

## Chapter 13: Brain and Cranial Nerves

### I. Development of the CNS

- A. The CNS begins as a flat plate called the \_\_\_\_\_
- B. The process proceeds as:
  1. The lateral sides of the \_\_\_\_\_ become elevated as waves called
    - a. The crest of each fold is called a \_\_\_\_\_
    - b. The groove between the two crests is called \_\_\_\_\_
  2. The neural folds move toward each other & the \_\_\_\_\_ fuse to create a \_\_\_\_\_
    - a. The cephalic portion becomes the \_\_\_\_\_
    - b. The caudal portion becomes the \_\_\_\_\_
  3. A series of pouches develops in \_\_\_\_\_
    - a. The pouch walls become \_\_\_\_\_
    - b. The pouch cavities become \_\_\_\_\_
  4. The neural tube develops \_\_\_\_\_ that cause the brain to be oriented \_\_\_\_\_ to the spinal cord

### II. Brainstem

- A. Medulla Oblongata
  1. The medulla is the most \_\_\_\_\_ part of the brainstem and is continuous \_\_\_\_\_
  2. The medulla oblongata contains:
    - a. \_\_\_\_\_ & \_\_\_\_\_ tracts
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
    - d. Part \_\_\_\_\_
  3. In terms of the medulla, what are nuclei? \_\_\_\_\_
  4. List the reflexes that medullary nuclei are involved in:
    - a. \_\_\_\_\_
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
    - d. \_\_\_\_\_

- e. \_\_\_\_\_ f. \_\_\_\_\_  
g. \_\_\_\_\_ h. \_\_\_\_\_

5. Structurally the pyramids are \_\_\_\_\_  
6. Functionally the pyramids are descending tracts involved in \_\_\_\_\_  
\_\_\_\_\_  
7. Define decussate \_\_\_\_\_  
8. Structurally the olives are two \_\_\_\_\_, \_\_\_\_\_  
9. Functionally the olives are nuclei involved in:  
a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_

#### B. Pons

1. The pons is located just \_\_\_\_\_  
2. The pons contains:  
a. \_\_\_\_\_ & \_\_\_\_\_ tracts  
b. Several \_\_\_\_\_  
3. The anterior pontine nuclei relay information \_\_\_\_\_  
4. The pons also contains important centers for:  
a. \_\_\_\_\_  
b. \_\_\_\_\_

#### C. Midbrain (Mesencephalon)

1. This is the \_\_\_\_\_ of the brainstem.  
2. The midbrain is located just \_\_\_\_\_  
3. Define tectum \_\_\_\_\_  
4. The four mounds on the dorsal surface of the midbrain are collectively called \_\_\_\_\_  
5. Each mound is called a \_\_\_\_\_  
a. The two superior mounds are called \_\_\_\_\_  
b. The two inferior mounds are called \_\_\_\_\_  
6. The inferior colliculi are involved in \_\_\_\_\_  
7. The superior colliculi are involved in \_\_\_\_\_

8. Define tegmentum \_\_\_\_\_
  9. The tegmentum largely consists of \_\_\_\_\_ like the
    - a. \_\_\_\_\_ &
    - b. \_\_\_\_\_
  10. Functionally the red nuclei \_\_\_\_\_
  11. Where are the cerebral peduncles? \_\_\_\_\_
  12. The cerebral peduncles consist primarily of \_\_\_\_\_
  13. The substantia nigra is a nuclear mass between \_\_\_\_\_ & \_\_\_\_\_
  14. The substantia nigra is involved in \_\_\_\_\_ & \_\_\_\_\_
- D. Reticular Formation
1. Describe the reticular formation \_\_\_\_\_
  2. The reticular formation receives axons from \_\_\_\_\_ &  
\_\_\_\_\_

### III. Cerebellum

#### A. Structure

1. The cerebellum is attached to the brainstem \_\_\_\_\_
2. Specify which part of the brainstem each of the peduncles connect to:
  - a. Superior peduncle connects cerebellum to \_\_\_\_\_
  - b. Middle peduncle connects cerebellum to \_\_\_\_\_
  - c. Inferior peduncle connects cerebellum to \_\_\_\_\_
3. The ridges of the cerebellar cortex are called \_\_\_\_\_
4. What is the arbor vitae? \_\_\_\_\_

#### B. Function

1. The flocculonodular lobe helps control:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_

2. Vermis & medial portion of the lateral hemispheres are involved in control of:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
3. The major portion of the lateral hemispheres works with the frontal lobe of the cerebral cortex in \_\_\_\_\_ , \_\_\_\_\_ , & \_\_\_\_\_ complex movements

#### IV. Diencephalon

##### A. Thalamus

1. Structurally composed of a cluster of \_\_\_\_\_ shaped like a \_\_\_\_\_
  - a. Two large \_\_\_\_\_
  - b. Connected by a small stalk called \_\_\_\_\_
  - c. The space between the two lateral portions (where the string of the yo-yo would be) is the \_\_\_\_\_
2. Most sensory input of the body goes to the thalamus where \_\_\_\_\_ synapse with \_\_\_\_\_ which \_\_\_\_\_
3. Axons carrying auditory information synapse in the \_\_\_\_\_
4. Axons carrying visual information synapse in the \_\_\_\_\_
5. Axons for most other sensory information synapse in the \_\_\_\_\_
6. Specify which nuclei are associated with each of the following functions:
  - a. Motor functions:
    1. \_\_\_\_\_
    2. \_\_\_\_\_
  - b. Mood modification:
    1. \_\_\_\_\_
    2. \_\_\_\_\_
  - c. Regulating emotions:
    1. \_\_\_\_\_
  - d. Sensory integration:

1. \_\_\_\_\_
2. \_\_\_\_\_

#### B. Subthalamus

1. A small area immediately \_\_\_\_\_
2. The subthalamus contains \_\_\_\_\_  
& \_\_\_\_\_
3. Functionally the subthalamic nuclei are involved in \_\_\_\_\_

#### C. Epithalamus

1. A small area \_\_\_\_\_ & \_\_\_\_\_ to the thalamus
2. The habenular nuclei are:
  - a. Influenced by \_\_\_\_\_
  - b. Involved in \_\_\_\_\_
3. The pineal body is:
  - a. Shaped \_\_\_\_\_
  - b. Appears to \_\_\_\_\_
  - c. May also influence \_\_\_\_\_

#### D. Hypothalamus

1. Is the most \_\_\_\_\_ & contains \_\_\_\_\_
2. The most conspicuous nuclei of the hypothalamus:
  - a. Appear as bulges on the ventral surface called \_\_\_\_\_
  - b. Functionally they are involved in:
    1. \_\_\_\_\_ &
    2. \_\_\_\_\_
3. What is the infundibulum? \_\_\_\_\_
  - a. What does it connect to? \_\_\_\_\_
4. The hypothalamus regulates the \_\_\_\_\_
5. Sensory neurons that terminate in the hypothalamus provide input from:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_

- d. \_\_\_\_\_
- e. \_\_\_\_\_
- 6. Efferent fibers extend into the brainstem and spinal cord to synapse with \_\_\_\_\_
- 7. Efferent fibers extend through the infundibulum \_\_\_\_\_
- 8. Efferent fibers extend to trigeminal and facial nerve to \_\_\_\_\_
- 9. Efferent fibers extend to motor neurons of the spinal cord to \_\_\_\_\_

**V. Cerebrum**

**A. General Structure and Function**

- 1. The left and right hemispheres are separated by a \_\_\_\_\_
- 2. The numerous folds of the cerebral surface are called \_\_\_\_\_
  - a. Singular form of term is \_\_\_\_\_
- 3. The grooves between the folds are called \_\_\_\_\_
  - a. Singular form of term is \_\_\_\_\_
- 4. Where is the central sulcus? \_\_\_\_\_
- 5. The precentral gyrus is located \_\_\_\_\_
  - a. Functionally the precentral gyrus is the \_\_\_\_\_
- 6. The postcentral gyrus is located \_\_\_\_\_
  - a. Functionally the postcentral gyrus is the \_\_\_\_\_
- 7. The lobes of the cerebral hemisphere are named for \_\_\_\_\_
- 8. Functionally the frontal lobe is important in:
  - a. Voluntary \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. Sense of \_\_\_\_\_
  - e. \_\_\_\_\_
- 9. Functionally the parietal lobe is the major center for \_\_\_\_\_ & \_\_\_\_\_ of sensory information
- 10. What landmark separates the frontal and parietal lobe? \_\_\_\_\_

11. The occipital lobe functions in \_\_\_\_\_
12. Functionally the temporal lobe \_\_\_\_\_ & \_\_\_\_\_ input for:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_ & \_\_\_\_\_
  - c. Plays \_\_\_\_\_
  - d. Functionally the “psychic cortex” \_\_\_\_\_
13. What landmark separates the temporal lobe from the rest of the cerebrum?  
\_\_\_\_\_
14. What is the insula? \_\_\_\_\_
15. Gray matter on the outer surface of the cerebrum is the \_\_\_\_\_ & clusters deep inside the brain are \_\_\_\_\_
16. What is the cerebral medulla? \_\_\_\_\_
17. Specify the connections made by each type of cerebral medulla nerve fiber:
  - a. Association fibers \_\_\_\_\_
  - b. Commissural fibers \_\_\_\_\_
  - c. Projection fibers \_\_\_\_\_

#### B. Basal Nuclei

1. Located on both sides of the brain (bilaterally) in the:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
2. Functionally the nuclei are involved in \_\_\_\_\_
3. Collectively they are called the \_\_\_\_\_ & include the:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_

#### C. Limbic System

1. Plays a central role in basic \_\_\_\_\_ such as:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_ & \_\_\_\_\_
  - d. Also involved in \_\_\_\_\_
2. Structurally the limbic system consists of:

- a. Certain \_\_\_\_\_
- b. Various \_\_\_\_\_ &
- c. Tracts \_\_\_\_\_

## VI. Meninges and Cerebrospinal Fluid

### A. Meninges

1. The dura mater is the \_\_\_\_\_ and most \_\_\_\_\_
2. Specify where each of the three dural folds is located:
  - a. Falx cerebri \_\_\_\_\_
  - b. Tentorium cerebelli \_\_\_\_\_
  - c. Falx cerebelli \_\_\_\_\_
3. The dura mater is tightly \_\_\_\_\_
4. Functionally the dura mater and dural folds help \_\_\_\_\_ and \_\_\_\_\_
5. Functionally the dural venous sinuses collect \_\_\_\_\_ & \_\_\_\_\_
  - a. The sinuses empty into \_\_\_\_\_
6. Describe the structure of the arachnoid mater: \_\_\_\_\_
7. The space between the dura and arachnoid mater is called \_\_\_\_\_
  - a. This space contains \_\_\_\_\_
8. The pia mater is bound \_\_\_\_\_
9. The space between the arachnoid and pia mater is called \_\_\_\_\_
  - a. This space contains:
    1. \_\_\_\_\_
    2. \_\_\_\_\_ & is
    3. Filled with \_\_\_\_\_

### B. Ventricles

1. The spaces within the CNS are lined with \_\_\_\_\_
2. Each cerebral hemisphere contains a \_\_\_\_\_ called the \_\_\_\_\_
3. Structurally the septa pellucida \_\_\_\_\_



- a. These lie just inferior to the \_\_\_\_\_ & are \_\_\_\_\_
- 4. Where is the third ventricle located? \_\_\_\_\_
- 5. The lateral ventricles and third ventricle are connected through two \_\_\_\_\_
- 6. Where is the fourth ventricle located? \_\_\_\_\_
- 7. The third ventricle is connected to the fourth ventricle by \_\_\_\_\_
- 8. The fourth ventricle is continuous with \_\_\_\_\_ of the spinal cord
- 9. The fourth ventricle is also continuous with the \_\_\_\_\_

C. Cerebrospinal Fluid (CSF)

- 1. Similar in composition to \_\_\_\_\_ with most \_\_\_\_\_
- 2. Functionally CSF bathes the CNS and provides \_\_\_\_\_
  - a. CSF also provides some \_\_\_\_\_ to CNS tissues
- 3. A choroid plexus is composed of:
  - a. Specialized \_\_\_\_\_
  - b. Support \_\_\_\_\_ &
  - c. Associated \_\_\_\_\_
- 4. In the choroid plexus substances must pass through cells because the endothelial cells are joined by \_\_\_\_\_
  - a. This is referred to as the \_\_\_\_\_
- 5. Cerebrospinal fluid fills the:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_ of the \_\_\_\_\_ & \_\_\_\_\_
  - c. \_\_\_\_\_ of the spinal cord
- 6. Cerebrospinal fluid circulates from the:
  - a. \_\_\_\_\_
  - b. Through the \_\_\_\_\_ into \_\_\_\_\_
  - c. Through the cerebral \_\_\_\_\_ into \_\_\_\_\_
  - d. From the fourth ventricle to the \_\_\_\_\_ space
  - e. Into the dural venous sinuses through the \_\_\_\_\_

## VII. Blood Supply to the Brain

- A. Blood reaches the brain through two different sets of arteries:
1. \_\_\_\_\_
  2. \_\_\_\_\_
- B. What forms the basilar artery? \_\_\_\_\_
- C. The basilar artery and internal carotid arteries contribute to \_\_\_\_\_  
\_\_\_\_\_ also known as \_\_\_\_\_
- D. Specify which portions of the cerebrum are supplied by each of the following:
1. Middle cerebral artery \_\_\_\_\_
  2. Anterior cerebral artery \_\_\_\_\_
  3. Posterior cerebral artery \_\_\_\_\_
- E. The blood-brain barrier is created by \_\_\_\_\_

## VIII. Cranial Nerves

- A. General
1. The 12 pairs of cranial nerves are referenced by
    - a. Which nerve is most anterior? \_\_\_\_\_
    - b. Which nerve is most posterior? \_\_\_\_\_
  2. List the three possible functions associated with cranial nerves:
    - a. \_\_\_\_\_
    - b. \_\_\_\_\_
    - c. \_\_\_\_\_
  3. Sensory functions include:
    - a. Special senses like \_\_\_\_\_
    - b. General senses like \_\_\_\_\_
  4. Somatic motor functions involve control of \_\_\_\_\_
  5. Proprioception informs the brain about \_\_\_\_\_
    - a. The brain receives proprioception information in cranial nerves that are innervating \_\_\_\_\_ muscles
  6. Parasympathetic function involves regulation of:
    - a. \_\_\_\_\_

- b. \_\_\_\_\_
- c. \_\_\_\_\_

1. These functions are part of the \_\_\_\_\_

B. Functionally the olfactory nerve (I) is \_\_\_\_\_ for \_\_\_\_\_

C. Functionally the optic nerve (II) is \_\_\_\_\_ for \_\_\_\_\_

D. Functionally the oculomotor nerve (III) is (use Table 13.5 as needed):

1. Motor to four extrinsic eye muscles:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

2. Motor to the upper eyelid \_\_\_\_\_

3. Parasympathetic to the smooth muscle of:

- a. \_\_\_\_\_
- b. \_\_\_\_\_

E. Functionally the trochlear nerve (IV) is \_\_\_\_\_  
that innervates \_\_\_\_\_ (from Table 13.5)

F. Functionally the trigeminal nerve (V):

a. Supplies motor innervation to:

- 1. Muscles of \_\_\_\_\_
- 2. One \_\_\_\_\_
- 3. One \_\_\_\_\_
- 4. Two \_\_\_\_\_

b. Also carries proprioception from the \_\_\_\_\_ joint

1. As a result damage to this nerve can interfere with \_\_\_\_\_

c. Involved in sensory cutaneous innervation from three branches called:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

d. Two branches innervate teeth and associated structures:

1. \_\_\_\_\_

2. \_\_\_\_\_

G. Functionally the abducens nerve (VI) is a \_\_\_\_\_

That innervates \_\_\_\_\_ (from Table 13.5)

H. Functionally the facial nerve (VII) is:

1. Somatic motor to:

a. All \_\_\_\_\_

b. Small \_\_\_\_\_

c. Two \_\_\_\_\_

2. Sensory for \_\_\_\_\_ from \_\_\_\_\_

3. Parasympathetic innervation of:

a. \_\_\_\_\_ & \_\_\_\_\_ salivary glands

b. \_\_\_\_\_

I. Functionally the vestibulocochlear nerve (VIII) is entirely \_\_\_\_\_ for

\_\_\_\_\_ & \_\_\_\_\_

J. Functionally the glossopharyngeal nerve (IX) is:

1. Somatic motor to one \_\_\_\_\_

2. Parasympathetic to the \_\_\_\_\_

3. Sensory for:

a. Sense of \_\_\_\_\_ from \_\_\_\_\_ tongue

b. Tactile sensations from posterior \_\_\_\_\_, middle \_\_\_\_\_,  
and \_\_\_\_\_

c. Blood pressure, blood carbon dioxide, blood oxygen, and blood pH from:

1. \_\_\_\_\_

2. \_\_\_\_\_

K. Functionally the vagus nerve (X) is:

1. Somatic motor to most muscles of the:

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

2. Sensory for:

- a. Taste \_\_\_\_\_
  - b. Inferior \_\_\_\_\_ and \_\_\_\_\_
  - c. Assists the \_\_\_\_\_ in transmitting sensory stimulation from the receptors in the \_\_\_\_\_ and \_\_\_\_\_
  - d. \_\_\_\_\_ and \_\_\_\_\_ organs
3. Parasympathetic fibers to \_\_\_\_\_ & \_\_\_\_\_ organs

L. Functionally the accessory nerve (XI) is:

- 1. Somatic motor to (use Table 13.5):
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_

M. Functionally the hypoglossal nerve (XII) is:

- 1. Somatic motor to:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_

N. Reflexes in the Brainstem Involving Cranial Nerves

- 1. Involve sensory input from \_\_\_\_\_ or \_\_\_\_\_
- 2. Involve motor output from \_\_\_\_\_
- 3. List two examples of brainstem reflexes involving cranial nerves:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_