

PSY 302: Chapter 3 Notes
The Brain (Part II) - 9/5/17

Notes by: Ariel

- Homework for next time: Read Ch. 4 (p. 77-85) & p. 92-94

- The 3 Major Fissures: 2 Hemispheres
 - Fissure- fissures
 - Sulcus- sulci
 - Gyrus- gyri
 - Sulci + gyri = surface 3x
 - Corpus callosum→ contralateral perceptual + motor information flow

- Corpus callosum:
 - Precise connections b/w the 2 hemispheres of the brain
 - Coordination b/w the R&L side of the body (hands, feet)
 - Allow for some specialized functions to be restricted to only one side (language on the left, face perception on the right)

- 4 lobes of the cerebral cortex
 - Frontal (front of the head)
 - Parietal (middle)
 - Temporal (side of the head by the ears)
 - Occipital (back of the head)
 - Fissures:
 - Longitudinal fissure
 - Central
 - Lateral

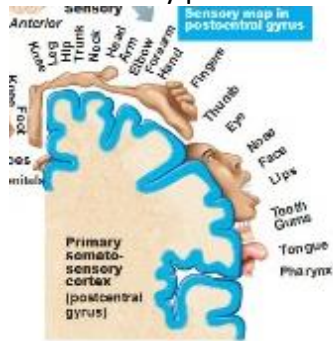
- Whatever is in front of the central fissure is about doing things
- Whatever is in back of it is about perceiving
- From top to bottom of the central fissure:
 - Feet→ trunk→ hands→ fingers → face→ lips

- Sensory processing:
 - Lateralization: Right vs Left
 - Convergence: from simple sensory features to more complex ones

- Separate cortexes for the senses (location on the brain)
 - Primary auditory cortex: on the temporal lobe
 - Primary visual cortex: on the occipital lobe
 - Primary somatosensory cortex: parietal; in back of the central sulcus
 - Primary motor cortex: parietal; in front of the central sulcus

- Primary sensory map: different parts of the body are represented by different groups of neurons.

- The number of neurons 'in charge' of a body part is not proportional to the size of the body part



- The mouth and hands have a lot of neurons in them
 - They are most sensitive
- Based on the image: the bigger the body part, in the image, the more neurons
- Video shown in class about a man who had his right arm amputated still felt it and had feeling in it when the Dr. touched the left side of his face (ex: Dr. stroked his jaw, he felt it on his jaw and his hand)
- When there is a missing part (ex: the hand) the neurons in the brain that are for the hand do not die, they go off and work with something that was close to the hand (in terms of neurons), therefore they go work for the face

- Sensory 'homunculus': <https://www.ebmconsult.com/articles/homunculus-sensory-motor-cortex> (sensory not motor)

- Anorexia nervosa: body image that they are too fat and need to lose weight when they are really skinny (there might be something wrong with the body image part of the brain)

- Beyond primary cortices: Complex Integrations

- Convergence \longrightarrow
 - Primary areas \rightarrow association areas \rightarrow ??? \rightarrow motor areas

- Limbic system:

- Limbic cortex
 - Fornix
 - Mammillary body
 - Amygdala
 - Hippocampus
- \longrightarrow yields or computes motivation & emotion

- Basal ganglia= Caudate

Putamen

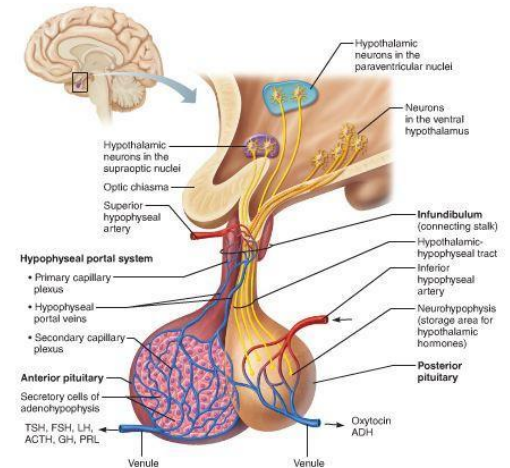
Globus Pallidus

- Diencephalon= Thalamus + Hypothalamus

- Thalamus:

- 2 lobes lined by the *Massa Intermedia*
- Major sensory structure made of specialized nuclei (LGN & MGN)
 - Ears \rightarrow MGN \rightarrow sound
 - Eyes (retina) \rightarrow optic chiasm \rightarrow LGN \rightarrow vision
- Also has some motor outputs:
 - Cerebellum \rightarrow VN \rightarrow primary motor cortex
- Thalamus (figure 3.14)

- Hypothalamus:
 - Controls the Autonomic system (heart, lungs, etc.) and Endocrine system (hormones)
 - Species specific behaviors (4 F's: fighting, feeding, fleeing, reproduction)
 - Posterior pituitary gland: oxytocin (child birth), vasopressin (anti-diuretic hormone, control urine output). Both substances are involved in 'attachment behaviors'
 - Hypothalamus → posterior pituitary → hormones in blood
 - Anterior pituitary gland (prolactin, production of milk): Controls the production of other hormones (ex: sex hormones, growth hormones): 'Master' gland
 - Hypothalamus → hormone releasing factor molecules → (using capillaries move to) → anterior pituitary → (using neurosecretory cells to release) → hormones in blood
 - Figure 3.16 (pituitary gland)

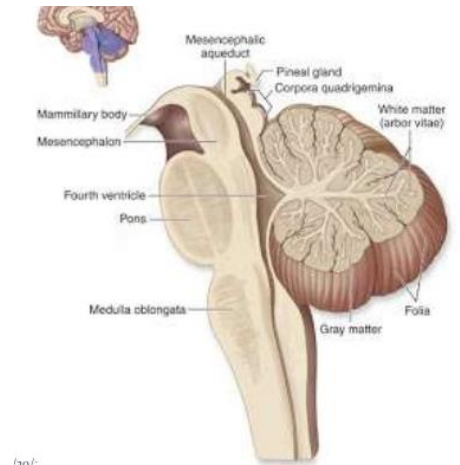


- Midbrain (=mesencephalon):
 - Tectum:
 - Sensory reflexes (eye movements)
 - Pineal gland (sleep/wake, jetlag)
 - Colliculi
 - Superior colliculus (vision)
 - Inferior colliculus (audition)
 - Tegmentum:
 - Reticular formation
 - Sleep, attention, movement, reflexes
 - Many nuclei
 - Periaqueductal gray matter (PAG)
 - Pain processing
 - Species typical basic behaviors (mating, aggression)
 - Red Nucleus and Substantia Nigra
 - Motor infos, (project to basal ganglia), Parkinson's disease

Brain stem= diencephalon + midbrain + hindbrain

- Hindbrain:

- Metencephalon= cerebellum + Pons
- Myelencephalon= Medulla
 - Cerebellum:
 - Dense and specialized structure ('little brain')
 - Made of cerebellar cortex, deep nuclei, peduncles
 - Coordination of complex movements (walking, jumping)
 - Smooth precise movement
 - Pons:
 - Relay b/w the cortex and cerebellum
 - Many nuclei
 - Vestibular nuclei (balance)
 - Facial nucleus (muscle of face)
 - Cochlear nuclei (sound)
 - Medulla:
 - Modulating heart and lung functions
 - Many nuclei



- Spinal Cord: sensory and motor

- Sensory- motor flow
 - Sensory information enters dorsally (into the back), and motor information exits ventrally (belly side)
 - Flow of information:
 - Afferent (anything that goes into the spinal cord)
 - Efferent (anything that exits the spinal cord)
 - Dorsal root ganglion (how information gets into the dorsal root)
 - Dorsal root (information goes here)
 - Ventral root (information exits here)
 - Spinal nerve (anything that goes out of the spinal cord)

- Figure 3.27

- Spinal cord:

- Controls glands and muscles
- Collects somatosensory information
- Ventral and dorsal roots
- Afferent vs efferent
- Gray matter (inside) white matter (outside); brain: opposite
- 4 levels: cervical, thoracic, lumbar, sacral
 - Sciatic nerve goes down the legs by going down the lumbar and out of the sacral level

- Tip of spinal cord (coccyx)
- Spinal cord- brain interactions
 - **Ascending:** to the brain
 - **Descending:** from the brain
 - Brain and spinal cord are in constant 2-way interactions through specialized groups of neurons
- PNS (Peripheral Nervous System)
 - Made of nerves
 - 12 cranial nerves (figure 3.21)
 1. Olfactory: sensory, smell
 2. Optic: sensory, sight
 3. Oculomotor: motor, eye movement
 4. Trochlear: motor, eye movement
 5. Abducens: motor, eye movement
 6. Trigeminal: sensory, touch and pain of the face & motor, in charge of jaw muscles
 7. Facial: motor, contraction of the face muscle & sensory, feeling of the face and sense of taste
 8. Auditory: sensory, sound
 9. Glossopharyngeal: sensory, taste & motor, muscle of throat and larynx (swallowing)
 10. Vagus: sensory & motor, all internal organs (communication & movement)
 11. Spinal accessory: motor, neck movement
 12. Hypoglossal: motor, tongue movement (speaking)

