

# Herpes Simplex Virus type 1 and Risk of Alzheimer's Disease

Herpes simplex virus type 1 (HSV-1) seems to play a role in Alzheimer's disease. Though scientists do not yet know exactly how HSV-1 is associated with Alzheimer's, it appears that the virus or repeated outbreaks of herpes along with a certain gene play an important role.

## **Basics of Alzheimer's Disease and Herpes**

To start, let's go over some terms you will find in the research that will help you understand what research scientists know.

### **Objective Measure of Mental or Cognitive Decline**

One way to gauge the level of mental decline or cognitive impairment is with the [Mini Mental State Examination \(MMSE\)](#). This consists of 11 areas of questions that help determine the level of cognitive impairment. It, or a variation of it, is widely used during annual physicals of seniors to screen for dementia.

### **Detection of Viral Infections**

Antibodies or immunoglobulins are produced in response to microbial infections of bacteria or a virus. These antibodies bind or attach themselves to a microbe to block it from invading a cell and can call other components of your immune system to inactivate or destroy the microbe.

Antibodies are "keyed" to the microbe they attack. In other words, antibodies work on a specific microbe. There are two antibodies of interest to us that are used to fight HSV-1 infections.

Immunoglobulin M (IgM), which is found mainly in the blood and lymph fluid. It is the first antibody to respond to and fight a new or recurring infection. High IgM levels may indicate a recent outbreak of HSV 1.

Immunoglobulin G (IgG) is most common type of antibody that is used to bind to and fight viruses, bacteria, and fungi. There are four types of IgG antibodies that have half-lives of between 1 week and 3 weeks. High IgG levels may indicate frequent, recurring outbreaks of HSV 1.

### **Genetics Associated with Alzheimer's Disease**

You probably remember from school that humans have 23 pairs of chromosomes. Along these chromosomes are around 24,000 different genes. These genes are made up of from a few hundred DNA base pairs to more than 2 million base pairs.

We are interested in the apolipoprotein E (APOE) gene which is a main determinate of Alzheimer's disease. This gene has three forms or polymorphic alleles:  $\epsilon 2$  (found in 8.4% of the worldwide population),  $\epsilon 3$  (found in 77.9% of the population) and  $\epsilon 4$  (found in 13.7% of the population).

People with the  $\epsilon 4$  allele are at greatest risk of Alzheimer's disease. The  $\epsilon 2$  allele presents the least risk.

## Herpes Simplex Virus 1



Photo by [Dermatologia Online](http://www.ildermatologonline.com) ©

Herpes is a long-term viral infection that cycles between periods of seeming inactivity to periods of outbreaks or symptoms. Most believe that [there is no cure that eliminates the herpes virus from the body](#). Herpes rates vary worldwide from 60% to 96% in adults. Rates are lower among those of higher socioeconomic status.

There are two strains of herpes virus. Herpes simplex virus 1 (HSV-1) is oral herpes and produces small blisters on the face or mouth. Herpes simplex virus 2 (HSV-2) is genital herpes producing its symptoms in the genital area.

People with compromised immune systems are more likely to have outbreaks of herpes as well as cognitive deficits of bipolar disorder (manic-depressive illness), and Alzheimer's disease.

The [Centers for Disease Control and Prevention \(CDC\)](#) estimates that 57.7% of the people between 14 and 49 years of age have HSV-1. Others estimate that about 70% of the US population of all ages is infected with HSV-1.

## Alzheimer's Disease

Alzheimer's disease is a progressive neurodegenerative disease that accounts for 60% to 70% of dementia cases. The disease produces plaques and tangles in the brain. Plaques are clusters of chemically "sticky" protein called amyloid- $\beta$  protein that builds up between nerve cells. This blocks communications at the synapses between nerve cells. Tangles are twisted fibers of a protein called tau. The twisted strands of tau cause damage that prevents nutrients and other essential supplies from reaching the cells and result in cell death.

The [Centers for Disease Control and Prevention \(CDC\)](#) reports that death rates from Alzheimer's rose 55% between 1999 and 2014. Alzheimer's is now the 6th leading cause of death in the United States.

## Herpes Simplex Virus type 1 and Risk of Alzheimer's Disease

One [study](#) examined brain cells from 90 patients. The researchers determined if the patients had the APOE-ε4 Allele, suffered from Alzheimer's, or patients had the HSV-1 virus. The percentages of patients having the APOE-ε4 allele fell in the four groups as follows:

### Patients Testing Positive for APOE-ε4 Allele

	HSV-1 negative	HSV-1 positive
Alzheimer's	10.0%	52.8%
non-Alzheimer's	6.3%	3.6%

As you can tell, the chance of a person having Alzheimer's with both the APOE-ε4 allele and a positive test for HSV-1 is high. But the presence of the APOE-ε4 allele or the HSV-1 virus alone does not significantly increase the risk of Alzheimer's.

The authors conclude that "APOE-epsilon 4 and HSV1 together are damaging in the nervous system."

### Repeated Herpes Outbreaks

Another [study](#) showed an increased risk of Alzheimer's in elderly people with anti-HSV IgM antibodies. Those same subjects showed no greater risk of Alzheimer's with anti-HSV IgG antibodies.

What this means is that these researchers found that simply having herpes was not associated with Alzheimer's. Rather, it's repeated outbreaks (that produce the IgM antibodies) that is causing the progressive cognitive damage.

The authors speculate that the repeated damage to and inflammation of the brain may make it more susceptible to Alzheimer's disease.

### HSV-1 Could Cause Amyloid Plaques in Alzheimer's Patients

Yet another [study](#) looked for HSV-1 DNA in amyloid plaques. They discovered that 90% of the plaques in Alzheimer's patients contained the DNA of the HSV-1. Further, **72% of the total HSV-1 DNA was associated with plaques.**

Contrast this with non-Alzheimer's where only **24% of the viral DNA was associated with plaques.**

The authors indicate that the HSV-1 virus is a major cause of amyloid plaques and a significant causal factor in Alzheimer's disease.

## Conclusions You Can Use

Like most diseases, all the causes of Alzheimer's disease have not be identified. But, there is very strong evidence that the apolipoprotein E (APOE) gene with the  $\epsilon 4$  allele, coupled with HSV-1 (especially repeated outbreaks) are associated with this disease.

This disease is debilitating to the one who has it, and heartbreaking to the family and friends of the patient.



It's more clear now than ever that you should take extreme care to avoid getting the disease. For those that already have HSV-1, Dr. Maria Vasquez was part of a team that discovered how to [eliminate the HSV-1 virus](#) from the body.

Anything you can do to reduce the chances of getting Alzheimer's disease is going to be worth it. After all, nobody wants to slowly fade into a thick fog, forgetting who they are and become totally dependent on others.