

# The Causes and Effects of Alzheimer's Disease

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## ABSTRACT

Many people in the world are known to have Alzheimer's disease though not many people know what causes it or how it fully impacts a person. This research paper thoroughly evaluates the causes of this disease, the people who are susceptible to it, treatments for it, and lastly, the long-awaited cure for this disease.

## Introduction

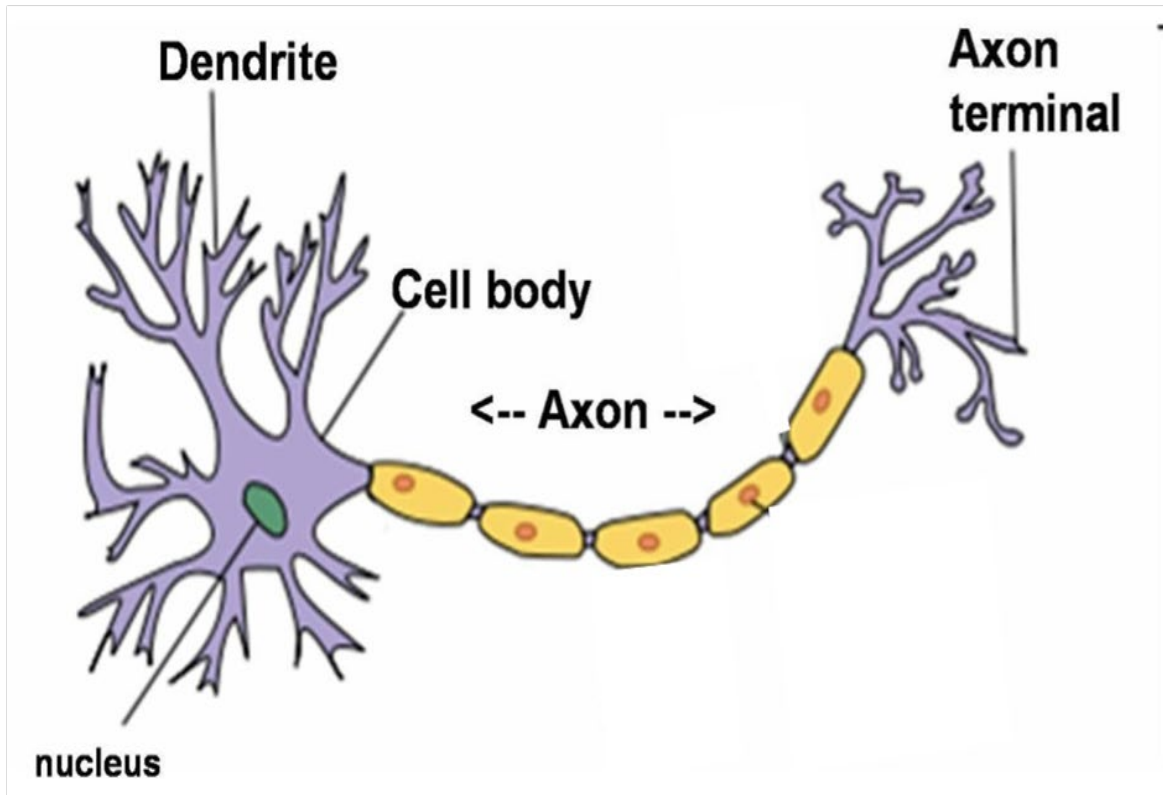
Do you have elders that have Alzheimer's disease? Have you wondered what occurs to people who have this disease? The symptoms of this are not pleasant, whether it is a very mild or severe case. Alzheimer's disease is one of the most common diseases in the world, and unfortunately, is eligible to be arguably one of the most dangerous diseases as well.

## Causes of The Disease

Dementia is a type of intellectual disorder that disrupts the regular functions of the brain. These are caused by damage or loss of neurons in the brain. Alzheimer's disease is a type of dementia that disrupts the flow of memories in the brain. The more proper definition is chronic dementia which causes interference within the brain's functions of memory, thinking, and behavior. What is this interference? What causes this interference? There are many factors that cause this interference, but one of the main reasons for it is a protein called amyloid. There are two different types of amyloid proteins, but the one to focus on is  $\beta$ -amyloid, also known as beta-amyloid. This protein comes from a larger protein, amyloid precursor protein (APP), that is broken down. Once broken down, amyloid goes through your body and attacks the nerves. It goes to your brain and starts to break down the healthy connections within your brain. These connections, known as neurons, are the key to a healthy and functioning brain.

## Neurons and How They Are Affected

Understanding what neurons are being the key to figuring out how beta-amyloid affects the brain. Neurons are made up of three parts: the axon, the dendrite, and the cell body. The cell body contains the nucleus, which controls the neuron and how it functions. The axon is a long tail out of the cell body that sends messages from the nucleus to the axon terminal. The axon terminal is the end of the axon, and it takes the messages that it receives from the axon and sends it to other neurons. The dendrite, which looks like tree branches, receives messages from other neurons. It may be inferred through this knowledge that neurons are touching, but they are not. Synapses, the spaces in between a neuron's axon and other dendrites, is what gives neurons their usefulness and capability to function. Electrical signals travel through the synapses to send messages to other neurons.

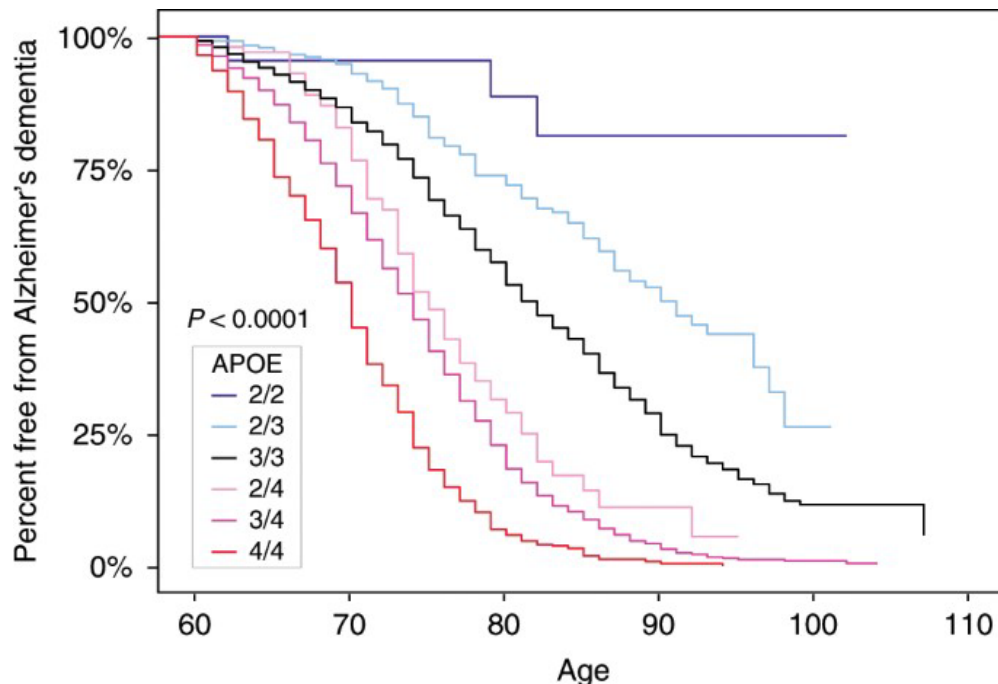


**Figure 1.** A simple diagram that shows all the parts of a neuron.

This is where the beta-amyloid comes in. It starts to build upon the axon and blocks messages that it sends to other neurons. The protein first starts to block connections of neurons from the hippocampus, an area of the brain where memories are stored. As more connections are blocked, the hippocampus can be isolated from the brain completely and will start to affect the other parts of the brain that control important functions such as speech, thinking, and motor functions.

## People this Disease Affects

Another factor that is noticed among those who are diagnosed with Alzheimer's disease are usually elderly folk. Usually, symptoms start to occur in people 60 years old or older. This is because this disease is also a type of dementia; dementia takes a long time to develop, meaning increasing age also means an increased risk to have the disease – This is known as late-onset Alzheimer's. This does not mean that younger people, under age 30, are not at risk of having this disease, but it means that they are less at risk to have this disease. One reason that increases the risk of Alzheimer's is if a family member has it. That's right, this disease can be passed down genetically. If a mother or a father has an altered APOE gene and it gets passed down to their child, then the risk of Alzheimer's increases by 2 to 3 times. One altered APOE gene is sufficient enough to make the risk high. Fortunately, it is not definite that if a family member has an altered gene then the child will have Alzheimer's. With a nutritious diet and sufficient sleep, the risks of this disease exponentially decrease.



**Figure 2.** The percent of people that are free from getting Alzheimer’s Disease with increasing age based on an altered APOE gene. In this, as an individual with an altered APOE gene gets older, the chance that they are free from Alzheimer’s disease gets lower and lower.

## Symptoms

The amount of blockage amyloid is causing in a brain is structured in three different levels: mild, moderate, and severe. With mild being the cases that sometimes go unnoticed and severe being the cases that most of the time require constant care.

### Symptom Level: Mild

Some of the symptoms of a mild case of Alzheimer’s disease are memory loss that disrupts daily life, poor judgment, taking longer to complete daily tasks that are typically easy, or losing and misplacing items. This level of Alzheimer’s is hard to be noticed by other people. The best time to treat and recover from this disease is at this level, but many people don’t take much notice of this, mistaking it for a feeling of tiredness. However, if this is left unchecked and untreated, it can worsen and become moderate to severe.

### Symptom Level: Moderate

During the moderate level, Alzheimer’s is diagnosed. At this level of amyloid invasion of the brain, people near this person must have supervision over them, which increases the level of responsibility and stress that they have because of this. Some of the symptoms of this increased level of Alzheimer’s are increased confusion and memory loss, withdrawal from social activities, inability, and unwillingness to learn new things, difficulty recognizing people’s faces, emotional outbursts, and muscle twitches. Care from families is required now as they can’t perform things for themselves. It is a huge stress for the family or caretakers.

## Symptom Level: Severe

Lastly, we have the most dangerous stage of Alzheimer's disease to have, severe. At this stage, the diagnosed patient is always on bed rest. They cannot care for themselves and can in fact be a harm to themselves and others. The diagnosed is completely reliant on other people to care for them even up to bodily needs and care. This is the symptom level when the brain is shutting down itself and the body. Some of the symptoms of this level of Alzheimer's are inability to communicate, no awareness of surroundings, seizures, complete loss of facial recognition and past memories, general physical decline, weight loss with little to no interest in eating, and many others which only help to bring down the body's health.

## Possible Cause of Death

At this severe stage, it is even possible to die from this disease, and it's called aspiration pneumonia. In this, the body forgets how to swallow and accidentally sends down food into the tube meant for air. This causes food in the lungs, which can eventually lead to death.

## Treatments

After reading all of this, many people might wonder: is there a cure or is there a treatment for this seemingly dangerous disease? With all of these scare-worthy symptoms, a solution to this problem might be hard to come up with. Fortunately, there are treatments designed to lower the impact Alzheimer's has on someone. They can provide relief and slow the spread of amyloid into the brain. Every individual has different needs so based on them and the amount of impact the disease has on them, their treatments can be different.

There are different drugs that someone can take in order, each with different responses based on the individual, such as galantamine, rivastigmine, and donepezil. These are cholinesterase inhibitors that are prescribed to treat Alzheimer's within the mild and moderate symptom stages. Cholinesterase inhibitors reduce and control behavioral and cognitive symptoms. They help with lowering the breakdown of acetylcholine, a chemical in the brain that enhances memory and thinking processes. However, as the disease increases its impact on the brain, these drugs' impact becomes less and less because as amyloid progresses into the brain, it lays waste to the production centers of acetylcholine.

Another treatment is a medicine that targets the underlying causes of Alzheimer's disease. Aducanumab is the only medicine approved in order to treat Alzheimer's disease. This medicine creates antibodies that target amyloid plaques. Creating antibodies, or immunotherapy, for this makes it so that neurologists have to regularly check up on the brain by MRI and PET scans. This immunotherapy is relatively new so scientists are still researching this treatment in order to fully figure out the side effects, such as bleeding and swelling in the brain associated with this new therapy. Sometimes the side effects of these diseases can be dangerous, such as dizziness, weakness, sleepiness, and mood swings.

## The Cure

Sadly, there is no cure for this dangerous disease, yet. In the future, scientists are looking forward to discovering a cure for this dangerous and pressing disease. They are not only looking for a better way to treat symptoms but to look for a way to end this altogether. But to end it altogether is a hard thing to do. As this is a type of dementia, scientists have to find different ways to solve the different ways that dementia can occur. Alzheimer's is only one type of dementia, but there are many more. To treat Alzheimer's disease, scientists need to find a way to stop the impact of amyloid in the brain and stop the buildup of amyloid from where it

starts. That is the only way Alzheimer's will become a terror of the past. It is estimated that this cure will be developed and approved between the years 2025-2030. It is still a long way away and anything can happen between now and then.

## Conclusion

One of the most dangerous diseases in the world is Alzheimer's disease, a type of dementia. Caused by the buildup of amyloid in the brain, it can cause the brain to forget others, the environment, and even themselves. It can cause people to lose their bodily functions and themselves. Treatments are available to lower the impact of this disease, but what is desperately needed is a cure. A cure is coming and is being developed by scientists at this very moment. What we can do as people to help raise awareness for this issue is to educate ourselves about this disease and give donations to different research centers so that a cure can come out as quickly as possible.

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