

Limbic System

Anatomically, the limbic system is a complex network of cortical areas and subcortical structures interconnected by bidirectional pathways that incorporates medial portions of the cerebral lobes, the basal nuclei, and the diencephalon.

Major limbic centers

Major limbic centers include:

1.The cortical areas:

- cingulate gyrus
- orbitofrontal
- insular
- medial prefrontal cortices
- parahippocampal gyrus.

2.Subcortical structures, including:

- anterior thalamic nuclei
- septal area
- nucleus accumbens
- hippocampus
- hypothalamus (mammillary bodies)
- the amygdala (amygdaloid complex).

It influences emotions, the visceral responses to emotions, motivation, mood, memory, and sensations of pain and pleasure.

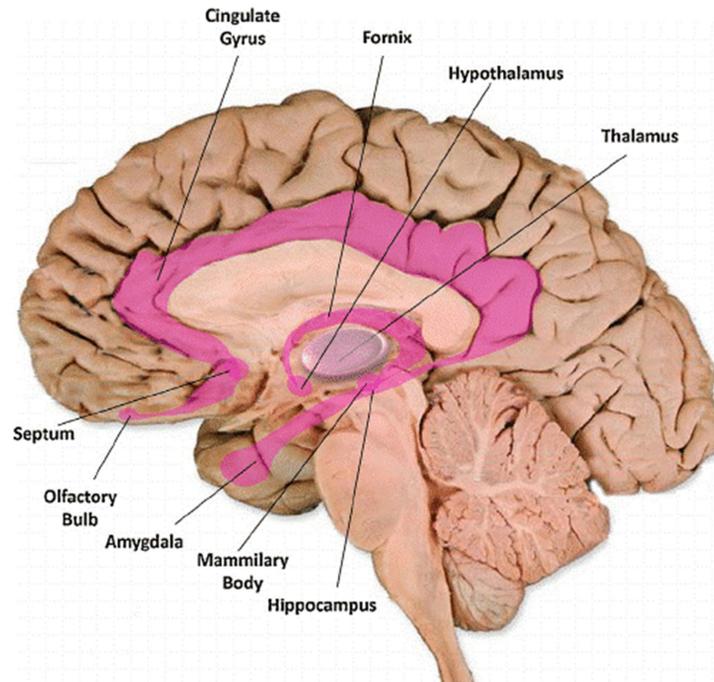


Figure : The limbic system.

The diencephalon

The diencephalon extends from the brain stem to the cerebrum and surrounds the third ventricle; it includes the thalamus, hypothalamus, and epithalamus.

The thalamus function

- 1.The thalamus is the major relay station for most sensory impulses that reach the primary sensory areas of the cerebral cortex from the spinal cord and brain stem.
2. the thalamus contributes to motor functions by transmitting information from the cerebellum and basal ganglia to the primary motor area of the cerebral cortex.
- 3.The thalamus also relays nerve impulses between different areas of the cerebrum and plays a role in the maintenance of consciousness.

Hypothalamus

The hypothalamus is a small part of the diencephalon located inferior to the thalamus. Important functions of the hypothalamus include the following:

- The hypothalamus controls and integrates activities of the autonomic nervous system,

- The hypothalamus control hormone secretion by controlling the pituitary gland, an endocrine gland located inferior to the hypothalamus
- Regulation of emotional and behavioral patterns. Together with the limbic system
- Regulation of eating and drinking
- Control of body temperature.
- Regulation of circadian rhythms and states of consciousness.

The epithalamus

The epithalamus is a small region superior and posterior to the thalamus. It consists of the pineal gland and habenular nuclei:

- 1.The pineal gland is about the size of a small pea , it considered part of the endocrine system because it secretes the hormone melatonin. Melatonin appears to contribute to the setting of the body's biological clock, which is controlled by the suprachiasmatic nucleus of the hypothalamus.
- 2.The habenular nuclei, involved in olfaction, especially emotional responses to odors.

Language

Language is the faculty of communication using symbols organized by a system of grammar to describe things and events and to express ideas. The cerebral hemisphere that controls language is called the dominant hemisphere. There are two cortical areas specialized for language:

1. Broca's area is in the frontal lobe, just anterior to the motor cortical areas that control the mouth.
2. Wernicke's area is in the upper part of the temporal lobe, near the auditory cortex.

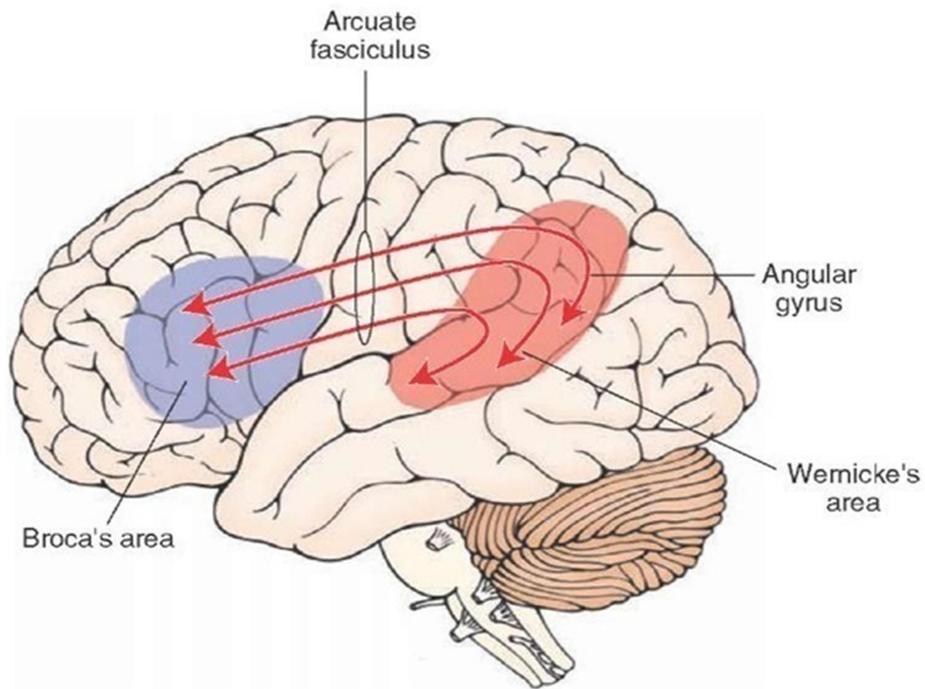


Figure:areas of cortex associated with speech.

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