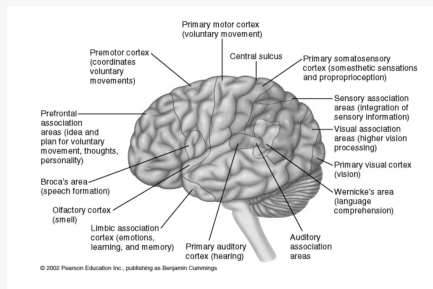


Brain

| | |
|------------|--|
| Forebrain | Consists of Cerebrum and Diencephalon |
| Cerebellum | Inferior to the forebrain |
| Brainstem | Consists of Midbrain, Pons and Medulla Oblongata |

Forebrain (Cerebrum)



Cerebrum (Forebrain)

| | | |
|-------------------------------|-------------------------------|---|
| Primary Somato-sensory Cortex | Processes sensory information | 1) Somesthetic sensations such as touch, temperature and pain 2) Proprioception such as awareness of muscle tension, joint and limb position |
| Primary Motor Cortex | Initiates voluntary movement | Actions that require thought such as playing the piano |

Cerebellum



Cerebellum

| | |
|-----------------------------------|--|
| Location | Inferior to forebrain, posterior to brain stem |
| No direct connection with muscles | Functions at unconscious level |

Roles of Cerebellum

| | |
|--|---|
| Receives variety of information | Information about voluntary muscle activity from motor cortex |
| | Sensory information from proprioceptors throughout body |
| | Information from visual and equilibrium pathways |
| Integrate this information and elicit a coordinated response | Sends its coordination plan to primary motor cortex |
| | Primary motor cortex signals the muscles to elicit desired response |

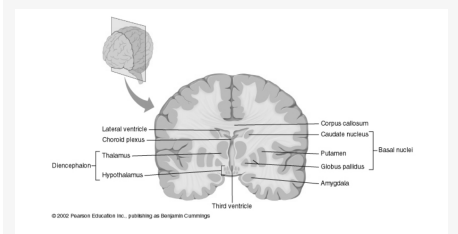
Cortical Control of Voluntary Movement

| | | |
|-------------------------|---|--|
| Pyramidal Tracts | Direct pathways from primary motor cortex to spinal cord | Corticospinal tracts (Anterior & Lateral) |
| Extrap-yrainidal Tracts | Indirect connections between brain and spinal cord | Includes all motor pathways outside pyramidal system Control small group of muscles that contract independently of each other Control large group of muscle that contract together to maintain posture and balance |

Cerebrum (Anterior)

| | |
|-----------------------|---|
| Subcortical Nuclei | Regions of gray matter in the cerebrum |
| ~ | Masses of gray matter scattered in the cerebrum |
| Includes Basal Nuclei | Components : Caudate Nucleus, Putamen, Globus Pallidus |
| | Important in modifying movements (to make sure they don't interfere with one another) |

Basal Nuclei



Basal Nuclei Function

| | |
|---|--|
| Inhibits motor function | Controls muscle activity |
| Receives input from: | Entire cerebral cortex and other subcortical nuclei like subthalamic nucleus of diencephalon and red nucleus |
| No direct connection with motor pathway | Sends impulses to primary motor cortex through the thalamus |
| Complex role in motor control | In charge of stopping, starting and monitoring movements by primary motor cortex |

Basal Nuclei Function (cont)

Particularly involved in sustained, stereotyped movements (riding a bicycle, eating)

Inhibits antagonistic (unnecessary) movements

Ex of antagonistic - bicep and tricep contraction

This enables multitasking

Basal Nuclei Damage

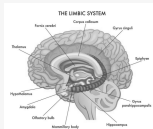
Impairment results in

Disturbance in muscle tone and posture

Tremors

Abnormally slow movements

Limbic System



Role of Limbic System

Control emotional aspect of behaviour

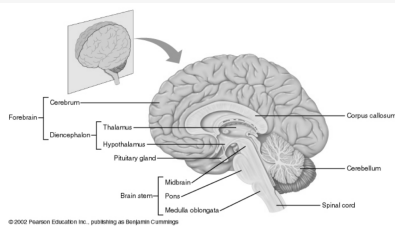
Amygdala

Involved in memory

Hippocampus

Works with prefrontal lobes to elicit relationship between feelings and thoughts

Diencephalon (Forebrain)



Diencephalon

Includes 2 structures

Thalamus

Hypothalamus

Thalamus

Relay station for all sensory input except for smell

Relay station for emotion impulses

Relay station for motor impulses from cerebellum and basal nuclei

Gateway of cerebral cortex

Process the information before sending it to cerebral cortex to be interpreted

Contains most of afferent neuron synapse

Nuclei of Thalamus



Nuclei of Thalamus

Ventral Posterolateral Nucleus

Receives somatic sensory information (touch, pain, pressure)

Relays information to somatosensory cortex

Ventral Lateral Nucleus

Receives motor information from basal nuclei and cerebellum

Relays information to motor cortex

Medial Geniculate Body

Sends auditory information from auditory receptors to auditory region of cerebral cortex

Lateral Geniculate Body

Sends visual information to occipital region of cerebral cortex

Hypothalamus

Location

Inferior to thalamus, superior to brain stem

Interconnected to cerebral cortex, thalamus and other parts of brain stem

Role of Hypothalamus

Important in regulating homeostasis

Senses chemical and thermal qualities of blood

It is crucial to :

Regulate the heart rate and arterial blood pressure

Control movements and glandular secretions of stomach and intestines

Regulate respiratory rate

Regulate water and electrolyte balance

Control hunger and regulate body weight