

## **SPINAL CORD & SPINAL NERVES**

1. Name the three coverings of the spinal cord and brain from superficial to deep.
2. Where does the epidural space occur?  
The subarachnoid space?
3. Where does the spinal cord begin and end?
4. The tapering of the cord is called the \_\_\_\_\_.
5. The "horse's tail" or \_\_\_\_\_ consists of nerves arising from the lowest portion of the cord.
6. Diagram a cross section of the spinal cord below. Label the following on your diagram: posterior gray horn, lateral gray horn, anterior gray horn, central canal, posterior white columns, lateral white columns, anterior white columns. Indicate which areas are sensory, which areas are motor, and which areas are mixed.
7. How many pairs of spinal nerves are there?
8. Each pair of spinal nerves serves a specific region of the body surface known as a \_\_\_\_\_.
9. Diagram a cross section of a nerve below. Label the following: nerve, epineurium, perineurium, endoneurium, fascicle, nerve fiber . Remember that the epineurium is very thick.

10. Each spinal nerve is connected to the spinal cord at 2 points called the \_\_\_\_\_ and the \_\_\_\_\_.

11. What causes the swelling in the posterior root (called the posterior root ganglion)?

12. Which root is the sensory (afferent) root and which root is the motor (efferent) root?

13. Name the distal branches of the spinal nerves. (there are 3).

14. Matching. Distal branches of the spinal nerves.

a. dorsal ramus    b. ventral ramus    c. meningeal branch

\_\_\_\_\_ innervates ventral and lateral skin and trunk muscles and gives rise to limb nerves

\_\_\_\_\_ innervates meninges, vertebrae, and spinal ligaments

\_\_\_\_\_ innervates the muscles and joints in that region of the spine and the skin of the back

15. Define nerve plexus.

16. Name the 3 major plexuses.

1.

2.

3.

17. The lumbrosacral plexus includes what 3 plexuses?

18. Match the following nerves with their nerve plexus.

a. cervical    b. brachial    c. lumbrosacral

\_\_\_\_\_ cutaneous nerves of the skin of neck, ear, shoulder

\_\_\_\_\_ ulnar nerve

\_\_\_\_\_ sciatic nerve

\_\_\_\_\_ phrenic nerve

19. What nerve are you compressing when you hit your funny bone?

20. What nerve innervates the diaphragm?

21. What does "r.i.p." mean in reference to a reflex?

22. Many reflexes are controlled by the \_\_\_\_\_.

23. A reflex begins at a \_\_\_\_\_ and ends at an \_\_\_\_\_.

24. Name the three types of neurons involved in a reflex arc (name them structurally and functionally).

1.

2.

3.

25. How can you tell if a reflex arc is somatic or autonomic? (2 ways)

26. Name the effector (1) of a somatic reflex.

27. Name the effectors (3) of an autonomic reflex.

1.

2.

3.

28. Give an example of a somatic reflex.

29. Give an example of an autonomic reflex.

## **BRAIN**

1. Name the 4 brain ventricles. Where is each located?

1.

2.

3.

4.

2. Which ventricles produce CSF?

3. What structure specifically produces CSF?

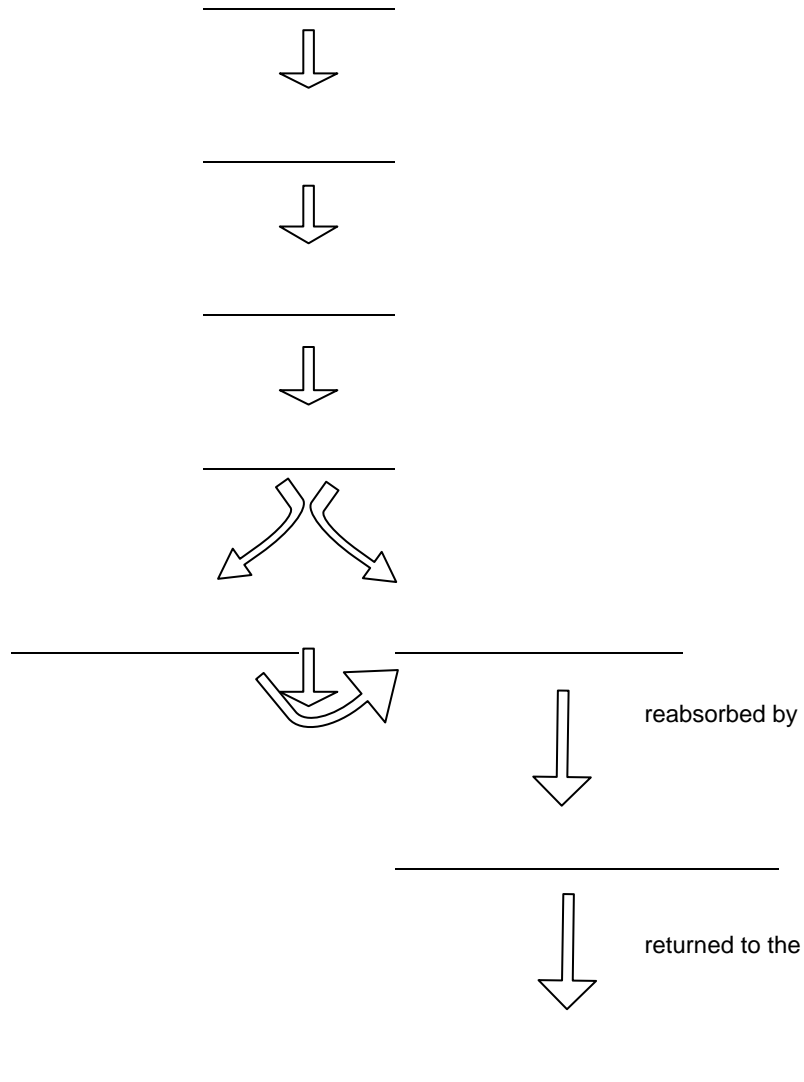
Describe these structures.

What type of neuroglial cells is associated with these structures?

4. What is the function of CSF?

5. What is the composition of CSF?

6. Complete the flow chart below for CSF circulation (use the following: cerebral aqueduct, blood, central canal, lateral ventricles, 3<sup>rd</sup> ventricle, arachnoid vili, subarachnoid space, 4<sup>th</sup> ventricle)



7. Where does CSF return to venous circulation? Why is this necessary?

8. Samples of CSF can be obtained from the subarachnoid space through a \_\_\_\_\_ .

9. a. Where exactly is the location of the blood brain barrier (in what capillaries?)

b. The blood barrier is a "double filter" system; what exactly makes up the "double filter"?

10. What kinds of substances is the barrier permeable to? Impermeable?

11. Why would the barrier be almost absent in some areas of the brain?

12. Know the parts of the brain and their functions!

- |                               |  |
|-------------------------------|--|
| 1. Medulla oblongata          | a. separates the 2 lateral ventricles  |
| 2. Pons                       | b. large bundle of white mater connecting 2 hemispheres  |
| 3. Cerebellum                 | c. memory  |
| 4. Superior colliculi         | d. visual reflex center  |
| 5. Inferior colliculi         | e. auditory reflex center  |
| 6. Thalamus                   | f. "bridge;" connects cord with brain; regulates breathing rate  |
| 7. Hypothalamus               | g. sensory relay station; gateway to cerebral cortex   |
| 8. Pineal gland               | h. spoken/written language; numerical/scientific skills;   |
| 9. Pituitary gland            | i. musical/artistic awareness; imagination   |
| 10. Left cerebral hemisphere  | j. taste area  |
| 11. Right cerebral hemisphere | k. primary visual area   |
| 12. Cerebral cortex           | l. primary auditory & olfactory areas; memory  |
| 13. Frontal lobe              | m. cardiac/resp./vasomotor centers; vomiting, coughing, etc.   |
| 14. Parietal lobe             | n. voluntary movement; cognitive functions; speech center  |
| 15. Occipital lobe            | o. olfaction & limbic system functions   |
| 16. Temporal lobe             | p. master gland  |
| 17. Insula                    | q. secretes melatonin which regulates biorhythms   |
| 18. Corpus callosum           | r. motor area of brain; balance, coordination, posture   |
| 19. Fornix                    | s. controls all qualities associated with conscious behavior   |
| 20. Septum pellucidum         | t. visceral control center; thermostat; part of limbic system;   |
| 21. Mamillary bodies          | secretes antidiuretic hormone and oxytocin; regulates<br>endocrine system; thirst/hunger centers                                     |
| 22. precentral gyrus          | u. part of cortex that receives sensory info. from sensory receptors in<br>skin, muscles, etc.; mapped into the sensory homunculus   |
| 23. postcentral gyrus         | v. primary motor area of cortex; mapped into the motor homunculus  |
| 24. basal nuclei              | w. gray matter within white mater of cerebrum; help to plan and<br>program voluntary movements especially highly practiced behaviors |

13. What is the function of the limbic system?

Name the parts of the limbic system.

14. What 4 structures make up the corpora quadrigemina? What are their functions?
  
15. What are the arbor vitae?
  
16. What is the difference between gyri, sulci, and fissures?
  
17. Would the legs be represented as large or small on the motor homunculus? What does this tell you about these muscles?
  
18. Would the hands be represented as large or small on the motor homunculus? What does this tell you about these muscles?
  
19. Would the lips be represented as large or small on the sensory homunculus? What does this tell you about the lips?
  
20. Would the arm be represented as large or small on the sensory homunculus? What does this tell you about the arm?

## **CRANIAL NERVES**

1. Make sure you know everything about the cranial nerves! (know number, name, and function!)

## **AUTONOMIC NERVOUS SYSTEM**

1. Give the 2 divisions of the peripheral nervous system. These 2 divisions involve what kind of control?
  
  
  
  
  
  
  
2. Name the 2 divisions of the ANS and give their nicknames.

3. Id. the following characteristics as belonging to the SNS or ANS.

- 2 motor neurons
- 1 motor neuron
- effector is cardiac muscle, smooth muscle, & glands
- effector is skeletal muscle
- lightly myelinated fibers
- heavily myelinated fibers
- thick axons
- thin axons
- fast conduction
- slow conduction
- neurotransmitter is ACh only
- neurotransmitters include ACh & norepinephrine

4. Diagram a general motor component of the ANS and label pre- and postganglionic neurons. Label where the autonomic ganglion would occur. Draw a box where the effector would occur.

5. Id. the following characteristics as belonging to the Sympathetic Div. (SD) or Parasympathetic Div. (PSD).

- short pre-, long post-
- long pre-, short post-
- more complex
- innervates more organs
- "Craniosacral"
- "Thoracolumbar"
- synapses with the adrenal medulla
- fight or flight response
- resting and digesting response

6. Why is the adrenal medulla sometimes called a "misplaced sympathetic ganglion?"

7. What does the acronym "SLUDD" stand for? What division is this acronym associated with?

8. What are the 4 "E's"? What division is this acronym associated with?

9. Parasympathetic (PSD) or Sympathetic (SD)?

- \_\_\_\_\_salivation
- \_\_\_\_\_pupil dilation (radial muscles in iris contract)
- \_\_\_\_\_pupil constriction (circular muscles in iris contract)
- \_\_\_\_\_lacrimation (tears)
- \_\_\_\_\_urination
- \_\_\_\_\_increased heart rate
- \_\_\_\_\_blood pressure (vasodilation and vasoconstriction)
- \_\_\_\_\_defecation
- \_\_\_\_\_increased secretion or perspiration from sweat glands
- \_\_\_\_\_stimulates adrenal medulla
- \_\_\_\_\_inhibits digestion
- \_\_\_\_\_increased respiration rate
- \_\_\_\_\_bronchoconstriction
- \_\_\_\_\_bronchodilation
- \_\_\_\_\_increased blood glucose levels (glycogen converted into glucose)
- \_\_\_\_\_arrector pili muscles in skin contract
- \_\_\_\_\_decreases heart rate
- \_\_\_\_\_slows respiratory rate
- \_\_\_\_\_digestion
- \_\_\_\_\_regulates body temperature
- \_\_\_\_\_stimulates secretory activity of pancreas
- \_\_\_\_\_stimulates gallbladder

10. In the sympathetic division, preganglionic fibers exit the cord and lead to sympathetic chain ganglia called \_\_\_\_\_ on each side of the vertebral column.



11. In the sympathetic division, postganglionic nerve fibers leave paravertebral ganglia by 3 routes. List these 3 routes. Explain/describe each.

1.

2.

3.

12. In the splanchnic nerve route, fibers pass through ganglia without synapsing and then they form the \_\_\_\_\_ nerves. These nerves lead to \_\_\_\_\_ ganglia, which contribute to the \_\_\_\_\_ plexus.

13. Matching.

a. cardiac plexus      b. pulmonary plexus      c. aortic plexus

\_\_\_\_\_ serves the heart

\_\_\_\_\_ serves the liver, stomach, intestines, kidneys, pancreas, etc.

\_\_\_\_\_ serves the lungs

14. In the parasympathetic division, the preganglionic fibers are long and end in \_\_\_\_\_ ganglia in or near the target organ.