Basal Nuclei, Limbic System, and Cerebellum

"*The basal nuclei, limbic system, and cerebellum are important in controlling body functions.*"

Match these terms with the correct statement or definition:

Basal nuclei
Cerebellum
Limbic system

basal nuclei
1. Functionally related nuclei consisting primarily of the corpus striatum and substantia nigra; involved in posture and planning and coordinating motor movements.

limbic system
2. Includes olfactory cortex and portions of diencephalon and cerebrum; initiates responses necessary for survival, such as hunger and thirst.

cerebellum
3. Functions as a comparator; involved in balance, maintenance of muscle tone, and fine motor movement.

cerebellum
4. Capable of "learning" motor skills.

limbic system
5. Influences emotions, visceral responses to emotions, motivation, and mood.

Proprioceptive neurons innervate joints and tendons, providing information about the position of body parts.

Spinal Cord

"*The spinal cord extends from the foramen magnum of the skull to the second lumbar vertebra.*"

A. Match these terms with the correct statement or definition:

Anterior (ventral) horn
Dorsal root
Dorsal root ganglia
Lateral horn
Nerve tract
Posterior (dorsal) horn
Spinal nerve
Ventral root

posterior (dorsal) horn
1. Gray matter in the spinal cord containing sensory neurons.

anterior (ventral) horn
2. Gray matter in the spinal cord containing motor neurons.

lateral horn
3. Gray matter in the spinal cord containing sympathetic autonomic neurons.

nerve tract
4. Part of white matter; ascending or descending axons that are grouped by function; nerve pathway.

dorsal root
5. Afferent nerve processes that carry action potentials to the spinal cord.

ventral root
6. Efferent nerve processes that carry action potentials away from the spinal cord.

dorsal root ganglia
7. Structures containing the cell bodies of afferent neurons.

spinal nerve
8. Formed by joining of dorsal and ventral roots.

B. Match these terms with the correct parts labeled in figure 8.4:

Anterior (ventral) horn
Dorsal root
Dorsal root ganglion
Gray matter
Lateral horn
Posterior (dorsal) horn
Spinal nerve
Ventral root
White matter (nerve tracts)

1. dorsal root
2. dorsal root ganglion
3. spinal nerve
4. ventral root
5. white matter (nerve tracts)
6. gray matter
7. anterior (ventral) horn
8. lateral horn
9. posterior (dorsal) horn

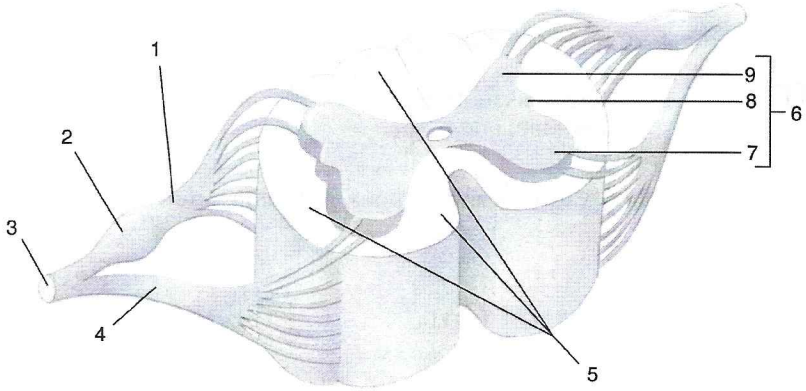

Figure 8.4

Spinal Pathways

"*The names of most pathways in the central nervous system reflect their general function.*"

Match these terms with the correct statement or definition:

Ascending pathways
Descending pathways
Lower motor neurons
Upper motor neurons

1. Spinothalamic, dorsal column, and spinocerebellar pathways. — ascending pathways
2. Direct (corticospinal) and indirect pathways. — descending pathways
3. Axons of these cells pass from either the anterior horn of spinal cord gray matter or cranial nerve nuclei of the brainstem to skeletal muscles. — lower motor neurons
4. Axons of these cells pass from the cerebral cortex, cerebellum, and brainstem to lower motor neurons. — upper motor neurons

Meninges

"*Three connective tissue layers, the meninges, surround and protect the brain and spinal cord.*"

Match these terms with the correct statement or definition:

Arachnoid mater
Dura mater
Dural sinus
Epidural space
Pia mater
Subarachnoid space

dura mater
1. Most superficial and thickest layer of the meninges.

dural sinus
2. Spaces within the dura mater that collect blood from the small veins of the brain.

epidural space
3. Space that surrounds the dura mater of the spinal cord.

arachnoid mater
4. Thin, wispy middle meningeal layer.

pia mater
5. Meningeal layer that is very tightly bound to the surface of the brain and spinal cord.

subarachnoid space
6. Space between the arachnoid mater and the pia mater that is filled with cerebrospinal fluid.

Ventricles and Cerebrospinal Fluid

"*The CNS contains fluid-filled cavities called ventricles.*"

Using the terms provided, complete these statements:

Arachnoid granulations
Central canal
Cerebral aqueduct
Choroid plexus
Fourth ventricle
Lateral ventricle
Third ventricle

Each cerebral hemisphere contains a relatively large cavity, the (1). A smaller midline cavity, the (2), is in the center of the diencephalon between the two halves of the thalamus and is connected by foramina to the lateral ventricles. The (3) is located at the base of the cerebellum and is connected to the third ventricle by a narrow canal, the (4). The fourth ventricle is continuous with the (5) of the spinal cord. Cerebrospinal fluid, which fills the ventricles, central canal, and subarachnoid space, is produced as a blood filtrate by the (6) in the ventricles. Cerebrospinal fluid passes from the subarachnoid space into the blood through the (7) in the superior sagittal sinus.

1. lateral ventricle
2. third ventricle
3. fourth ventricle
4. cerebral aqueduct
5. central canal
6. choroid plexus
7. arachnoid granulations

Peripheral Nervous System

"*The peripheral nervous system collects information and relays it by way of afferent fibers to the central nervous system.*"

Match these terms with the correct statement or definition:

Afferent
Cranial
Efferent
Spinal

cranial — 1. Part of the peripheral nervous system with 12 pairs of nerves.

spinal — 2. Part of the peripheral nervous system with 31 pairs of nerves.

afferent — 3. Fibers that collect information and carry it to the CNS.

efferent — 4. Fibers that relay information from the CNS to various parts of the body.

Cranial Nerves

"*There are three general categories of cranial nerve function: (1) sensory (afferent), (2) motor (efferent), and (3) parasympathetic (efferent).*"

Match the cranial nerve with the correct function:

Olfactory (I)
Optic (II)
Oculomotor (III)
Trochlear (IV)
Trigeminal(V)
Abducens (VI)
Facial (VII)
Vestibulocochlear (VIII)
Glossopharyngeal (IX)
Vagus (X)
Accessory (XI)
Hypoglossal (XII)

olfactory (I) — 1. Smell.

optic (II) — 2. Vision.

oculomotor (III) — 3. Controls four of the six eye muscles, constricts the pupil, and thickens the lens.

trigeminal (V) — 4. Sensory to face and teeth.

facial (VII) — 5. Motor to muscles of facial expression; parasympathetic to salivary and tear glands.

vestibulocochlear (VIII) — 6. Hearing and balance.

vagus (X) — 7. Parasympathetic to viscera of the thorax and abdomen.

hypoglossal (XII) — 8. Movement of the tongue.

Spinal Nerves

"*The spinal nerves arise along the spinal cord from the union of the dorsal root and ventral root.*"

Using the terms provided, complete these statements:

Brachial	Lumbosacral
Cervical	Phrenic
Femoral	Plexuses
Ischiadic (sciatic)	Radial

All the spinal nerves are mixed nerves, containing both sensory and somatic motor fibers. Most of the spinal nerves are organized into three (1), where nerves come together and then separate. The (2) plexus originates from spinal nerves C1 to C4. One of the most important branches of this plexus is the (3) nerve, which innervates the diaphragm. The (4) plexus originates from nerves C5 to T1, and has five major nerves arising from it: the axillary, (5), ulnar, musculocutaneous, and median nerves. The (6) plexus originates from spinal nerves L1 to S4, and the obturator, (7), tibial, and common fibular nerves exit this plexus. Together, the tibial and common fibular nerves are called the (8) nerve.

1. plexuses
2. cervical
3. phrenic
4. brachial
5. radial
6. lumbosacral
7. femoral
8. ischiadic (sciatic)

Autonomic Nervous System

"*The autonomic system differs structurally and functionally from the somatic motor system.*"

Match these terms with the correct statement or definition:

Autonomic ganglion	Preganglionic neuron
Autonomic system	Somatic motor system
Postganglionic neuron	

somatic motor nervous system 1. Efferent neurons with single axons extending from the CNS to skeletal muscle.

autonomic nervous system 2. Efferent system with two neurons in series extending from the CNS to smooth muscle, cardiac muscle, and glands.

preganglion neuron 3. First neuron in an autonomic pathway.

autonomic ganglion 4. Location where preganglionic neurons synapse with postganglionic neurons.

Sympathetic and Parasympathetic Divisions

"*The sympathetic division is sometimes referred to as the "fight or flight" system.*"

A. Using the terms provided, complete these statements:

Anterior (ventral)	Lateral
Brainstem nuclei	Posterior (dorsal)
Collateral ganglia	Terminal ganglia
Sympathetic chain ganglia	

Cell bodies of sympathetic preganglionic neurons are in the (1) horn of spinal cord gray matter between T1 and L2. Axons of the sympathetic preganglionic neurons exit through ventral roots and project to the (2), which are connected to each other along both sides of the spinal cord. Although some sympathetic preganglionic axons synapse here, others pass through and synapse in (3), which are located nearer the target organs. Cell bodies of parasympathetic preganglionic neurons are located within (4) of cranial nerves, or the lateral part of the gray matter of S2 to S4 regions of the spinal cord. Axons of parasympathetic preganglionic neurons extend to (5) located either near or embedded in the wall of target organs.

1. lateral
2. sympathetic chain ganglia
3. collateral ganglia
4. brainstem nuclei
5. terminal ganglia

B. Match these divisions of the autonomic system with the correct description:

Parasympathetic division
Sympathetic division

sympathetic division 1. Division that increases heart rate, blood pressure, respiration, blood glucose, and mental activity.

parasympathetic division 2. Division that stimulates activities such as digestion, defecation, and urination, and slows heart rate and respiration.

sympathetic division 3. Most postganglionic neurons of this division secrete norepinephrine.

parasympathetic division 4. All postganglionic neurons of this division secrete acetylcholine.