Neocortex

Psychology 472
Pharmacology of Psychoactive Drugs

• Is the most developed in Humans
• Has many folds and fissures
  – The folds of tissue are called gyri or a gyrus (single)
  – The fissures or valleys are called sulci or a sulcus (single)

Is what you see when you look at a brain from the outside

Structures are divided into several section or lobes.
Each lobe has a different function
Cortex is separated in half by a fissure called the central fissure
Splits the brain into left and right halves called hemispheres

Hemispheres

• Left Hemisphere controls the right side of the body
• Right Hemisphere controls the left side of the body
• Each hemisphere contains 4 lobes
  – Frontal
  – Parietal
  – Temporal
  – Occipital
Lobes
- Each lobe is separated by a fissure or a sulcus. For us three are important
  - Central Sulcus
    Separates the Frontal and Parietal lobe
  - Lateral Sulcus
    Separates the Temporal lobe from the Frontal and Parietal lobe
  - Parietal Occipital Sulcus
    Separates the Parietal lobe from the Occipital lobe

Lobes of the Brain
- Frontal
- Parietal
- Temporal
- Occipital

Frontal Lobe
- Contains a variety of structures
  - Precentral Gyrus Also called Area 4
    Is responsible for voluntary motor movement
  - Areas 6 and 8
    - Are responsible for muscle tone
    - Gets muscles ready to fire

To Get Movement
- Areas 6 and 8 prepare muscle to contract
- Area 4 causes the muscle to contract
  Basal Ganglia, Cerebellum, and other structures help smooth out the movement.
Broca's Area
Is located at the bottom of area 4, 6 & 8.
Is concerned with speech
When damaged, the person can understand speech, but they cannot talk well.
Called Broca's Aphasia

Association Area
• Remainder of the Frontal Lobe
• Is important for thought processes, memory formation and problem solving.
• When damaged have problems with memory

PreFrontal Cortex
• Involved with decision making and judgement
• One of the last brain structures to develop fully
• One reason young adults make stupid decisions
• Extremely important in emotional arousal

Parietal Lobe
• Also contains a variety of structures
• Somatosensory area (Area 3)
  Is concerned with sensory functioning.
  Is where you feel pain, temperature etc.
• Area 1, Area 2, and association cortex
  Interprets what is happening in Area 3
Temporal Lobe

- Is below the Lateral Sulcus
- Is concerned with hearing and patterning of sound (speech).

Wernicke's Area

- Is a sub-area of the Temporal Lobe
- Is concerned with the integration and comprehension of speech.
- Also receives information from other areas such as the occipital lobe
- When damaged, you can speak fluently but the content is Nonsense. Called Wernicke's Aphasia
- When damaged, it is also hard to comprehend and understand written stimuli (reading).

Arcuate Fasiculus

- Is a set of fibers that look like an arc
- These fibers connect Wernicke’s area with Broca’s Area
- When damaged, the symptoms look like Wernicke’s Aphasia

Occupital Lobe

- Is concerned with vision
- Area 17
  - Is the primary visual cortex
  - Is where visual information goes first
  - Helps with organization of visual stimuli
- Information is then sent to other lobes
Insular Cortex / Island of Reil

- Also called the Insular Lobe
- Is located under the lateral Sulcus
- Is concerned with Emotion, perception, motor control, self-awareness, cognitive functioning, and interpersonal experience

Medial Forebrain Bundle

- Structures
  - Prefrontal Cortex
  - Nucleus Accumbens
  - Ventral Tegmental Area

Medial Forebrain Bundle

- Includes
  - Prefrontal Cortical Areas (Judgment)
  - Ventral Tegmental Area (processes sensory info.)
  - Nucleus Accumbens (directs motivated beh.)
  - Amygdala (Integrates emotion and pleasure responses)
  - Others

- Called the reward center
  - Full of dopamine neurons
Hormones

- Put the system into hyperdrive
  - Speed up the process
  - Judgment is impaired due to lack of brain development in Prefrontal cortex.
- Result
  - Impulsivity
  - Difficulty in controlling emotion
  - Preference for high stimulation and low effort activities (video games, sex, drugs)

Impacts of Drugs

- Impact depends on the type of drug
- Impact depends on age of the adolescent
  - Earlier the drug, usually the more changes and damage that results

Conclusion

- The brain has lots of structures
- Each structure is involved with lots of functions
- Is very resistant to damage
- When damaged, individuals can have lots of problems
- Problems can identify where the brain is damaged.