Chapter 13: Brain and Cranial Nerves

I. 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 ____________________ &
II. 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

III. 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 ____________

IV. 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 ______________________________

V. 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 ______________________________ barrier

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 __________________________

VI. 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 ______________________________

VI. 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

VII. 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 a ______________________________
   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 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. _________________