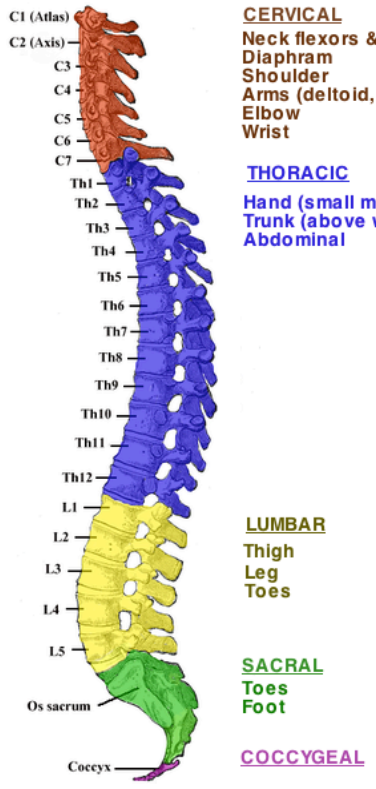
Subcortical Structures of the Brain

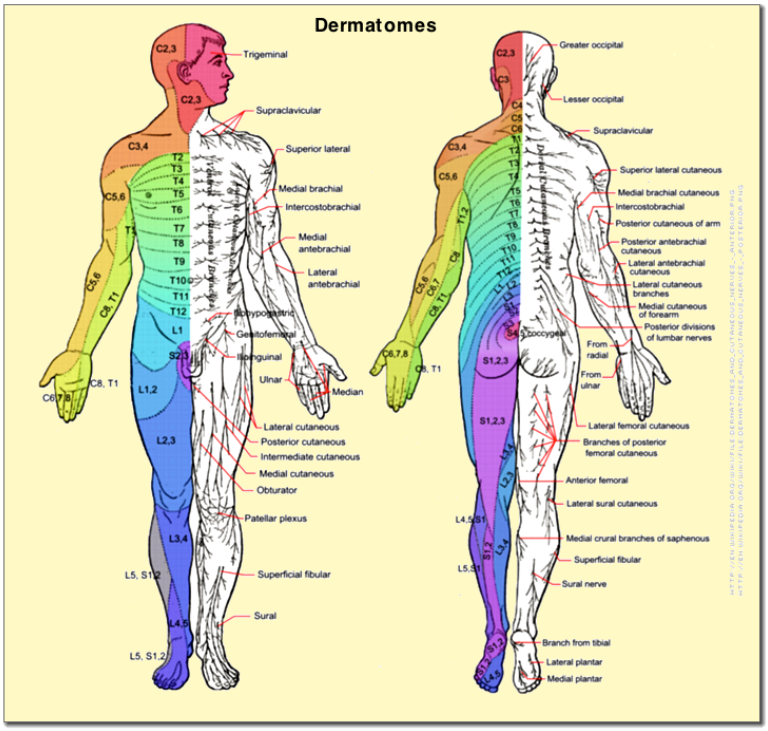
Subcortical = Below the level of the cortex, i.e., related to structures under the 'grey' matter of the cortical surface.

The Spinal Cord

Segments

- Cervical
- Thoracic
- Lumbar
- Sacral
- Coccygeal





- **Afferent sensory input from the surface of the body**
- **Efferent motor output to the muscles**
- **Dermatomes** = surfaces of the skin sending sensory input to specific level of the spinal colum
- **Paraplegia** = damage below the mid-thoracic area, i.e., can still move arms, but not legs
- **Quadraplegia** = damage to spinal cord above the mid-thoracic area, i.e., cannot move either arms or legs

Brainstem

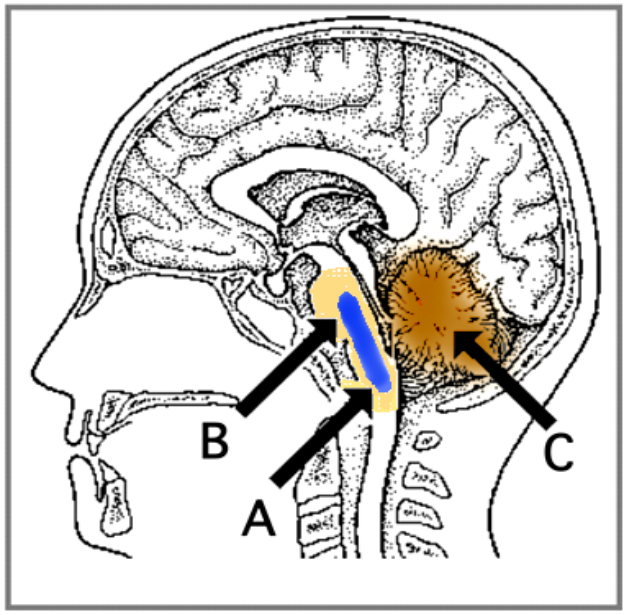
Hindbrain

Cerebellum [C in figure]

- Coordination
- Skilled movement
- Learning (classical conditioning)

Reticular Formation (area in blue) in **Pons** [**B** in figure] & **Medulla oblongata** [**A** in figure]

- General arousal & consciousness: control of sleeping and awakening



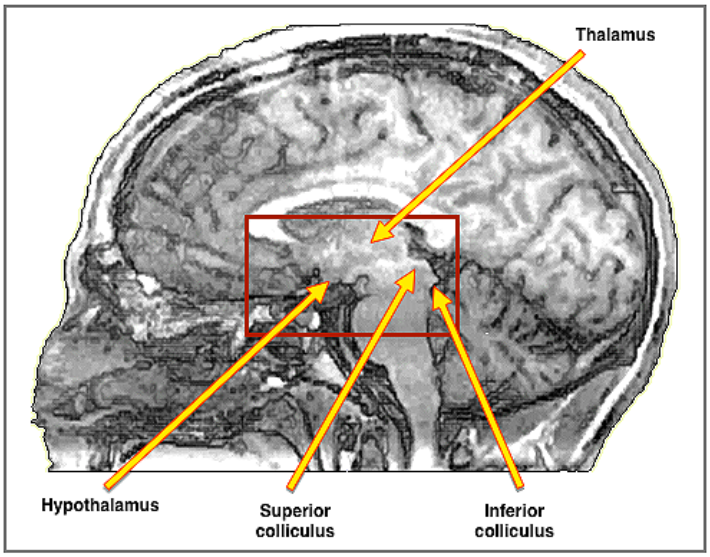
Midbrain

Superior colliculi ("upper hills")

- Visual tracking/eye movements

Inferior colliculi ("lower hills")

- Auditory direction detection
- Auditory & sensory integration



Diencephalon

Hypothalamus

- Motivated behaviors: thirst, feeding, sexual behavior, termperature, emotional behavior, sleeping

Thalamus

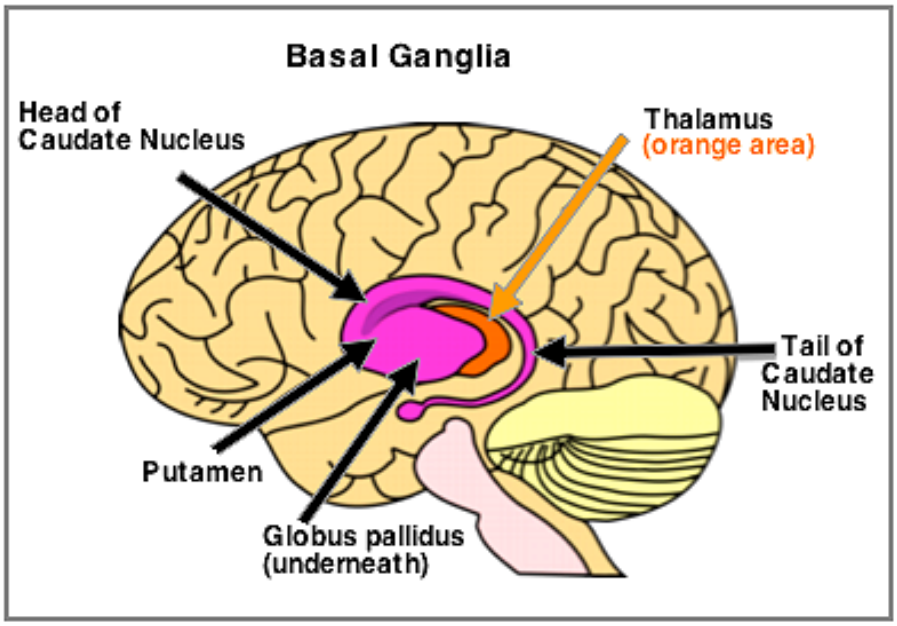
- Principal relation station (ca. 20 distinct nuclei (clusters of neurons)) for incoming sensory data with information sent to other areas of the cortex
- Intra-cortical communication

Forebrain

Basal Ganglia ("lower knots" below cortex)

Putamen ("shell")
Globus pallidus ("pale globe")
Caudate nucleus ("tailed nucleus")

- Sequencing of motor instructions
- Muscle tone
- Stimulus-response (habit) learning



Limbic System ("borderland/edge")

Amygdala ("almond")

- Emotional responses to environmental stimuli

Hippocampus ("sea horse")

- Establishment of new memories
- Spatial navigation

Cingulate cortex ("girdle" cortex)