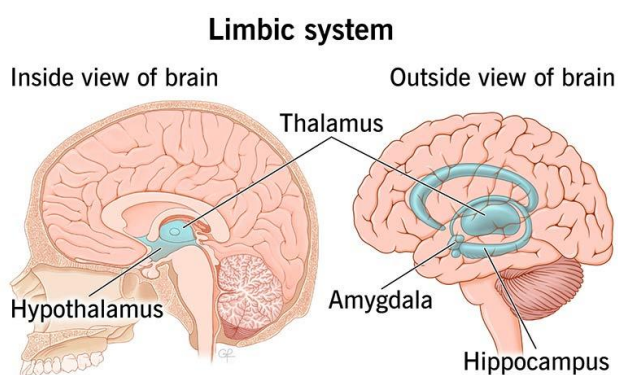


Limbic System

The limbic system is a group of structures in your brain that regulate your emotions, behavior, motivation and memory. While small in size, your limbic system has a big job to help you interact with the world around you.

Overview



Limbic system processes and manages:



The limbic system is a group of brain structures that manage your emotions, behaviors and more.

What is the limbic system?

The limbic system is a group of interconnected brain structures that help regulate your emotions and behavior. The structures (also known as components or parts) of the limbic system work together with other brain regions by processing your memory, thoughts and motivations, then tell your body how to respond.

The limbic system is one of the oldest structures of your brain. It produces natural instincts that your ancestors used to survive by triggering behaviors needed to:

- Eat and drink.
- Reproduce.
- Care for young.
- React to surroundings (fight or flight response).

There are many components to your limbic system that give it a lot of responsibilities. For example, it helps manage your memories and helps you learn from them. It also helps keep you stimulated and motivated.

Why is the limbic system also known as the emotional nervous system?

The connection between your physical and emotional well-being is why the limbic system is also known as your emotional nervous system.

For example, the limbic system is involved when you need to eat. You'll recognize your limbic system in action when you feel pleasure while eating certain foods. The limbic system is also responsible for increasing your blood pressure when you feel emotional stress.

What is the limbic system and higher mental function?

Higher mental function occurs when multiple components of your brain work together to help you complete a task. You use higher mental functioning when you speak, remember, control your emotions, plan or make decisions, for example. The components of your limbic system work together with other brain regions so you can attain higher mental functioning every day.

Function

What is the function of the limbic system?

The main functions of the limbic system include processing and managing your:

- Emotions.
- Behaviors.
- Motivations.
- Memory.
- Autonomic nervous system (heart rate, blood pressure, body temperature).

What does the limbic system control?

The limbic system helps control your emotions and behaviors. It manages your actions based on what it learns from your environment. It takes in information, processes it, learns from it and reacts. It can help you regulate:

- How you feel and respond to certain situations or stimuli (like your senses).
- Hunger and thirst.
- Pain and pleasure responses.
- Sexual arousal.

Anatomy

Where is the limbic system located?

The limbic system is located deep within your brain. It contains several parts (structures or components) that take the shape of a closed fist in the middle of your forebrain (the largest region of your brain).

The word "limbic" comes from the Latin word "limbus," which means "border." When referencing the limbic

system, this refers to the location of the components that sit on the border above your brainstem and underneath your cerebral cortex (the outer layer on the top of your brain).

What are the four components of the limbic system and their functions?

There are four main structures of the limbic system:

- **Hypothalamus:** The hypothalamus produces **hormones**, helps you sleep, and manages your mood, hunger and thirst, sexual arousal, blood pressure, body temperature and heart rate.
- **Amygdala:** The amygdala plays a role in how you experience emotions and feelings (like anxiety, anger and fear), memory and social interpretations (information about others).
- **Thalamus:** The thalamus processes sensory information (hearing, taste, sight and touch) and helps with memory, planning and emotions.
- **Hippocampus:** Your hippocampus is responsible for your ability to form new memories.

How does the limbic system work with my sense of smell?

Your sense of smell comes from your olfactory bulb, which isn't part of your limbic system. Many of your other senses are processed through signals to your limbic system so your body can react to them. Your sense of smell causes you to recall memories and certain emotions related to the smell, which directly contributes to the function of your limbic system.

Conditions and Disorders

What are common conditions that affect the limbic system?

Almost all **mental health conditions** and conditions that affect your memory involve your limbic system. Common conditions that affect your limbic system include, but aren't limited to, the following:

- Alzheimer's disease.
- Anxiety disorders.
- Depression.
- Post-traumatic stress disorder (PTSD).
- Schizophrenia.
- Stress.
- Substance use disorder (SUD).

What are the symptoms of limbic system conditions?

The following symptoms may happen as a result of a condition affecting part of your limbic system:

- Mood changes (irritability, anger, fear, sadness, etc.).
- **Memory loss.**
- Too much or too little **sleep.**
- Behavioral changes.

What tests check the health of my limbic system?

Depending on what symptoms you experience, a healthcare provider may offer the following to confirm a diagnosis:

- **Neurological exam.**
- Neuropsychological exam
- Psychological evaluation.
- Imaging tests like an **MRI** (magnetic resonance imaging).

What treatments manage limbic system conditions?

Treatment varies based on your diagnosis but could include:

- Taking medications.
- Participating in counseling or **therapy**.
- Relaxation techniques like **yoga** or deep breathing exercises.
- **Deep brain stimulation (DBS)**.

Care

How do I keep my limbic system healthy?

Your limbic system connects your physical and emotional health. To keep your limbic system in top shape, you can:

- Eat nutritious, well-balanced meals.
- Get regular exercise.
- Spend time with people you like.
- Participate in activities you enjoy doing.
- Avoid using recreational drugs or substances.
- Take breaks when you feel overwhelmed or stressed out.
- Treat any underlying health conditions.
- Talk to a mental health professional as needed.

Additional Common Questions

What is the controversy with the limbic system?

Some researchers identify additional components within the limbic system beyond the four main structures, which may include the:

- **Basal ganglia:** The basal ganglia is your reward processing center and is involved in emotions. It also regulates your movement and how you learn.
- **Cingulate gyrus:** The cingulate gyrus is important for emotional and social behaviors like imagining how someone else is feeling.
- **Insula cortex:** The insula is important in your internal perceptions, such as when you feel your heart race or stomach clench when you're afraid.
- **Orbitofrontal cortex:** The orbitofrontal cortex links your reward center to actions and acts like a filter to determine if those actions are appropriate or not.

- Entorhinal cortex: The entorhinal cortex contributes to how you form memories.

There's disagreement in the science community as to whether these components fit within the limbic system based on its current definition.

There's also conflict in whether the term "limbic system" accurately describes this area's complete function. Many providers are phasing this word out and prefer to use the individual names of each part of the brain involved.

A note from Cleveland Clinic

The limbic system plays an important role in your body. It has a lot of responsibilities that revolve around the link between your emotions, memory and behavior. Researchers are still learning about the details of the limbic system and how it functions within your brain. If you have any questions about these components and how to maintain their health, talk to a healthcare provider to learn more.

Experts You Can Trust

✔ Medically Reviewed. Last updated on 04/06/2024.

References

Cleveland Clinic's health articles are based on evidence-backed information and review by medical professionals to ensure accuracy, reliability and up-to-date clinical standards.

- Martin JH. The limbic system and cerebral circuits for reward, emotions, and memory. In: *Neuroanatomy: Text and Atlas*. 5th ed. McGraw Hill, 2021.
- National Institute of Neurological Disorders and Stroke (U.S.). Brain Basics: Know Your Brain (<https://www.ninds.nih.gov/health-information/public-education/brain-basics/brain-basics-know-your-brain>). Last reviewed 11/15/2023. Accessed 4/6/2024.
- Sullivan RM, Wilson DA, Ravel N, et al. Olfactory memory networks: from emotional learning to social behaviors (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4330889>). *Front Behav Neurosci*. 2015 Feb 17;9:36. Accessed 4/6/2024.
- Torrico TJ, Abdijadid S. Neuroanatomy, Limbic System (<https://www.ncbi.nlm.nih.gov/books/NBK538491/>). 2023 Jul 17. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan. Accessed 4/6/2024.

Call: 800.223.2273 | 9500 Euclid Avenue, Cleveland, Ohio 44195 | © 2026 Cleveland Clinic. All Rights Reserved.