

Today we are going to talk about memory which is our ability to save and store information and experiences in order to access it and use it in the future.

Memory has two functions 1) it determines your current behavior 2) determines your future and take decision .

To form a memory it should go through stages, the first one is called **encoding**, like getting a CD and make it specific to a certain song; after encoding there is **storing** which is downloading the song; putting the CD in a place in order to use it later is called **retention**, using it later is called **retrieving** or **recalling**.

There is something called recognition, it happens when you recognize the memory you learnt; for example when your friend introduces you to someone new and after few weeks if you see this new guy accidentally you will recognize him.

Prefrontal cortex is responsible for processing of short term memory. And for long term memory it's stored in the hippocampus that is part of the limbic system and present in the temporal lobe, so diseases affecting the limbic system or the temporal lobe will affect the memory. Cerebral cortex has a role in storing memories.

Short term memory (working memory) which helps in carrying out your tasks has two types: **recent memory** which can be stored for one minute to seven days maximumly / and **immediate memory** (minute memory) can be stored for 30 sec. to one minute.

To test for immediate memory give your patient a name and an address then ask him to repeat them after you. And for recent memory like the previous test but after giving him the name and address tell your patient to keep them in his mind as you are going to ask him about them later and you ask him after 15 minutes for example. There is another special test for memory for hospitalized patients by asking them what did they eat for breakfast today or who visited them and then ask the nurses for there answers.

Long term memory is divided into **explicit** and **implicit**; the later has many names as automatic, non-declarative, unconscious and procedural which helps carrying on tasks automatically, people who have very excellent implicit memory are

athletes and musicians. Explicit memory is conscious and declarative memory which is further divided into **episodic** and **semantic**; episodic resembles certain episodes in your life especially those which have an emotional aspects like your wedding date; semantic is the one related to events or facts like historical and geographical that no one argues about them, like the name of the current prime minister and what is Jordan's capital.

There is another memory called **spatial navigation memory** that is memory for directions. **Executive memory** is when you're able to remember instructions from your manager for example to perform your daily tasks, and being able to plan like knowing the steps and what you should do if you want to travel, also the ability to organize and have an intact abstract thinking ( ability to see beyond things ) and concrete. To test abstract thinking do similarity test like asking the patient what is the similarity between an apple and orange he might say both of them are rounded he is close but we are after that both them are fruits. Another test is giving your patient a proverb but first ask him if he know it previously and then let him tell you what is the meaning of that proverb.

**Retrograde amnesia** is forgetting events that had happened before having a severe accident like severe traffic accident. And **anterograde amnesia** is forgetting what happens after the accident.

In order to convert short term memory to long term memory 1) you have to be motivated and interested in remembering that information 2) repetitive rehearsals.

Your brain does chunking which is putting related memories together by making memory traces for different memories, for example: a memory trace for birthdays and another one for dates of your exams. And a reason for forgetting is not accessing these traces regularly.

### **Causes of forgetting**

Not everything we learn we can remember and one of the causes of forgetting is age; an example to this is not being able to remember events in the first year of life and this inability to remember is not because our brain doesn't encode while we are infants, in fact the minute after we born our brain starts encoding but coding abilities differ from one individual to another. And the most important

cause of dementia that affects elderly and their memory abilities is Alzheimer disease, although it may affect individuals before the age 65 and it's called presenile dementia. By the age of 80 20% of the hippocampus is lost.

Another reason is physical trauma for example brain hemorrhage, tumor ... Also emotional trauma especially children how suffered from severe abuse which may be physical or sexual abuse also neglect which considered to be abuse.

Depression may also lead to memory disturbances, depressed patient is preoccupied with almost everything negative happened in his life and forget happy experiences which will lead to severe felt feeling, so these thoughts will be at the expense of learning leading to memory impairment. Symptoms of depressed patients are similar to those of dementia and because there is no degeneration in their brains we call it ( depressive pseudodementia ) and when depression is treated symptoms of memory impairment will be relieved and memory will come back normal. Other things that may cause severe memory impairment are anxiety and stress. **HPA axis** ( hypothalamus, pituitary and adrenal glands ) becomes highly activated in severe anxiety and stress, hypothalamus promotes the pituitary to secrete ACTH into the blood stream and reaches the adrenal cortex stimulating the releases of cortisol, cortisol and ACTH are called stress hormones and there levels increase in stress, and too much of these hormones will kill some neurons leading to forgetting. Anxiety patients suffer from preoccupation of certain thoughts with lack of concentration that leads to memory loss.

Getting enough amount of quite sleep ( and to get good marks study hard and sleep early and the time between studying and sleep shouldn't contain any distractions like mobile phones. Also people who get enough sleep are less likely to get dementia, depression... etc.) sleep is divided into REM sleep "where dreams occur" and non REM sleep, good quality sleep is good for memory because while you are sleep there is consolidation for your memory causing discard of memories you don't need and keeping memories you need.

An important factor is illegal drugs and the most common is cannabis, and non regular users cannabis will have impaired learning abilities so they will not be able to learn new things, although their ability to recall stored memories is intact; for chronic cannabis users or those who started using cannabis in their childhood will affect their cognition and memory. Another drugs that can affect memory are cocaine and methamphetamine, both of them are stimulators to the CNS and also they cause constriction in blood vessels that will affect blood flow to the brain. Ekstaasi "MVMA metyleenidioksimetamfetamiini " also called club or party drug

causes dehydration and cardiac problems ( for this drug the doctor didn't mention its effect on memory). Interference is when two sets of memories compete with each other, old memories and new things we learn, if the new memory overcomes the old one we call this retroactive memory, if the old one predominates we call this proactive. Transience is forgetting because of the passage of time.