Reflexes Examination
Deep Tendon Reflexes

**Hypo-reflexia**

Hypo-reflexia is an absent or diminished response to tapping. Hypo-reflexia usually indicates a disease that involves one or more of the components of the two-neuron reflex arc itself.

**Hyperreflexia**

Hyperreflexia refers to hyperactive or repeating (clonic) reflexes. Hyperreflexia usually indicate an interruption of corticospinal and other descending pathways that influence the reflex arc due to a supra-segmental lesion, that is, a lesion above the level of the spinal reflex pathways.

By convention the deep tendon reflexes are graded as follows:

- 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

Whether the 1+ and 3+ responses are normal depends on what they were previously, that is, the patient's reflex history; what the other reflexes are; and analysis of associated findings such as muscle tone, muscle strength, or other evidence of disease.

Asymmetry of reflexes suggests abnormality.
Technique

All of the commonly used deep tendon reflexes are presented here in a group. In a screening examination you will usually find it more convenient to integrate the reflex examination into the rest of the examination of that part of the body; that is, do the upper extremity reflexes when examining the rest of the upper extremity. When an abnormality of the reflexes is suspected or discovered, however, the reflexes should be examined as a group with careful attention paid to the technique of the examination.

Valid test results are best obtained when the patient is relaxed and not thinking about what you are doing. After a general explanation, mingle the specific instructions with questions or comments designed to get the patient to speak at some length about some other topic. If you cannot get any response with a specific reflex—ankle jerks are usually the most difficult—then try the following:

- Several different positions of the limb.
- Get the patient to put slight tension on the muscle being tested. One method of achieving this is to have the patient strongly contract a muscle not being tested.
- In the upper extremity, have the patient make a fist with one hand while the opposite extremity is being tested.
- If the reflex being tested is the knee jerk or ankle jerk, have the patient perform the "Jendrassik maneuver," a reinforcement of the reflex. The patient's fingers of each hand are hooked together so each arm can forcefully pull against the other. The split second before you are ready to tap the tendon, say "pull."
- In general, any way to distract the patient from what you are doing will enhance the chances of obtaining the reflex. Having the patient count or give the names of children are examples.
Note the following features of the reflex response:

- Amount of hammer force necessary to obtain contraction
- Velocity of contraction
- Strength of contraction
- Duration of contraction
- Duration of relaxation phase
- Response of other muscles that were not tested. When a reflex is hyperactive, that muscle often will respond to the testing of a nearby muscle. A good example is reflex activity of a hyperactive biceps or finger reflex when the brachioradialis tendon is tapped. This is termed "overflowing" of a reflex.

After obtaining the reflex on one side, always go immediately to the opposite side for the same reflex so that you can compare them.
Clinical Significance

A. Absent stretch reflexes indicate a lesion in the reflex arc itself. Associated symptoms and signs usually make localization possible:

1. Absent reflexes and sensory loss in the distribution of the nerve supplying the reflex: the lesion involves the afferent arc of the reflex—either nerve or dorsal horn.

2. Absent reflex with paralysis, muscle atrophy, and fasciculations: the lesion involves the efferent arc—anterior horn cells or efferent nerve, or both.

Peripheral neuropathy is today the most common cause of absent reflexes. Neuropathies can be predominantly sensory, motor, or mixed and therefore can affect any or all components of the reflex arc.

The causes include diseases such as diabetes, alcoholism, amyloidosis, uremia; vitamin deficiencies such as pellagra, beriberi, pernicious anemia; remote cancer; toxins including lead, arsenic, isoniazid, vincristine, diphenylhydantoin.

Muscle diseases do not produce a disturbance of the stretch reflex unless the muscle is rendered too weak to contract. This occasionally occurs in diseases such as polymyositis and muscular dystrophy.

B. Hyperactive stretch reflexes are seen when there is interruption of the cortical supply to the lower motor neuron, an "upper motor neuron lesion." The interruption can be anywhere above the segment of the reflex arc. Analysis of associated findings enables localization of the lesion. The stretch reflexes can provide excellent clues to the level of lesions along the neuraxis.
Lists the segmental innervation of the common stretch reflexes.

For example, if the biceps and brachioradialis reflexes are normal, the triceps absent, and all lower reflexes (finger jerk, knee jerk, ankle jerk) hyperactive, the lesion would be located at the C6–C7 level, the level of the triceps reflex. The reflex arcs above (biceps, brachioradialis, and jaw jerk) are functioning normally, while the lower reflexes give evidence of absence of upper motor neuron innervation.

<table>
<thead>
<tr>
<th>Reflex</th>
<th>Nerve or root</th>
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<td>Jaw jerk</td>
<td>Trigeminal nerve</td>
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<tr>
<td>Biceps</td>
<td>C5–C6</td>
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<tr>
<td>Brachioradialis</td>
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<td>Triceps</td>
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<td>Ankle jerk</td>
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Superficial reflexes

Superficial reflexes are motor responses to scraping of the skin.

Superficial reflexes are graded simply as present or absent, although markedly asymmetrical responses should be considered abnormal as well.

Superficial reflexes are a polysynaptic reflex.

Superficial reflexes can be abolished by ① severe lower motor neuron damage or ② destruction of the sensory pathways from the skin that is stimulated.

Classic examples of superficial reflexes include:

1. The abdominal reflex includes contraction of abdominal muscles in the quadrant of the abdomen that is stimulated by scraping the skin tangential to or toward the umbilicus. This contraction can often be seen as a brisk motion of the umbilicus toward the quadrant that is stimulated.

2. The cremaster reflex is produced by scratching the skin of the medial thigh, which should produce a brisk and brief elevation of the testis on that side.

3. The normal planter response occurs when scratching the sole of the foot from the heel along the lateral aspect of the sole and then across the ball of the foot to the base of the great toe. This normally results in flexion of the great toe (a "down-going toe") and, indeed, all of the toes. The evaluation of the plantar response can be complicated by voluntary withdrawal responses to plantar stimulation.

4. The "anal wink" is a contraction of the external anal sphincter when the skin near the anal opening is scratched. This is often abolished in spinal cord damage (along with other superficial reflexes).
Pathological reflexes" Babinski Reflex (Extensor Plantar Reflex)

The best known (and most important) of the so-called "pathological reflexes" is the Babinski response (up going toe; extensor response). The full expression of this reflex includes extension of the great toe and fanning of the other toes. This is actually a superficial reflex that is elicited in the same manner as the plantar response (i.e., scratching along the lateral aspect of the sole of the foot and then across the ball of the foot toward the great toe). This is a primitive withdrawal type response that is normal for the first few months of life and is suppressed by supraspinal activity sometime before 6 months of age.

Positive (Abnormal Finding): Dorsiflexion of the big toe and hyperextension of other toes

Negative (Normal in Adults): Brisk plantar flexion; often associated with dorsiflexion of the foot at the ankle

Damage to the descending tracts from the brain (either above the foramen magnum or in the spinal cord) promotes a return of this primitive protective reflex, while at the same time abolishing the normal plantar response. The appearance of this reflex suggests the presence of an upper motor neuron lesion.