# Degenerative brain diseases and their effect on sleep

# Alzheimer

Alzheimer is a disease that slowly destroys memory, thinking skills, eventually the ability to perform day-to-day tasks. Most people with Alzheimer symptoms are older, and most of them over 65 years old. In America, experts suggest that more than 6 million may have Alzheimer or have dementia caused by Alzheimer.

## Effects

Alzheimer is a common disease that changes your brain in different ways and has some effects on the affected. Cognitive and functional abilities like a person's ability to think, remember and communicate. It becomes harder to follow a path, make decisions and follow a conversation. Sometimes people experience confusion and memory loss initially only for short-term memory, but after some time it impacts the long-term memory as well. The cognitive and functional abilities are not the only thing that can change during the development of Alzheimer, emotions and mods can change so that people that are impacted lose interest in past favorite hobbies and some people become more withdrawn and less expressive.

Physical abilities may also be impacted, the coordination and mobility often fail or are limited to perform day-to-day tasks. In some cases even these simple tasks such as eating, bathing and getting dressed are difficult, near impossible.

The disease also impacts the behavior of the affected, common reactions are repeating the same actions or words, hiding possessions, restlessness and physical outbursts.

## What happens to the brain?

During the process of aging the brain shrinks in some degree healthy and natural, but in case of an Alzheimer disease the damage is widespread. Many neurons stop functioning, loose connections to other neurons and die.

Here you can look at a comparison of a healthy brain and a brain impacted by severe Alzheimer's.

A picture containing text, food

Description automatically generated

These changes may begin a decade before the symptoms show up. In early stages, the brains go through toxic changes. The abnormal buildup of Proteins, the dying of Neurons and many other complex changes are the result of Alzheimer.

Amyloid plaques are one of the abnormal buildup of proteins, they are formed from a breakdown of a larger protein, the amyloid precursor protein. One of the forms is extremely toxic, and this form builds up between cells and stops cell functions.

## Stages of Alzheimer

There are 3 Stages of Alzheimer, Mild, Moderate and Severe Alzheimer.

### Mild Alzheimer

In the mild stage, the effects slightly show up and are often not recognized in this early stage. The effects include greater memory loss, cognitive difficulties which can occur in the form of getting lost, trouble handing money and paying bills, repeating questions and taking longer to perform day-to-day tasks.

### Moderate Alzheimer

In the moderate stage, the damage extends to areas in the brain that control language reasoning, conscious thought and sensor processing. Memory loss and confusion grow and people begin being unable to recognize family and friends, may be unable to learn new things, and some people at this stage may have hallucinations, delusions, and paranoia.

### Severe Alzheimer

This is the last stage, plaques, and tangles spread throughout the brain, the brain tissue shrinks and people with severe Alzheimer cannot communicate and are completely dependent. Near to death of the person, the person is in bed most of the time as the body shuts down.

## The effect on sleep of Alzheimer

People with Alzheimer’s may not sleep well at night but sleep excessively during the day.

Researchers thinks that Alzheimer causes cellular changes in the brain, which also affects the circadian rhythm (the same thing affected when aging). Individuals with Alzheimer may have damaged SCN cells, the master clock in our brain, ending in difficulties to follow a typical sleep-wake-cycle.

Brain proteins also impact the sleep, as mentioned previously the Beta-amyloids they are extremely toxic. But while sleeping, these amyloids are reduced. In a study, after an Individual stayed up 31 hours, the amyloids increased by 5%. “A lack of sleep may, therefore, contribute to Alzheimer’s.” says the article https://www.medicalnewstoday.com/articles/alzheimers-and-sleep#why-it-affects-sleep.

People with Alzheimer's or other form of dementia often sleep for long periods and may need to sleep during the day, and as Alzheimer progresses the patient gets weaker, and is exhausted after simple tasks. Thus, some patients may also sleep after the symptoms worsen.

Other effects on sleep of Alzheimer can include reduced sleep quality, less REM and deep sleep (which is directly connected to memory loss, etc.), … Another example of potential effects of Alzheimer's on sleep is the lack of exposure to sun and physical movement.

Sleep positions also matter for people with Alzheimer, reports state that people with Alzheimer wish to sleep on the side rather than on the back or stomach. A 2015 study has found out that rats sleeping laterally may remove brain waste more efficiently, although this has to be proved with further studies.

# Dementia

Dementia is an umbrella term for some types of dementia, it is including diseases with brain issues such as memory loss, …. One of the most known types is Alzheimer, but there are other types such as Vascular dementia, dementia with Lewd bodies (DLB) frontotemporal dementia(FTD).

Dementia is progressive, and has different types. Over several years, people with those diseases experience worsening signs. For the simplicity of things the progressive procession be divided in 3 stages,

* the early sage
* the middle stage
* the late stage

These stages may also be called mild, moderate and severe.

Dementia can be caused by lots of things, such as dying nerve cells, Alzheimer's disease(and the other types under the term of dementia), severe head injuries and inherited dementia. Some other rare causes are, the Huntington's disease (a mostly inherited disease which is neurodegenerative, that means the loss of structure and neurons in the brain), Leukoencephalopathies (these are disease that affect the deeper, white-matter tissues), and some other specific diseases.

Dementia can also be caused by sleep issues, different types of dementia are associated with different sleep problems.

## Some effects on sleeping of Dementia

A person with dementia migth sleep not well due to:

* have difficulty getting to sleep
* wake up several times during the night
* sleep less deeply
* sleep for less time overall
* Medication
* Melatonin
* being inactive and bored
* being confused at night
* ...

All these causes to poor quality sleep can interfer with the bodies internal clock. This internal clock is also affected by the degeneration of the 'main clock' in the brain.

# What happens to the brain when aging?

As a person gets older, some changes occur in all parts of our bodies, including the brain. The changes range from shrinking, dying neutrons, decreasing blood flow, …

## How does neurons are affected and die?

Normaly the neurons react adaptively to oxidative stress (caused by an imbalance between production and accumulation of oxygen reactive species) and bioenergetic challenges caused by ongoing activity in the neuron network, but in case of aging or degenerative disorders, these mechanisms where the neurons adapt are compromised and show unique age-related changes. This compromised mechanisms result in more susceptibility to brain diseases.

The ability to repair DNA damage in the neurons declines with age, and the result is dying neurons.

* We have demonstrated that aging leads to a loss of coordination within a pathway that is central to DNA repair in neurons, Anupam Sengupta says.

In this pathway, you could compare the loss of coordination in this pathway with a building site, where an old building is torn down. The building of a new building is delayed due to a shortage of workers and or building material. The building site, is the DNA repair job, and incomplete, they are toxic to the neuron, causing even more degeneration.

## What happens to the brain's size?

It has been found out, that after the age of 40, the brain shrinks 5%. The rate of decreasing increases sometimes after the age of 70. The shrinking is usually caused from dying of neurons. Although it has also been suggested that it can also be caused by the decreasing of the volume.

Brain changes do not occur in the same extent in all regions of the brain, and the shrinkage affects also the neuropsychological functions.

# The effects on sleep of aging

It is common that the quality of the sleep of older adults experiences a heavy decrease, but why is that so? A lot of changes occur due to changes to the body's internal clock also known as circadian clock, the “master clock” in our brain (suprachiasmatic nucleus(SCN) composed of about 20,000 cells) is impacted by deterioration of cells and thus can lead to the disruption of circadian rhythms. This impacts when people get hungry, when the body releases certain hormones, when a person feels sleepy or alert, etc.

Changes in production of hormones, such as melatonin and cortisone, also play a role in disrupted sleep of older adults. Other common reasons are mental and physical health related, these can include brain disorders like Alzheimer's or forms of Dementia, but can also occur from depression, anxiety, heart disease, diabetes and other conditions that may cause discomfort and even pain. The poor sleep quality can also be related to the lifestyle changes that often come with aging, such as retirement, less sleep structures, more napping. Loss of independence and social isolation, which also infect the sleep indirectly.

The sleeping architecture also changes, with studies proving that older adults wake frequenter up at night. This architecture refers to the shifts in which older adults spend more time in the earlier lighter phase instead of the deeper phases, which combined with waking up in the night has as result less restful and fragmented sleep.

That older people need less sleep as younger people are true, to a certain point. In fact, contrary to popular opinion, older people don't need less sleep than younger people in their 20s. Adults require the same amount of sleep from their 20s into old age. The National Sleep Foundation guidelines, recommend that people over 65 years should get over 8 hours of sleep.

# Dementia

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# Aging

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