



Memory

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Memory is the retention of learned information or experiences; it is involved in all mental activities. Involves four processes:

- Registration (of information/events)
- Fixation (retention)
- Recognition
- Recall

There may be a failure of learning and memory in patients with impaired perception and attention because the material to be learned was never registered and assimilated in the first place. Similarly in stage 2 failure-newly presented information is correctly registered but cannot be retained for more than few minutes (Korsakoff amnesic syndrome - anterograde amnesia or failure of learning).

Memory is often classified as:

1. Immediate
2. Short-term
3. Long-term

Immediate (retention of information for a few seconds); short-term (retention of information for several second or minutes); and long-term (retention of information for days, weeks or years). In short-term memory loss, patients can remember their childhood and past events but fail to remember events that happened in the past few minutes. In long-term memory loss, patients are unable to recall events in the remote past.

Memory loss can be partial or total. Most memory loss occurs as part of the normal aging process. However, memory loss may also occur as a result of severe emotional trauma or due to brain damage following disease or physical trauma. Memory loss can be described as amnesia, forgetfulness or impaired memory.

Depending on the cause, memory loss can be sudden or gradual and it can be permanent or temporary. Memory loss resulting from trauma to the brain is usually sudden and may be permanent or temporary. On the other hand, age-related memory loss, such as in Alzheimer's disease, occurs gradually and is usually permanent. It is barely noticeable at first, but progressively gets worse.

In most cases, memory loss is temporary and usually affects memories relating to a portion of a person's experience. However, severe physical brain trauma, such as that following a severe head injury, can cause total (global) memory loss. Some patients may temporarily lose memory and consciousness, then fully recover after the event.

CAUSES AND SYMPTOMS

Aging

A person loses nerve cells at the rate of 1% per year, even without a disease associated with memory loss, such as Alzheimer's disease. The body stops growing new nerve cells after age 25. Therefore, by the time a person reaches 70 years of age, he or she will probably have lost at least one-third of his or her memory functioning.

Nutritional Deficiency

Not enough thiamine (vitamin B₁), vitamin B₁₂, and/or protein contributes to memory loss.

Depression

Depression can cause memory loss at any age. This is one of the main reasons for forgetfulness in the elderly. Depression-related memory loss is a treatable condition.

Disease

Memory loss can result from chronic disease conditions such as diabetes or hypothyroidism.

Oxygen Deprivation

Condition such as severe head trauma, surgery, stroke, or heart attacks cause a sudden reduction of oxygen to the brain, which causes widespread death of nerve cells and significant memory loss.

Free-radical Damage

Free-radical molecules destabilize other molecules around them, resulting in damage to the body at the molecular level. Free-radicals can damage the blood-brain barrier, a membrane

that separates the circulating blood and the brain. A weakened barrier may not be able to prevent toxic chemicals from entering the brain. Widespread brain damage, accelerated cell death and memory loss occur as a result.

Chemical Poisoning

Daily exposure to toxic chemicals such as alcohol, tobacco and illicit drugs (heroin, cocaine and amphetamines) destroy brain cells at a rapid rate. Other environmental toxins, such as lead and mercury, can penetrate the blood-brain barrier. Once inside the brain, these heavy metals kill nerve cells. This helps explain why exposure to heavy metals has been linked to memory and learning problems in children. Even though aluminum is not considered a heavy metal, its accumulation in the brain is believed to contribute to Alzheimer's disease.

CNS Infections and Inflammation

Encephalitis (an inflammatory disease of the brain) can result in the death of nerve cells, which can result in significant memory loss. CNS infection such as toxoplasmosis and neurosyphilis can also cause significant brain damage and memory loss.

Stress

Emotional or physical stress stimulates the release of stress hormones such as cortisol and adrenaline. Constant exposure to stress hormones results in nerve-cell death and memory loss.

Sensory Overload

When a person is trying to do many tasks or worry about many things at the same time, the brain is overloaded with information and cannot process short-term memories. Therefore, if a person is trying to remember a lot of information, he or she tends to forget car keys or scheduled appointments.

Low Blood Sugar

Nerve cells require glucose (sugar) to generate energy. If there is not enough glucose in the blood nerve cells starve and die. Excessively low blood sugar can send a person into shock and/or into a coma.

Seizures

Prolonged seizures, such as in patients with epilepsy especially status epilepticus, can cause significant memory loss.

Severe Emotional Trauma

Extreme emotional trauma has been associated with sudden amnesia. This occurs because the brain is trying to protect a person from recalling unbearable emotional trauma.

Low Estrogen Levels in Postmenopausal Women

Women often report a significant decrease in memory function immediately following menopause.

DIAGNOSIS

To find the underlying cause of memory loss, a physician obtains a detailed medical history, which documents the pattern, symptoms and types of memory loss. He or she inquires about contributing factors that may worsen or trigger memory loss. A

routine physical and detailed neuropsychological examination with a focus on memory function is conducted. In addition, several diagnostic tests are ordered.

Tests used to pinpoint the exact cause of memory loss may include neuroimaging; electroencephalography (EEG) for patients with seizures; blood, cerebrospinal fluid and tissue analysis to rule out specific disease and cognitive tests for gauging the patient's recent and remote (long-term) memory and possibly his or her attention span, judgment and word comprehension as well.

Available neuroimaging techniques include computed tomography or CT scan, magnetic resonance imaging (MRI), positron emission tomography (PET) and single-photon emission computed tomography (SPECT). A CT scan can detect structural abnormalities, such as brain tumors or lesions. For detection of widespread loss of neurons associated with aging or degenerative disease, MRI, PET, or SPECT test can be run. They can show the severity and extent of nerve damage. These tests can also help the clinician pinpoint the exact cause of the memory loss. A PET scan especially useful in that it allows the doctor to track and record which memory centers are stimulated in live, working brain tissue while a person is functioning.

MANAGEMENT

Dietary Guidelines

The following dietary changes are recommended to help a person have better memory:

- Reduce sugar intake.
- Avoid eating foods that contain additives such as artificial sweeteners, monosodium glutamate (MSG), preservatives and artificial colors. These chemicals can accumulate in the body and become toxic, causing brain damage and memory loss.
- Eat organically grown foods, which are not contaminated with pesticides or insecticides. These toxic chemicals can affect nerve function and cause memory loss.
- Limit alcohol intake and do not smoke. • Do not use illicit drugs.
- Drink only filtered water to avoid toxic chemicals in the water system.
- Eat a low-fat, high fiber diet with emphasis on fresh fruits and vegetables. Raw fruits and vegetables are the best source of the vitamins, minerals, fiber and antioxidants that the body needs for detoxifying. Antioxidants also protect and support brain function.
- Get enough protein. Protein is necessary to maintain healthy muscles, organs and nerve cells; and it also helps maintain blood sugar levels.
- Eat cold-water fish, which are a good source of omega-3 fatty acids. Omega-3 fats are believed to reduce the risk of strokes, blood clotting and heart attacks. These are major causes of sudden memory loss in the elderly.

Nutritional Supplements

The following nutritional supplements may help restore and maximize memory:

- ***L-Acetylcarnitine (LAC)***
Studies have shown that acetylcarnitine can improve memory function in the elderly. It can even reverse memory loss in some patients who have early Alzheimer's disease.
- ***Phosphatidylserine***
Phosphatidylserine (100mg three times per day) probably works by lowering stress hormone levels and increasing the availability of acetylcholine. This supplement may help improve brain function in patients suffering from age related memory loss.
- ***Vitamin E***
A strong antioxidant, vitamin E (400-800 IU per day) protects memory cells from free radical damage.
- ***Omega-3 Fatty Acids***
Flaxseed oil (1 tablespoon per day) and fish oil capsules are good sources of omega-3 fatty acids. Omega-3 enriched eggs are available in some places.
- ***Thiamine***
Treat a vitamin B₁ deficiency with supplements (3-8 g per day). Thiamine/vitamin B₁ is a good antioxidant and may also improve mental function in Alzheimer's patient.
- ***Methylcobalamin***
Methylcobalamin (1,500 micrograms daily) is the preferred supplemental form of cyanocobalamin, or vitamin B₁₂. Many Alzheimer's patients have been found to have a vitamin B₁₂ deficiency.

Herbal Therapy

The following herbs may help reverse memory loss and/or improve mental performance:

- ***Ginkgo Biloba***
Extract (24% ginkgo flavonglycosides: 80mg three times per day) of the herb is well known for its ability to improve memory function. Ginkgo works by improving the circulation of blood to the brain. It is also a strong antioxidant. Therefore, it can slow down memory loss associated with normal aging or due to degenerative brain diseases such as Alzheimer's disease. Several studies have demonstrated that ginkgo helps improve mental functions such as thinking and concentrating in patients with Alzheimer's disease.
- ***Gotu Kola (Centella asiatica: 70mg taken twice daily)***
This herb helps improve memory by increasing blood circulation to the brain and keeps blood vessels strong and healthy.
- ***Ginseng***
Studies have shown that ginseng can improve memory and enhance learning ability. The recommended dosage of Korean ginseng is 3-9 g per day. Because ginseng may elevate blood pressure, patients with heart disease or high blood pressure should consult with their doctor before using this herb.

Allopathic Treatment

The method of treatment for memory loss depends on underlying causes.

- ***Age***
The elderly can be taught simple techniques to remember things better such as repeating a person's name several times, using word association, or jotting things down in a notebook.
- ***Depression***
Depressed patients often show enhanced memory function after they are successfully treated for depression.
- ***CNS Infections***
Patients need to be given effective antimicrobial treatment immediately to save them from death, significant brain damage and profound memory loss.
- ***Trauma***
Patients' memories usually return as they recover from the accident of injury.
- ***Alzheimer's Disease (AD)***
Drugs such as tacrine or donepezil can improve memory and cognitive functions in AD patients.

Expected Results

A patient's prognosis depends on the underlying causes of his or her memory loss. Partial or complete recovery can be expected when the memory loss results from treatable causes such as depression or nutritional deficiencies. However, patients with degenerative nerve conditions such as Alzheimer's disease are expected to have a slow, irreversible decline of both memory and cognitive function. Medical treatment with memory-enhancing medications and long-term care are often required.

Prevention

Although there is no realistic way to prevent memory loss due to sudden trauma, there are things a person can do to decrease or slow down age-related memory loss. Keeping the mind active by continually learning new things is an important strategy in this regard. By eating healthy and nutritious foods, taking nutritional supplements and antioxidants, reducing stresses at home and at work and avoiding environmental toxins, one can slow or even prevent memory loss.

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