

Laboratory Exercise

28

Brain and Cranial Nerves

Materials Needed

Textbook
Dissectible model of the human brain
Preserved human brain
Anatomical charts of the human brain

The brain, the largest and most complex part of the nervous system, contains nerve centers associated with sensory functions and is responsible for sensations and perceptions. It issues motor commands to skeletal muscles and carries on higher mental activities. It also functions to coordinate muscular movements, and it contains centers and nerve pathways necessary for the regulation of internal organs.

Twelve pairs of cranial nerves arise from the ventral surface of the brain and are designated by number and name. Although most of these nerves conduct both sensory and motor impulses, some contain only sensory fibers associated with special sense organs. Others are primarily composed of motor fibers and are involved with the activities of muscles and glands.

Purpose of the Exercise

To review the structural and functional characteristics of the human brain and cranial nerves.

LEARNING OUTCOMES

After completing this exercise, you should be able to

- 1 Identify the major external and internal structures in the human brain.
- 2 Locate the major functional regions of the brain.
- 3 Identify each of the cranial nerves.
- 4 Differentiate the functions of each cranial nerve.

EXPLORE

Procedure A—Human Brain

1. Review the section entitled “Brain” in chapter 11 of the textbook.
2. As a review activity, label figures 28.1 and 28.2.
3. Complete Part A of Laboratory Report 28.
4. Observe the anatomical charts, dissectible model, and preserved specimen of the human brain. Locate each of the following features:

cerebrum

cerebral hemispheres

corpus callosum

gyri (convolutions)

sulci

central sulcus

lateral sulcus

fissures

longitudinal fissure

transverse fissure

lobes

frontal lobe

parietal lobe

temporal lobe

occipital lobe

insula (insular lobe)

cerebral cortex

basal nuclei (basal ganglia,
a widely used clinical term)

caudate nucleus

putamen

globus pallidus

ventricles

lateral ventricles
third ventricle
fourth ventricle
choroid plexuses
cerebral aqueduct

diencephalon

thalamus
hypothalamus
optic chiasma
mammillary bodies
pineal gland

cerebellum

lateral (right and left) hemispheres
falx cerebelli
vermis
cerebellar cortex

arbor vitae

cerebellar peduncles

brainstem

midbrain (mesencephalon)
cerebral aqueduct
cerebral peduncles
corpora quadrigemina

pons

medulla oblongata

5. Locate the labeled areas in figure 28.3 that represent the following functional regions of the cerebrum:

motor area for voluntary muscle control

motor speech area (Broca's area)

cutaneous sensory area

auditory area

visual area

sensory speech area (Wernicke's area)

6. Complete Part B of the laboratory report.

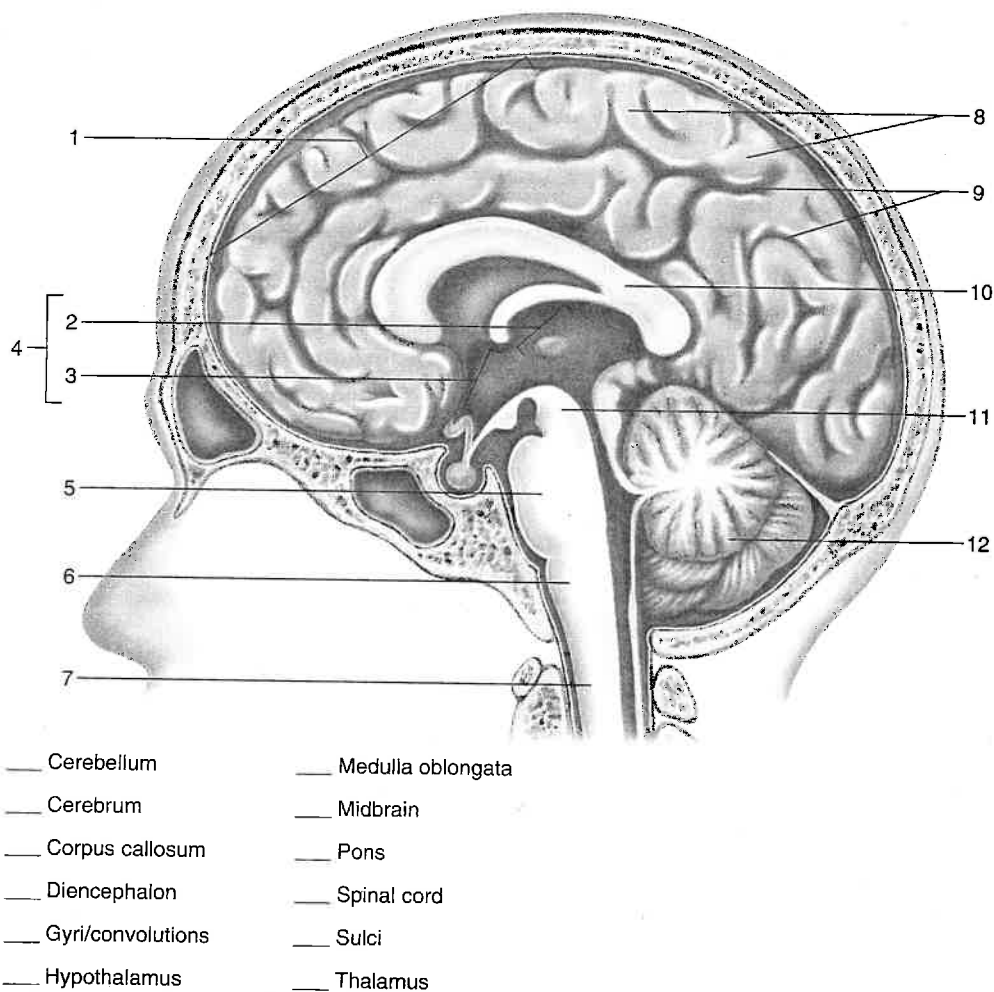


Figure 28.1 Label this diagram by placing the correct numbers in the spaces provided. **A**

Anterior ← → Posterior

Superior

Central sulcus

1

2

3

4

5

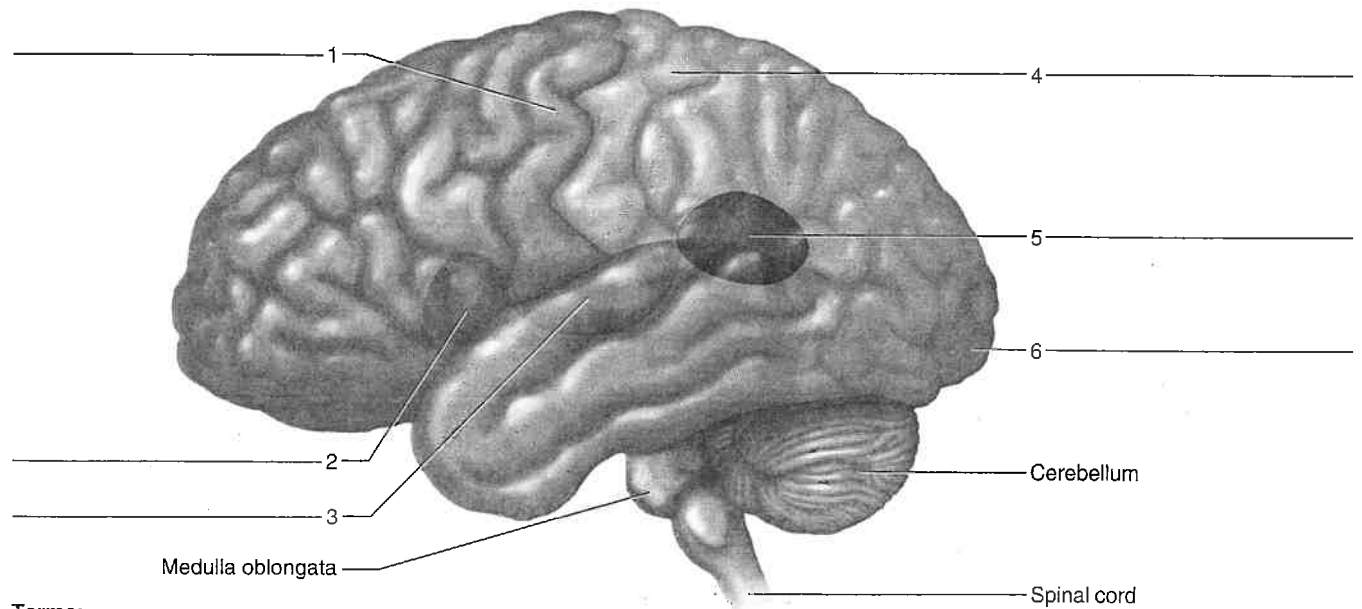
Cerebellum (not part of cerebrum)

Inferior

Terms:

Frontal lobe
Insula (deep lobe)
Occipital lobe
Parietal lobe
Temporal lobe

Figure 28.2 Label the five lobes of the left cerebral hemisphere, using the terms provided. Lobe 3 is retracted to expose the deep lobe 2 in this figure. **1**



Terms:

Auditory area
Motor speech area (Broca's area)
Cutaneous sensory area
Motor area for voluntary muscle control
Visual area
Sensory speech area (Wernicke's area)

Figure 28.3 Label the functional areas of the cerebrum, using the terms provided. (Note: These areas are not visible as distinct parts of the brain.) **2**

Procedure B—Cranial Nerves

1. Review the section entitled “Cranial Nerves” in chapter 11 of the textbook.
2. As a review activity, label figure 28.4.
3. Observe the model and preserved specimen of the human brain, and locate as many of the following cranial nerves as possible as you differentiate some of their associated functions:

olfactory nerves (I)—smell

optic nerves (II)—vision

oculomotor nerves (III)—pupil constriction and open eyelid

trochlear nerves (IV)—stimulate superior oblique eye muscle

trigeminal nerves (V)—sensory from face and teeth and mastication movements

abducens nerves (VI)—lateral eye movements

facial nerves (VII)—salivation, tear secretions, and taste

vestibulocochlear nerves (VIII)—hearing and balance (equilibrium)

glossopharyngeal nerves (IX)—regulate blood pressure, salivation, and swallowing

vagus nerves (X)—regulate many visceral organs including the heart rate

accessory nerves (XI)—control neck and shoulder muscles

hypoglossal nerves (XII)—control tongue movements

The following mnemonic device will help you learn the twelve pairs of cranial nerves in the proper order:

Old Opie occasionally tries trigonometry, and feels very gloomy, vague, and hypoactive.¹

4. Complete Part C of the laboratory report.

1. From *HAPS-EDucator*, Winter 2002. An official publication of the Human Anatomy & Physiology Society (HAPS).

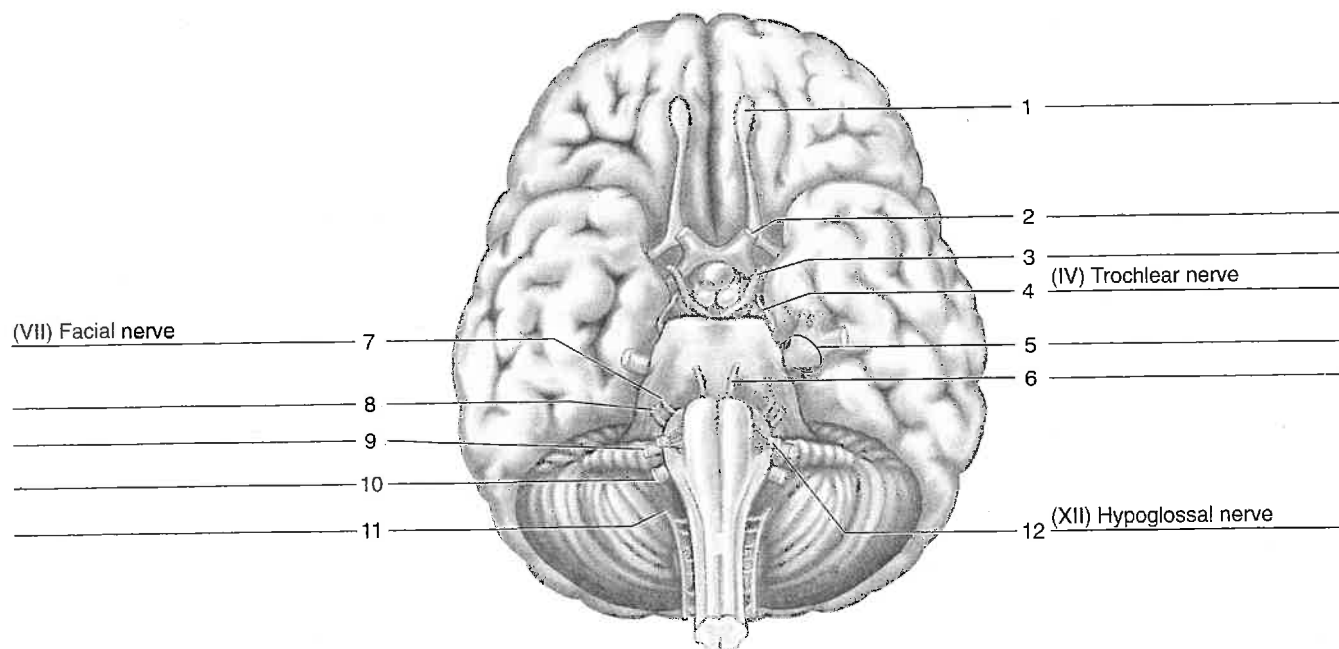


Figure 28.4 Provide the names of the cranial nerves in this ventral view. **3**