinal cord injury presents with the following motor and sensory examination results.

**Voluntary Motor Function:**

| | R | L | | R | L |
|---|---|---|---|---|---|
| Quadriceps | 3/5 | 4/5 | Gluteus maximus | 0/5 | 0/5 |
| Hip flexors | 5/5 | 5/5 | Anterior tibialis | 2/5 | 3/5 |
| Plantar flexors | 0/5 | 0/5 | Hamstrings | 0/5 | 0/5 |
| Long toe extensors | 0/5 | 0/5 | Gluteus medius | 0/5 | 0/5 |

- All upper extremity muscle strength is 5/5.
- Rectus abdominis contraction is palpable from the ribs to the pubis.
- Voluntary anal contraction is absent.

**Sensation:**

- In key sensory points bilaterally, light touch and pin prick are intact in C1 to L4, diminished in L5, and absent below L5. Deep anal pressure sensation is absent.

What is the single neurological level of injury using ISNCSCI classification?
a. L2
b. L3
c. L4
d. L5

Answer: b

| | Rationale |
|---|---|
| **b** | A person may have as many as four sensory and motor levels: right sensory, left sensory, right motor, and left motor. The single NLI is the most *rostral* (highest) of these four levels. The motor level is L3 on both sides. Sensory level is L4 bilaterally. Thus, L3, the |

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| | |
|---|---|
| | most rostral of these two levels, is the single NLI. |
| a | The NLI is L3, not L2, because the highest motor or sensory level for this patient is L3. |
| c | The NLI is L3, not L4, because the highest motor or sensory level for this patient is L3. |
| d | The NLI is L3, not L5, because the highest motor or sensory level for this patient is L3. |

**10. Case-Based Scenario:** A patient who has sustained a traumatic spinal cord injury presents with the following motor and sensory examination results.

**Voluntary Motor Function:**

| | R | L | | R | L |
|---|---|---|---|---|---|
| Quadriceps | 3/5 | 4/5 | Gluteus maximus | 0/5 | 0/5 |
| Hip flexors | 5/5 | 5/5 | Anterior tibialis | 2/5 | 3/5 |
| Plantar flexors | 0/5 | 0/5 | Hamstrings | 0/5 | 0/5 |
| Long toe extensors | 0/5 | 0/5 | Gluteus medius | 0/5 | 0/5 |

- All upper extremity muscle strength is 5/5.
- Rectus abdominis contraction is palpable from the ribs to the pubis.
- Voluntary anal contraction is absent.

**Sensation:**

- In key sensory points bilaterally, light touch and pin prick are intact in C1 to L4, diminished in L5, and absent below L5. Deep anal pressure sensation is absent.

What is the AIS (ASIA Impairment Scale) classification of this spinal cord injury?
a. A
b. B
c. C
d. D

Answer: a

| | Rationale |
|---|---|
| **a** | Because there is no sensory or motor sparing in the lowest sacral segment, including no deep anal pressure sensation or voluntary anal contraction, this patient's lesion is complete (AIS A). |
| b | The AIS B classification requires sparing of light touch and/or pin prick sensation in the S4 to S5 key sensory point, sparing of deep anal pressure, or both. |

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| | |
|---|---|
| c | This patient's lesion is complete (AIS A) because there is no sensory or motor sparing in the lowest sacral segment. |
| d | This patient's lesion is complete (AIS A) because there is no sensory or motor sparing in the lowest sacral segment. |

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