

## Go purple to raise awareness for Alzheimer's!

### The end of Alzheimer's starts with stem cell therapy

By Vanessa Alvarez

Alzheimer's disease (AD) is a slow-onset progressive brain disorder that causes a decline in memory, cognitive skills, behavior, and social interactions. A way to visualize AD is



Figure 1. Balloon symbolizes memory, skills, and knowledge in AD patients

by imagining you are holding a bunch of balloons by their strings, as pictured in Figure 1. The balloons symbolize your memories, knowledge, and sense of self, while the strings represent the brain's pathway to those aspects of you. Now, envision that you release some of your balloons into the sky or some of those balloons get cut and you are left with the strings. Can you get those balloons back or tie those balloons back

to the strings? The short answer is no. With AD, people can lose their memories and knowledge as quickly as letting go of a balloon. People with AD can lose the ability to connect with long time family and friends or perform simple routines like brushing teeth. Given how devastating this disease is, it is important to diagnose and treat AD early before things get worse.

### How is AD diagnosed?

There are 7 stages of AD (fig. 2). The first stage is defined by changes in the brain that do not cause outward symptoms and are only detectable with a PET scan of the brain. This means

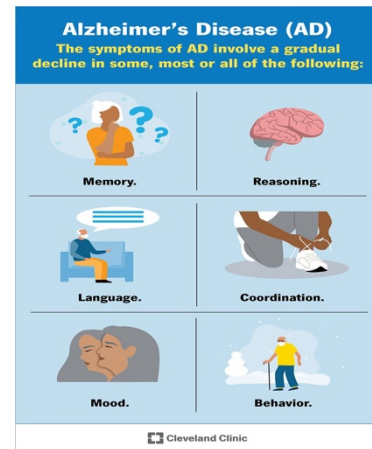


Figure 2. Alzheimer's disease stages

<https://my.clevelandclinic.org/health/diseases/9164-alzheimers-disease>

that before many other AD symptoms become noticeable, the brain is already changing. The second stage of AD is punctuated by mild forgetfulness. By the third stage, the memory loss will have gradually increased to noticeable memory difficulties. Stage four AD patients start to show increased confusion about simple things, for example about what day it is or where they are. Over the span of months or years patients will progress to stage five of AD in which they will have emotional symptoms that may include hallucinations, delusions, or even paranoia. Finally, the last two stages of AD include difficulty communicating and lack of physical control (*Stages of Alzheimer's - Penn Medicine*, n.d.).

### **Do you know anyone with AD?**

In 2023, it is estimated that over 6.5 million Americans are living with Alzheimer's. This is alarming as studies have shown that by 2050 the number of individuals diagnosed with AD will increase to approximately 13 million just in the U.S. That's more than double the current amount of AD patients! Thus, it is imperative that we find a cure for this disease because it is affecting many families of individuals diagnosed with AD.

### **What causes AD?**

Although there isn't one sole cause for all diagnosed individuals, studies have shown that AD can be caused by age-related changes in the brain, genetic risk factors, and/or environmental risk factors.

You might be asking, what makes people suddenly start to have such severe symptoms? What causes our balloons to be released? Evidence suggests that AD brain-related changes could result from abnormal behavior in the interaction between A $\beta$  plaques and tau proteins. If you look at figure 3, you can see what a normal brain looks like compared to the brain of an individual with AD (*Alzheimer's Disease*, n.d.). Scientists are currently working on developing an efficient strategy that will target A $\beta$  and tau proteins to alter their interaction using stem cell

treatment strategy that will target A $\beta$  and tau proteins to alter their interaction using stem cell treatment (Qin et al., 2022). Stem cells are undifferentiated cells that can be modified into other

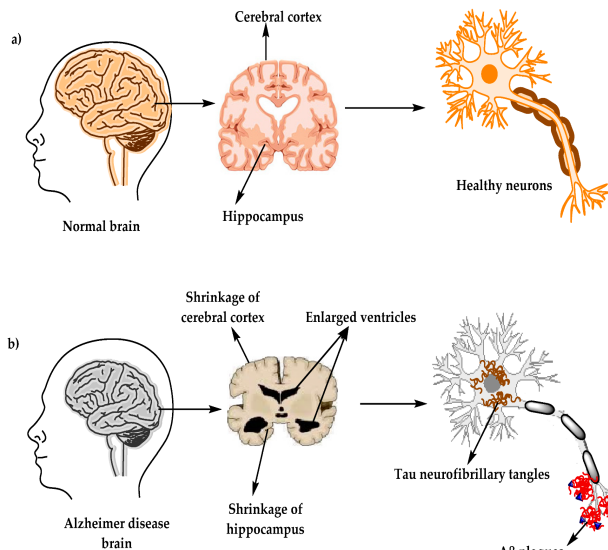


Figure 3. Brain structure comparison between a.) normal brain vs. b.) AD brain. <https://www.mdpi.com/1420-3049/25/24/5789>

cells. Think of stem cells as transformers; they can transform into different types of vehicles or machines.

**So, where are we at in terms of finding a cure for AD?** Researchers have found that by repeatedly injecting mice with the treatment could lead to normalized levels of both A $\beta$  plaques and tau proteins, as well as generate new neurons within the brain (Hadassah Medical Organization, 2022). Given that the

treatments used on the mice functioned properly, the study was approved for clinical trials. As of writing this article, this clinical trial is still in progress. Researchers are continuously studying neurodevelopmental and cognitive changes in the participants in hopes that this research will shed light on the advantages of using stem cell therapy as a form of treatment for individuals diagnosed with Alzheimer's disease.

As once stated by filmmaker Scott Kirshenbaum, "Though those with Alzheimer's might forget us, we as a society must remember them" (*Documentary*, n.d.).

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