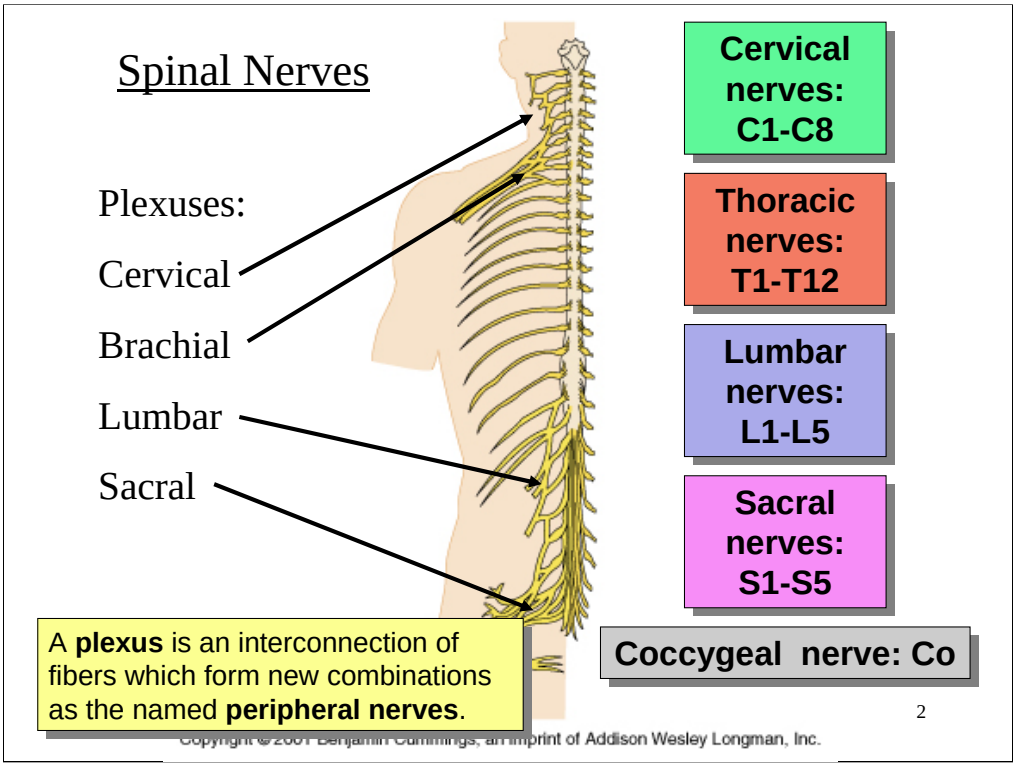
Mpeg 4 for iPod

mp3

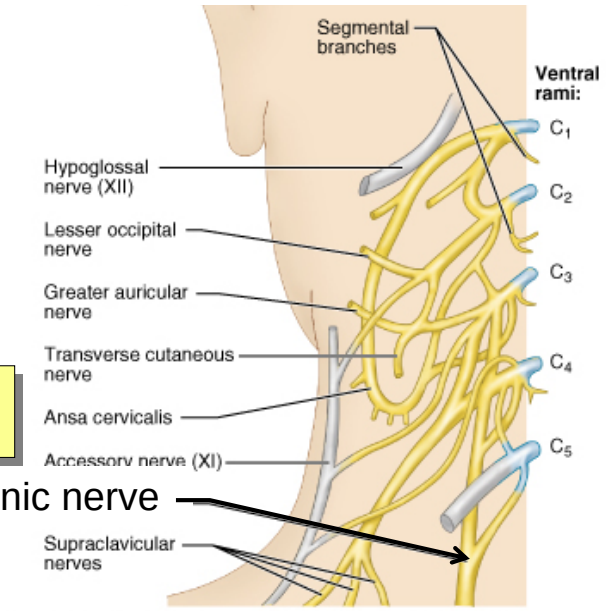
This lab involves the second section of the exercise "*Spinal Cord, Spinal Nerves, and the Autonomic Nervous System*", and "*Human Reflex Physiology*". Complete the Review Sheets for the the portion of the first exercise pertaining to the spinal nerves only, and the Review Sheet for the reflexes.
Study the spinal and peripheral nerve distributions described in the Lab Manual.
Get with a friend to perform as many of the reflex activities as you can.
The quiz for this lab is titled "Peripheral Nerves and Reflexes".
There are also videos showing cadaver dissection of the nerves.

Click on the sound icon for the audio file (mp3 format) for each slide. There is also a link to a dowloadable mp4 video which can be played on an iPod.

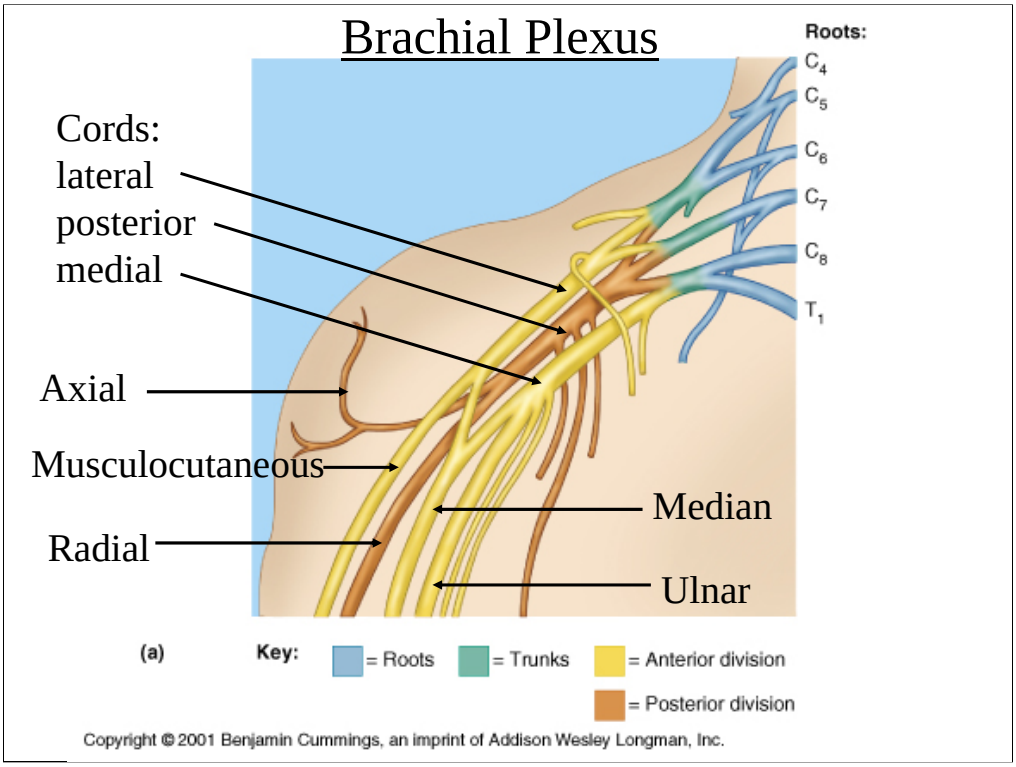


At 31 places along the spinal cord the dorsal and ventral roots come together to form **spinal nerves** Spinal nerves contain both sensory and motor fibers, as do most nerves. Spinal nerves are given numbers which indicate the portion of the vertebral column in which they arise. There are 8 cervical (C1-C8), 12 thoracics (T1-T12), 5 lumbar (L1-L5), 5 sacral (S1-S5), and 1 coccygeal nerve. Nerve C1 arises between the cranium and atlas (1st cervical vertebra) and C8 arises between the 7th cervical and 1st thoracic vertebra. All the others arise below the respective vertebra or former vertebra in the case of the sacrum.

The Cervical Plexus



Innervates the diaphragm



These are the primary nerves of the brachial plexus:

Axial: shoulder, deltoid

Musculocutaneous: upper ant. Arm, elbow flexors

Radial: extensors

Median and ulnar: elbow, wrist, & finger flexors

There is no audio file for this slide

Nerve	Origin	Distribution
axillary	posterior cord (C5, 6)	motor: deltoid, teres minor sensory: area over distal part of deltoid
median	lateral and medial cords (C5,6,7,8; T1)	motor: flexors and pronators located in forearm sensory: lateral of palm, first four digits
Musculo-cutaneous	lateral cord (C5,6,7)	motor: flexors located in upper arm sensory: medial side of upper arm; ventral side of forearm
radial	posterior cord (C5,6,7,8; T1)	motor: all extensors of arm and hand sensory: dorsal side of arm; lateral ½ of dorsal side of hand
ulnar	medial cord (C7,8; T1)	motor: flexors located in forearm and hand sensory: medial part of hand, both dorsal and ventral; 4th and 5th fingers

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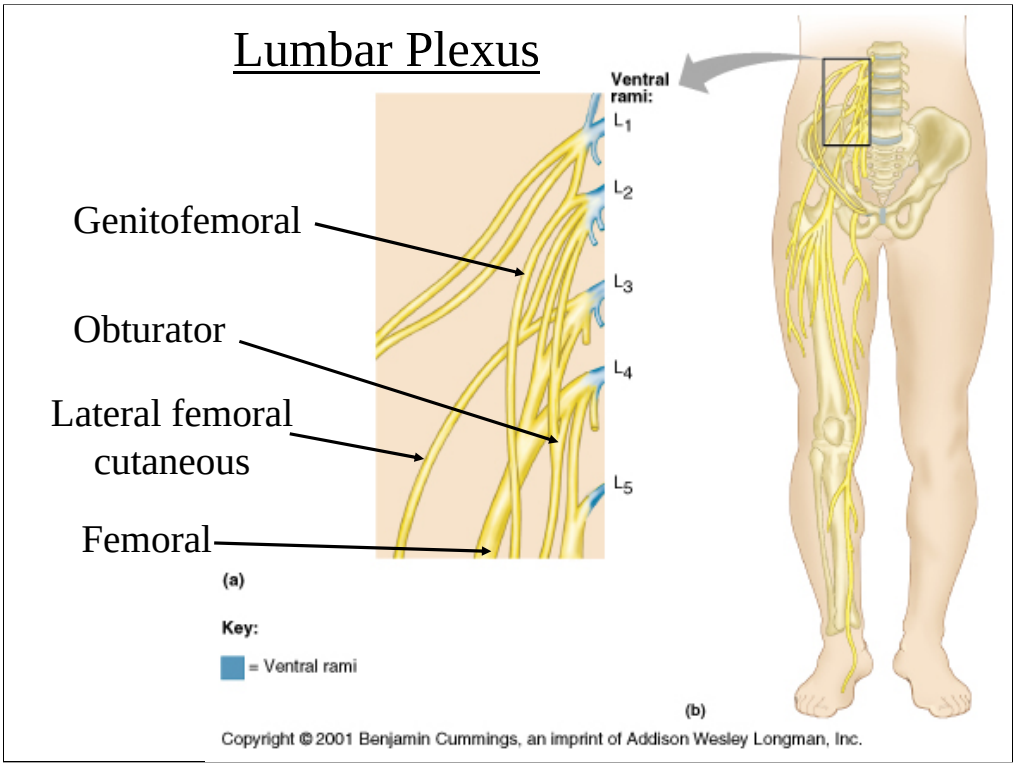


These are the primary nerves of the lumbar plexus:

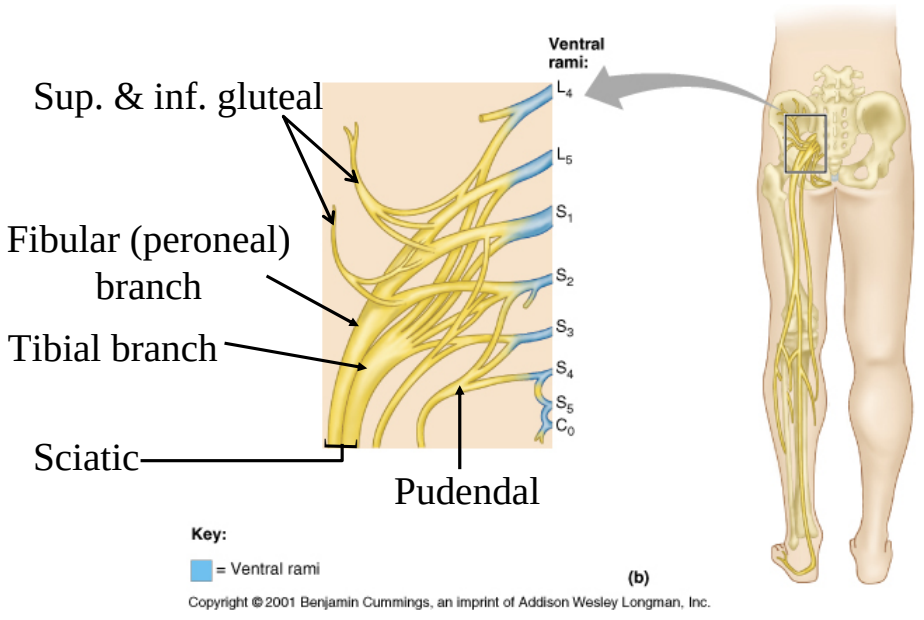
Genitofemoral: motor and sensory to the genitalia

Obturator: innervates the adductor muscles of the leg

Lateral femoral cutaneous: sensory from skin of the upper thigh

Femoral: knee extensors and skin of the upper, anterior thigh

Sacral Plexus



These are the primary nerves of the sacral plexus:

Superior and inferior gluteal nerves: motor: gluteus med., gluteus min., tensor fasciae latae; gluteus maximums

Fibular (peroneal) branch: anterior and lateral lower leg and top of foot.

Tibial branch: calf region of lower leg and bottom of foot

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Nerve	Origin	Distribution
Lat. femoral cutaneous	L2,3	sensory: lateral side of thigh
femoral	L2,3,4	motor: muscles on anterior side of thigh sensory: anterior side of thigh; medial half of lower leg
obturator	L2,3,4	motor: adductors of high and knee sensory: proximal medial part of thigh
Sup. gluteal	L4,5; S1	motor: gluteus med., gluteus min., tensor fasciae latae
Inf. gluteal	L5; S1,2	motor: gluteus maximus
Post. femoral cutaneous	S1,2,3	sensory: posterior side of thigh
pudendal	S2,3,4	sensory: genitalia, perineum, anus

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Sciatic	L4,5; S1,2,3 tibial branch	motor: muscles of plantar flexion sensory: proximal lateral part of lower leg; and calf.
	common peroneal	motor: hamstrings; posterior compartment of lower leg sensory: distal posterior part of lower leg
	Sup. peroneal	motor: lateral compartment of lower leg sensory: distal anterior part of lower leg
	deep peroneal	motor: anterior compartment of lower leg sensory: part of dorsal side of foot

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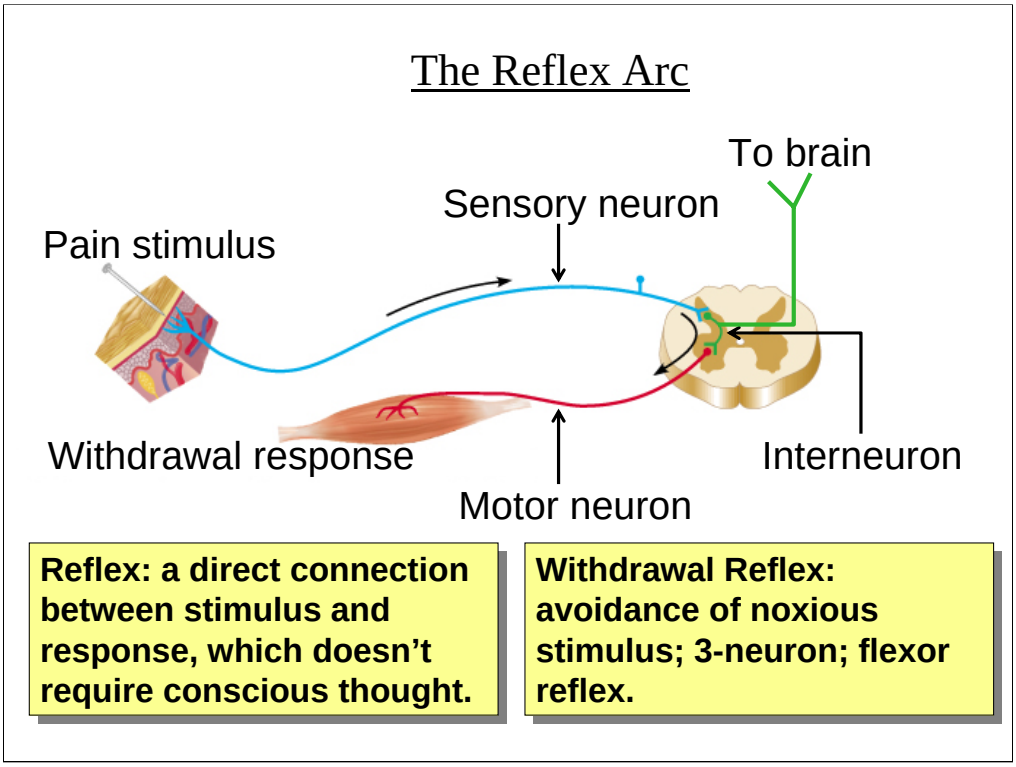
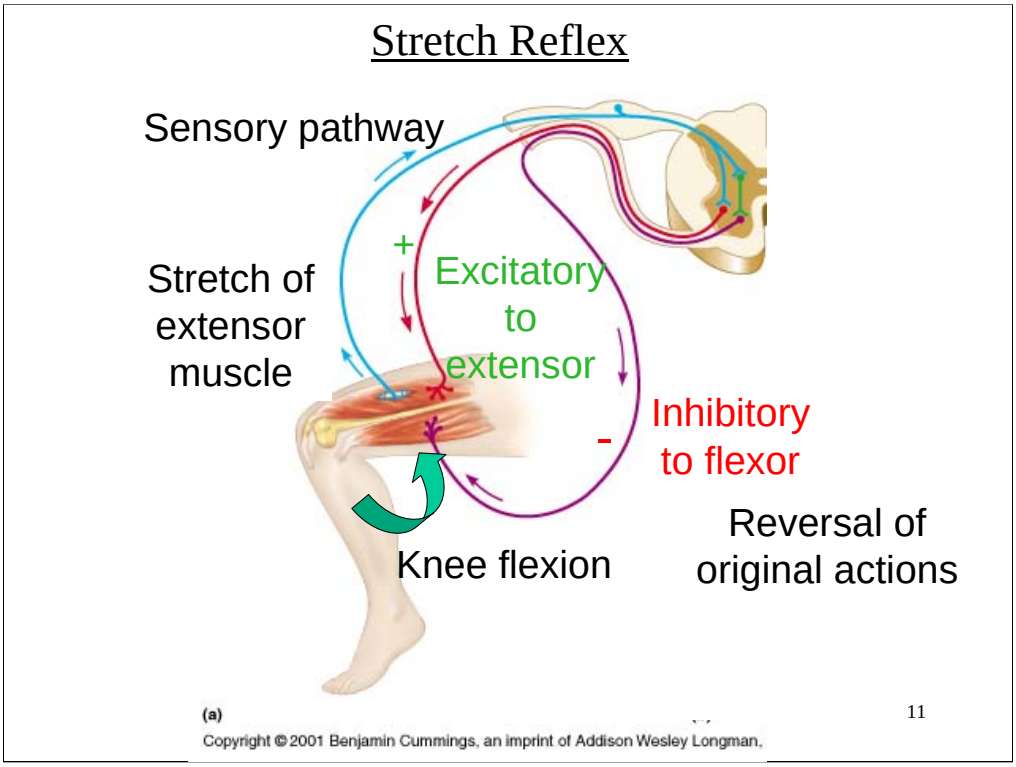
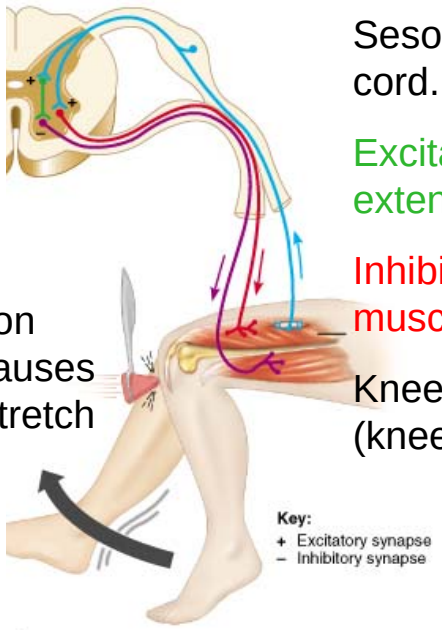


A reflex is a direct connection between stimulus and response, which does not require conscious thought. There are voluntary and involuntary reflexes. It is the voluntary reflexes we are considering here. As discussed earlier, a reflex involves at least 2 or 3 neurons. The typical components of a reflex are shown in Figure 13.12. The reflex shown in this figure is called a **3-neuron reflex** because it requires three types of neurons: a **sensory**, an **interneuron**, and a **motor** neuron. It is also called a **withdrawal reflex** because it is commonly involved in withdrawing from painful stimuli. Withdrawing from painful stimuli does not require thought. But the interneuron does send a fiber through the spinothalamic tract to the brain where the pain is perceived. This occurs at virtually the same instant you are withdrawing from the stimulus. For example, let's say you accidentally touch a hot stove. Instantly you withdraw your hand from the stove, at the same time you are feeling the pain.



he stretch reflex in its simplest form involves only 2 neurons, and is therefore sometimes called a **2-neuron reflex**. The two neurons are a **sensory** and a **motor** neuron. The sensory neuron is stimulated by **stretch (extension) of a muscle**. Stretch of a muscle normally happens when its antagonist contracts, or artificially when its tendon is stretched, as in the **knee jerk reflex**. Muscles contain receptors called muscle spindles. (See Figure 13.13) These receptors respond to the muscles's stretch. They send stimuli back to the spinal cord through a sensory neuron which connects directly to a motor neuron serving the same muscle. This causes the muscle to contract, reversing the stretch. The stretch reflex is important in helping to coordinate normal movements in which antagonistic muscles are contracted and relaxed in sequence, and in keeping the muscle from overstretching. Since at the time of the muscle stretch its antagonist was contracting, in order to avoid damage it must be inhibited or tuned off in the reflex. So an additional connection through an interneuron sends an inhibitory pathway to the antagonist of the stretched muscle - this is called **reciprocal inhibition**.

Knee-Jerk Reflex



Sesory to spinal cord.

Excitatory to extensor muscle.

Inhibitory to flexor muscle.

Knee extends (knee jerk)

Tendon stretch causes muscle stretch

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The knee jerk is a test reflex performed to assess the function of nerves and spinal connections. Because virtually all human adult reflexes must be facilitated, the knee jerk reflex won't work if there is any interruption in spinal cord pathways.

There is no audio file for this slide

Lab Protocol for Spinal Nerves and Reflexes

1) Complete the Review Sheets for the portion of the exercise on spinal nerves and for the reflex physiology lab.

2) Take the quiz for Peripheral Nerves and Reflexes

3) View the cadaver videos showing dissection of nerves.

ADAM Interactive Anatomy

a. From Dissectible Anatomy, Male, Anterior, adjust the image so that the right arm and shoulder are filling your view. Select Layer Indicator 82. Observe the brachial plexus along with other nearby structures. Change the Layer Indicator to 86 and identify the trunks and nerves of the plexus. Scroll down along the arm and page through layers from. 86 to 117, identifying the radial, median, and ulnar nerves along the way.

b. Next move to the upper right thigh region, Layer Indicator 181. Identify the femoral nerve, obturator nerve, and other structures of this region.

c. Switch to the posterior view with both thighs and hips visible and go to Layer Indicator 108. Identify the sciatic, superior gluteal, and posterior cutaneous nerves. Page down to layer 120 identifying the inferior gluteal nerve along with other structures. Scroll down to observe the branching of the tibial and common peroneal nerves.