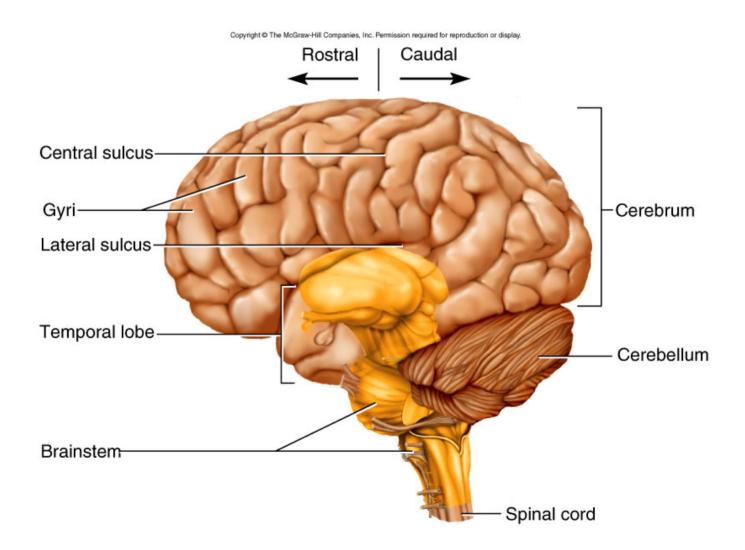
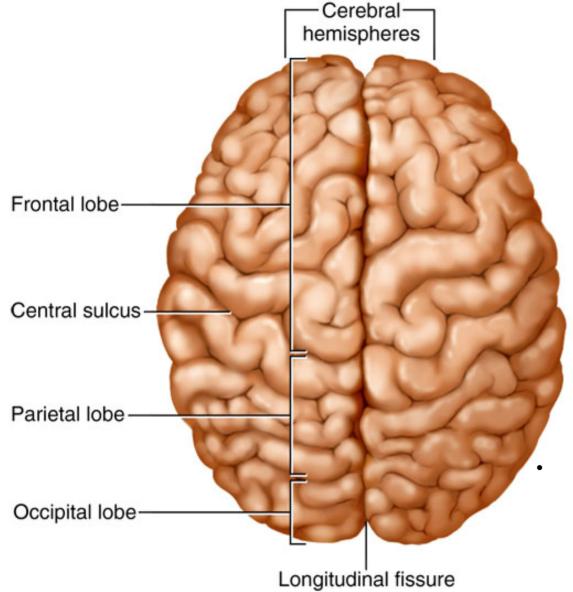
Brain Anatomy

Directional Terms and Landmarks



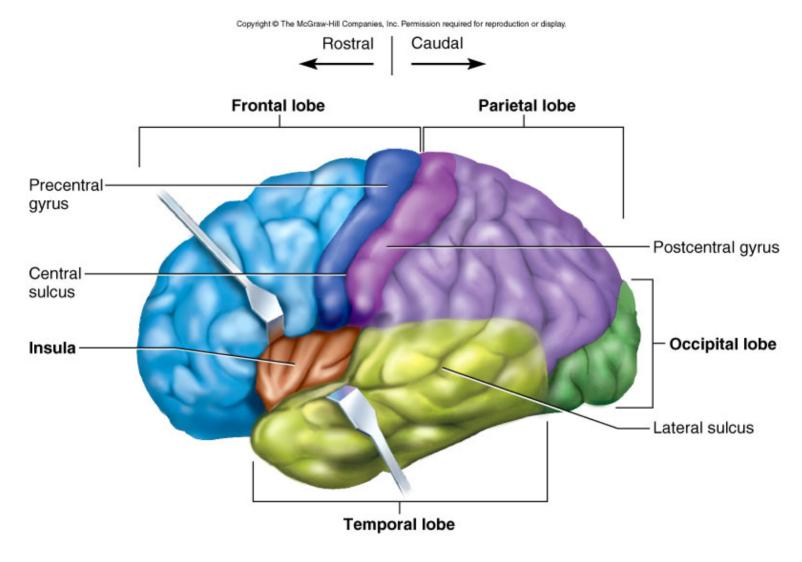


(a) Superior view

Longitudinal fissure - cerebral hemispheres.

- gyri = folds; sulci = grooves
- cortex = surface layer of gray matter
- nuclei = deeper masses of gray matter
- tracts = bundles of axons (white matter)

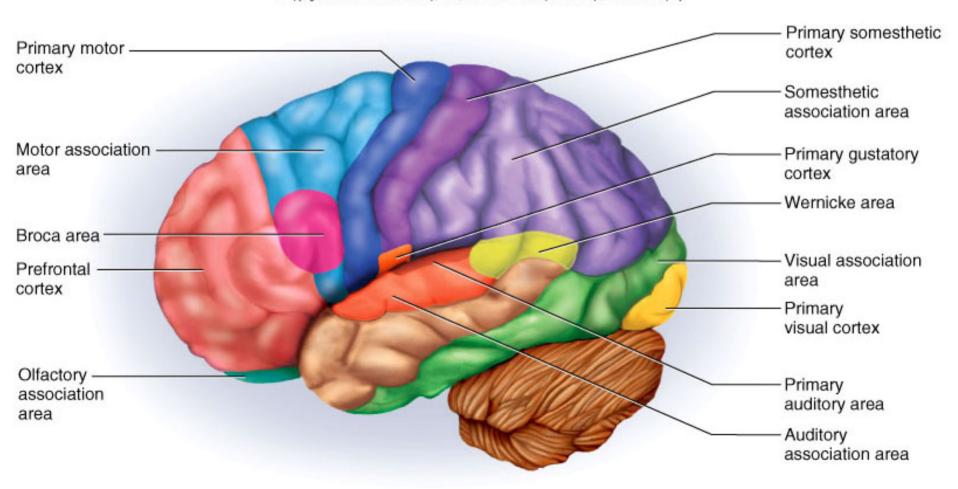
Cerebrum -- Gross Anatomy



- Cerebral cortex 3mm layer of gray matter
 - extensive folds increase surface area divided into lobes

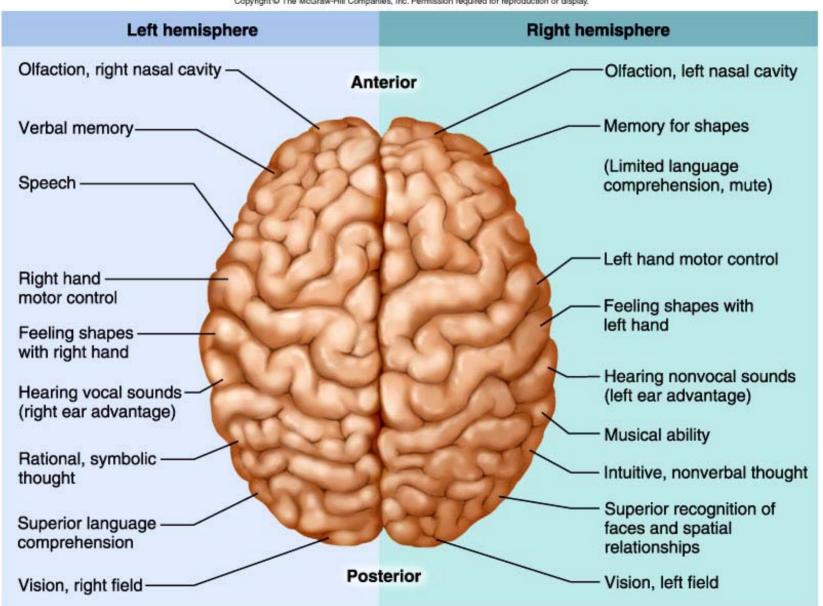
Functional Regions of Cerebral Cortex

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Lateralization of Cerebral Functions

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Median Section of the Brain

Copyright @ The McGraw-Hill Companies, Inc. Permission required for reproduction or display. Central sulcus Parietal lobe Cingulate gyrus Corpus callosum Parieto-occipital sulcus Frontal lobe Thalamus Occipital lobe Anterior -Pineal gland commissure Hypothalamus Posterior commissure Optic chiasm Cerebral aqueduct Pituitary gland Temporal lobe -Fourth ventricle Cerebellum Midbrain Pons Medulla oblongata

Limbic System

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- Loop of cortical structures
 - amygdala, hippocampus and cingulate gyrus
- Role in emotion and memory
 - pleasure and aversion centers

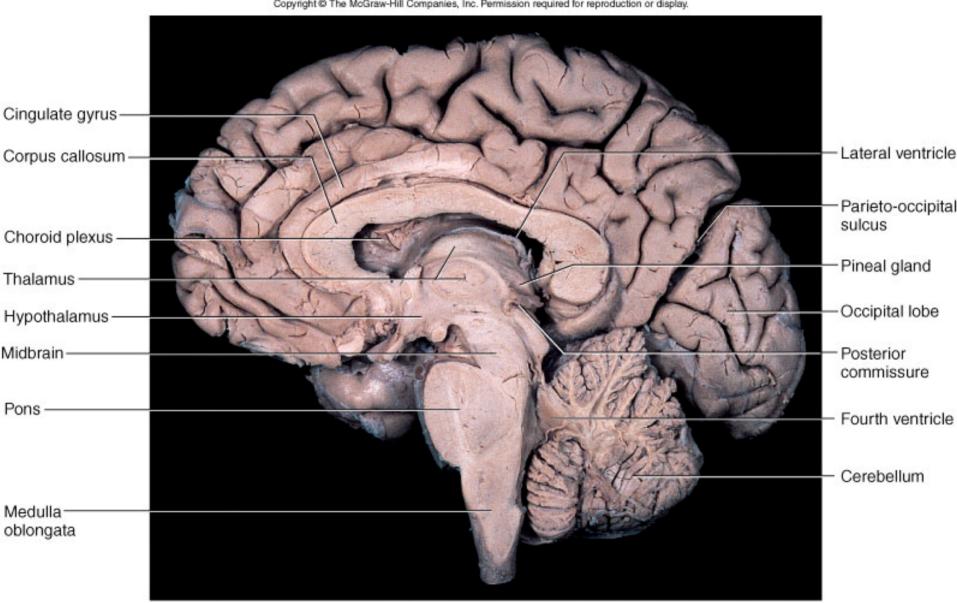
Insula of Dissected Brain

Copyright @ The McGraw-Hill Companies, Inc. Permission required for reproduction or display. Precentral gyrus Central sulcus -Postcentral gyrus Frontal lobe Parietal lobe Insula Temporal lobe-Occipital lobe Cerebellum Blood vessels Medulla oblongata

(c) Lateral view

Median Section of Cadaver Brain

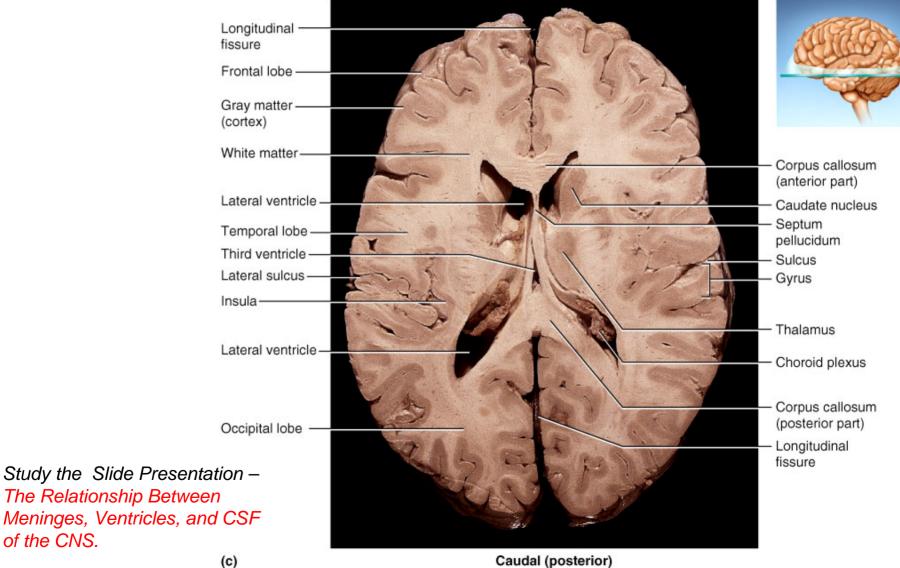
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Ventricles of the Brain

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Rostral (anterior)



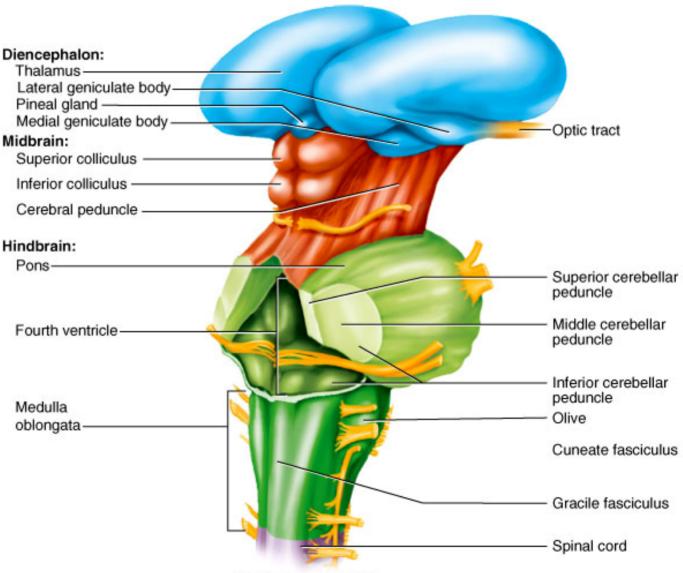
The Relationship Between Meninges, Ventricles, and CSF of the CNS.

Caudal (posterior)

Dorsolateral View of Brainstem

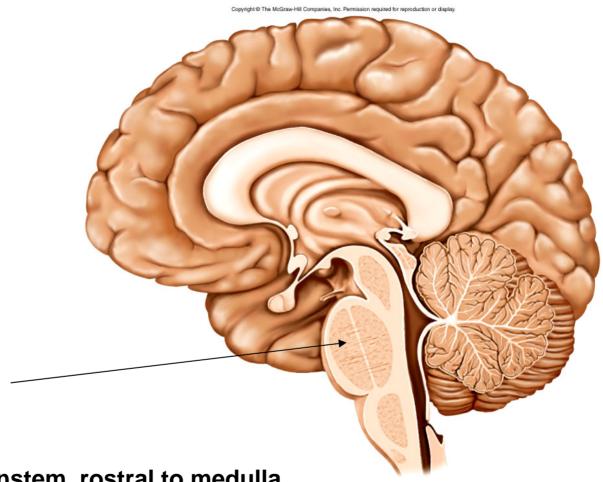
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(b) Dorsolateral view

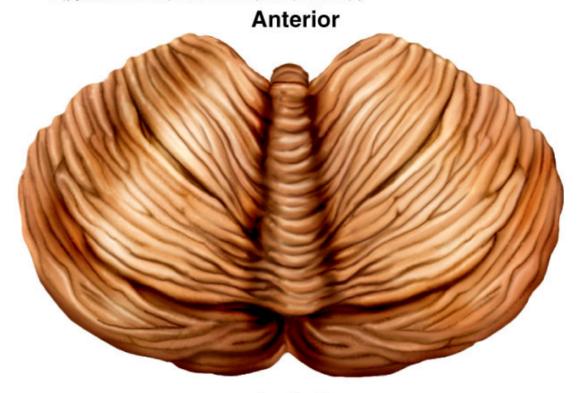
Pons



- Bulge in brainstem, rostral to medulla
- Ascending sensory tracts
- Descending motor tracts
- Pathways in and out of cerebellum

Cross-section of Pons

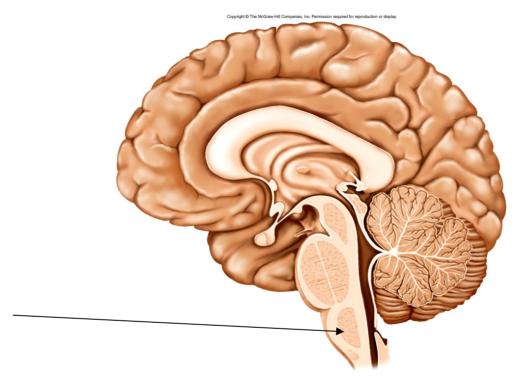
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Posterior

(b) Superior view

Medulla Oblongata



(a)

- 3 cm extension of spinal cord
- Ascending and descending nerve tracts
- Nuclei of sensory and motor CNs (IX, X, XI, XII)
- Pyramids and olive visible on surface

Medulla Oblongata

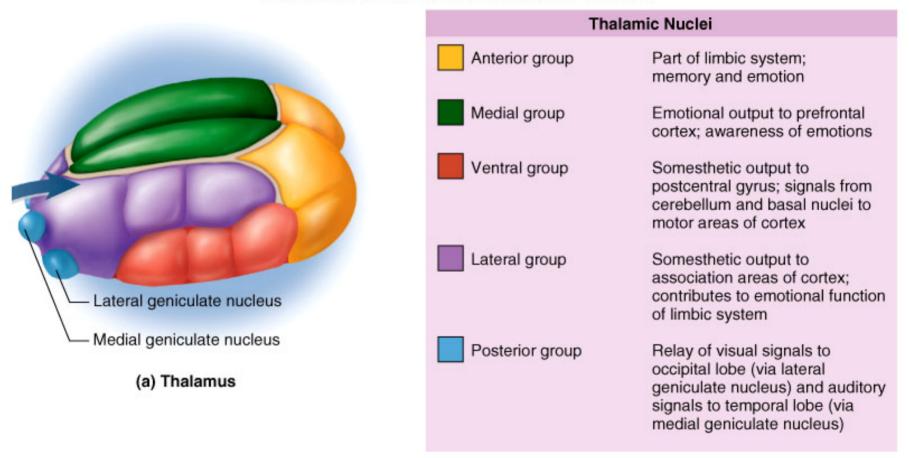
Copyright @ The McGraw-Hill Companies, Inc. Permission required for reproduction or display. Nucleus of hypoglossal nerve Fourth ventricle Gracile nucleus-Nucleus of Cuneate nucleus vagus nerve Trigeminal nerve: Dorsal spinocerebellar Nucleus tract -Tract Reticular formation Tectospinal tract Medial lemniscus-Inferior olivary nucleus Olive Hypoglossal nerve Pyramids of medulla Pyramidal tract -(c) Medulla oblongata

Medulla and Pons

Copyright @ The McGraw-Hill Companies, Inc. Permission required for reproduction or display. Diencephalon: Thalamus-Infundibulum Optic tract Mammillary body Cranial nerves: Midbrain: Optic nerve (II) Cerebral peduncle Oculomotor nerve (III) Trochlear nerve (IV) Trigeminal nerve (V) Abducens nerve (VI) Pons-Facial nerve (VII) Vestibulocochlear nerve (VIII) Glossopharyngeal nerve (IX) Vagus nerve (X) Accessory nerve (XI) Medulla oblongata: Regions of the brain stem Pyramid-Hypoglossal nerve (XII) Diencephalon Anterior median fissure Midbrain Pyramidal decussation -Spinal nerves Pons Spinal cord Medulla oblogata (a) Ventral view

Diencephalon: Thalamus, Hypothalamus & Epithalamus

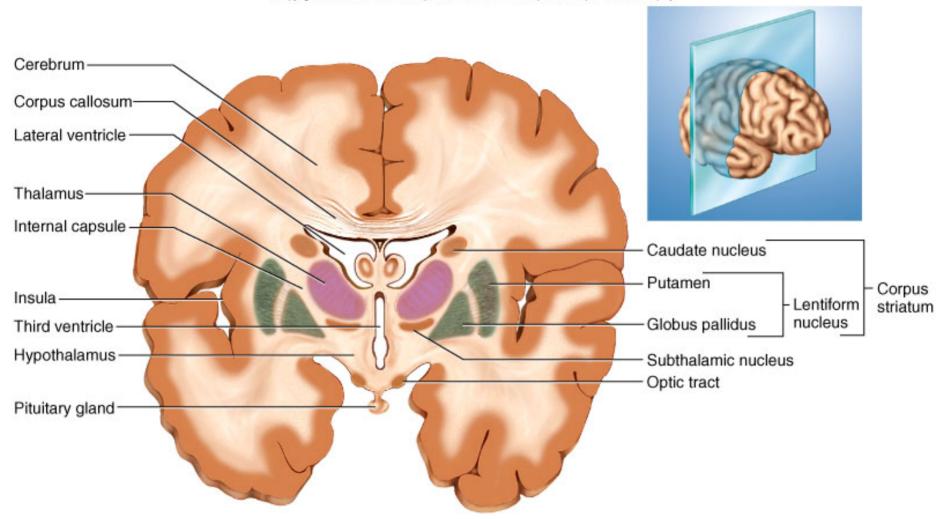
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- Oval mass of gray matter protrudes into lateral ventricle and 3rd ventricle
- 23 nuclei receive nearly all sensory information on its way to cerebral cortex
- Relays signals from cerebellum to motor cortex
- Emotional and memory functions

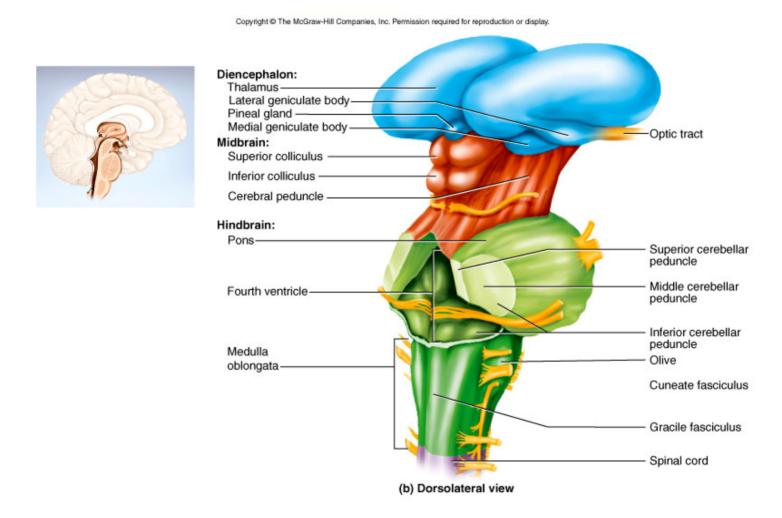
Thalamus

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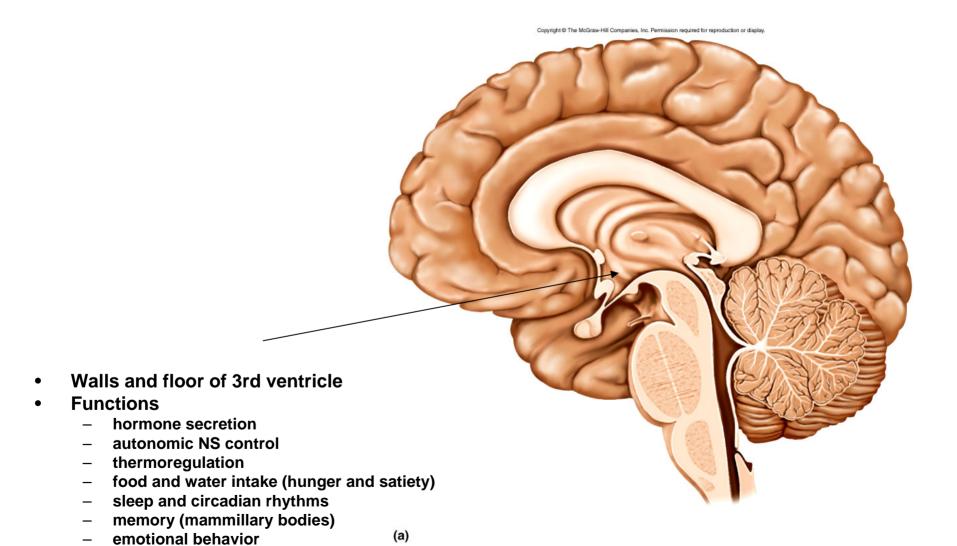
- Masses of gray matter deep to cortex
 - corpus striatum (lentiform nucleus) = caudate nucleus, putamen, and globus pallidus
- Motor control
 - substantia nigra and motor cortex

Superior and Inferior Colliculus



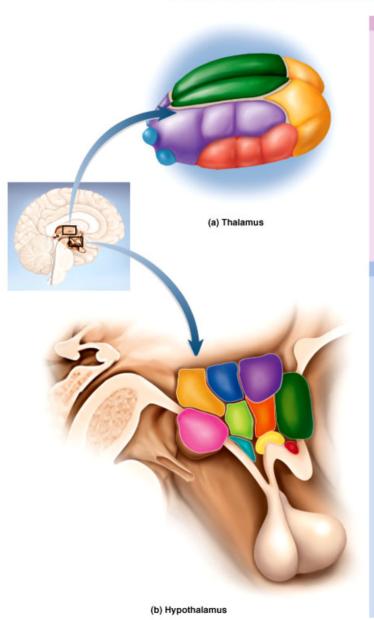
- Tectum (4 nuclei corpora quadrigemina)
 - superior colliculus (tracks moving objects, blinking, pupillary and head turning reflexes)
 - inferior colliculus (reflex turning of head to sound)

Hypothalamus



Hypothalamus

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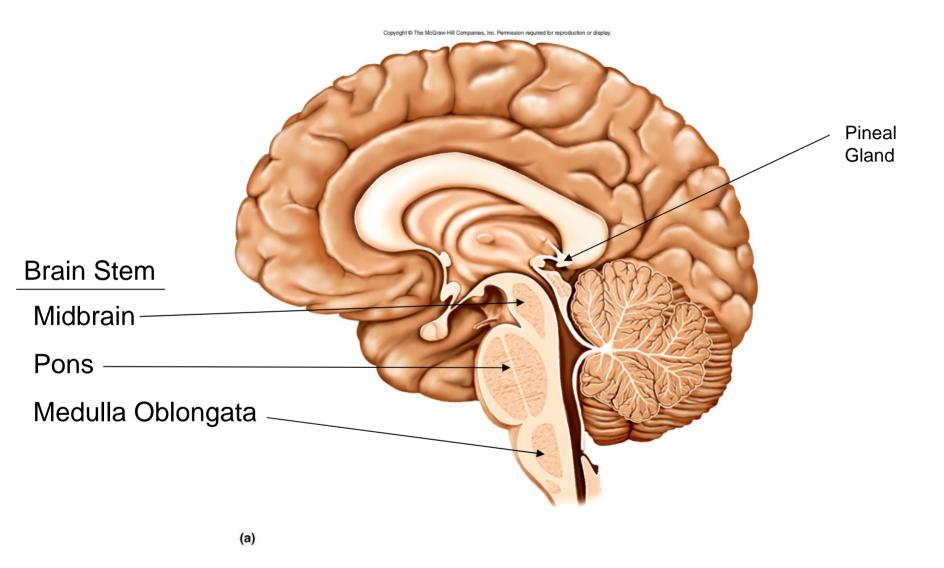


Anterior group Part of limbic system; memory and emotion Medial group Emotional output to prefrontal cortex: awareness of emotions Ventral group Somesthetic output to postcentral gyrus; signals from cerebellum and basal nuclei to motor areas of cortex Lateral group Somesthetic output to association areas of cortex: contributes to emotional function of limbic system Posterior group Relay of visual signals to occipital lobe (via lateral geniculate nucleus) and auditory signals to temporal lobe (via medial geniculate nucleus) Hypothalamic Nuclei Anterior nucleus Thirst center: thermoregulation Arcuate nucleus Regulates appetite: secretes releasing hormones that regulate anterior pituitary Dorsomedial nucleus Rage and other emotions Mammillary nuclei Relay between limbic system and thalamus; involved in longterm memory Paraventricular Produces oxytocin (involved nucleus in childbirth, lactation, orgasm); controls posterior pituitary Posterior nucleus Functions with periaqueductal gray matter of midbrain in emotional, cardiovascular, and pain control Preoptic nucleus Hormonal control of reproductive functions Suprachiasmatic Biological clock; regulates nucleus circadian rhythms and female reproductive cycle Produces antidiuretic hormone Supraoptic nucleus (involved in water balance); controls posterior pituitary Ventromedial nucleus Satiety center (suppresses hunger)

Thalamic Nuclei

 Mammillary bodies contain 3 to 4 nuclei that relay signals from limbic system to thalamus

Epithalamus



- Epithalamus consists of pineal gland (endocrine) and the habenula (connects limbic system to midbrain)
- Epithalamus tissue forms thin roof over the third ventricle.

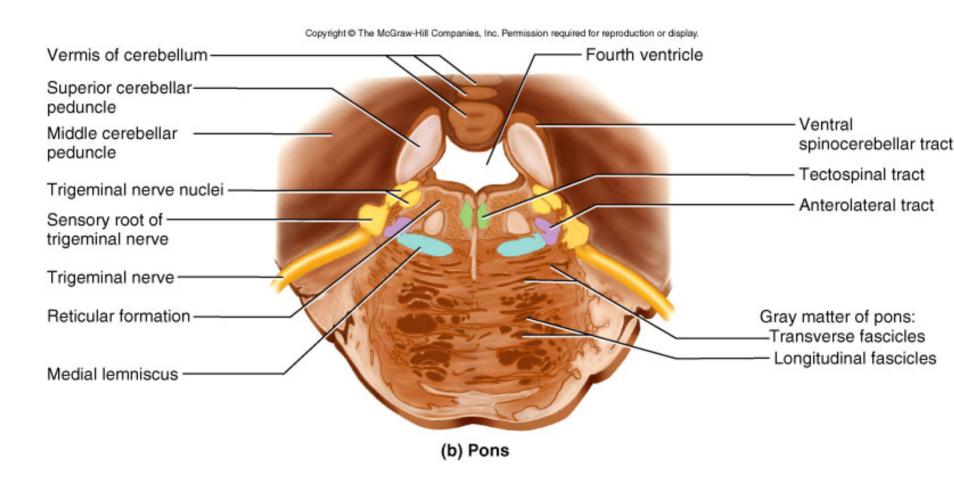
Cerebellum

Copyright @ The McGraw-Hill Companies, Inc. Permission required for reproduction or display. Superior colliculus -Inferior colliculus Pineal gland Posterior commissure Cerebral aqueduct Mammillary body Midbrain White matter (arbor vitae) Oculomotor nerve Gray matter-Fourth ventricle Pons Medulla oblongata (a) Median section



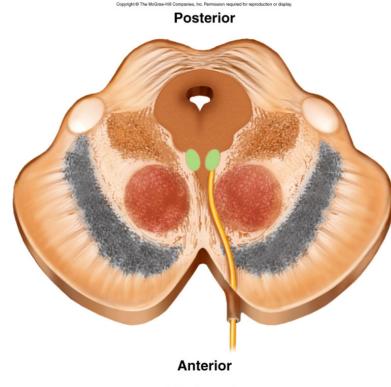
- Central aqueduct
- CN III and IV
 - eye movement
- Cerebral peduncles
 - hold corticospinal tract

Cerebellum



- Two hemispheres connected by vermis
- Cortex = surface folds called folia
- Output comes from deep gray nuclei
 - granule and purkinje cells

Cerebellum

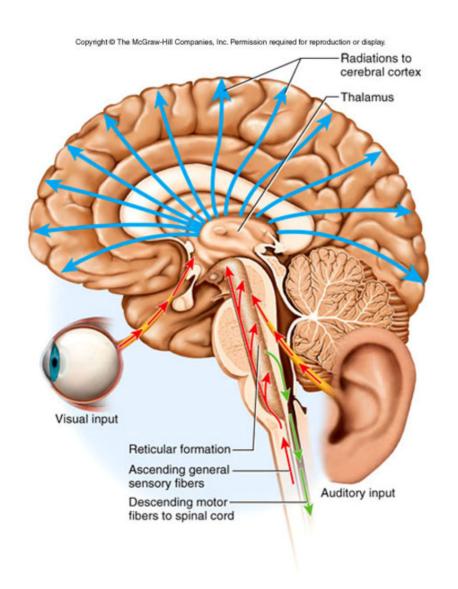


Sits atop 4th ventricle

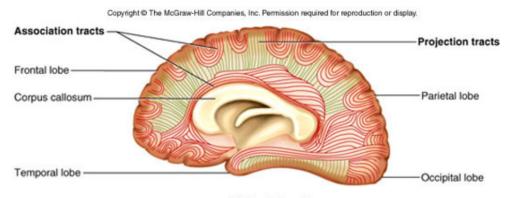
(a) Midbrain

- White matter (arbor vitae) visible in sagittal section
- Connected to brainstem by cerebellar peduncles
 - superior peduncle = output to midbrain, thalamus, and cortex
 - middle peduncle = input from cerebral cortex and inner ear
 - inferior peduncle = spinocerebellar tracts (proprioception)

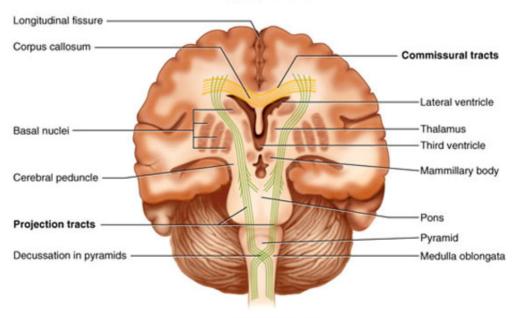
Reticular Formation



Tracts of Cerebral White Matter



(a) Sagittal section



(b) Frontal section