Alzheimer's Disease is a build of problematic plaques in the brain. These plaques are caused by the mutation of the amyloid precursor protein (APP). It is expressed in a wide range of different cell types including neurons. It can be proteolytically processed by beta and gamma-secretases. It has a copper binding domain and a central role in the development of Alzheimer's Disease. Amyloid precursor protein is cleaved by helper proteins which leads to the release of the Aβ peptide. If there is a single amino acid mutation in the Aβ peptide the material tangles, accumulates and creates plaques in the brain of Alzheimer's patients. APP is produced in large quantities and is metabolized quickly. APP is sorted in the endoplasmic reticulum and the Golgi, after sorting the protein is then shipped to the axons.

**Mutation and Disease**

- B-amylloid (Aβ) is a peptide that is created from APP proteolysis.
- Aβ gives neurons the ability to adapt and change.
- Mutations are known to result in two neurodegenerative diseases:
  - **Alzheimer's Disease**
    - Mutation occurs in APP at protein position 717 where Valine is replaced with Isoleucine, and is written Val717Ile.
  - **Cerebral Amyloid Angiopathy**
    - Mutation occurs at protein position 694 (Asn694Asp). Like Alzheimer’s, people afflicted with this disease suffer from dementia. Additionally, they are susceptible to stroke and brain bleeds.

**Pathological Consequences**

- Mutation of APP leads to an increase in Aβ production resulting in neuronal damage.
- Mutations cause longer, stickier forms of the peptide.
- Accumulations of the Aβ peptide are referred to amyloid plaques.
- The aggregation of plaques leads to neuronal death through apoptosis.
- Aggregation of plaques also result in loss of synaptic terminals, synaptic dysfunction and inflammation.
- In addition to the accumulation of amyloid plaques, aggregates of neurofibrillary tangles are also markers of Alzheimer's disease.

**Therapies**

- There is no cure for Alzheimer’s yet; there is only treatment.
- Targeting Aβ production, Aβ aggregation or its clearance from the brain has been an active area of research for preventing or curing AD.
- Research has developed two new techniques to measure the size and rate of development of the clusters of beta-amyloid in the very early stages.
- Substances were tested to see if they could slow down or prevent the development of plaques.
- Nicotine was observed to slow plaque formation.
- Galantamine, which is the chemical name for the cholinesterase inhibitor currently marketed as Reminyl.
- Reminyl used to block beta-amyloid from sticking together.

**References**

[Alzheimer's Disease](http://www.alz.org)
[SA 3.0](http://creativecommons.org/licenses/by/3.0/)
[Clarimón](http://www.rsc.org/Publishing/Journals/cb/Volume/2009/9/Alzheimers_facts.asp)
[O'Brien](http://www.mdpi.com/2072-6680/4/2/686)
[Barrett](http://www.mdpi.com/2072-6680/2/6/567)
[Chakrabarti](http://www.mdpi.com/2072-6680/2/6/567)
[O'Brien](http://www.mdpi.com/2072-6680/3/1/22)
[Therapies](http://www.ncbi.nlm.nih.gov/pubmed/?term=Function%20and%20toxicity%20of%20amyloid%20beta%20and%20recent%20therapeutic%20interventions%20targeting%20amyloid%20beta%20in%20Alzheimer%27s%20disease)