

# 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

Grade	Meaning
0	No detectable muscle contraction
1	Weak muscle contraction observed or palpated without active movement
2	Active movement of body part when effect of gravity is eliminated
3	Active movement of body part against gravity
4 (+/-)	Active movement of body part against gravity with some resistance
5	Active movement of body part against gravity with full resistance (normal muscle strength)

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**

### Reflex

Bicep (C5/6)  
Brachioradialis (C6)  
Triceps (C7)  
Patellar (L4)  
Ankle (S1)

### Scale

0 = no response; always abnormal  
1+ = a slight but definitely present response; may or may not be normal  
2+ = a brisk response; normal  
3+ = a very brisk response; may or may not be normal  
4+ = A tap elicits a repeating reflex (clonus); always abnormal

### 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.

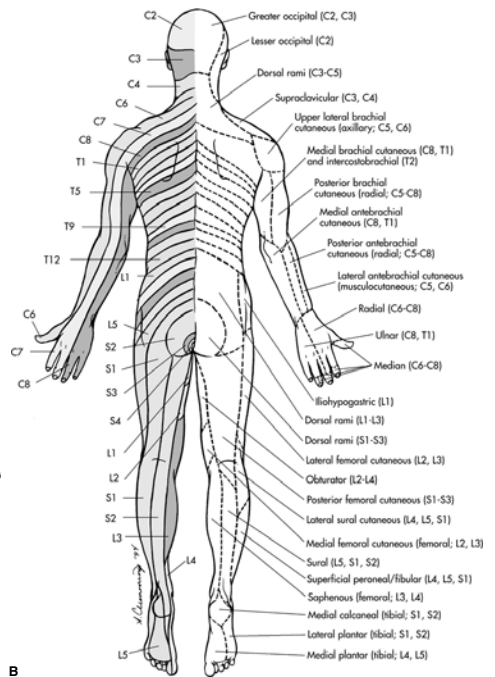
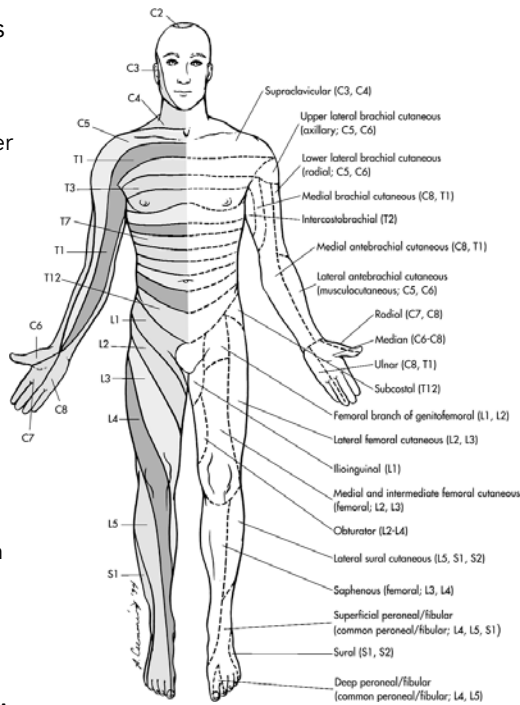
Hypoactive DTRs are more related to nerve compression.

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 dominant 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 bent 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