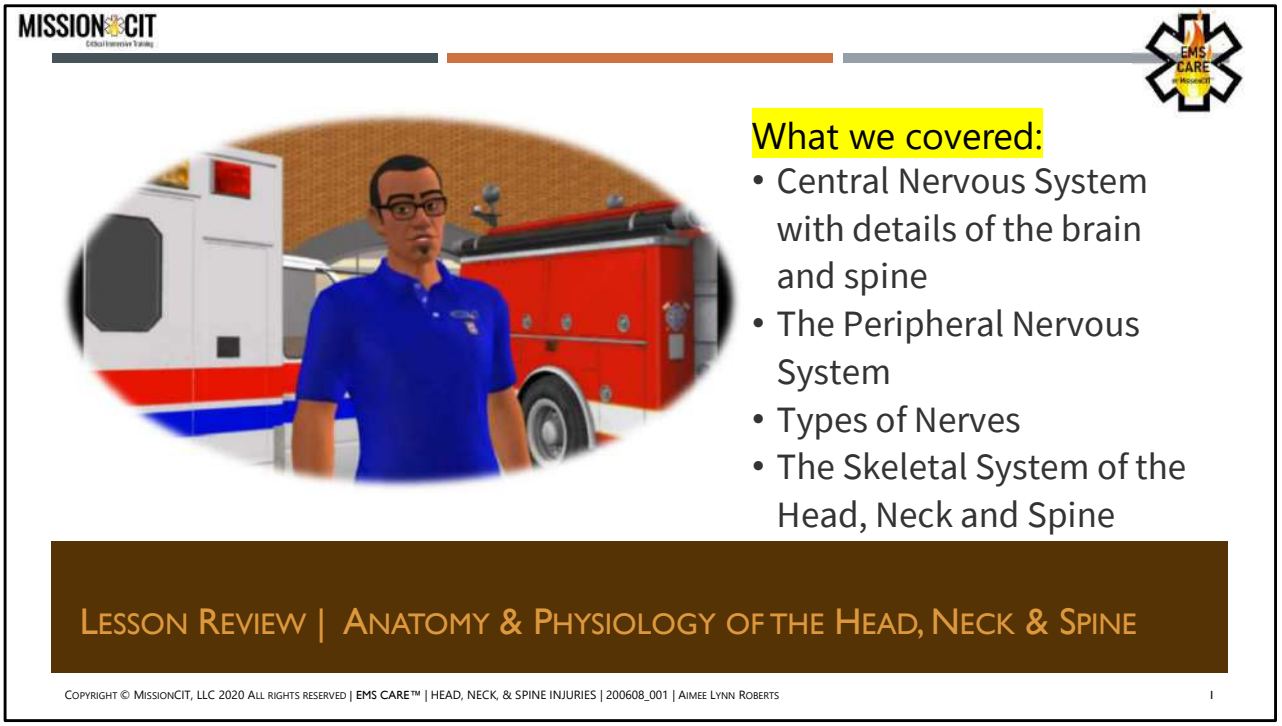


Good to see you again. Our review sessions for Head & Spine Injuries will summarize what we covered from each of the five previous lessons.

We first review the lesson on the Anatomy & Physiology of the Head, Neck & Spine. During the lesson, we covered the:

- Central Nervous System
- Details of the brain and spine
- The Peripheral Nervous System
- Types of Nerves, and

- The Skeletal System of the Head, Neck and Spine.

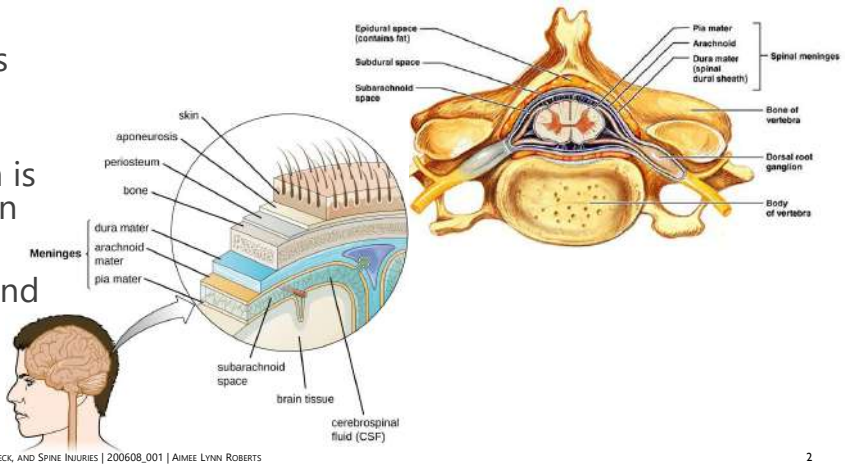
Over the next few slides, we will discuss the key takeaways from these subjects. You then can test your knowledge with some interactive questions. All helping you to prepare for the final quiz on Head and Spine Injuries.

Good studying

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Anatomy & Physiology of the Head, Neck & Spine | Lesson Review | Central Nervous System - Key Takeaways

- Overview: Central, Peripheral Nervous Systems, Nerve Cells and Neurons
- The central nervous system (CNS), which is made up of the brain and spinal cord.
- Protective Devices and Coverings
- Cerebrospinal Fluid (CSF)



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We begin with key takeaways on the Central nervous system (CNS). The CNS includes the brain and spinal cord. The brain controls the body and is the center of consciousness. The nervous system transmits signals between the brain and the rest of the body, including internal organs.

Since the central nervous system is so important, it is protected by a number of structures and is enclosed in bone.

The brain is first protected by the skull (cranium). This offers physical protection and so naturally is one of the

hardest bones in the body. While the spinal cord is protected by the vertebrae of the spinal column. The brain and spinal cord are also both covered with a protective tissue known as meninges.

The meninges are made out of connective tissue and provide a cushioning from the hard skull of the brain. And also against jolting from the spinal column.

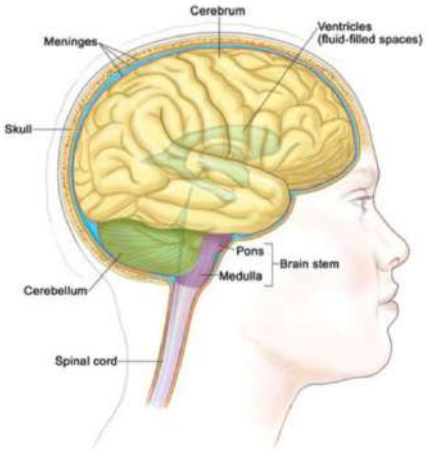
The front part of each vertebra consists of a round, solid block of bone called the vertebral body; the back part forms a bony arch. The series of arches form a tunnel called the spinal canal, which encases and protects the spinal cord. The vertebrae are connected by ligaments and separated by cushions, called intervertebral disks.

Finally, there cerebrospinal that circulates the entire central nervous system. It occupies the space between the Pia Mater and Arachnoid and supplies nutrients, like blood in the rest of the body, disposes of waste and acts as a shock absorber

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Anatomy & Physiology of the Head, Neck & Spine | Lesson Review | Brain and Spinal Cord - Key Takeaways

- Brain
  - Cerebrum, Brainstem, Diencephalon, Cerebellum
- Spinal Cord
  - Major Functions
  - Structure: Cervical, Thoracic, Lumbar, Sacral, Coccygeal



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We next set of takeaways discusses the brain and the spinal cord. The Brain's four major parts include:

1. The cerebrum is the front of brain, composed of the right and left hemispheres. Functions of the cerebrum include initiation and coordination of movement, temperature, touch, vision, hearing, judgment, reasoning, problem solving, emotions, and learning.
2. The brainstem located in the middle of the brain controls most functions necessary for life. It includes the midbrain, the pons, and the medulla.

3. The diencephalon is a small part of the brain divided into four parts: the epithalamus, thalamus, subthalamus, and hypothalamus. The diencephalon acts as a primary relay and processing center for sensory information and autonomic control.
4. The cerebellum or back of brain coordinates voluntary muscle movements and maintains posture, balance, and equilibrium.

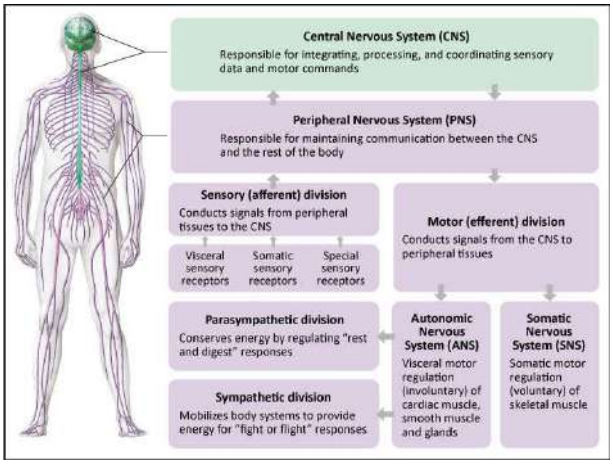
The spinal cord is a long, fragile tube-like structure that begins at the end of the brain stem and continues down almost to the bottom of the spine. The spinal cord consists of nerves that carry incoming and outgoing messages between the brain and the rest of the body.

The spinal cord's major functions include: Electrical communication. Walking and Reflexes. The overall structure of the spinal cord is enclosed by the protection of the vertebral column. The spinal nerves are in the spaces between the arches of the vertebrae. Spinal nerves are divided into these separate regions: Cervical or neck, Thoracic or chest, Lumbar or abdominal, Sacral, or pelvic and the Coccygeal or tailbone areas.

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Anatomy & Physiology of the Head, Neck & Spine | Lesson Review | Peripheral Nervous System - Key Takeaways

- Parts of the nervous system that are outside the brain and spinal cord
- Motor and sensory divisions
- Somatic and Autonomic nervous systems
- Reflex Arc
- Sympathetic and Parasympathetic divisions



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The next set of takeaways concerns the peripheral nervous system. The peripheral nervous system refers to the parts of the nervous system that are outside the brain and spinal cord. These nerves form the communication network between the CNS and the body parts.

The peripheral nervous system is broken into the motor and sensory divisions. The sensory or afferent division connects the head, face, eyes, nose, muscles, and ears to the brain.

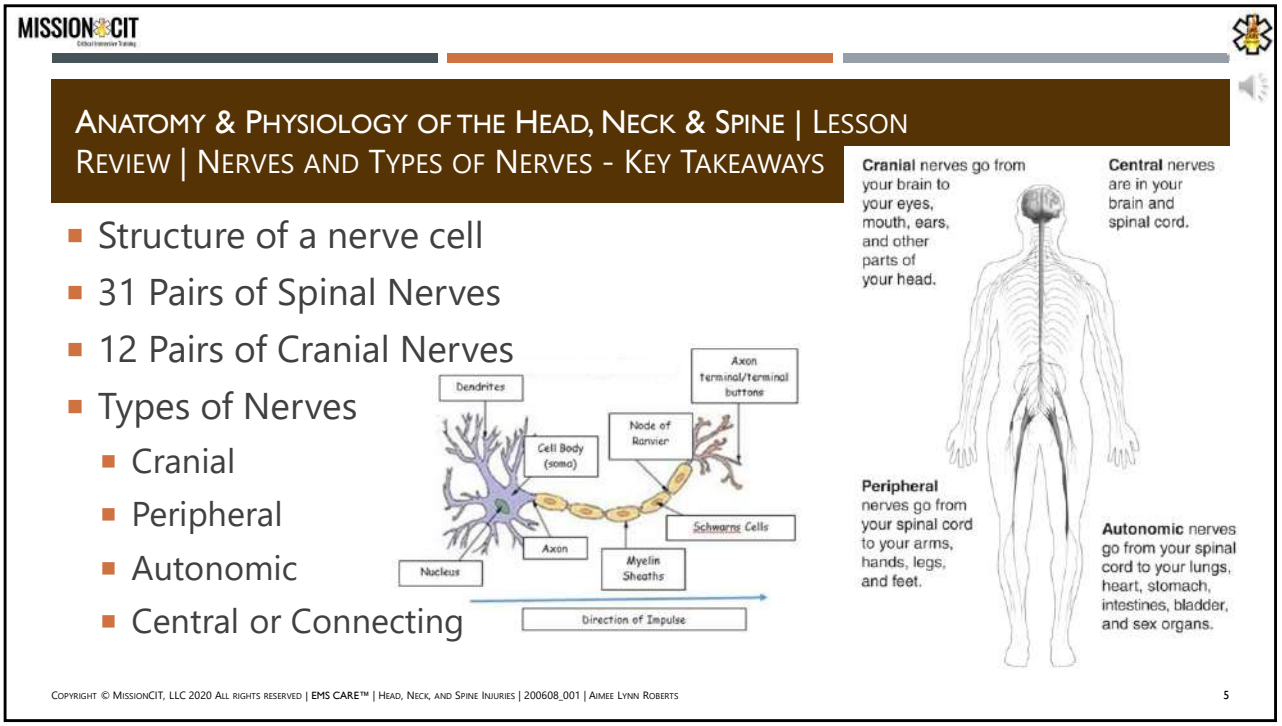
The motor division is further divided into the Somatic

and Autonomic nervous systems. The somatic nervous system controls all the things that we are aware of and can consciously influence, such as moving our arms, legs and other parts of the body. The somatic nervous system consists of both afferent or sensory, and efferent or motor nerves. In addition to regulating the voluntary movements of the body, the somatic nervous system is also responsible for reflexes, controlled by a neural pathway known as the reflex arc.

The Autonomic, or involuntary nervous system regulates the processes in the body that we cannot consciously influence such as breathing, heartbeat and metabolic processes. It is further divided into two parts, the Sympathetic and Parasympathetic divisions.

The sympathetic nervous system prepares your body for physical and mental activity. When confronted with a threatening situation, the sympathetic nervous system reacts to the stress with a fight-or-flight response.

The parasympathetic nervous system is responsible for bodily functions when we are at rest, including digestion and various metabolic processes.



This set of takeaways reviews the various types of nerves.

The basic unit of the nervous system is a nerve cell, or neuron. A neuron has a cell body, which includes the cell nucleus, and special extensions called axons and dendrites.

Each large axon is surrounded by oligodendrocytes in the brain and spinal cord and by Schwann cells in the peripheral nervous system. The membranes of these cells consist of a lipoprotein called myelin. The membranes are wrapped tightly around the axon,

forming a multilayered sheath. This myelin sheath resembles insulation, such as that around an electrical wire. Nerve impulses travel much faster in nerves with a myelin sheath than in those without one.

The anatomy of the Peripheral Nervous System includes 31 pairs of spinal nerves. They conduct impulses from the skin and other organs to the spinal cord, as well as motor impulses from the spinal cord to the muscles. In addition, there are 12 pairs of cranial nerves that Transmit information directly to or from the brain.

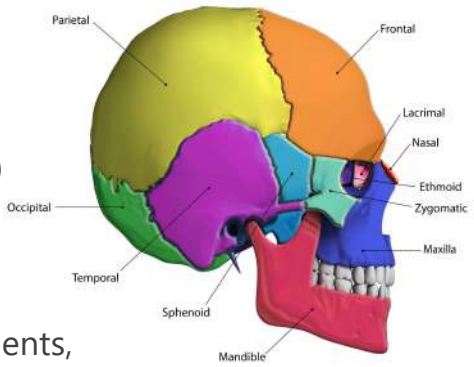
Thus, the peripheral nervous system anatomy includes

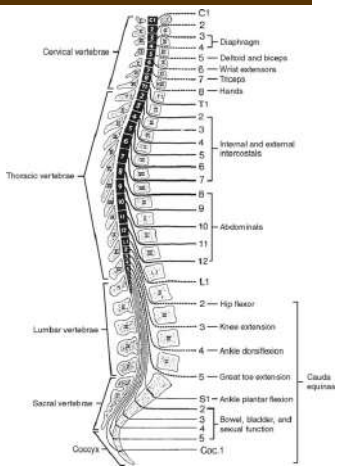
- Cranial Nerves connecting the head, face, eyes, nose, muscles, and ears to the brain.
- Peripheral Nerves connecting the spinal cord to the rest of the body, including the 31 pairs of spinal nerves.
- Autonomic nerves going from the spinal cord to the lungs, heart, stomach, intestines, bladder, and sex organs. And
- Central or Connecting Nerves that are found only in the brain and spinal cord, connecting the sensory and motor nerves with the short fibers in the CNS.

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Anatomy & Physiology of the Head, Neck & Spine | Lesson Review | Skeletal System Key Takeaways

- Skull
  - Cranium
  - Facial Bones
  - Mandible (Jawbone)
- Spine
  - 33 vertebrae
  - Connected by ligaments, surrounded by muscles





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The last set of takeaways reviews the bones of the skull and spine

The skull is composed of the cranium and the facial bones. It supports and protects the face and the brain. The brain connects to the spinal cord through a large opening at the base of the skull called the foramen magnum.

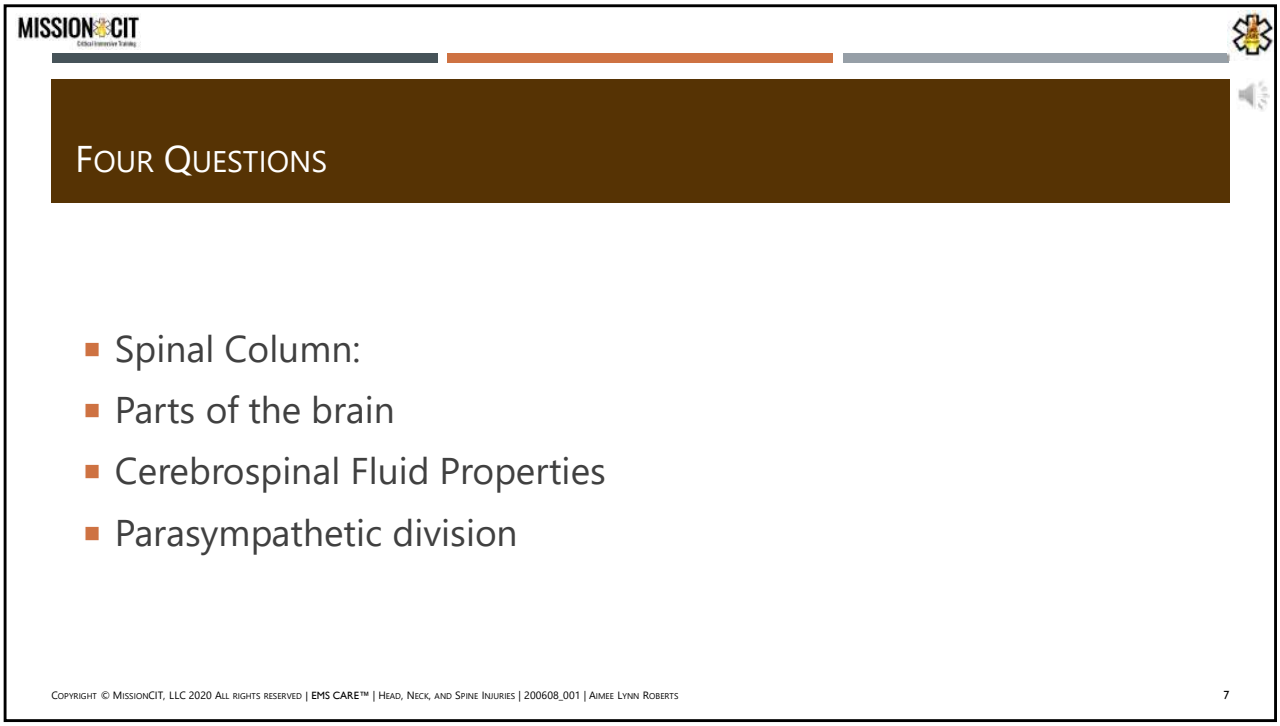
The adult skull is a collection of 22 bones, protecting the brain and supporting the other soft tissues of the head. The only bone that remains separate from the rest of the

skull is the mandible, or jawbone.

Functions of the skull include protection of the brain, fixing the distance between the eyes to allow stereoscopic vision, and fixing the position of the ears to enable sound localization of the direction and distance of sounds.

Surrounding the brain is a region of the skull known as the cranium. In this region we have eight cranial bones:

The spinal column is the body's central supporting structure made up of 33 vertebrae divided into five sections. It provides the base support for the entire body. Hence, enabling one to stand, bend, and twist, without causing harm to the spinal cord.



And here are 4 questions to test your knowledge on the anatomy & Physiology of the Head, Neck, & Spine.

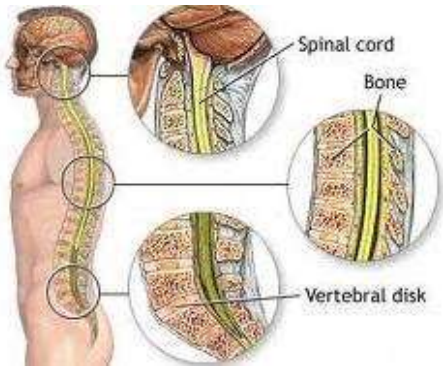
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QUESTION 1

- The spinal column has 33 vertebrae that are connected by ligaments and separated by:
  1. Intervertebral Disks
  2. Cerebrospinal Fluid
  3. Pia Mater
  4. Myelin Sheaths

Answer: Intervertebral Disks

- Discussion: Vertebrae are connected by ligaments and separated by cushions, called intervertebral disks



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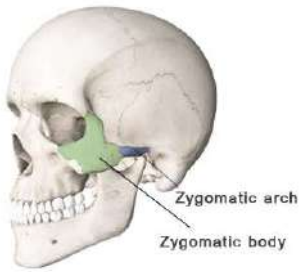
So, how did you do. Here are the answers to each question.

For the first question, the answer is Intervertebral Disks.

As we discussed, Vertebrae are connected by ligaments and separated by cushions, called intervertebral disks

QUESTION 2

- Which of the following is NOT part of the brain:
  1. Cerebellum
  2. Diencephalon
  3. Thalamus
  4. Zygomatic
- Answer: Zygomatic
- Discussion: Zygomatic is the bone that forms the prominent part of the cheek and the outer side of the eye socket.



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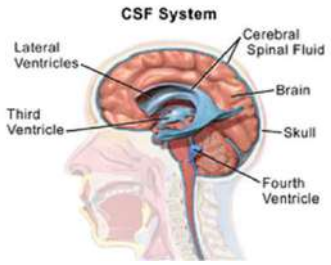
For the second question, the answer is Zygomatic. Recall that Zygomatic is the bone that forms the prominent part of the cheek and the outer side of the eye socket.

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QUESTION 3

- Cerebrospinal Fluid Properties – check all that are correct:
  1. Disposes of waste
  2. Acts as a shock absorber
  3. Occupies the space between the Pia Mater and Arachnoid
  4. Supplies nutrients, like blood

  Answer: All are correct – each one should be checked
- Discussion: As we learned, the Cerebrospinal fluid circulates the entire central nervous system. It occupies the space between the Pia Mater and Arachnoid and supplies nutrients, like blood in the rest of the body, disposes of waste and acts as a shock absorber.



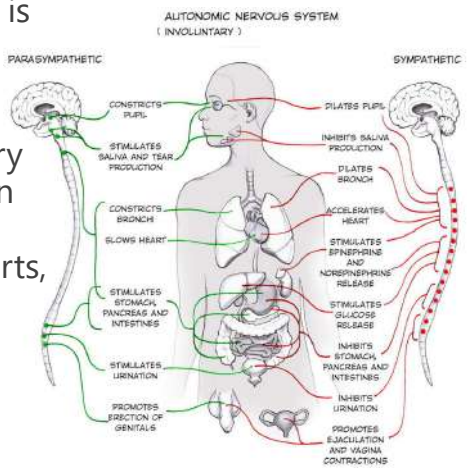
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For the third question, the answer is all are correct – each one should be checked. As we learned, the Cerebrospinal fluid circulates the entire central nervous system. It occupies the space between the Pia Mater and Arachnoid and supplies nutrients, like blood in the rest of the body, disposes of waste and acts as a shock absorber.

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QUESTION 4

- True | False: The Parasympathetic division is part of the Somatic Nervous system
- Answer: False
- Discussion: The Autonomic, or involuntary nervous system regulates the processes in the body that we cannot consciously influence. It is further divided into two parts, the Sympathetic and Parasympathetic divisions. The parasympathetic nervous system is responsible for bodily functions when we are at rest.



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For the last question, the answer is false. As we learned, it is part of the Autonomic nervous system. The Autonomic or involuntary nervous system regulates the processes in the body that we cannot consciously influence. It is further divided into two parts, the Sympathetic and Parasympathetic divisions. The parasympathetic nervous system is responsible for bodily functions when we are at rest.

So, this is not your final quiz, which will be available after the last review lesson. Keep in mind, you will need to pass with a score of 75% or greater to get credit for this

Topic on Head and Spine Injuries.

Good Studying