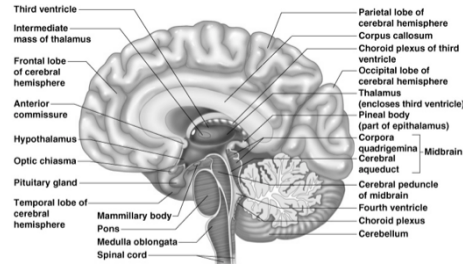


The Nervous System

Cerebellum



(a)

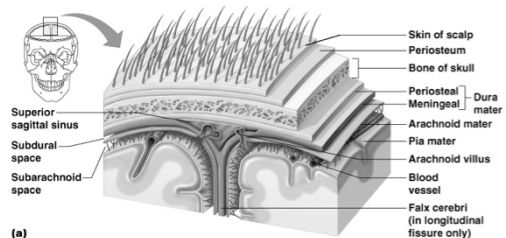
1.15a

Protection of the Central Nervous System

- Scalp and skin
- Skull and vertebral column
- Meninges
- Cerebrospinal fluid
- Blood brain barrier

Figure 7.16a

Protection of the Central Nervous System



(a)

Figure 7.16a

Meninges

- Dura mater
 - Double-layered external covering
 - Periosteum – attached to surface of the skull
 - Meningeal layer – outer covering of the brain
 - Folds inward in several areas

Cerebrospinal Fluid

- Similar to blood plasma composition
- Formed by the choroid plexus
- Forms a watery cushion to protect the brain
- Circulated in arachnoid space, ventricles, and central canal of the spinal cord

Ventricles and Location of the Cerebrospinal Fluid

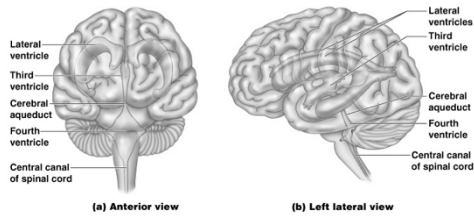


Figure 7.17a-b

Ventricles and Location of the Cerebrospinal Fluid

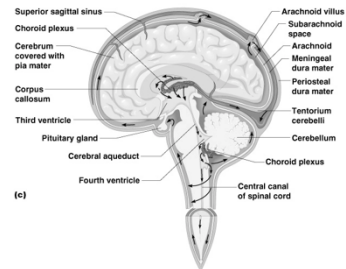


Figure 7.17c

Blood Brain Barrier

- Includes the least permeable capillaries of the body
- Excludes many potentially harmful substances
- Useless against some substances
 - Fats and fat soluble molecules
 - Respiratory gases
 - Alcohol/Nicotine
 - Anesthesia

Traumatic Brain Injuries

- Concussion
 - Slight brain injury
 - No permanent brain damage
- Contusion
 - Nervous tissue destruction occurs
 - Nervous tissue does not regenerate
- Cerebral edema
 - Swelling from the inflammatory response
 - May compress and kill brain tissue

Cerebrovascular Accident (CVA)

- Commonly called a stroke
- The result of a ruptured blood vessel supplying a region of the brain
- Brain tissue supplied with oxygen from that blood source dies
- Loss of some functions or death may result

Alzheimer's Disease

- Progressive degenerative brain disease
- Mostly seen in the elderly, but may begin in middle age
- Structural changes in the brain include abnormal protein deposits and twisted fibers within neurons
- Victims experience memory loss, irritability, confusion and ultimately, hallucinations and death

Spinal Cord

- Extends from the medulla oblongata to the region of T12
- Below T12 is the cauda equina (a collection of spinal nerves)
- Enlargements occur in the cervical and lumbar regions

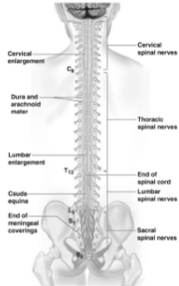


Figure 7.18

Spinal Cord Anatomy

- Exterior white matter – conduction tracts

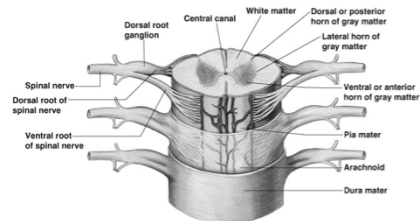


Figure 7.19

Spinal Cord Anatomy

- Internal gray matter - mostly cell bodies
 - Dorsal (posterior) horns
 - Anterior (ventral) horns

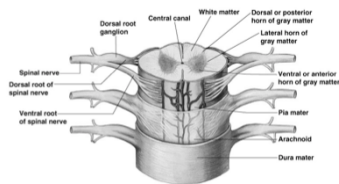


Figure 7.19

Spinal Cord Anatomy

- C

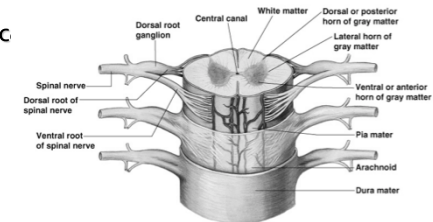


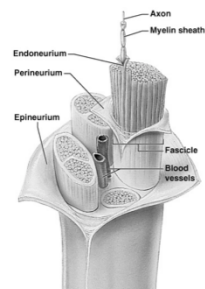
Figure 7.19

Spinal Cord Anatomy

- Meninges cover the spinal cord
- Nerves leave at the level of each vertebrae
 - Dorsal root
 - Associated with the dorsal root ganglia – collections of cell bodies outside the central nervous system
 - Ventral root

Structure of a Nerve

- Endoneurium surrounds each fiber
- Groups of fibers are bound into fascicles by perineurium
- Fascicles are bound together by epineurium



Classification of Nerves

- Mixed nerves – both sensory and motor fibers
- Afferent (sensory) nerves – carry impulses toward the CNS
- Efferent (motor) nerves – carry impulses away from the CNS

Cranial Nerves

- 12 pairs of nerves that mostly serve the head and neck
- Numbered in order, front to back
- Most are mixed nerves, but three are sensory only

Distribution of Cranial Nerves

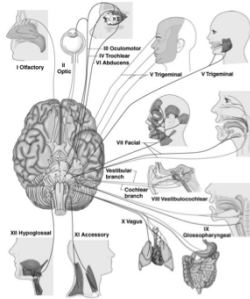


Figure 7.21

Cranial Nerves

- I Olfactory nerve – sensory for smell
- II Optic nerve – sensory for vision
- III Oculomotor nerve – motor fibers to eye muscles
- IV Trochlear – motor fiber to eye muscles

Cranial Nerves

- V Trigeminal nerve – sensory for the face; motor fibers to chewing muscles
- VI Abducens nerve – motor fibers to eye muscles
- VII Facial nerve – sensory for taste; motor fibers to the face
- VIII Vestibulocochlear nerve – sensory for balance and hearing

Cranial Nerves

- IX Glossopharyngeal nerve – sensory for taste; motor fibers to the pharynx
- X Vagus nerves – sensory and motor fibers for pharynx, larynx, and viscera
- XI Accessory nerve – motor fibers to neck and upper back
- XII Hypoglossal nerve – motor fibers to tongue