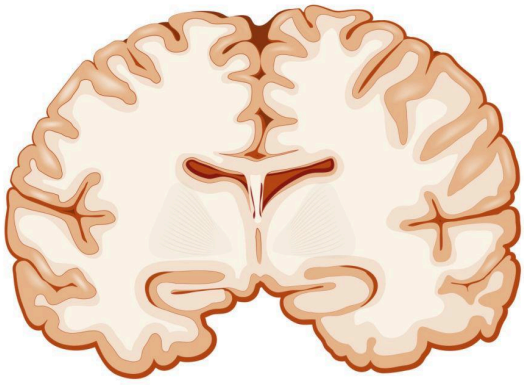
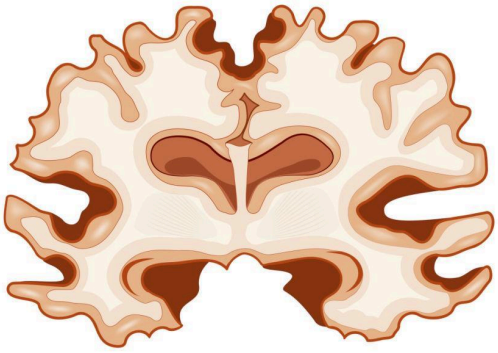
Normal brain

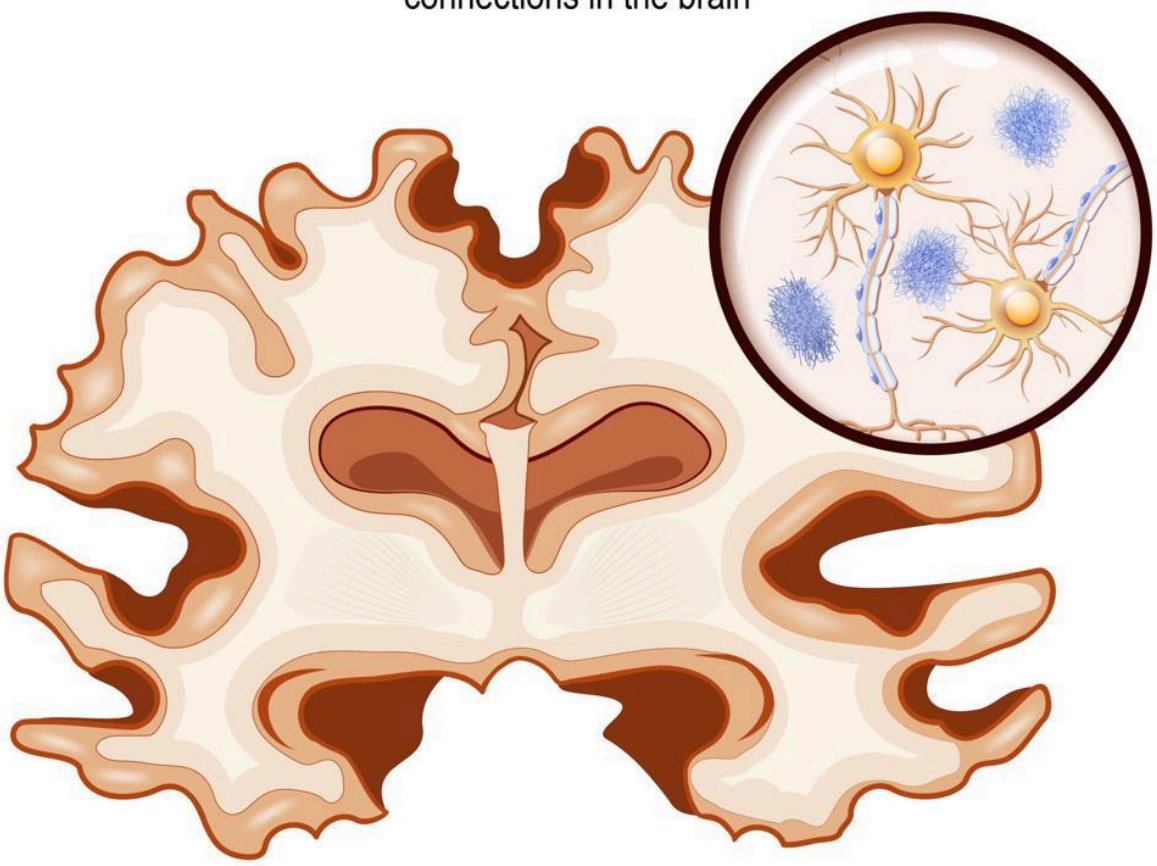


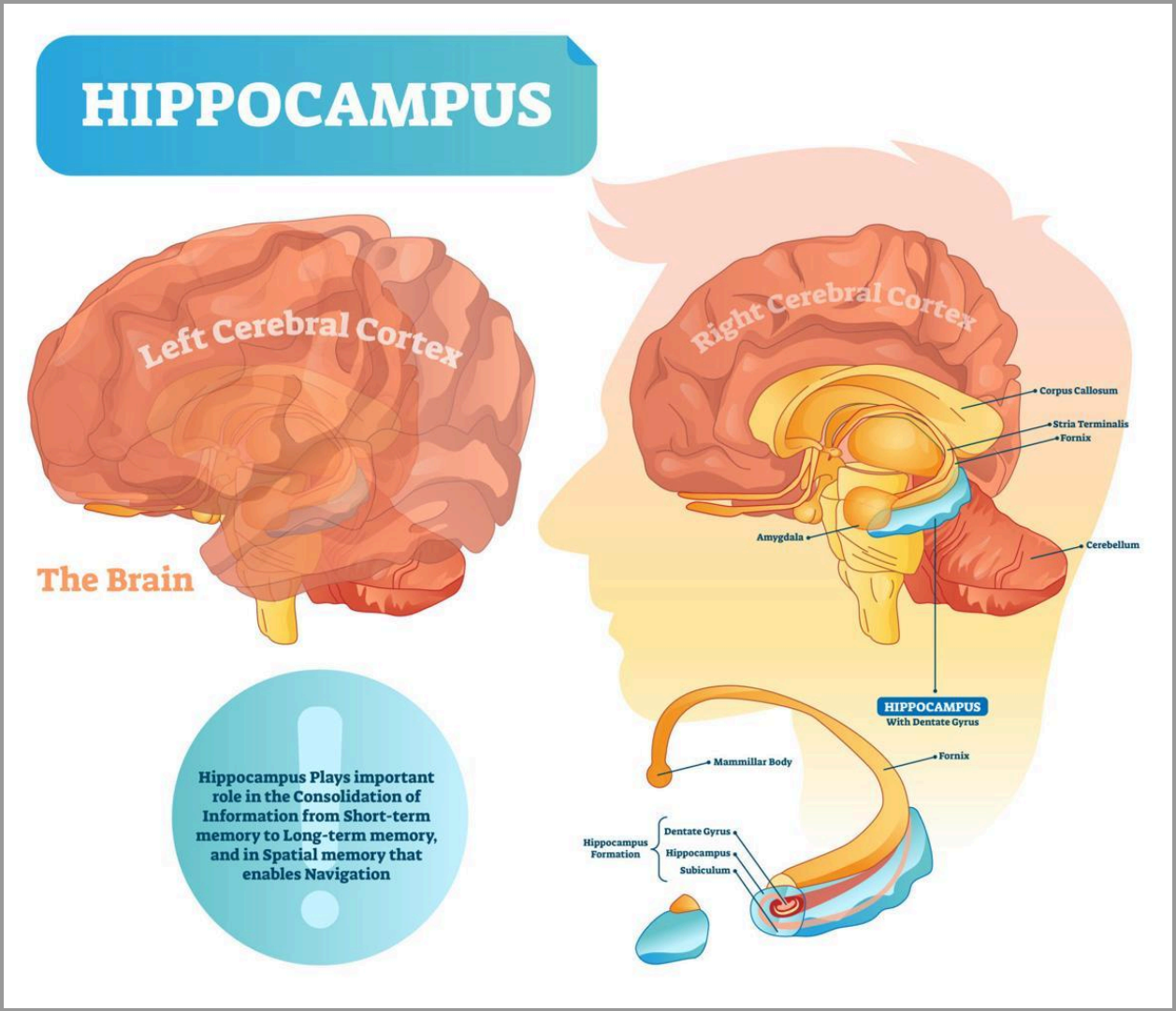
Alzheimer's brain



Alzheimer's disease

The disease associated with amyloid plaques, neurofibrillary tangles, and loss of neuronal connections in the brain





The human brain is often compared to a computer, but that comparison actually understates its power. A computer stores files; the brain stores life itself. Every smell you remember from childhood, every face you recognize, every skill you have learned—from tying shoes to reading—exists because billions of microscopic cells inside your brain cooperate perfectly. These cells are called neurons, specialized nerve cells that send signals to each other through tiny electrical impulses.

Alzheimer's disease is a condition that slowly disrupts this cooperation.

To understand it clearly, imagine a massive communication network. In a healthy brain, messages travel from one neuron to another with remarkable speed. This communication is what allows a person to recall memories, solve problems, understand language, and navigate the world.

Alzheimer’s interferes with that network.

Instead of information flowing cleanly, abnormal protein material begins accumulating in the brain. One type forms deposits outside neurons called amyloid plaques. These plaques are clusters of protein fragments that the brain fails to remove properly. When too many accumulate, they crowd the spaces where neurons normally exchange signals.

Inside the neurons themselves, another problem develops. A structural protein called tau begins to twist into distorted strands called neurofibrillary tangles. These tangles block the internal transport system that normally carries nutrients and molecular supplies throughout the neuron.

When both problems occur together, neurons become stressed and eventually stop functioning.

Unlike many organs, the brain does not easily replace lost nerve cells. As neurons die, the brain's overall size can gradually shrink. This shrinkage is not something a person can feel, but it can be seen in medical imaging such as MRI scans.

One of the earliest structures affected is the hippocampus, a region deep within the brain responsible for forming new memories. When this area becomes damaged, people often struggle with recent information. A person might ask the same question repeatedly because the memory of receiving the answer never becomes firmly stored.

Older memories, however, may remain clear for a long time. That is because they were recorded decades earlier, before the disease began damaging memory centers.

As Alzheimer's advances, additional brain regions begin to lose efficiency. Areas responsible for language can be affected, making it difficult to find the right words during conversation. Regions involved in spatial awareness may weaken, causing confusion about directions or familiar places.

It is important to understand that Alzheimer's is not simply ordinary forgetfulness. Everyone misplaces items or forgets details occasionally. Alzheimer's involves a deeper decline in several thinking abilities—memory, reasoning, judgment, and comprehension.

Scientists have spent decades studying why the disease develops. Age is the strongest factor. The risk rises significantly after age sixty-five, although the condition can appear earlier in rare cases. Genetic variations—small differences in inherited DNA—can also influence vulnerability.

Another important factor involves the health of the brain's blood vessels. The brain consumes about one fifth of the body's total oxygen supply, even though it represents only a small fraction of body weight. If circulation becomes impaired over many years, brain cells may become more vulnerable to damage.

Despite the seriousness of the disease, people with Alzheimer's often retain emotional awareness for a long time. They may forget names or places, yet still recognize kindness,

comfort, or music that once mattered to them. This reveals something remarkable about the brain: memory is not a single storage unit but a vast system spread across many regions.

Researchers around the world are trying to slow the disease by targeting the underlying biology. Some studies focus on preventing plaque formation. Others aim to stabilize tau proteins or strengthen the brain's ability to clear harmful molecules.

Although medicine continues searching for effective treatments, understanding the disease itself already provides valuable insight. Alzheimer's demonstrates how delicate the brain's communication systems truly are.

Every memory you carry—every lesson you have learned—exists because neurons are constantly exchanging signals with astonishing precision. When that system falters, the loss of memory reminds us how extraordinary the brain really is.

Learning about Alzheimer's is therefore not only about disease. It is also about appreciating the fragile and remarkable machinery that allows human beings to remember their past, understand their present, and imagine their future.