

# Alzheimer's Disease: Cannabinoids and CBD Research Overview

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Alzheimer's disease is the most common form of dementia, affecting over 4.5 million Americans. Studies have shown cannabis can limit the progression of the disease.

## ***Overview of Alzheimer's Disease***

Alzheimer's disease is a progressive type of dementia that destroys memory, behavior and thinking. The disease causes brain cells degenerate and die, leading to a steady decline in memory, intellectual and social skills. As brain cells die, the brain shrinks.

Scientists believe Alzheimer's disease is caused by a combination of genetic, lifestyle and environmental factors<sup>1</sup>. Age seems to play a role, as risk increases significantly at and beyond the age of 65. The disease affects nearly half of people over the age of 85<sup>10</sup>.

Hallmarks of the disease include plaques, which are clumps of protein fragments called amyloid-beta, and tangles, which are twisted fibers of the protein tau. Plaques and tangles build up in the brain and interfere with cell communication and nutrient transport, thus contributing to brain cell death.

Alzheimer's typically begins with mild confusion or forgetfulness, but progresses over time at a rate that varies person to person. Memory loss persists and worsens, causing

individuals to repeat statements or questions, forget conversations or appointments, routinely misplace possessions and eventually forget names of family members, friends, and everyday objects. Alzheimer's will also cause a person to lose their sense of day, have difficulty finding the right words, have problems concentrating and thinking, and to experience depression, anxiety, social withdrawal, mood swings and irritability.

There is no cure for Alzheimer's disease and medications and other management strategies may only temporarily improve symptoms.

### ***Findings: Effects of Cannabinoids and CBD on Alzheimer's Disease***

Studies have determined that two of the major cannabinoids found in cannabis, tetrahydrocannabinol (THC) and cannabidiol (CBD), reduce the buildup of plaques and tangles, and therefore show viable potential as treatment options for Alzheimer's disease.

THC has been shown to be effective at lowering amyloid-beta levels and enhancing mitochondrial function, therefore causing the researchers to conclude "that THC could be a potential therapeutic treatment option for Alzheimer's through multiple functions and pathways"<sup>3,5</sup>. An earlier study also found THC to be effective at preventing amyloid beta aggregation, indicating it could impact the progression of the disease<sup>6</sup>.

The brains of Alzheimer's patients experience an over-activation of microglia (cells that form myelin), which contributes to excessive tau buildup and eventually tangles. However, CBD has been shown to modulate microglial function and control neuroinflammation<sup>9</sup>. In addition, CBD has been shown to improve the survival rate of cells through a combination of neuroprotective, anti-oxidative, anti-inflammatory and anti-apoptotic effects against the toxicity caused by beta-amyloid, therefore showing potential as a therapeutic option for Alzheimer's<sup>7</sup>. One study that found CBD's neuroprotective effects and its ability to promote the regeneration of brain cells was effective for reversing the cognitive deficits caused by Alzheimer's<sup>4</sup>.

A lack of glucose uptake has been linked to a worsening of brain diseases like Alzheimer's disease, and findings in a 2016 animal trial suggest that cannabis could promote an increased glucose uptake in the brain, suggesting that cannabis could be beneficial for treating Alzheimer's disease through multiple methods<sup>8</sup>.

Cannabinoids provide a multi-faceted approach in the treatment of Alzheimer's. In addition to reducing amyloid-beta levels, modulating microglial function and increasing glucose uptake, they protect brain cells from the deleterious effects of amyloid-beta, reduce inflammation, and support the brain's repair process by enhancing neurogenesis (birth of new cells)<sup>2</sup>.

### ***States That Have Approved Medical Cannabis for Alzheimer's Disease***

Currently, 11 states have approved medical cannabis specifically for the treatment of Alzheimer's disease. These states include Arizona, Arkansas, Delaware, Illinois, Maine, Michigan, New Hampshire, North Dakota, Ohio, Oregon and Rhode Island.

In Washington D.C., any condition can be approved for medical cannabis as long as a DC-licensed physician recommends the treatment.

Five other states will consider allowing medical cannabis to be used for the treatment of Alzheimer's disease with the recommendation from a physician. These states include: **California** (any debilitating illness where the medical use of cannabis has been recommended by a physician), **Connecticut** (other medical conditions may be approved by the Department of Consumer Protection), **Massachusetts** (other conditions as determined in writing by a qualifying patient's physician), **Nevada** (other conditions subject to approval), and **Washington** (any "terminal or debilitating condition").

## ***Recent Studies on Cannabinoids and CBD's Effect on Alzheimer's Disease***

**THC found to reduce amyloid-beta levels and enhance mitochondria function, thus demonstrating potential as an Alzheimer's disease treatment option.**

*The potential therapeutic effects of THC on Alzheimer's disease.*

(<http://www.ncbi.nlm.nih.gov/pubmed/25024327>)

**THC prevented amyloid-beta aggregation, the key pathological marker of Alzheimer's disease.**

*A molecular link between the active component of Cannabis and Alzheimer's disease pathology.*

(<http://www.ncbi.nlm.nih.gov/pubmed/17140265>)

**CBD provided neuroprotective, anti-oxidant and anti-inflammatory effects and promoted the regeneration of brain cells in mice with Alzheimer's disease.**

*Chronic cannabidiol treatment improves social and object recognition in double transgenic APP<sup>swe</sup>/PS1 $\Delta$ E9 mice.*

(<http://link.springer.com/article/10.1007%2Fs00213-014-3478-5>)

**Cannabinoids stimulate the removal of beta amyloid, block the inflammatory response, and provide neuroprotective effects.**

*Amyloid proteotoxicity initiates an inflammatory response blocked by cannabinoids.*

(<http://www.nature.com/articles/npjamd201612->)