Neurological Spinal Examination

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Spine exam includes motor and sensory exam of the extremities, trunk region and deep tendon reflexes. A thorough spinal exam can help localize the problem to more specific spinal regions (cervical/thoracic/lumbar). Understanding the individual muscle groups and which nerve controls them will aid in a more accurate assessment.

When testing each individual muscle group it is important to utilize the standard motor strength grading scale to keep measurements consistent between each examiner so a true change in exam is easily recognized and can be evaluated.

**MOTOR STRENGTH GRADING SCALE**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>0</td>
<td>No detectable muscle contraction</td>
</tr>
<tr>
<td>1</td>
<td>Weak muscle contraction observed or palpated without active movement</td>
</tr>
<tr>
<td>2</td>
<td>Active movement of body part when effect of gravity is eliminated</td>
</tr>
<tr>
<td>3</td>
<td>Active movement of body part against gravity</td>
</tr>
<tr>
<td>4 (+/-)</td>
<td>Active movement of body part against gravity with some resistance</td>
</tr>
<tr>
<td>5</td>
<td>Active movement of body part against gravity with full resistance (normal muscle strength)</td>
</tr>
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Note that grade 4 is the only grade that has (+/-). All other grades are definitive and (+/-) is not applicable. 4- slight resistance, 4 moderate resistance, 4+ strong resistance but not quite full strength.

**REFLEX NORMAL VS ABNORMAL**

DTR (deep tendon reflexes) grading scale ranges 0-4 with normal being 2

<table>
<thead>
<tr>
<th>Reflex</th>
<th>Scale</th>
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<tbody>
<tr>
<td>Bicep (C5/6)</td>
<td>0 = no response; always abnormal</td>
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<tr>
<td>Brachioradialis (C6)</td>
<td>1+ = a slight but definitely present response; may or may not be normal</td>
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<tr>
<td>Triceps (C7)</td>
<td>2+ = a brisk response; normal</td>
</tr>
<tr>
<td>Patellar (L4)</td>
<td>3+ = a very brisk response; may or may not be normal</td>
</tr>
<tr>
<td>Ankle (S1)</td>
<td>4+ = A tap elicits a repeating reflex (clonus); always abnormal</td>
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**Abnormal/ Pathological Reflexes in Adult patient**

**Hoffmans:** when tapping the middle finger the thumb and index finger pinch together. This is a sign of cord compression or injury.

**Babinski:** When taking an instrument and drawing on the bottom of the foot from heel to great toe the great toe flexes up and out. Can be a sign of cerebellar pathology or cervical myelopathy.

**Clonus:** take foot and flex upward (count beats) abnormal >3 beat. Can be related to spinal cord injury, cerebellar injury, encephalopathy.

Hyperactive DTRs are more indicative of spinal cord injury/Cord compression.

Hypoactive DTRs are more related to nerve compression.

Abnormal reflexes can also be seen in anxious states.
**SENSATION**

*Dermatomes*: region of skin that relates to a specific spinal nerve root

- **C5**: Lateral upper arm
- **C6**: Radial forearm, thumb and index finger ("6 shooter")
- **C7**: Middle finger
- **C8**: Ulnar forearm, ring finger and little finger
- **T1**: Medial arm
- **T2**: Upper medial arm
- **T4**: Nipple line
- **T10**: Umbilicus line
- **T12**: Groin line
- **L1**: Anterior top lateral to medial thigh
- **L2**: Anterior middle lateral to medial thigh
- **L3**: Anterior lower to medial thigh
- **L4**: Anterior thigh to big toe "L4 to the floor"
- **L5**: Lateral aspect thigh to medial foot and 2-5 toes
- **S1**: Posterior leg to bottom of foot

**MOTOR**

*Myotomes*: the muscles and which spinal nerve is responsible for movement

You will check right and left side of patient in all myotomes. Be sure to use same arm/hand to test as there is a slight strength difference between your dominate and non-dominant hand. Isolate the muscle group by placing your non-examining hand on the muscle you are testing.

- **C4 Trapezius**
  - **SHOULDER SHRUG**: Have patient shrug shoulders. Push down against their shoulders
- **C5 Deltoid**
  - **SHOULDER ABDUCTION**: Have patient bend arms and elevated to in line with shoulders and push down on elbows - “chicken wings”
- **C6 Biceps**
  - **ELBOW FLEXION**: Have patient hold your hand and pull arm into flexed/ bent position
  - **WRIST EXTENSION**: Have patient pull wrist up, push down on wrist
- **C7 Triceps**
  - **ELBOW EXTENSION**: Have patient place hand against your hand and push to full arm extension
  - **WRIST FLEXION**: Have patient push wrist down
- **C8 Grip**
  - **FINGER FLEXION**: Have patient grip two of your fingers and squeeze, attempt to pull your fingers out
- **T1 Intrinsic**
  - **FINGER SPAN**
  - **ABDUCTION**: Have patient spread fingers apart and attempt to squeeze them together typically squeeze index and pinky fingers
- **L2 Psoas**
  - **HIP FLEXOR**: Have patient lift thigh with knee bend up toward chest and push down on thigh
- **L3 Quadriceps**
  - **LEG EXTENSION**: Have patient lift leg up with knee straight and press down on shin
- **L4 Ankle dorsiflexion**
  - Have patient pull foot up toward their knee and push down on top of foot
- **L5 Extensor Hallucis Longus (EHL)**
  - **GREAT TOE EXTENSION**: Have patient pull up on great toe and push down on great toe
- **S1 Gastrocnemius**
  - **FOOT EVERSION**: Have patient turn foot in medially and push on medial aspect laterally
  - **PLANTAR FLEXION**: Have patient push foot down and push up on foot
- **S2, S3, S4 External Bladder sphincter**

Bladder control

*All Neuroscience Nursing Primer references listed on special reference page.*