



Reflex Response

Spinal cord reflexes represent the most basic of motor responses. These reflexes are carried out entirely within the spinal cord and are modified by inputs from higher brain centers to generate complex movements.

The *myotatic*, or muscle stretch reflex, is an example of a *spinal reflex*. Muscle stretch activates receptors in the muscle which send nerve impulses to the spinal cord, stimulating the muscle's motor neurons and causing reflex contraction.

The *knee-jerk reflex* is a spinal reflex activated by tapping the **patellar tendon** below the knee. This tendon then stretches the muscle spindles, generating sensory impulse to the spinal cord. Alpha motor neurons in the spinal cord cause a brief, rapid contraction of the **quadriceps femoris**, which causes the leg to extend.

Tapping the **Achilles tendon** behind the ankle and just above the heel activates *plantar flexion* of the foot. This reflex response is like walking tip-toed or standing on your toes.

These reflexes are very important when trying to diagnose damage to the nerves or spinal cord.

The **Jendrassik maneuver** will heighten (exaggerate) the patellar (knee-jerk) reflex by countering some of the normal descending inhibitory brainstem inputs to reflex arc interneurons.

- For this maneuver, the subject interlocks his/her fingers and then concentrates on pulling the fingers apart, using as much force as can be generated without breaking the interlock. The patellar tendon must be tapped *as soon as* the subject is distracted by attempting to pull apart the interlocked fingers.

Synaptic delay is not appreciably shortened, but a larger number of reflex arc neurons become activated due to removal of descending inhibition and the reflex response occurs a few milliseconds earlier. The amplitude of the response is increased because a larger number of motor units have been activated. Clinically, some brainstem lesions are manifested by exaggerated spinal cord reflexes. In a way, the Jendrassik maneuver mimics the effect of these lesions.

Objective

1. To measure reflex time of different nerves in the body under different conditions using the reflex hammer.
2. To compare and correlate magnitude of hammer strike to magnitude of response (via EMG activity).
3. **Optional:** To measure response via angular movement (goniometer) under varying strike force.