



# Curiosity Guide #404

## Central Nervous System

Accompanies Curious Crew, Season 4, Episode 4 (#404)

### Knee-Jerk Reflex

Investigation #3

#### Description

Can you make your friend's leg swing when he or she is trying to hold the leg still?

#### Materials

Tendon hammer, or you can use a long remote control or the side of your hand

A friend

Stool

#### Procedure

1. Have your friend sit on a stool with legs not touching the floor.
2. Gently feel for the kneecap, or patella bone, on one leg.
3. Feel just below the kneecap for the soft gap, and gently tap with the tendon hammer or side edge of the remote control.
4. What happened? Could you get the leg to swing?
5. Tell your friend to try not to let the leg swing and tap below the knee again.
6. Did your friend's leg move?

## My Results

### Explanation

Just below the kneecap is the patellar tendon. When this tendon is struck, the sensory neurons send a signal to the spinal cord. In the spinal cord, a synaptic connection with a motor neuron sends a new signal back to the muscles and makes the leg jerk. The message never goes all the way to the brain and doesn't include any interneurons. This smaller loop is called a simple reflex arc. The brain did not have to do any processing, so the signal is very rapid. A reflex is a body movement that requires no thought and can protect your body.

**More to think about:** Something similar would happen if you were to touch a hot stove. You would have an automatic withdrawal reflex. The nerve endings in our skin can detect temperature, pain, or pressure so we can react and protect ourselves. Doctors make use of the knee-jerk reflex to make sure that the Central Nervous System is working the way it should. Even babies have many reflexes, like to the rooting reflex when a baby will turn its head toward an object that touches its cheek or mouth, or the grasp reflex when a baby squeezes its fingers around an object that touches its palm. Shivering is another reflex that many warm-blooded animals have when they get too cold.

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