

Nervous System
Part 3 Bio 250

Essentials of Human Anatomy & Physiology
Elaine N. Marieb Seventh Edition

Chapter 7
The Nervous System

Slides 7.43 – 7.62

Lecture Slides in PowerPoint by Jerry L. Cook
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Cerebellum

- Two hemispheres with convoluted surfaces
- Provides involuntary coordination of body movements

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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

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Slide
7.45a

Meninges

- Arachnoid layer
 - Middle layer
 - Web-like
- Pia mater
 - Internal layer
 - Clings to the surface of the brain

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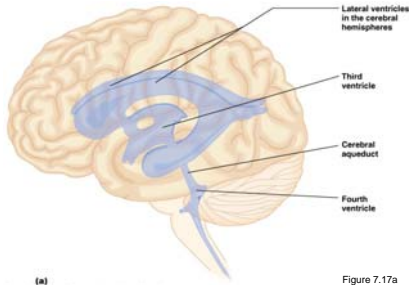
Cerebrospinal Fluid

- 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

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Ventricles and Location of the Cerebrospinal Fluid



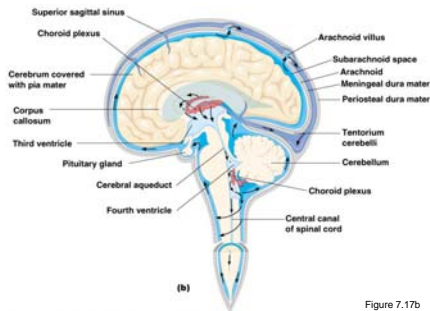
(a)

Figure 7.17a

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Slide 7.47a

Ventricles and Location of the Cerebrospinal Fluid



(b)

Figure 7.17b

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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

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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

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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

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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

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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

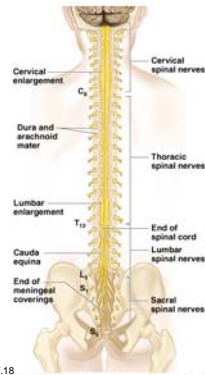


Figure 7.18

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Spinal Cord Anatomy

- Exterior white mater – conduction tracts

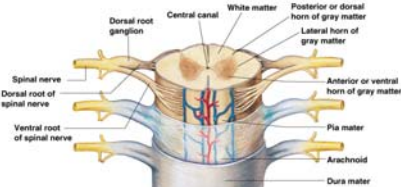


Figure 7.19

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Spinal Cord Anatomy

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

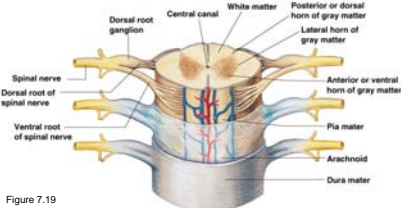


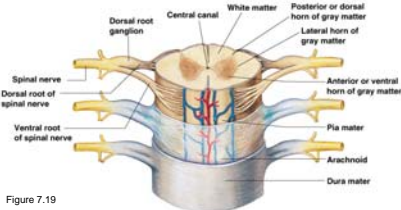
Figure 7.19

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Spinal Cord Anatomy

- Central canal filled with cerebrospinal fluid



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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

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Peripheral Nervous System

- Nerves and ganglia outside the central nervous system
- Nerve = bundle of neuron fibers
- Neuron fibers are bundled by connective tissue

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Structure of a Nerve

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

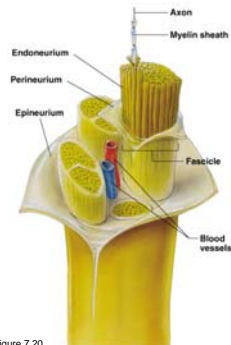


Figure 7.20

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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

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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

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Distribution of Cranial Nerves

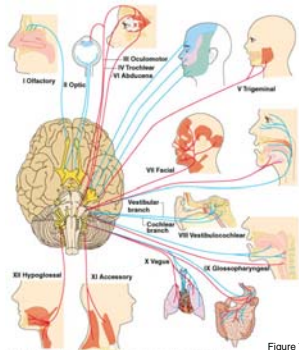


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Cranial Nerves

- **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

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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

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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

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