

The Nervous System...

TO: What are the anatomical structures of the brain and what does each control?



There is a computer like system in our body.

- What is the computer of our body?
 - Brain
- What carries messages in our body?
 - Nerves



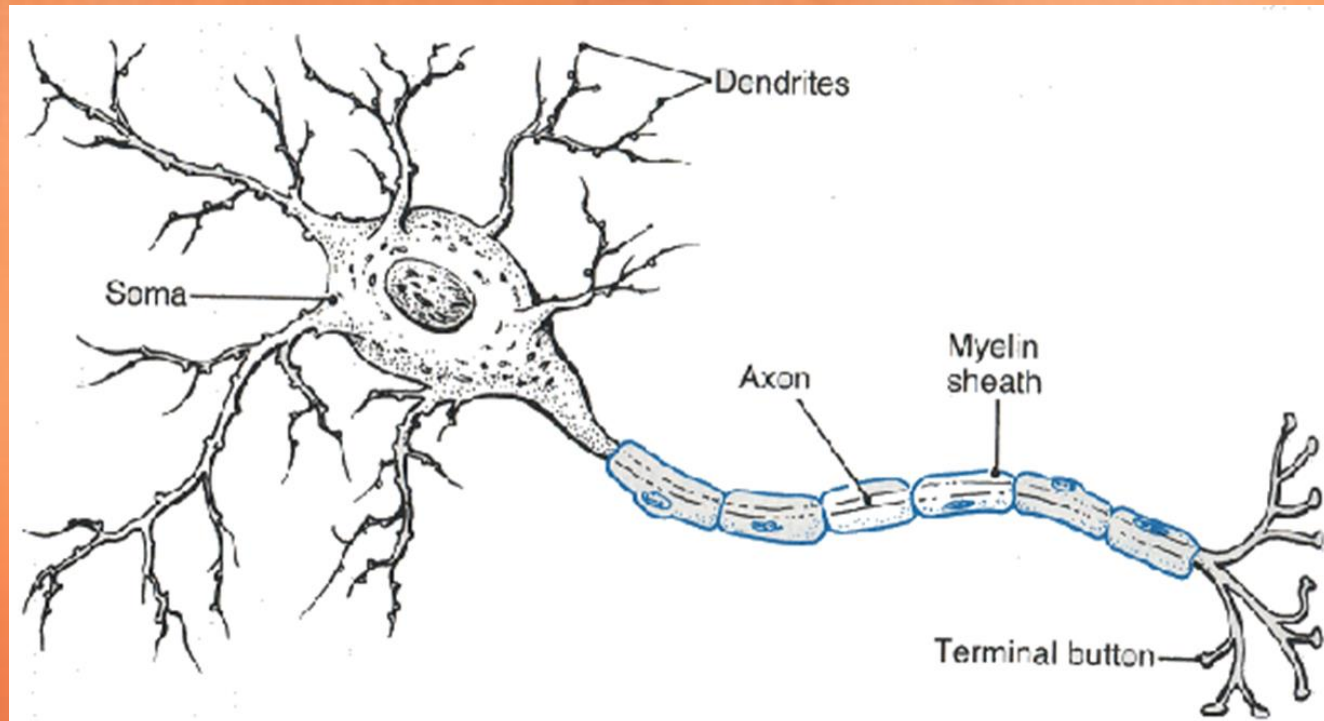
Nervous System

- Complex organized system
- Coordinates all activities of the body
- Allows body to respond and adapt to changes inside and outside the body



Neuron (nerve cell)

- Basic unit/structure of the nervous system
- Parts of a neuron
 - Cell body
 - Nucleus inside the cell body
 - Nerve Fibers



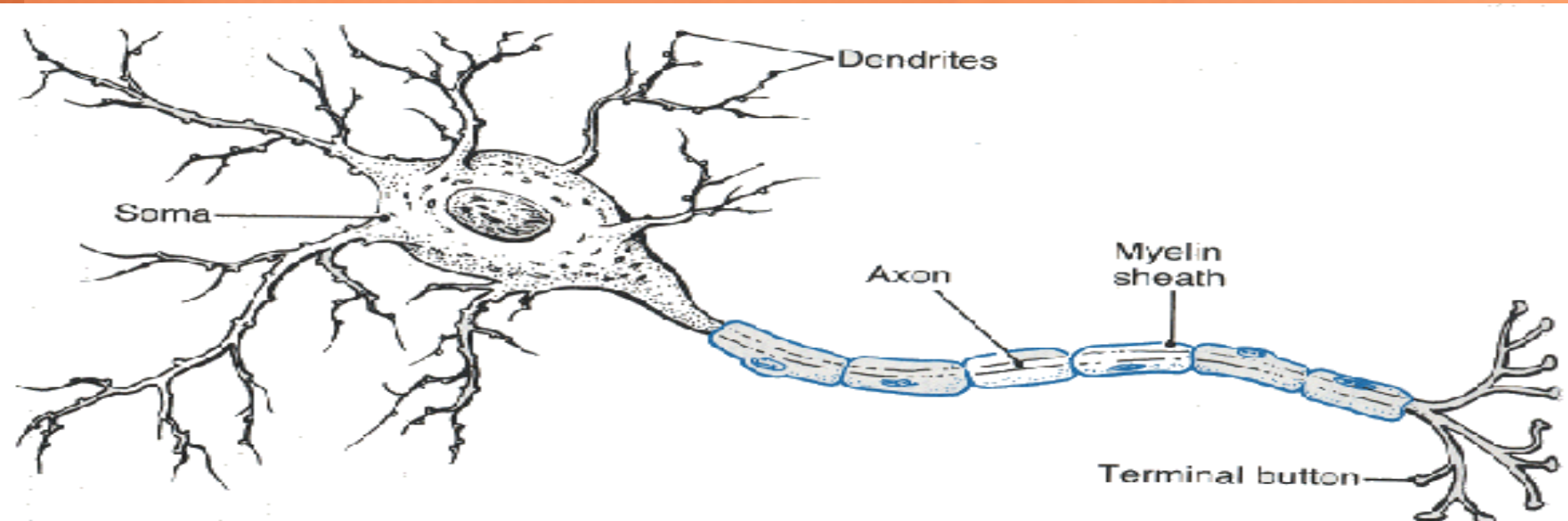
Nerve Fibers

- Dendrites –
 - Carry impulses TOWARD cell body
- Axon –
 - Single nerve fiber
 - Carries impulses AWAY from cell body
 - Axons covered by: myelin sheath

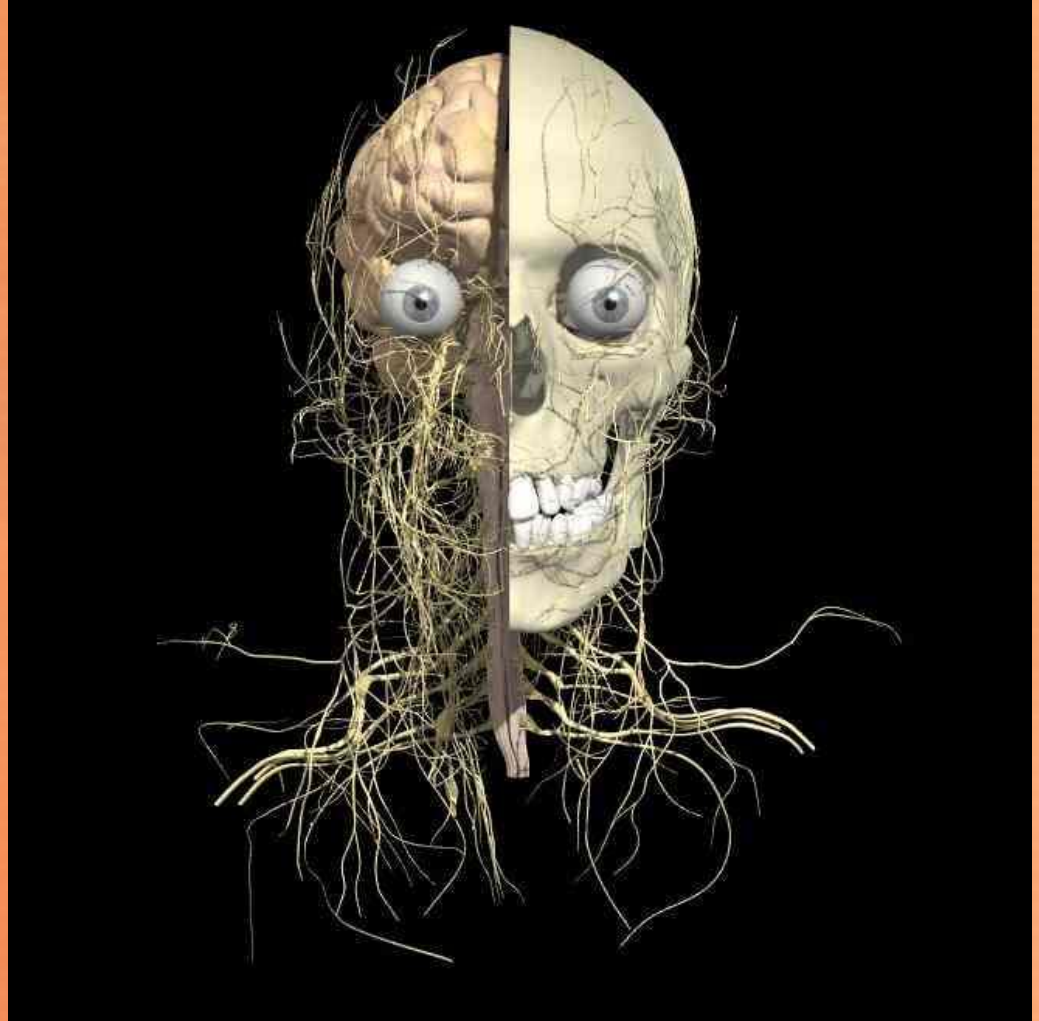


Nerve Fibers Continued..

- Myelin Sheath
 - Increase rate of transmission of impulse
 - Insulates and maintains the axon



Nerves – A combo of many nerves fibers located outside the brain & spinal cord.



3 types of nerve fibers:

1. Afferent or sensory nerves carry messages from body to brain/sc (Arrive)
2. Efferent or motor nerves carry messages from brain/sc to mm (Exit)
3. **Mixed nerves** carry both sensory & motor messages.



2 Divisions of the NS

1. Peripheral Nervous System (PNS)

- Made up of all the nerve fibers (wires of a computer)
- Has 2 more divisions

2. Central Nervous System (CNS)

- Brain and SC (hard drive and monitor)



PNS Part 1: Autonomic Nervous System (ANS)

- Controls involuntary body functions
 - Ex. Respiration & digestion
- Reactions to ERs



Autonomic Nervous System

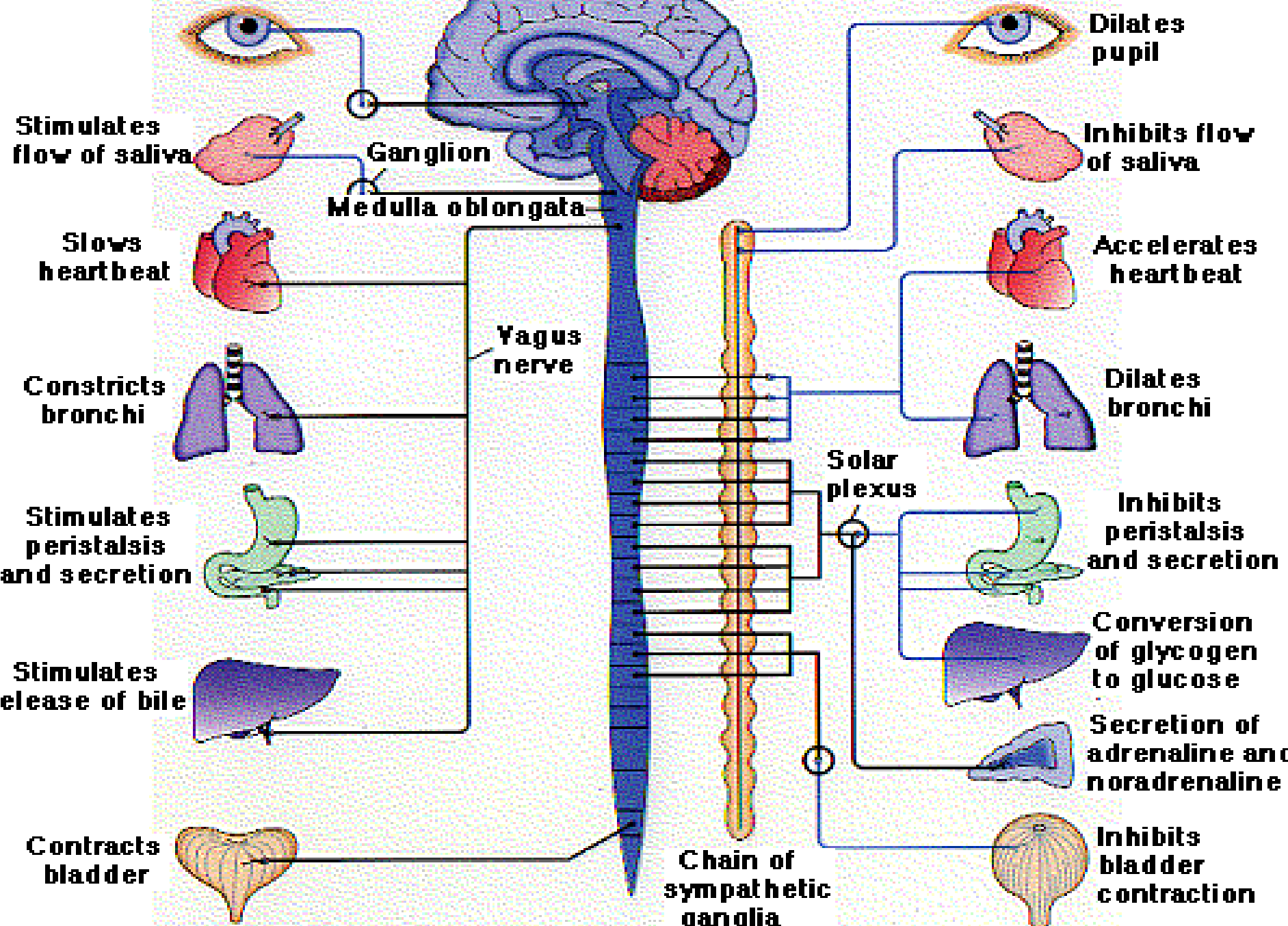
2 systems working together to maintain a balanced state in the body = **Homeostasis**

- **Sympathetic Nervous System**
 - Fight or Flight Response
 - HR, Resp., BP,digestion
- **Parasympathetic Nervous System**
 - Counteracts the sympathetic system



Parasympathetic

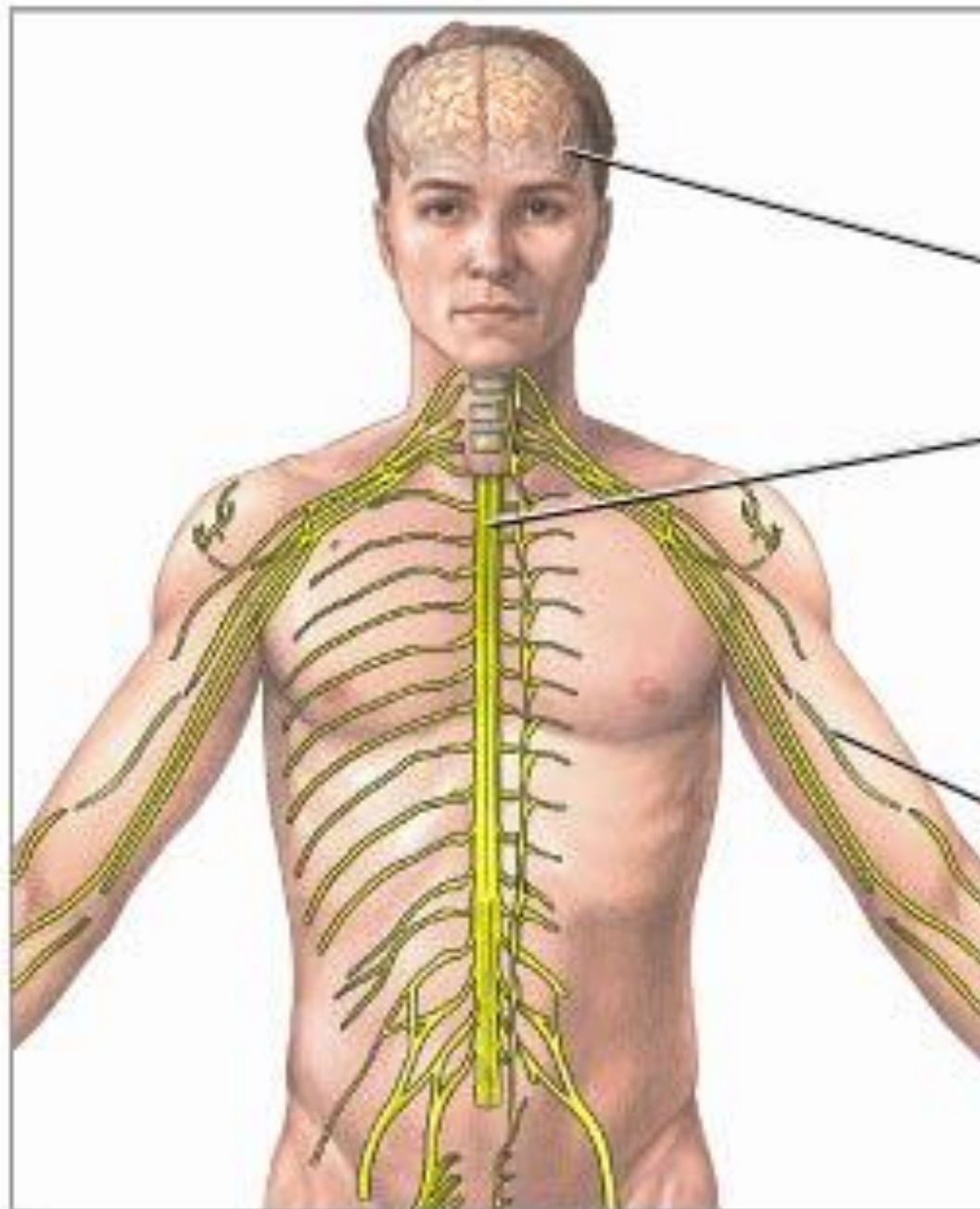
Sympathetic



PNS Part 2: Somatic Nervous System (SNS)

- Controls voluntary body functions
 - Ex. Walking
- 12 pairs of cranial nerves
- 31 pairs of spinal nerves





Central
nervous
system

Brain

Spinal cord

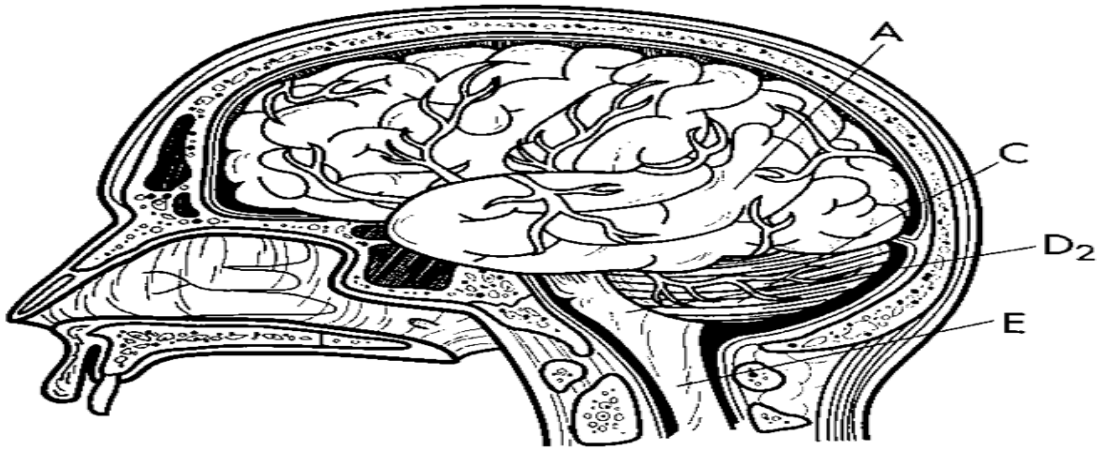
Peripheral
nervous
system

Peripheral
nerve

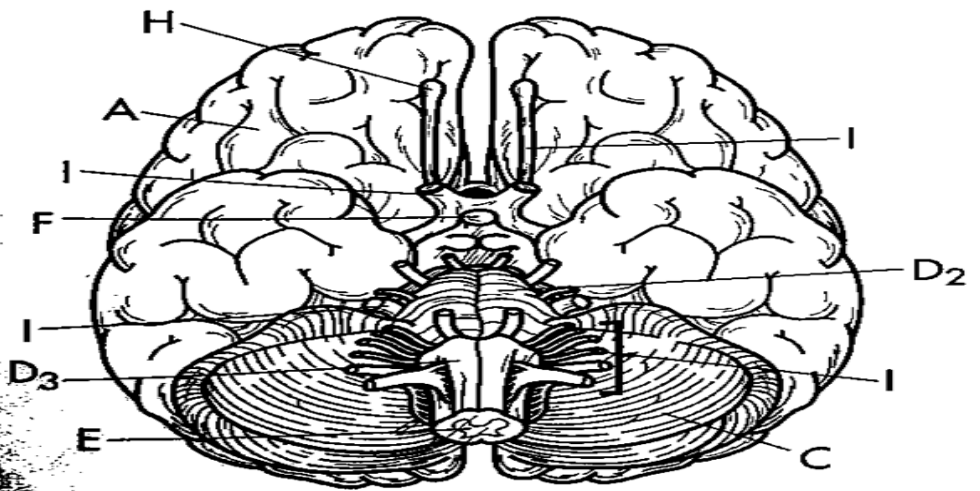
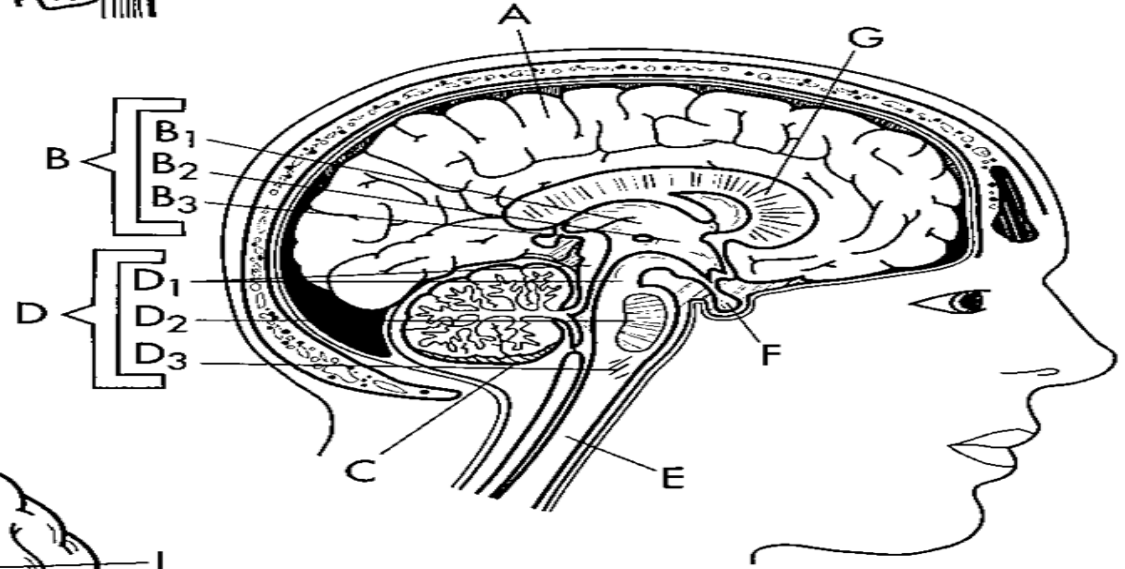
2. Central Nervous System



OVERVIEW OF THE BRAIN



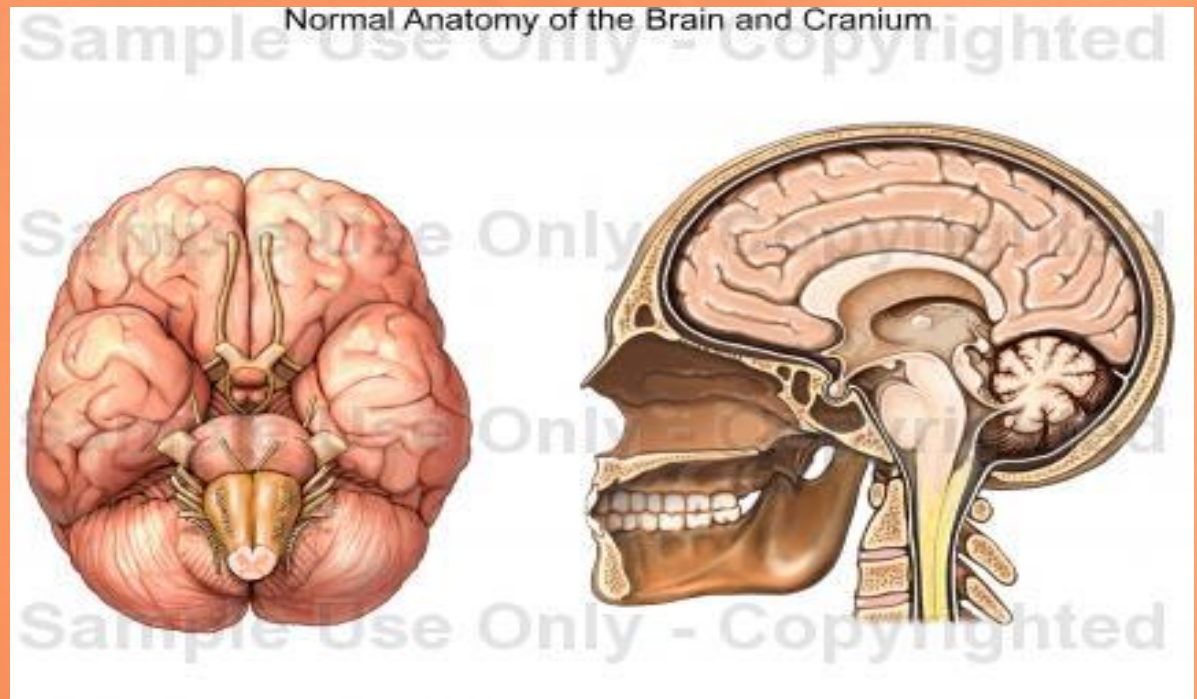
- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

The Brain

- Mass of nerve tissue
- Protected by membranes and cranium

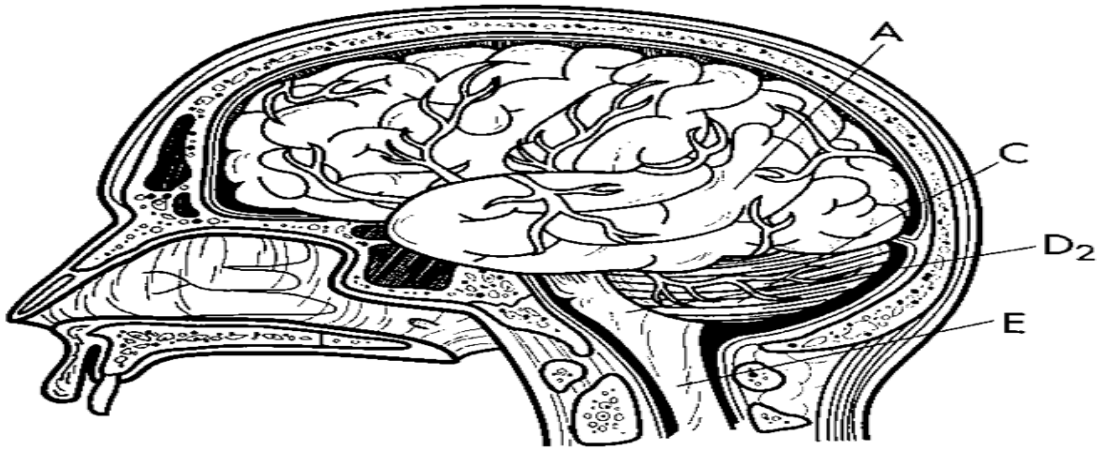


Cerebrum

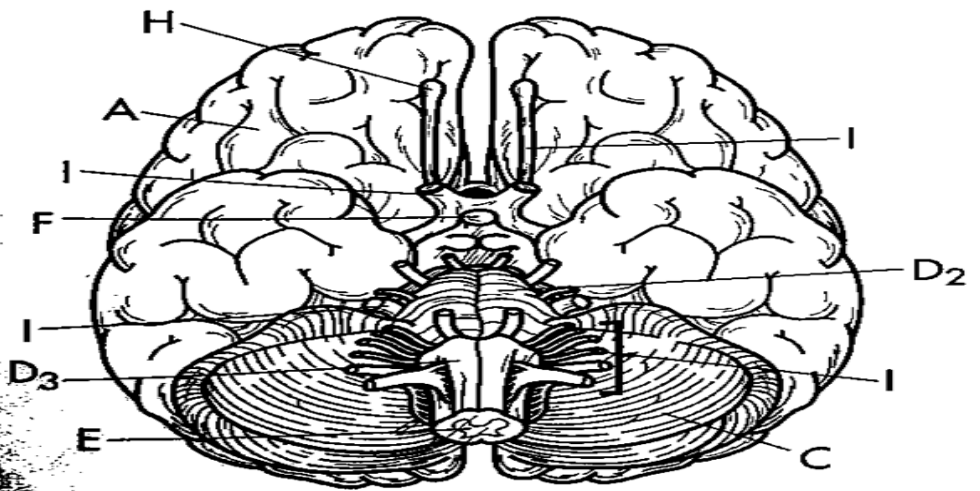
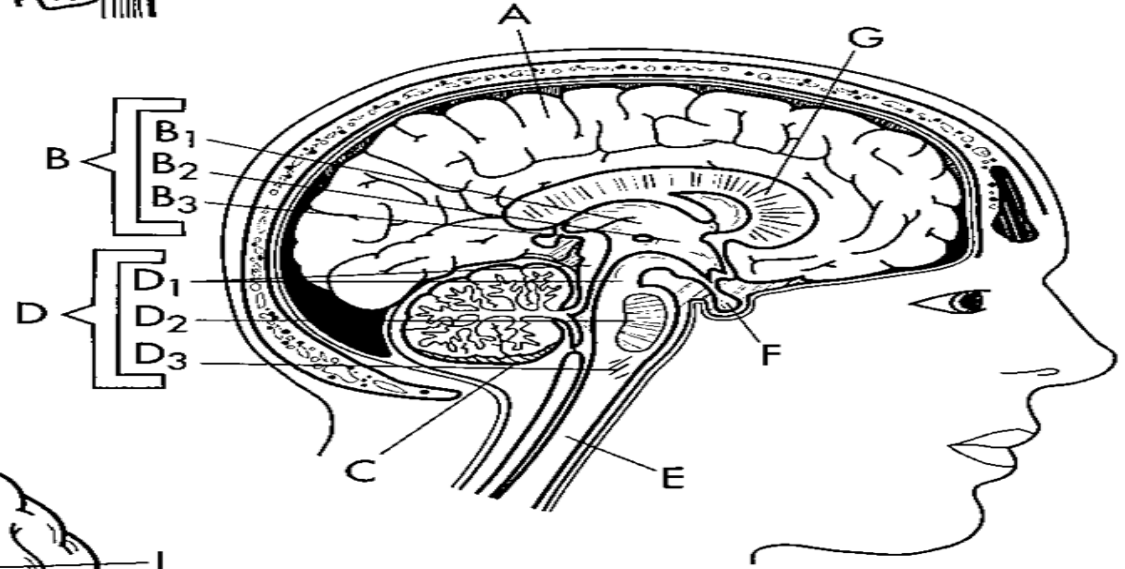
- Largest section of brain
- Contains 2 hemispheres
- Responsible for (pick four):
 - REASONING
 - THOUGHT
 - MEMORY
 - SPEAKING
 - SENSATION
 - SIGHT
 - HEARING
 - VOLUNTARY BODY FUNCTIONS



OVERVIEW OF THE BRAIN



- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



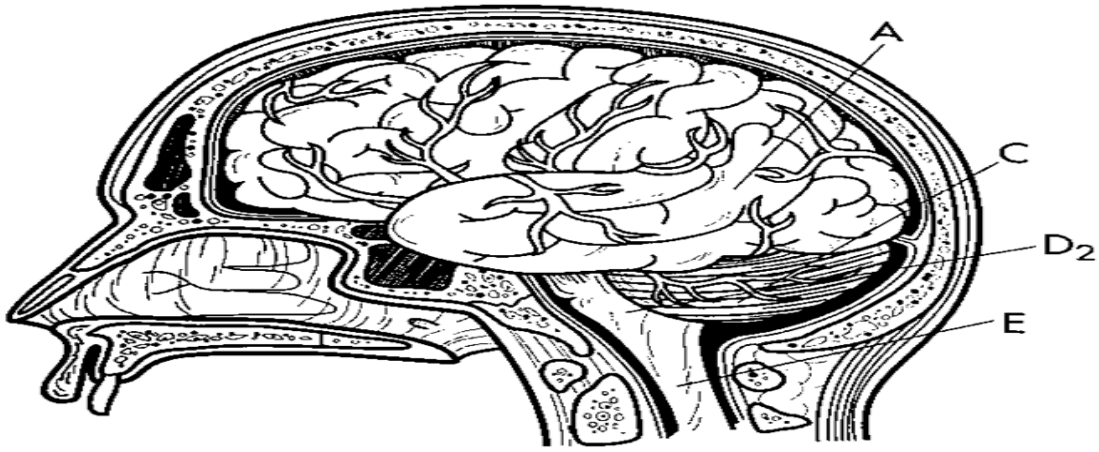
- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

Cerebellum

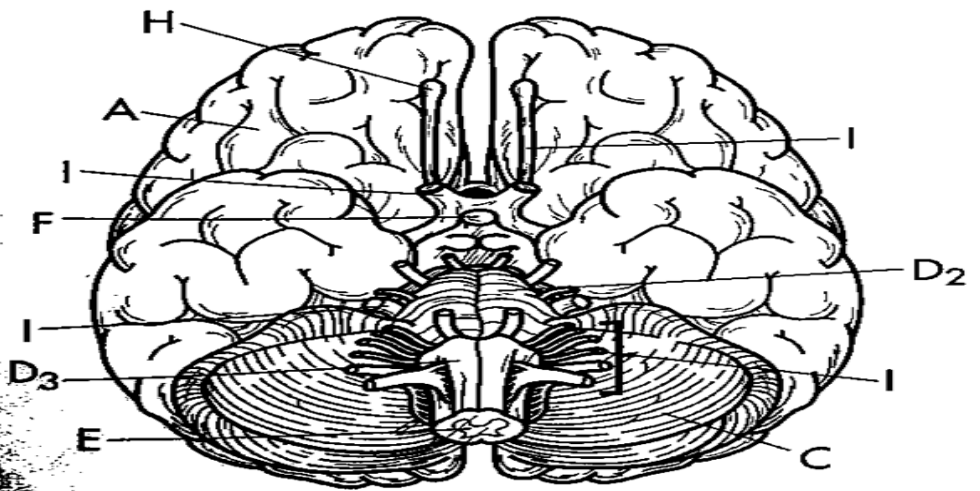
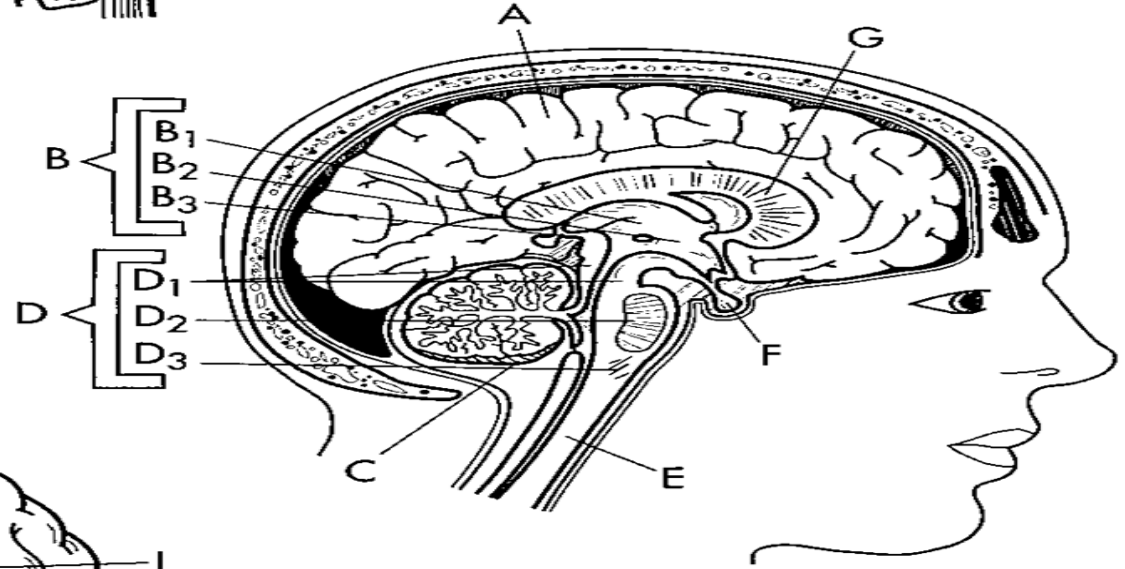
- Section inferior to the cerebrum
- Responsible for:
 - Coordination of mm
 - Balance
 - Posture
 - Muscle Tone



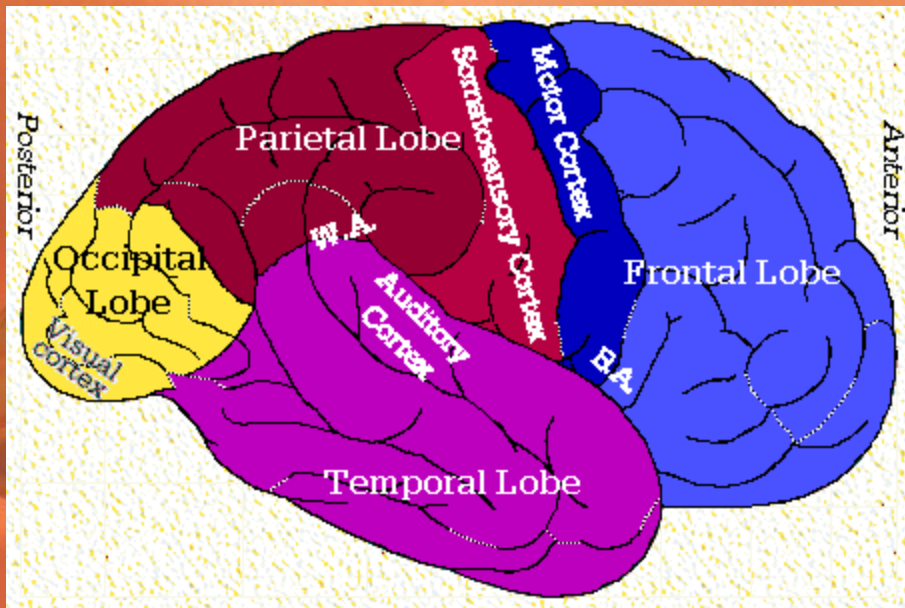
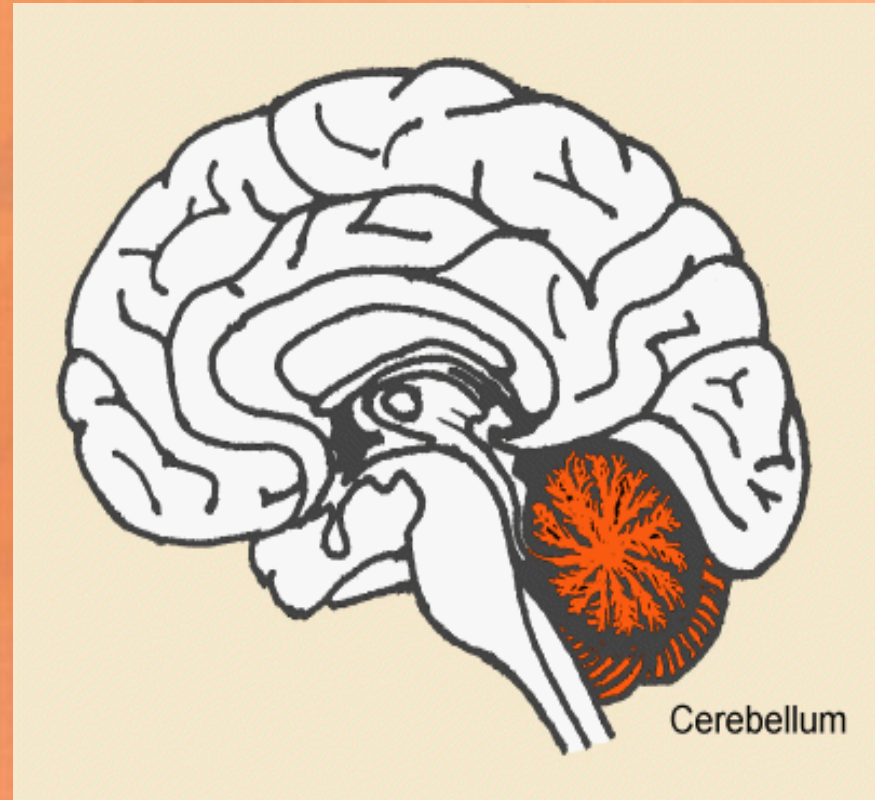
OVERVIEW OF THE BRAIN



- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

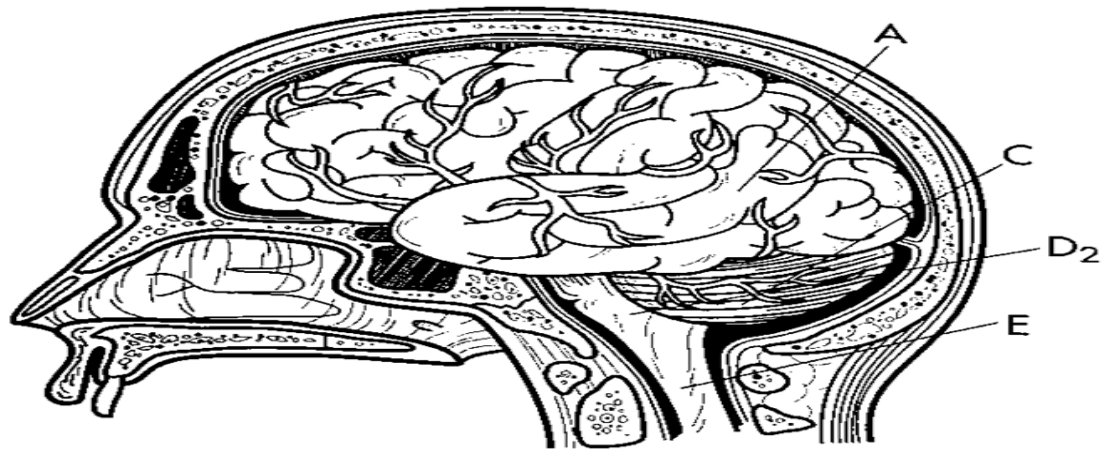


Diencephalon

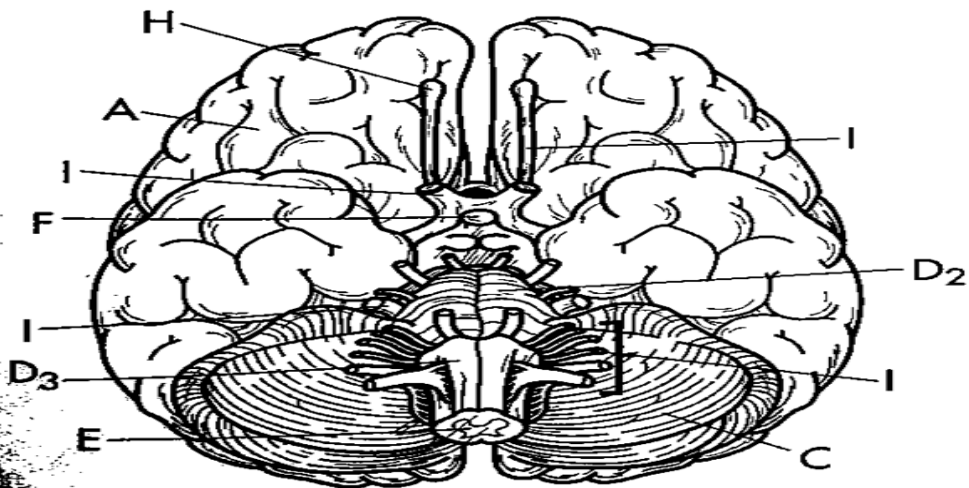
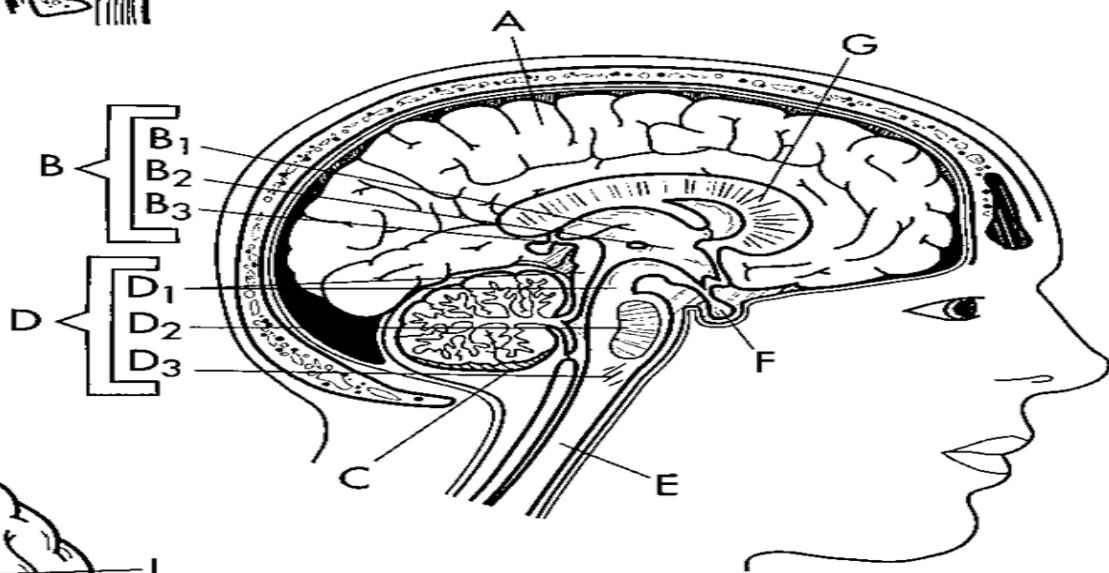
- Located b/w the cerebrum and midbrain
 - Contains 2 structures:
 - Thalamus
 - Relay center, directs sensory impulses to cerebrum
 - Hypothalamus
 - Regulates and controls:
 - ANS
 - T
 - Appetite
 - H₂O Balance
 - Sleep
 - Constriction/dilation of bld vessels



OVERVIEW OF THE BRAIN

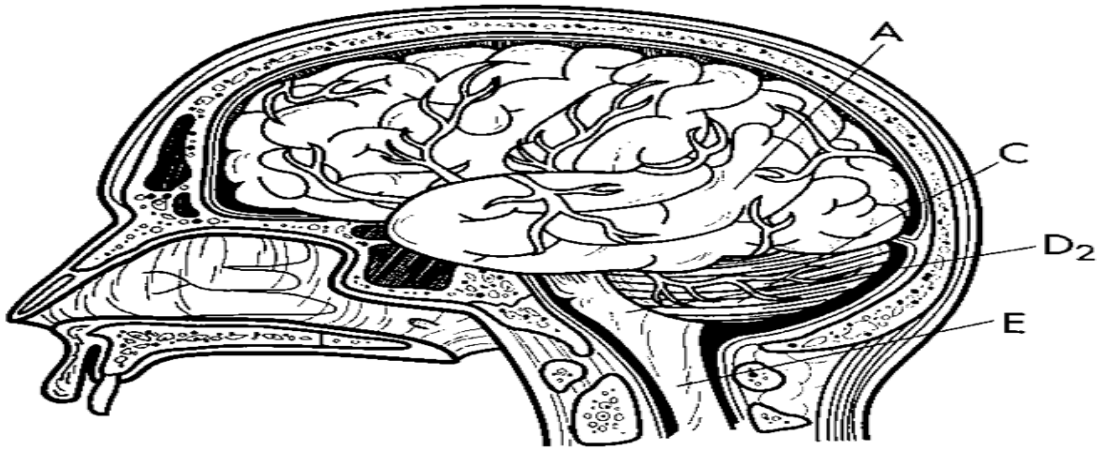


Cerebrum	A	<input type="radio"/>
Diencephalon	B	<input type="radio"/>
Thalamus	B ₁	<input type="radio"/>
Hypothalamus	B ₂	<input type="radio"/>
Epithalamus	B ₃	<input type="radio"/>
Cerebellum	C	<input type="radio"/>
Brain stem	D	<input type="radio"/>
Midbrain	D ₁	<input type="radio"/>
Pons	D ₂	<input type="radio"/>

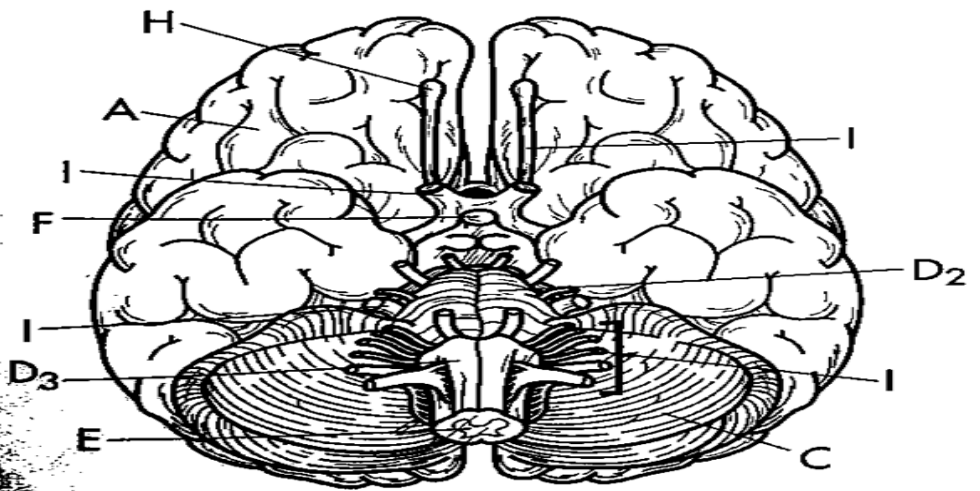
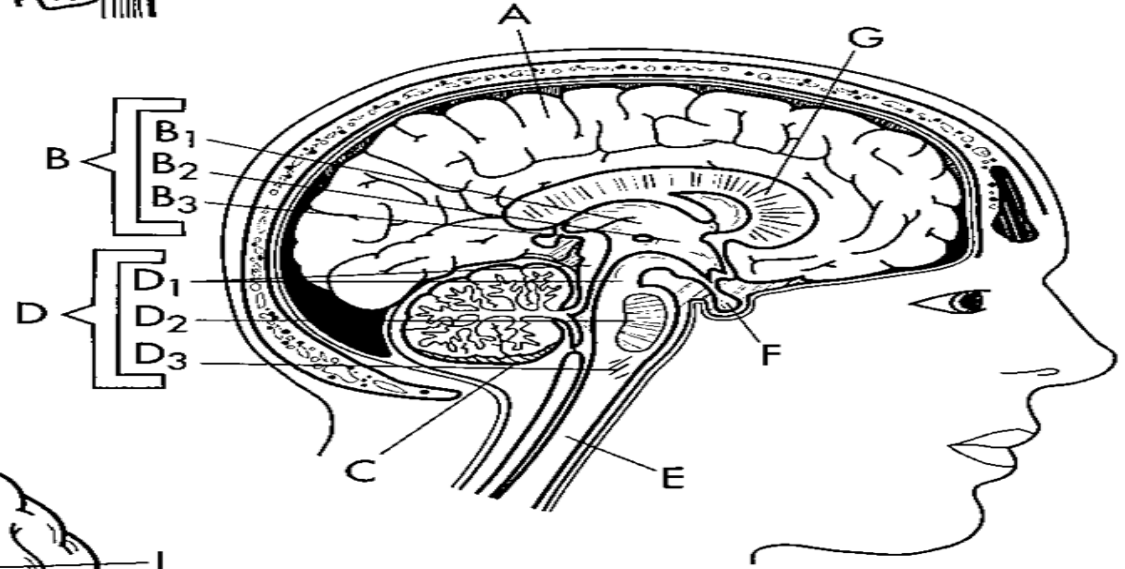


Medulla oblongata	D ₃	<input type="radio"/>
Spinal cord	E	<input type="radio"/>
Pituitary gland	F	<input type="radio"/>
Corpus callosum	G	<input type="radio"/>
Olfactory bulbs	H	<input type="radio"/>
Cranial nerves	I	<input type="radio"/>

OVERVIEW OF THE BRAIN



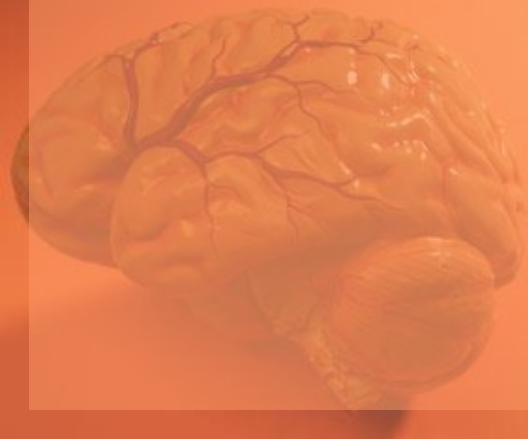
- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



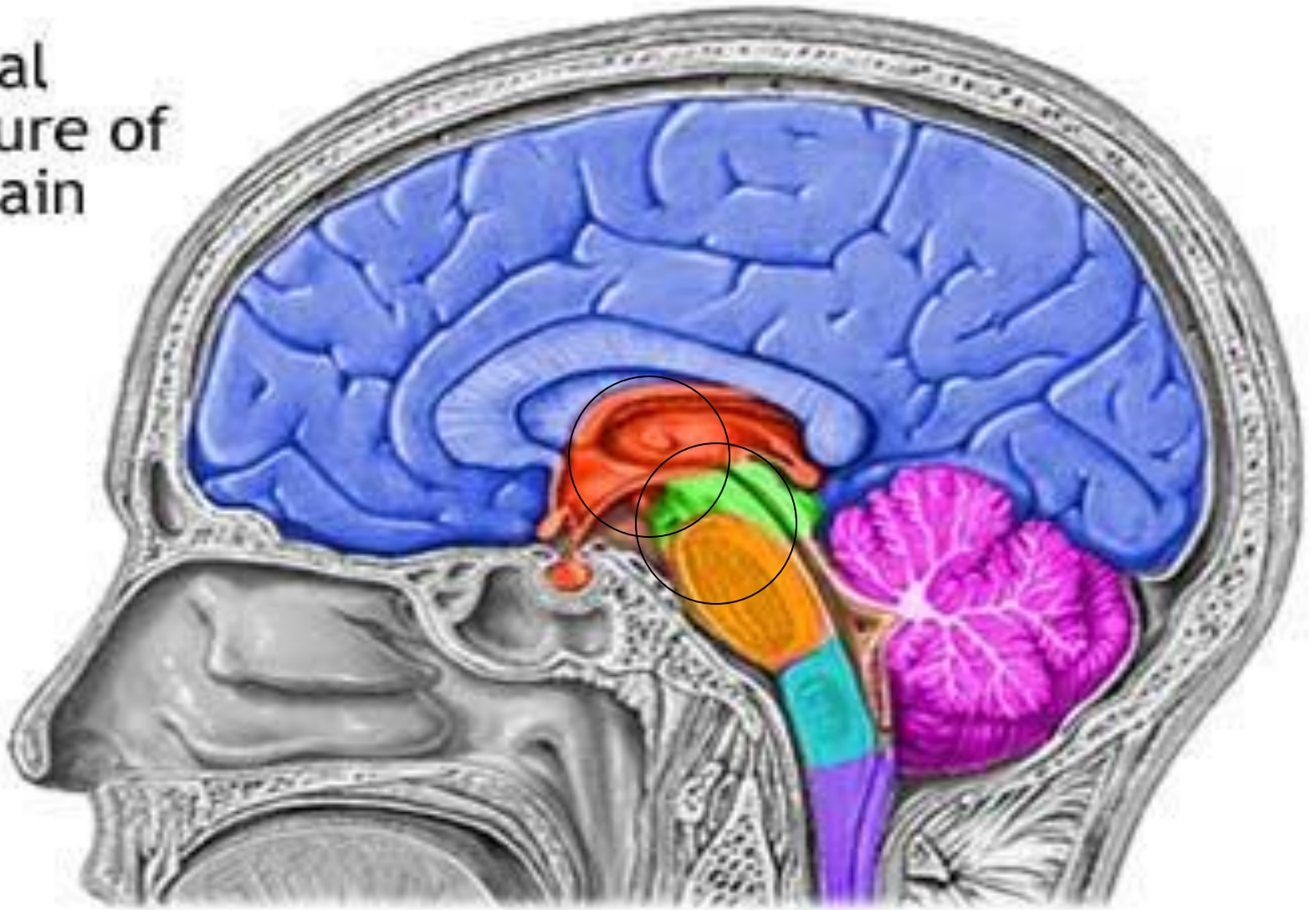
- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

Midbrain

- Located inferior to the cerebrum, superior to the brain stem
- Responsible for:
 - conduction of impulses b/w brain parts
 - eye reflexes

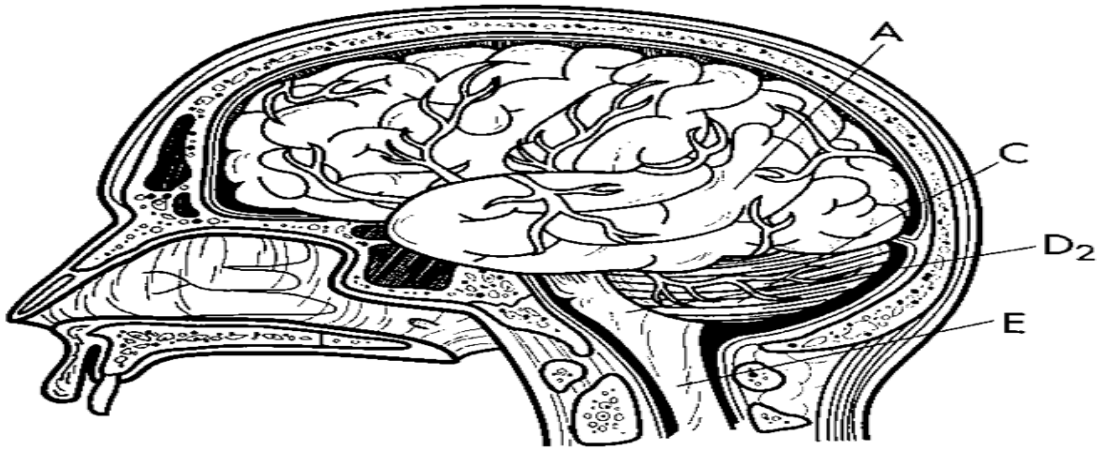


Internal structure of the brain

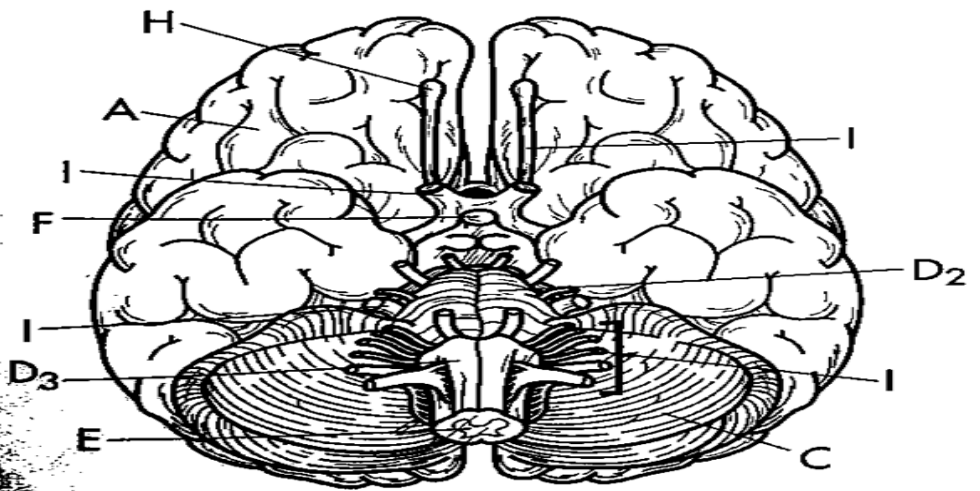
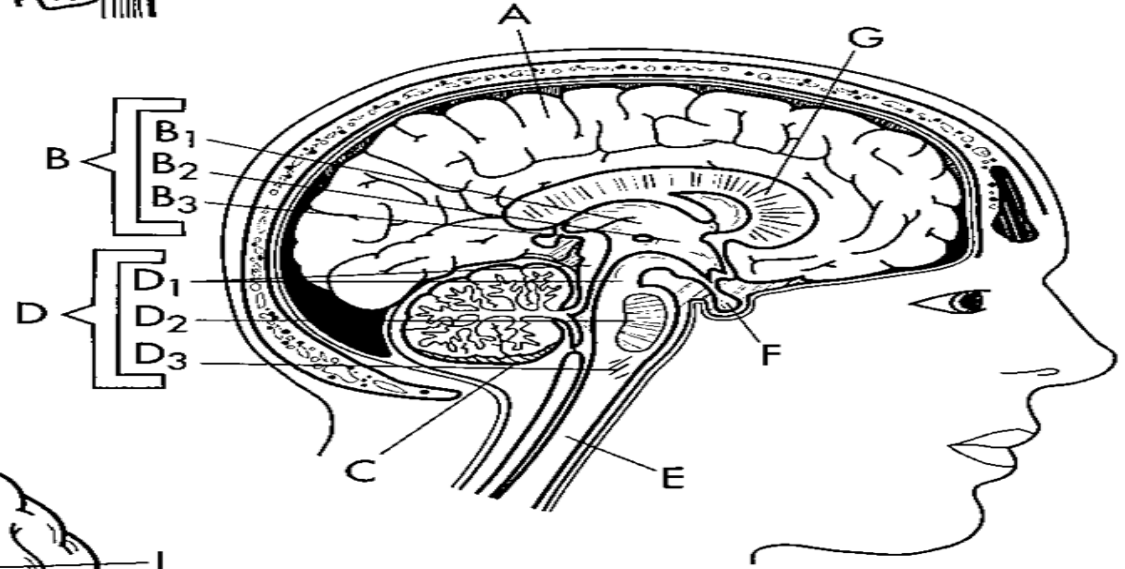


- Spinal cord
- Cerebellum
- Diencephalon
- Pons
- Medulla Oblongata
- Midbrain
- Cerebral hemisphere

OVERVIEW OF THE BRAIN



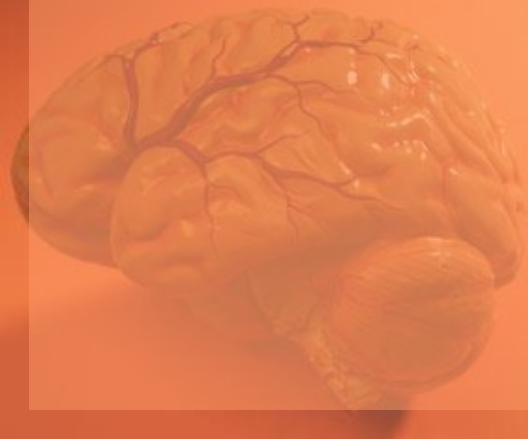
- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



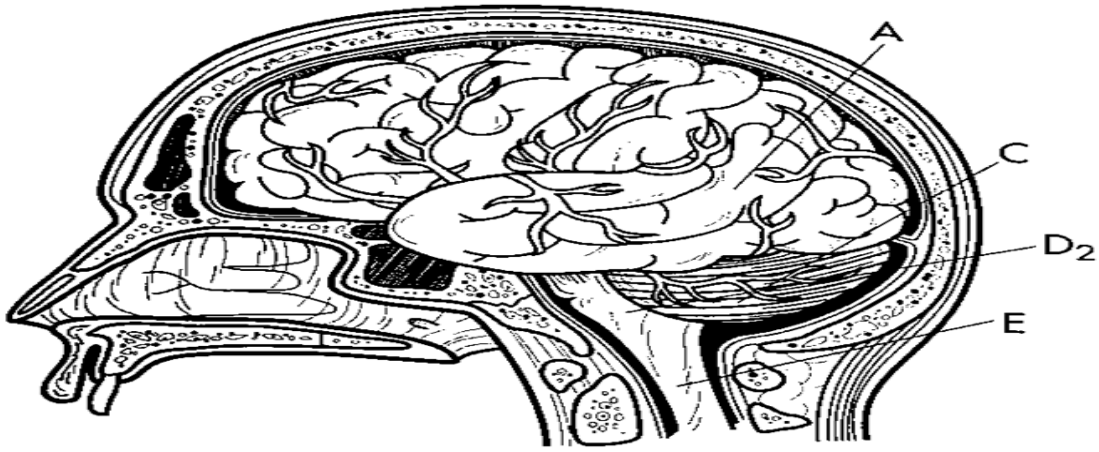
- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

Pons

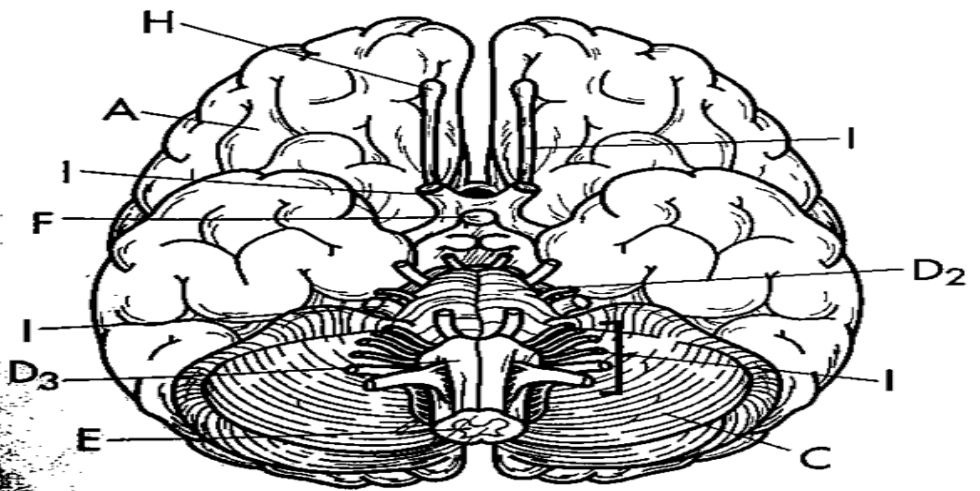
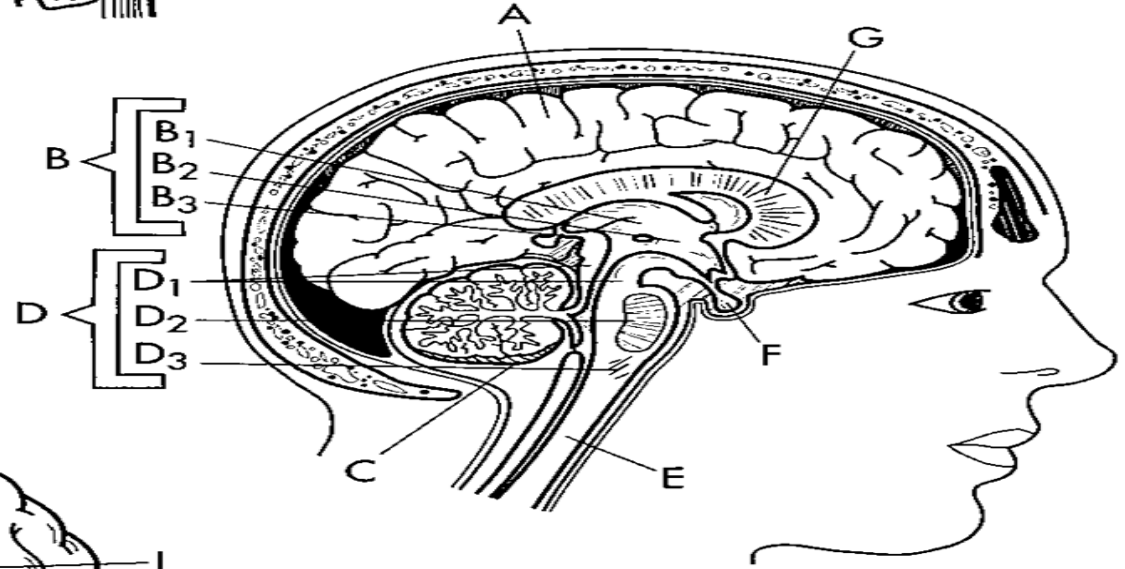
- Located inferior to the midbrain of the brain stem
- Responsible for:
 - Conduction messages to other parts of the brain
 - Reflex actions: chew/taste/saliva



OVERVIEW OF THE BRAIN



- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



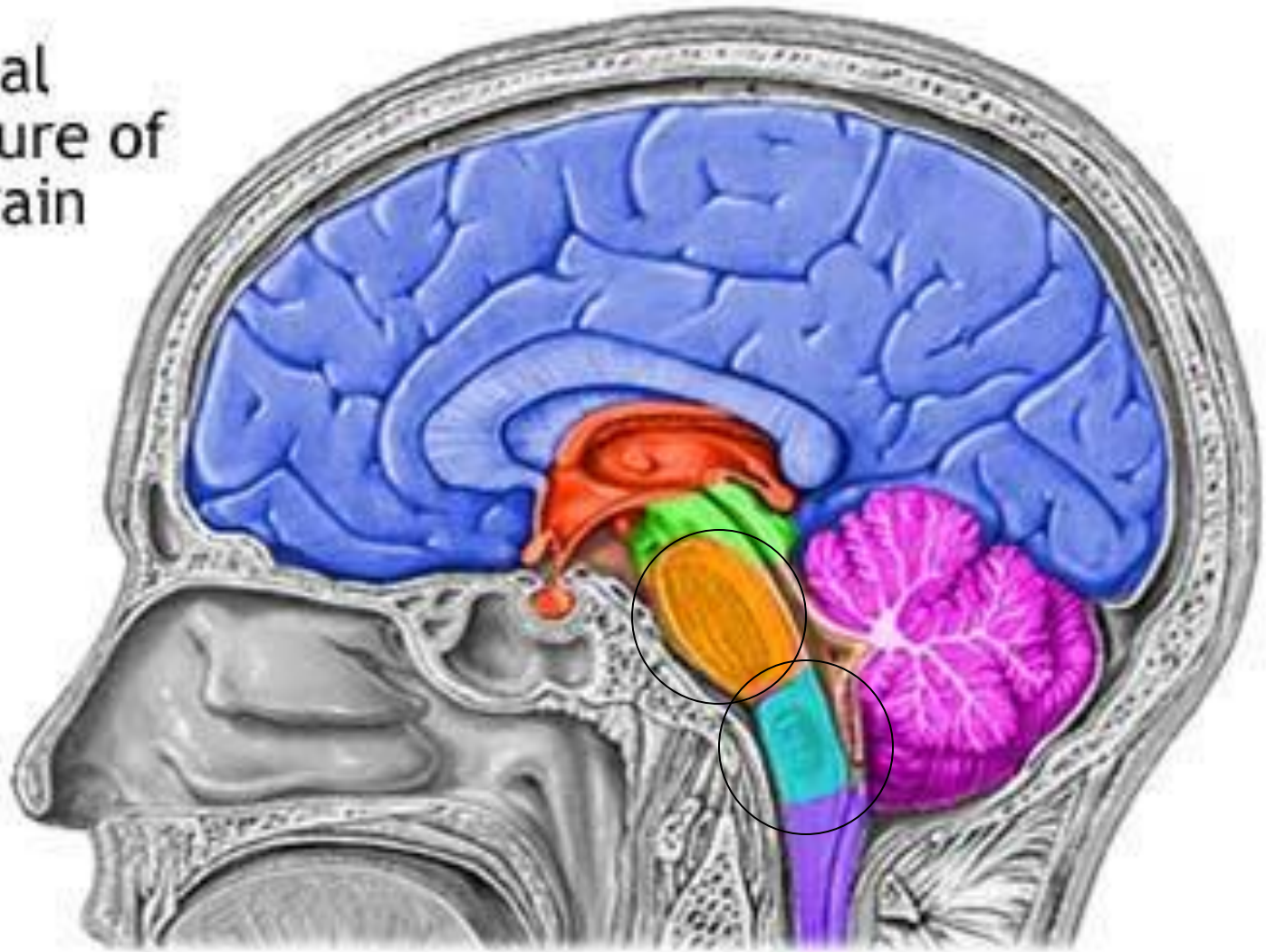
- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

Medulla Oblongata

- Most distal part of brain stem
- Beginning of sc
- Responsible for (pick 4):
 - Regulating Heartbeat
 - R
 - Swallowing
 - Coughing
 - BP

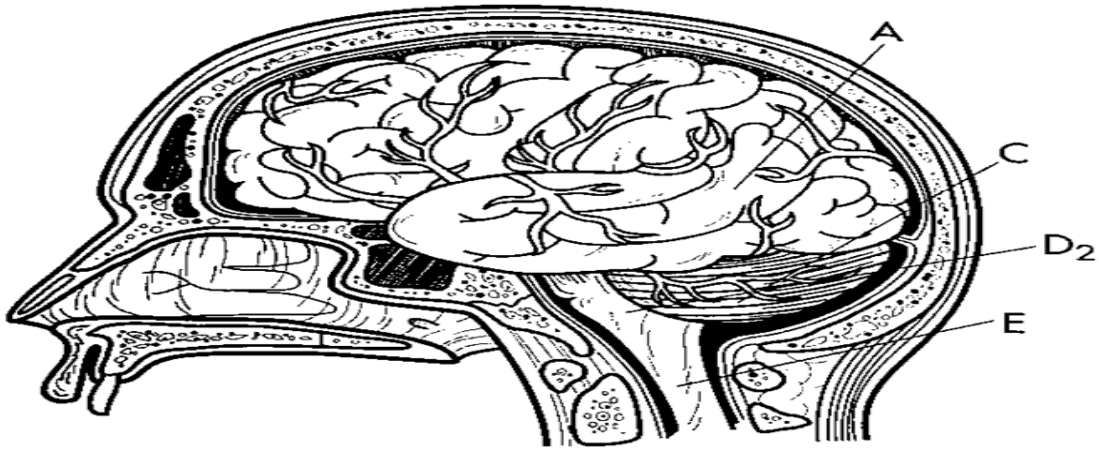


Internal structure of the brain

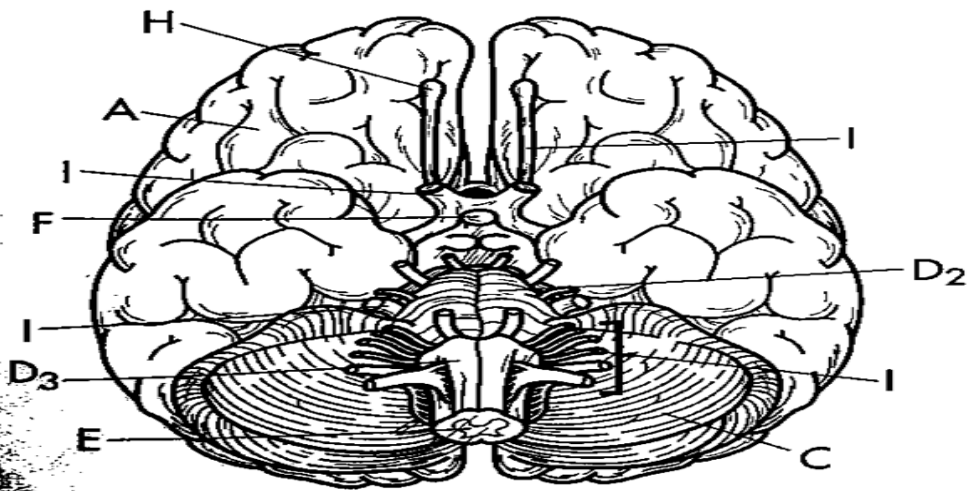
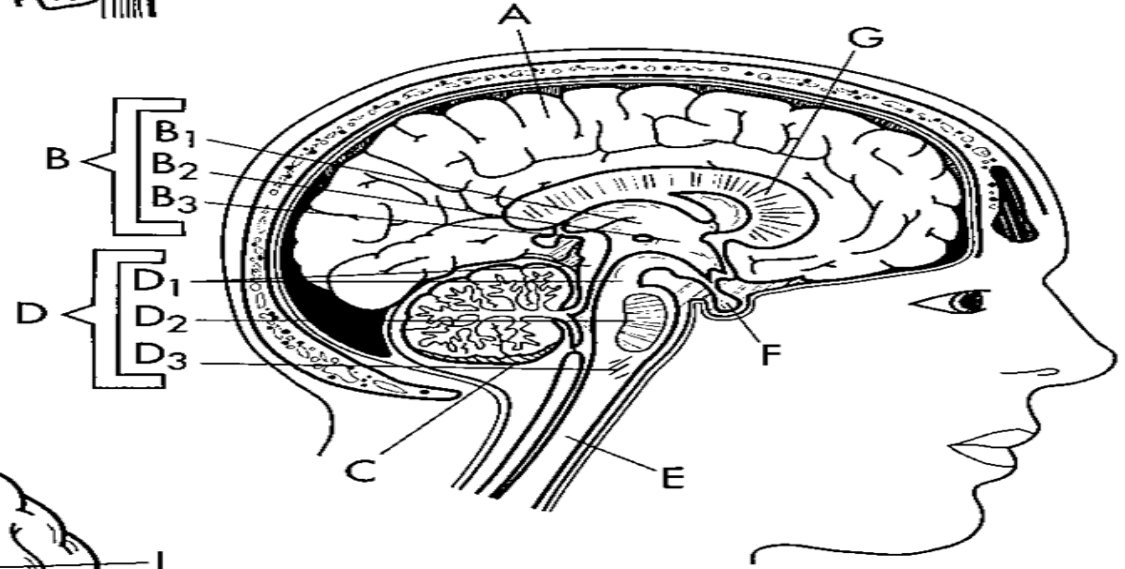


- | | | | |
|---|--|---|--|
|  Spinal cord |  Cerebellum |  Diencephalon |  Pons |
|  Medulla Oblongata |  Midbrain |  Cerebral hemisphere | |

OVERVIEW OF THE BRAIN

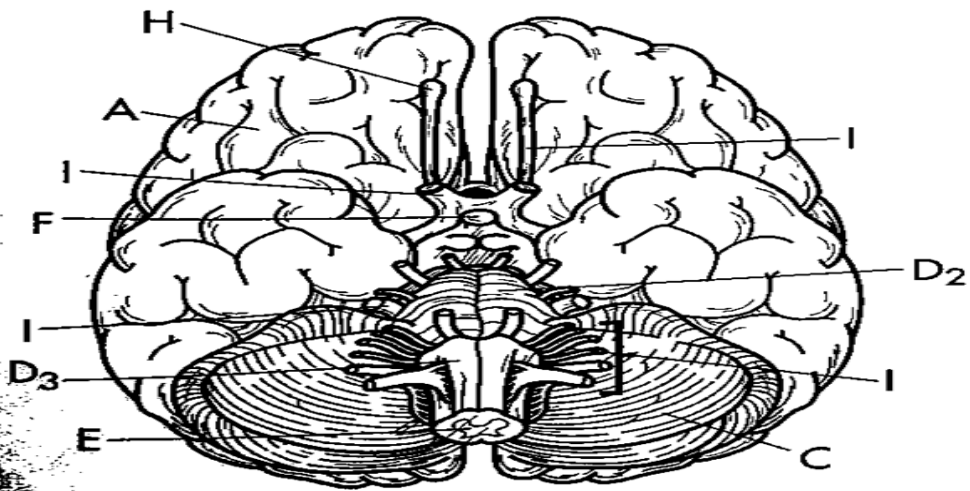
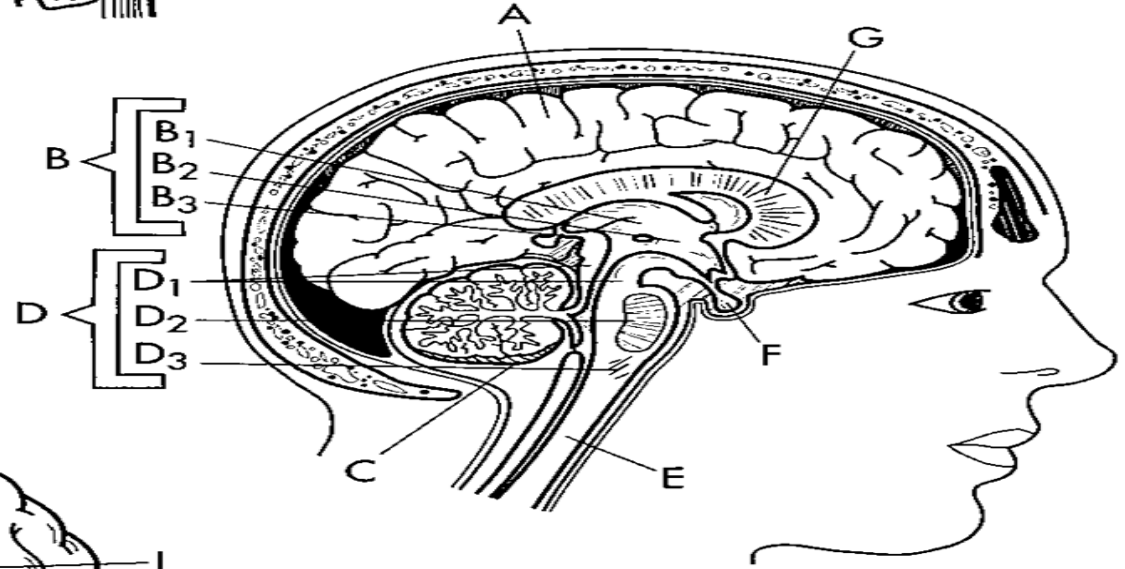
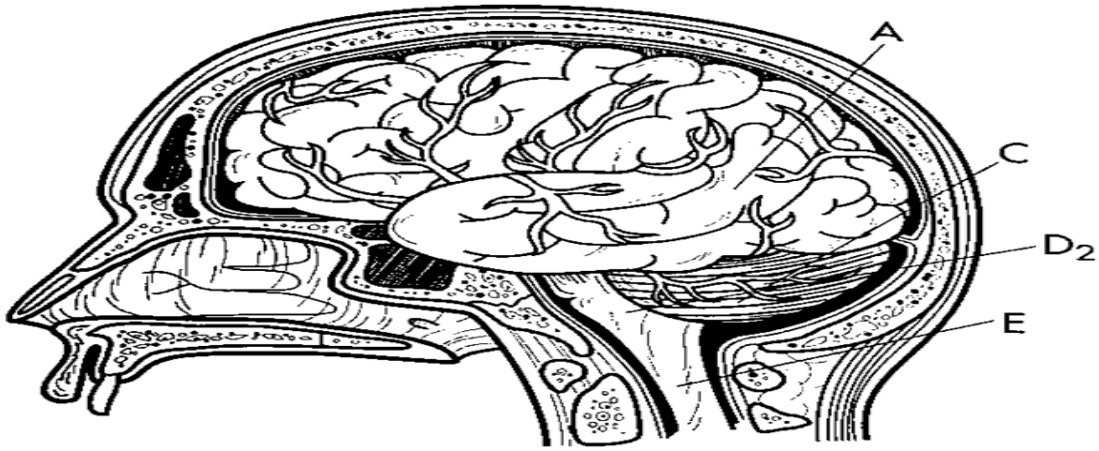


- Cerebrum A ○
- Diencephalon B ○
- Thalamus B₁ ○
- Hypothalamus B₂ ○
- Epithalamus B₃ ○
- Cerebellum C ○
- Brain stem D ○
- Midbrain D₁ ○
- Pons D₂ ○



- Medulla oblongata D₃ ○
- Spinal cord E ○
- Pituitary gland F ○
- Corpus callosum G ○
- Olfactory bulbs H ○
- Cranial nerves I ○

OVERVIEW OF THE BRAIN

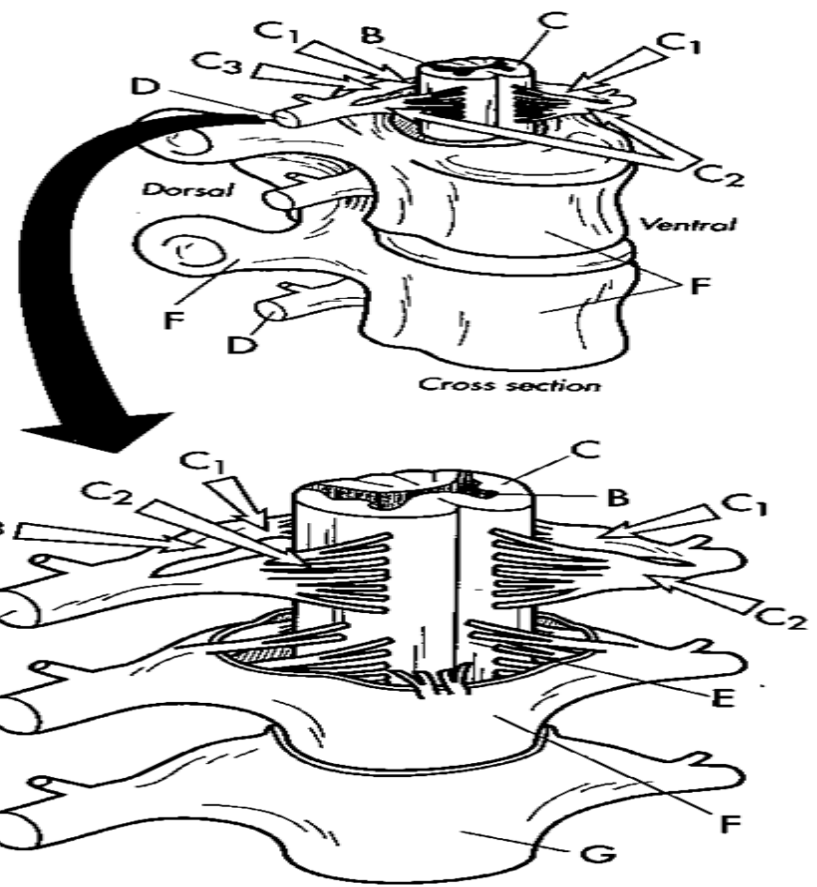
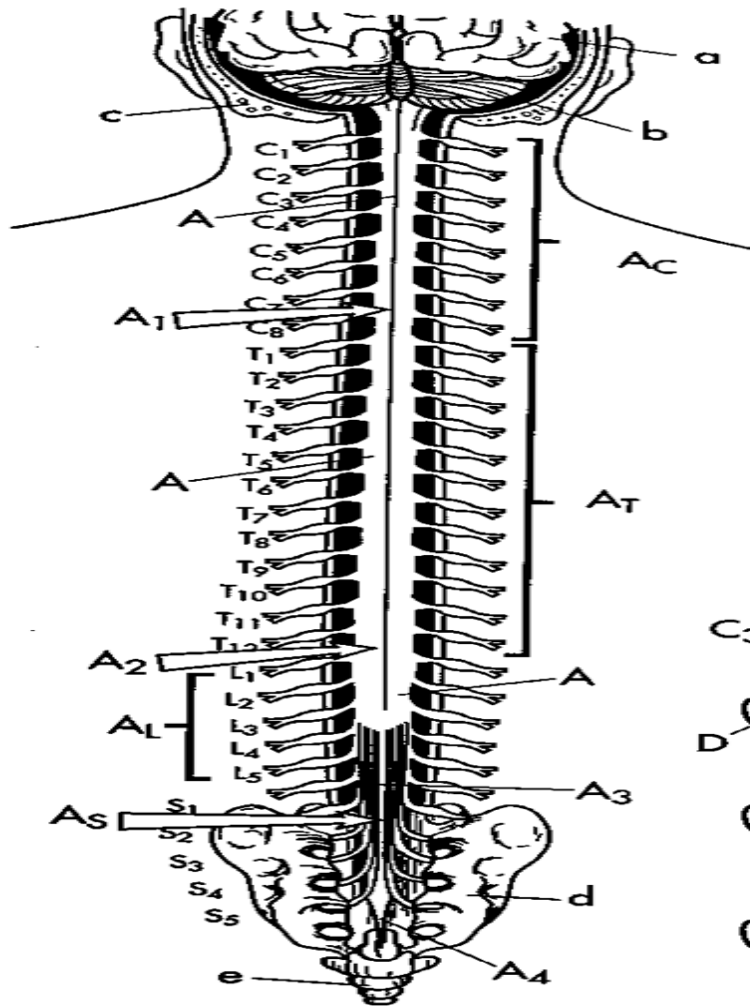


Spinal Cord

- Starts at MO
- Ends at L1 or L2
- Protected by _____.
- Responsible for: carrying sensory mess to brain & motor mess from brain

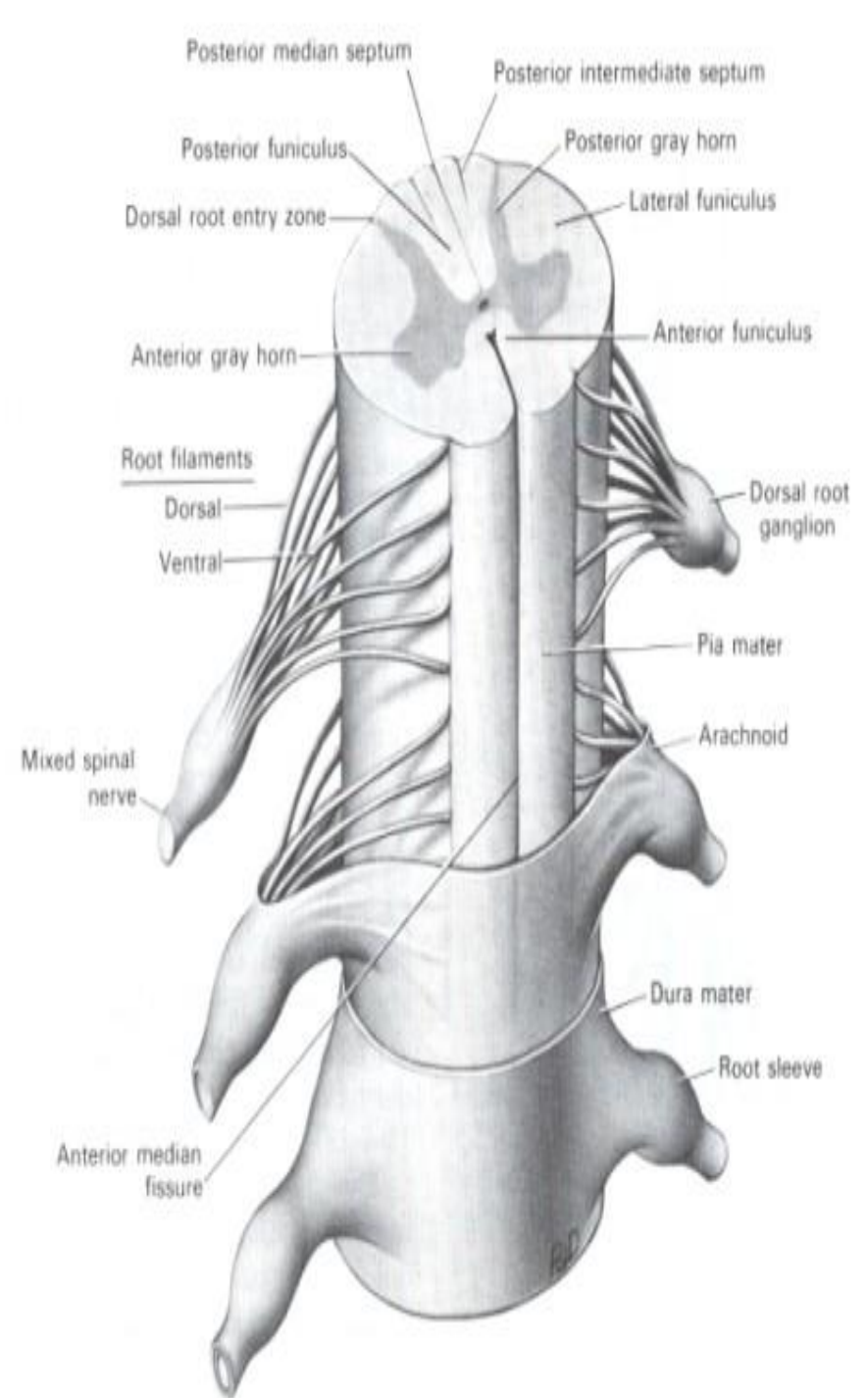
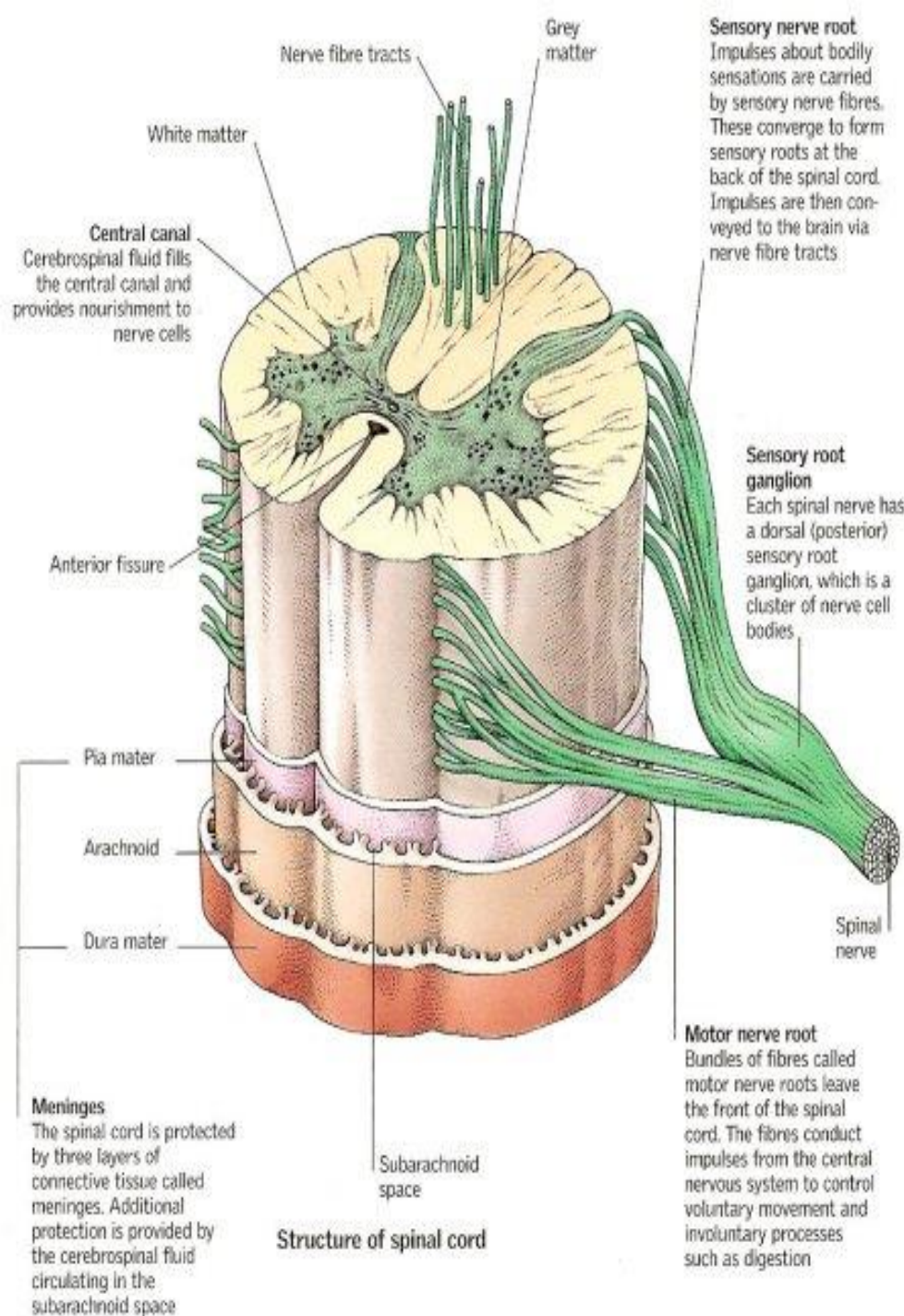


ANATOMY OF THE SPINAL CORD

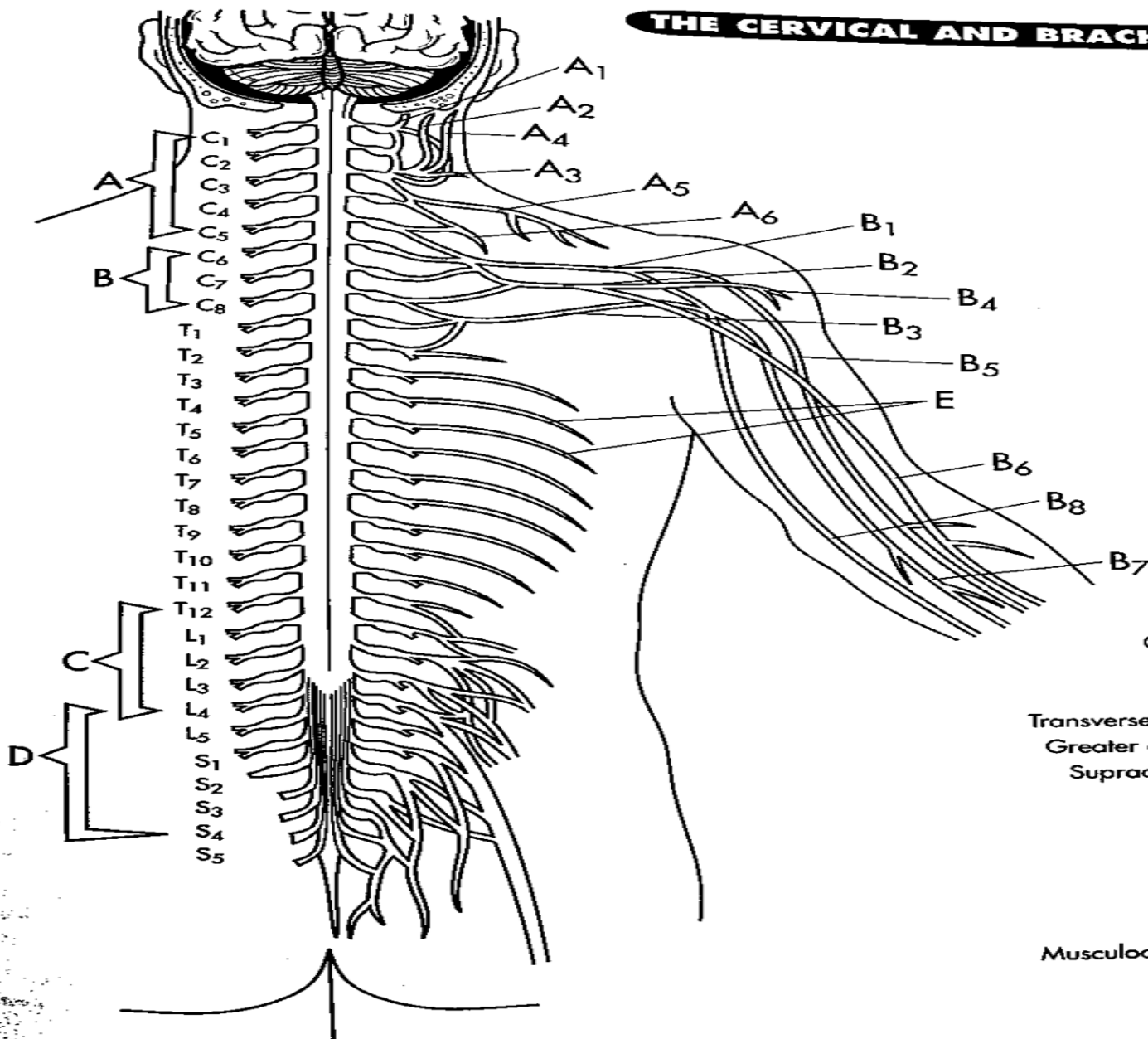


Spinal cord	A	○
Cervical enlargement	A ₁	○○
Lumbar enlargement	A ₂	○○
Conus medullaris	A ₃	○○
Filum terminal	A ₄	○○
Cervical segment	AC	○○
Thoracic segment	AT	○○
Lumbar segment	AL	○○
Sacral segment	AS	○○

Gray matter	B	○
White matter	C	○○
Dorsal root	C ₁	○○
Ventral root	C ₂	○○
Dorsal root ganglion	C ₃	○○
Spinal nerve	D	○○
Pia mater	E	○○
Arachnoid	F	○○
Dura mater	G	○○
Cerebrum	a	○○
Cerebellum	b	○○
Occipital bone	c	○○
Sacrum	d	○○
Coccyx	e	○○

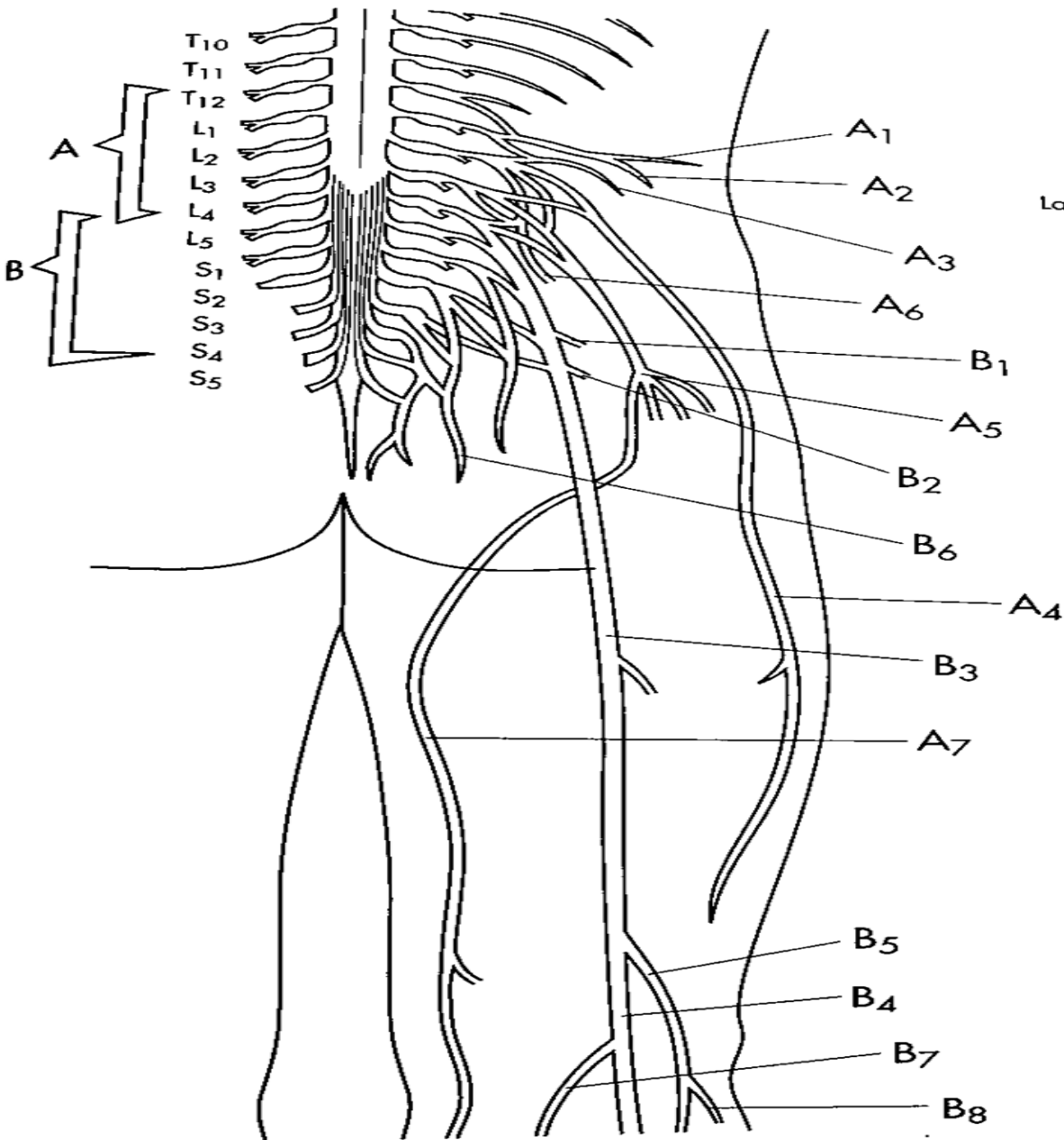


THE CERVICAL AND BRACHIAL PLEXUSES



Cervical plexus	A	○
Ansa cervicalis	A ₁	○
Lesser occipital	A ₂	○
Transverse cervical nerve	A ₃	○
Greater auricular nerve	A ₄	○
Supraclavicular nerve	A ₅	○
Phrenic nerve	A ₆	○
Brachial plexus	B	○
Lateral cord	B ₁	○
Posterior cord	B ₂	○
Medial cord	B ₃	○
Axillary nerve	B ₄	○
Musculocutaneous nerve	B ₅	○
Radial nerve	B ₆	○
Median nerve	B ₇	○
Ulnar nerve	B ₈	○
Lumbar plexus	C	○
Sacral plexus	D	○
Ventral rami	E	○

THE LUMBAR AND SACRAL PLEXUSES



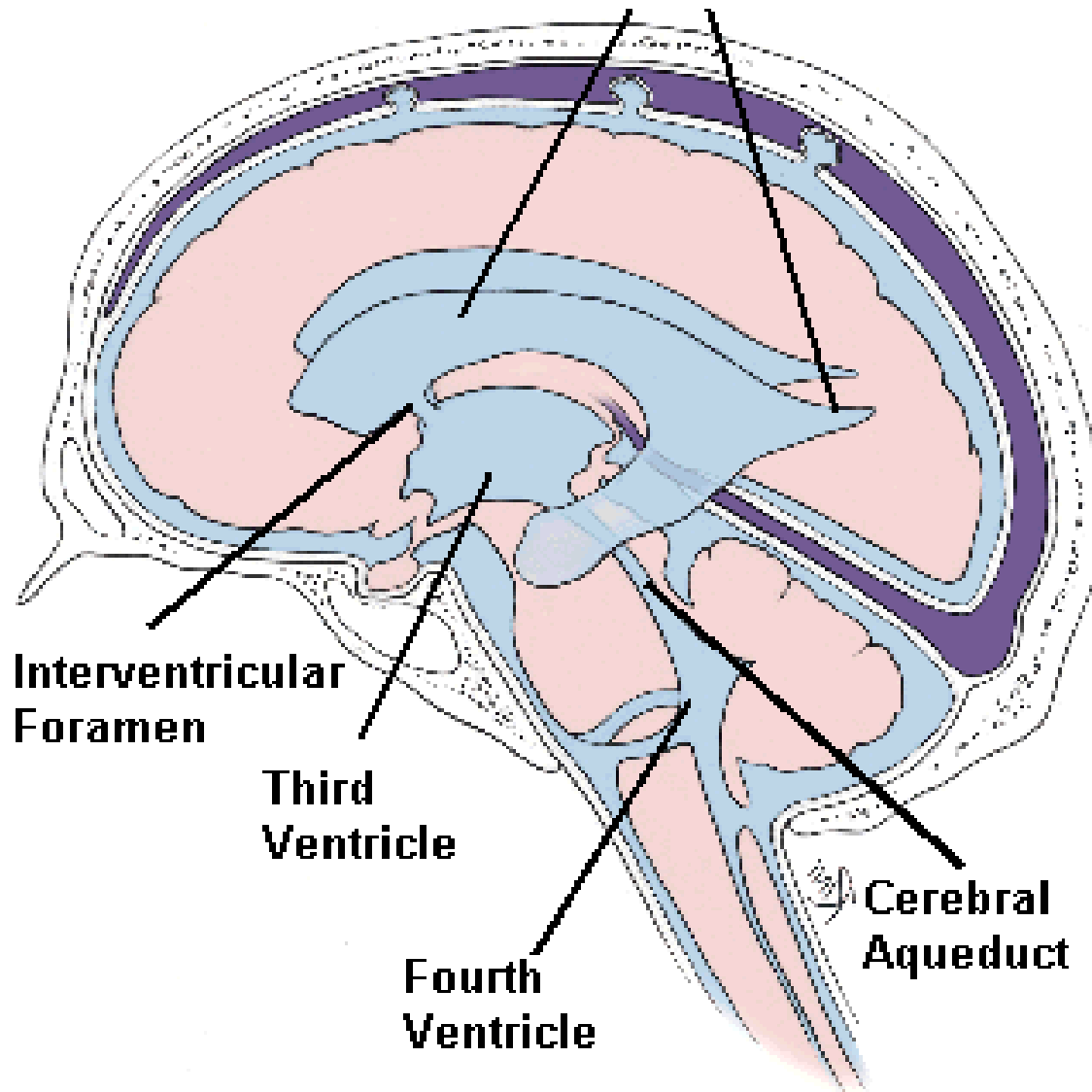
- | | | |
|---------------------------------|----------------|-----------------------|
| Lumbar plexus | A | <input type="radio"/> |
| Iliohypogastric nerve | A ₁ | <input type="radio"/> |
| Ilioinguinal nerve | A ₂ | <input type="radio"/> |
| Genitofemoral nerve | A ₃ | <input type="radio"/> |
| Lateral femoral cutaneous nerve | A ₄ | <input type="radio"/> |
| Femoral nerve | A ₅ | <input type="radio"/> |
| Obturator nerve | A ₆ | <input type="radio"/> |
| Saphenous nerve | A ₇ | <input type="radio"/> |
| Sacral plexus | B | <input type="radio"/> |
| Superior gluteal nerve | B ₁ | <input type="radio"/> |
| Inferior gluteal nerve | B ₂ | <input type="radio"/> |
| Sciatic nerve | B ₃ | <input type="radio"/> |
| Tibial nerve | B ₄ | <input type="radio"/> |
| Perineal nerve | B ₅ | <input type="radio"/> |
| Pudendal nerve | B ₆ | <input type="radio"/> |
| Medial sural cutaneous nerve | B ₇ | <input type="radio"/> |
| Lateral sural cutaneous nerve | B ₈ | <input type="radio"/> |

OTHER PARTS OF THE BRAIN

- Ventricles
 - 4 hollow spaces in the brain filled with CSF.
- Cerebrospinal Fluid
 - Shock absorber to protect the brain and spinal cord.
 - Carries nutrients & helps remove metabolic wastes.



Lateral Ventricles



Interventricular Foramen

Third Ventricle

Fourth Ventricle

Cerebral Aqueduct



