



Overview of the Nervous System Forebrain Structures

Psychology 372

Physiological Psychology

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Forebrain

- Consists of several structures in two major areas
 - Diencephalon (inter brain)
 - Telencephalon (end brain)

Encephalon = Brain

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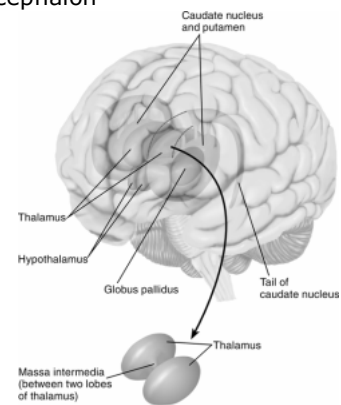
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Diencephalon

- Consists of many structures
 - Thalamus
 - Hypothalamus
 - Others (you do not have to know about)

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Diencephalon



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Thalamus

- Is basically a relay station from sensory structures to the cortex and back.
- Is a major center for collecting and integrating information
- Also has a role in memory formation

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Hypothalamus

- Is part of the Papez Circuit (Limbic System)
- Receives information from many structures.
- Is smaller than the thalamus and is located in front of and below the thalamus (hypo = below).
- Is connected to the pituitary gland which secretes many hormones.

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Functions

- Governs eating, drinking, fighting, and sexual behavior.
- Regulates endocrine activity
- Is involved with emotion
- Helps control the Autonomic NS
- Has been suggested to be involved with sexual identity.

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Diencephalon Conclusion

- Is an older forebrain structure, but is extremely important for normal functioning.

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Telencephalon

- These structures have increased the most as evolution has progressed.
- Has several major groups of structures.

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Olfactory System

- Has several structures
- Is not as developed in humans as some other organisms (e.g. dogs)
- Can be important in emotional arousal (pheromones)
- Is involved with smell

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Limbic System

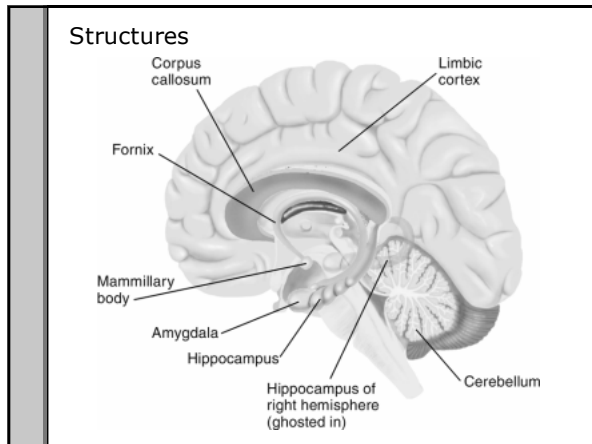
- Originally suggested by Papez
- Added to and modified by MacLean
- Highly involved with emotion
 - Specifically, emotional memories.
 - Also, involved with pleasure

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Structures

- Cingulate Gyrus
- Corpus Callosum
- Septal area
- Amygdala
- Hippocampal Formation
- Parahippocampal Gyrus
- Fornix
- Hypothalamus (Mammillary Body)

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Cingulate Gyrus

- Also called Limbic Cortex
- Borders older and newer evolutionary structures.
- Involved with emotional memories.

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Corpus Callosum

- Is an axon pathway that connects the neocortex of the left and right hemispheres.

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Septal Area

- Is involved with controlling aggression and pleasure

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Amygdala

- Is involved with controlling rage behavior and aggression
- When destroyed, the organism attacks anything

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Hippocampal Formation and Parahippocampal Gyrus

- Has a major role in memory formation
- When damaged, you cannot form any new memories.

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Mammillary Body of the Hypothalamus

- Is involved with regulation of emotional behavior
- May be involved with pleasure, pain, and anger

Note: Is also categorized in both the Diencephalon and Telencephalon

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Limbic System

- In general, the limbic system controls animal instinctive behavior

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Basal Ganglia

- Has several structures as well:
 - Caudate Nucleus
 - Lenticular Formation
 - Putamen
 - Red Nucleus
 - Substantia Nigra
 - Globus Pallidus

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Basal Ganglia

- Are a set structures that lie just under the anterior aspect of the lateral ventricles.

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Like the Cerebellum

- Is involved with controlling movement.
- While cerebellum controls rapid movement;
- Basal Ganglia helps with
 - Controlling slower movements
 - Starting and stopping movement
 - Balance

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In General

- The basal ganglia controls the direction and amplitude of movement; especially postural movement.

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When Damaged

- Causes problems with posture, walking, etc. Get a lot of tremors, jerks, twitching, etc.
- Parkinson's syndrome
 - Classic symptom tremor at rest.
 - Once you move the tremor stops until in later stages of the disease, then you always have tremors.
 - Occurs because the Substantia Nigra degenerates. (Discussed more later)

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Causes

- In the past, it was thought to be genetic or viral.
- Today, we know that it can be environmentally caused.

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Conclusion

- Wide variety of older cortical areas.
- Are extremely important for many activities.

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