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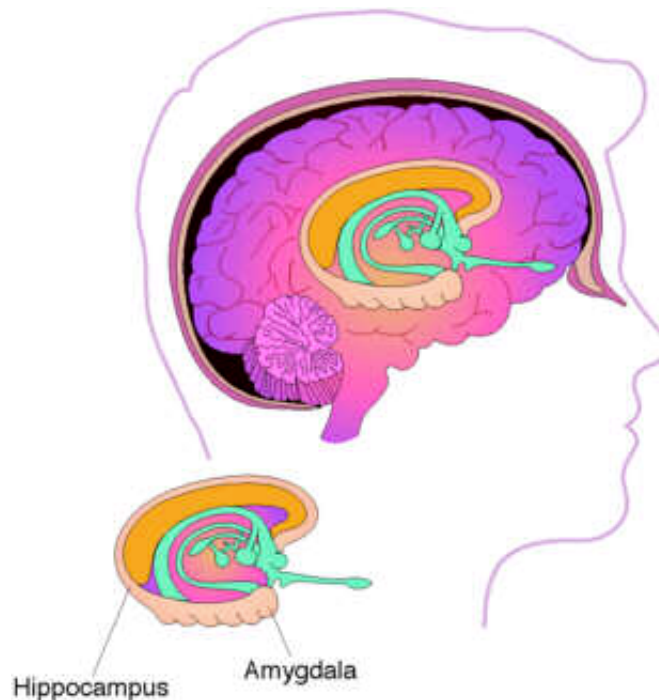
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SITE AWARDS

Amnesia.

Barrett, Julia



Memory loss may result from bilateral damage to the limbic system of the brain responsible for memory storage, processing, and recall.

(Illustration by Electronic Illustrators Group).

■ **Definition**

Amnesia refers to the loss of memory. Memory loss may result from two-sided (bilateral) damage to parts of the brain vital for memory storage, processing, or recall (the limbic system, including the hippocampus in the medial temporal lobe).

■ **Description**

Amnesia can be a symptom of several neurodegenerative diseases; however, people whose primary symptom is memory loss (amnesiacs), typically remain lucid and retain their sense of self. They may even be aware that they suffer from a memory disorder.

People who experience amnesia have been instrumental in helping brain

researchers determine how the brain processes memory. Until the early 1970s, researchers viewed memory as a single entity. Memory of new experiences, motor skills, past events, and previous conditioning were grouped together in one system that relied on a specific area of the brain.

If all memory were stored in the same way, it would be reasonable to deduce that damage to the specific brain area would cause complete memory loss. However, studies of amnesiacs counter that theory. Such research demonstrates that the brain has multiple systems for processing, storing, and drawing on memory.

■ Causes & symptoms

Amnesia has several root causes. Most are traceable to brain injury related to physical trauma, disease, infection, drug and alcohol abuse, or reduced blood flow to the brain (vascular insufficiency). In Wernicke-Korsakoff syndrome, for example, damage to the memory centers of the brain results from the use of alcohol or **malnutrition**. Infections that damage brain tissue, including **encephalitis** and herpes, can also cause amnesia. If the amnesia is thought to be of psychological origin, it is termed psychogenic.

There are at least three general types of amnesia:

- **Anterograde.** This form of amnesia follows brain trauma and is characterized by the inability to remember new information. Recent experiences and short-term memory disappear, but victims can recall events prior to the trauma with clarity.
- **Retrograde.** In some ways, this form of amnesia is the opposite of anterograde amnesia: the victim can recall events that occurred after a trauma, but cannot remember previously familiar information or the events preceding the trauma.
- **Transient global amnesia.** This type of amnesia has no consistently identifiable cause, but researchers have suggested that migraines or transient ischemic attacks may be the trigger. (A transient ischemic attack, sometimes called "a small stroke," occurs when a blockage in an artery temporarily blocks off blood supply to part of the brain.) A victim experiences sudden confusion and forgetfulness. Attacks can be as brief as 30-60 minutes or can last up to 24 hours. In severe attacks, a person is completely disoriented and may experience retrograde amnesia that extends back several years. While very frightening for the patient, transient global amnesia generally has an excellent prognosis for recovery.

■ Diagnosis

In diagnosing amnesia and its cause, doctors look at several factors. During a **physical examination**, the doctor inquires about recent traumas or illnesses, drug and medication history, and checks the patient's general health. Psychological exams may be ordered to determine the extent of amnesia and the memory system affected. The doctor may also order imaging tests such as **magnetic resonance imaging (MRI)** to reveal whether the brain has been damaged, and blood work to exclude treatable metabolic causes or chemical imbalances.

■ Treatment

Treatment depends on the root cause of amnesia and is handled on an

individual basis. Regardless of cause, cognitive **rehabilitation** may be helpful in learning strategies to cope with memory impairment.

■ Prognosis

Some types of amnesia, such as transient global amnesia, are completely resolved and there is no permanent loss of memory. Others, such as Korsakoff syndrome, associated with prolonged alcohol abuse or amnesias caused by severe brain injury, may be permanent. Depending on the degree of amnesia and its cause, victims may be able to lead relatively normal lives. Amnesiacs can learn through therapy to rely on other memory systems to compensate for what is lost.

■ Prevention

Amnesia is only preventable in so far as brain injury can be prevented or minimized. Common sense approaches include wearing a helmet when bicycling or participating in potentially dangerous sports, using automobile seat belts, and avoiding excessive alcohol or drug use. Brain infections should be treated swiftly and aggressively to minimize the damage due to swelling. Victims of strokes, brain aneurysms, and transient ischemic attacks should seek immediate medical treatment.

■ Key Terms

- **Classical conditioning**
The memory system that links perceptual information to the proper motor response. For example, Ivan Pavlov conditioned a dog to salivate when a bell was rung.
- **Emotional conditioning**
The memory system that links perceptual information to an emotional response. For example, spotting a friend in a crowd causes a person to feel happy.
- **Explicit memory**
Conscious recall of facts and events that is classified into episodic memory (involves time and place) and semantic memory (does not involve time and place). For example, an amnesiac may remember he has a wife (semantic memory), but cannot recall his last conversation with her (episodic memory).
- **Limbic system**
The brain structures involved in memory.
- **Magnetic resonance imaging (MRI)**
MRI uses a large circular magnet and radio waves to generate signals from atoms in the body. These signals are used to construct images of internal structures.
- **Motor skill learning**
This memory system is associated with physical movement and activity. For example, learning to swim is initially difficult, but once an efficient stroke is learned, it requires little conscious effort.
- **Neurodegenerative disease**
A disease in which the nervous system progressively and irreversibly deteriorates.

- Priming memory
The memory system that joins perceptual and conceptual representations.
- Transient ischemic attack
A sudden and brief blockage of blood flow in the brain.
- Working memory
The memory system that relates to the task at hand and coordinates recall of memories necessary to complete it.

■ Further Reading

Books

Cohen, Neal J., and Howard Eichenbaum. Memory, Amnesia, and the Hippocampal System. Cambridge, Massachusetts: MIT Press, 1993.

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Squire, Larry R., and Stuart M. Zola. "Amnesia, Memory and Brain Systems." Philosophical Transactions of the Royal Society of London, Series B. 352 (1997):1663.

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