Limbic system

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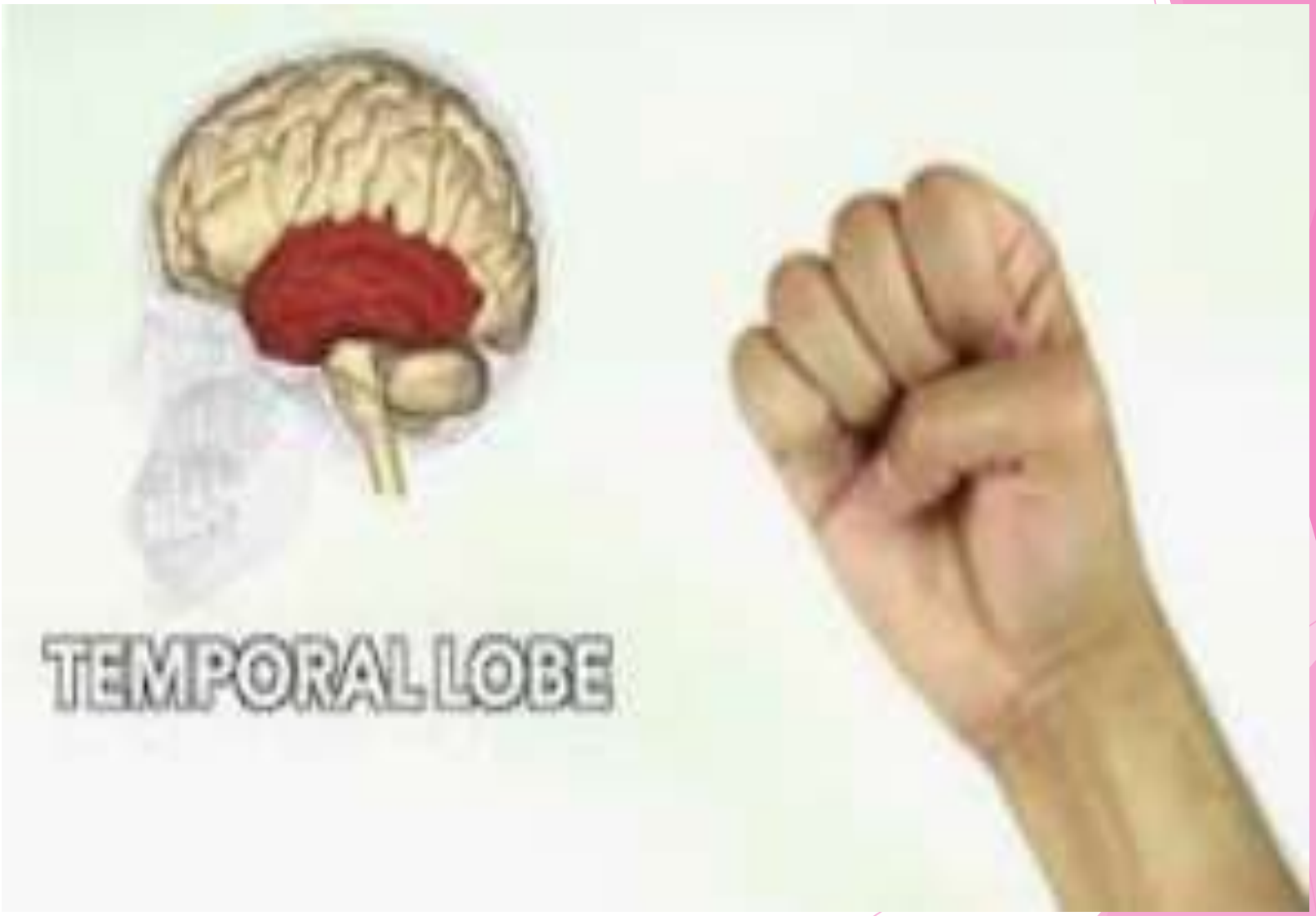
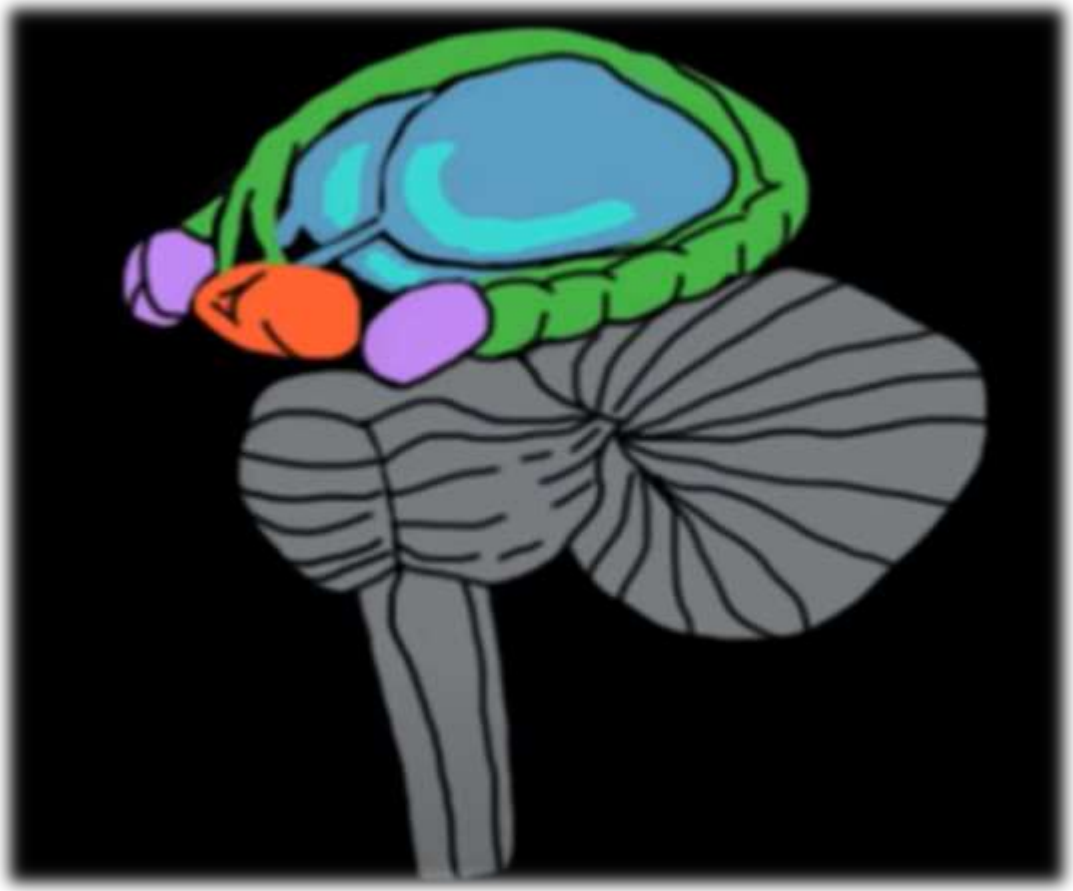
Tricks to remember the structures of the brain

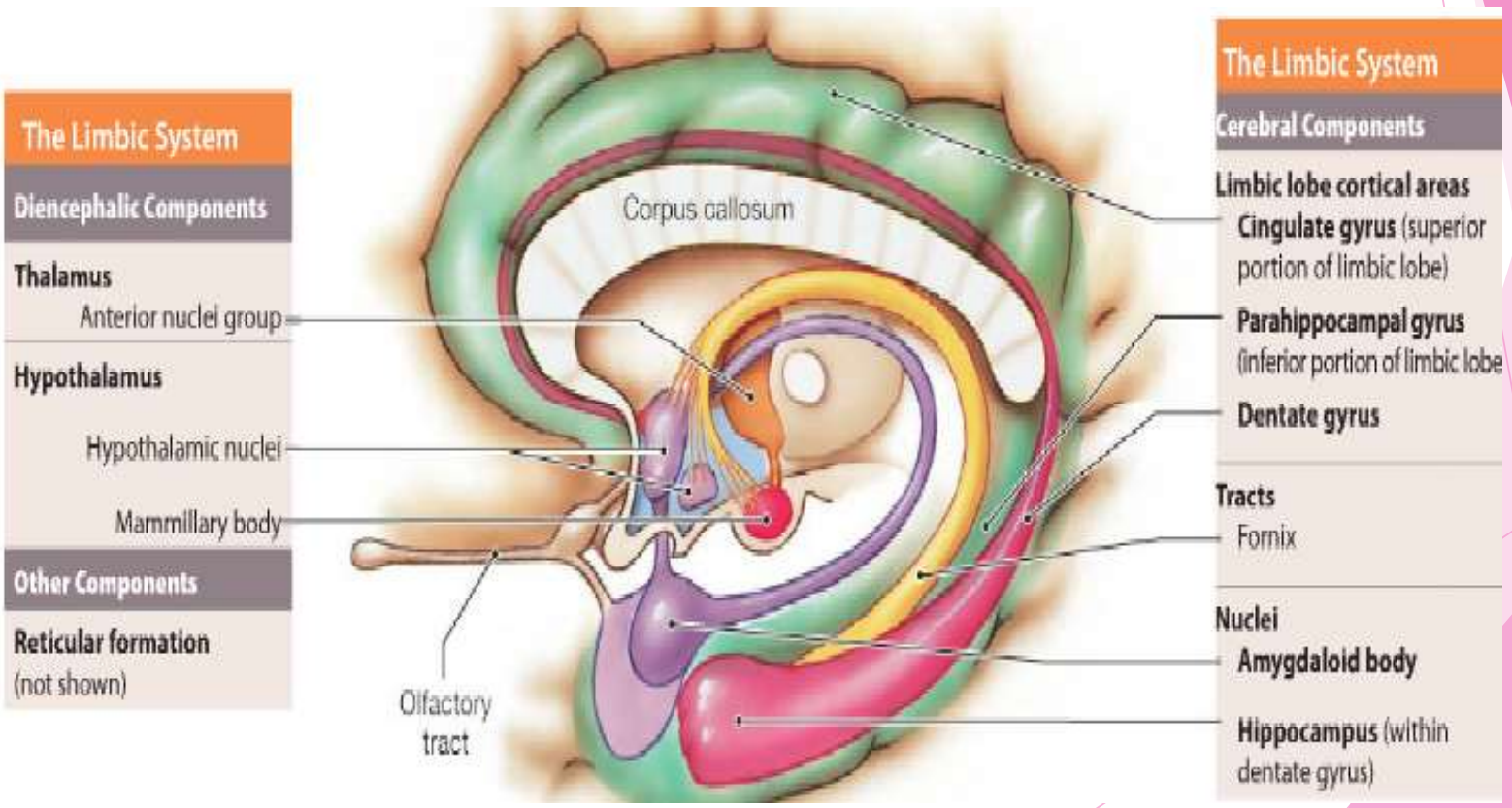


Mnemonics of the Limbic system



Limbic system

Consists of a complex network of neurons that interconnected a number of associated structures of the brain



Functions of the Limbic system

a. generation of emotions
   1. happiness, joy and euphoria
   2. anger and rage
   3. anxiety, fear
   4. sadness, depression

b. The emotional state can affect the general level of alertness via thalamus

Anxiety , fear, anger, excitement increase the level of alert

Depression, sadness decrease the level of alertness

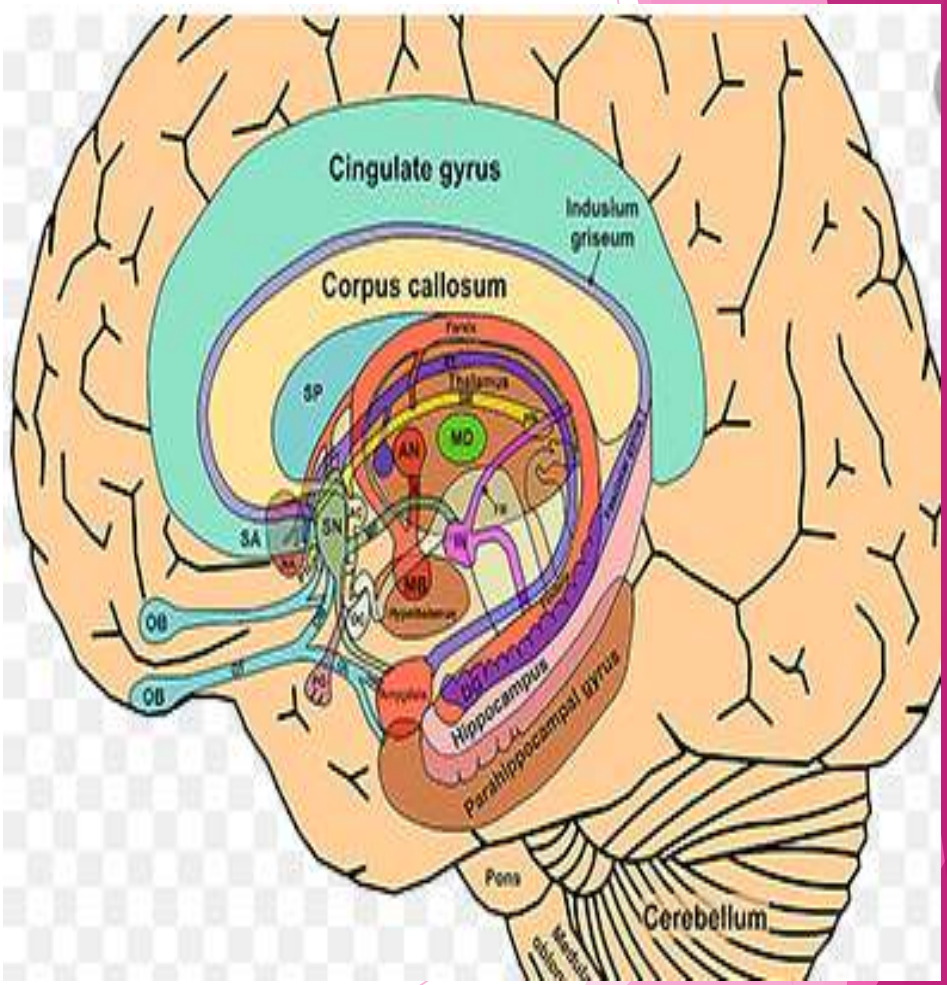
c. Motivation

Passions are needed for learning

Mnemonics for Emotions

- **S Septal nuclei** Pleasure zone
- **A Amygdale** Emotions
- **N The nucleus accumbens**

  also known as the accumbens nucleus, is a region in the basal forebrain rostral to the preoptic area of the hypothalamus ; reward, pleasure, addiction
- **H Hypothalamus** regulate ANS
- **O Olfactory system** odor



Clinical considerations of limbic system

Charles Whitman: The Amygdala & Mass Murder

Continued Clinical considerations

a. Rabies

The virus is transmitted in the saliva of an infected animal. From the point of entry (usually a bite), the rabies virus travels along nerves to the spinal cord and then to the brain, where it multiplies and destruction somatic motor neurons and specifically destruction the neurons in the amygdala nucleus

Continued clinical consideration
Klüver–Bucy syndrome

Bilateral destruction of amygdala

Mellow (-)

1. Amnesia, characterized by an inability to recall memories. Its nature is both anterograde and retrograde, meaning new memories cannot be formed and old memories cannot be recalled. The level of amnesia is profound.

2. Docility, characterized by exhibiting diminished fear responses or reacting with unusually low aggression. This has also been termed "placidity" or "tameness".

3. Hyperorality, an oral tendency to examine objects by mouth

Benzodiazepines

- They act on specific receptors in the brain, called gamma-aminobutyric acid-A (GABA-A) receptors.
- Attach to these receptors and make the nerves in the brain less sensitive to stimulation, which has a calming effect.
- They function pharmacologically similar to alchol

Continued
Clinical consideration

B. Schizophrenia

.Antisocial

.Increase dopamine (drugs to decrease dopamine level but decrease it in basal ganglia cause Parkinson disease)

. Genetic

C. Mania and depression

Mania (hyper, implosive)

form of aggression

Increase norepinephrine, decrease serotonin

Increase Ach

Drugs: decrease norepinephrine and increase serotonin (lithium)

Depression (sad; reclusive)

decrease norepinephrine, increase serotonin

Decrease Ach

Drugs: increase catecholamine(amphetamine)

Mnemonics for Memories

- **H Hippocamus** Consolidation of new memories

Bilateral destruction caused Anterograde amnesia . retrograde remain intact

- **F Fornix** (meaning "arch" in Latin) is a C-shaped bundle of nerve fibers in the brain that acts as the major output tract of the hippocampus. The fornix also carries some afferent fibres to the hippocampus from structures in the diencephalon and basal forebrain.
- **M Mammillary bodies** receives from a hippocampus and project up to the thalamus
- **A Anterior nucleus of the thalamus** memory processing and receives from mammillary bodies
- **E entorhinal cortex (EC)** is an area of the brain located in the medial temporal lobe and functions as a hub in a widespread network for memory

Papez circiut

The Papez circuit

- a neural circuit for the control of emotional expression. In 1937, James Papez proposed that the circuit connecting the hypothalamus to the limbic lobe was the basis for emotional experiences.
- Paul D. MacLean reconceptualized Papez's proposal and coined the term limbic system. MacLean redefined the circuit as the "visceral brain" which consisted of the limbic lobe and its major connections in the forebrain – hypothalamus, amygdala, and septum. Over time, the concept of a forebrain circuit for the control of emotional expression has been modified to include the prefrontal cortex.
- Clinical consideration

Alzheimer's and Parkinson disease

Important for episodic memory and consolidation establishing memory for the purpose of survival