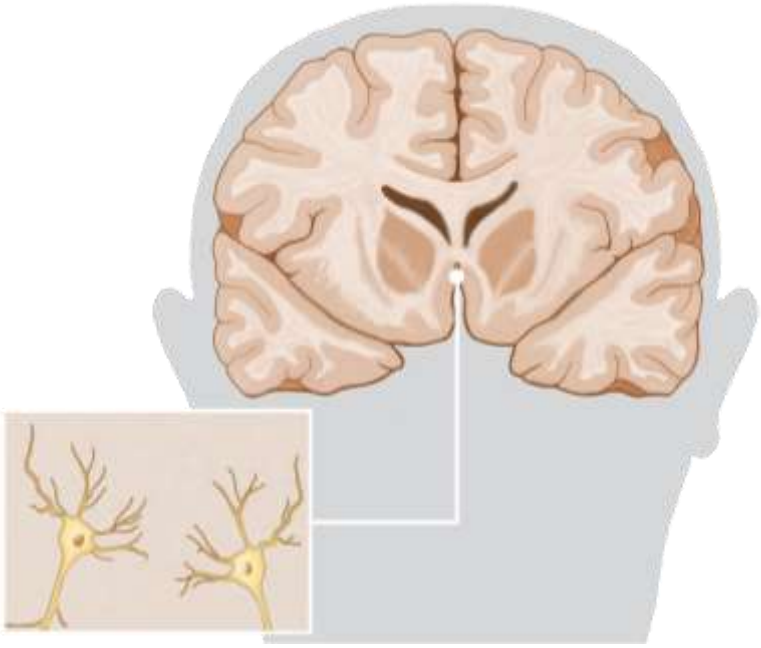
FACTSHEET:

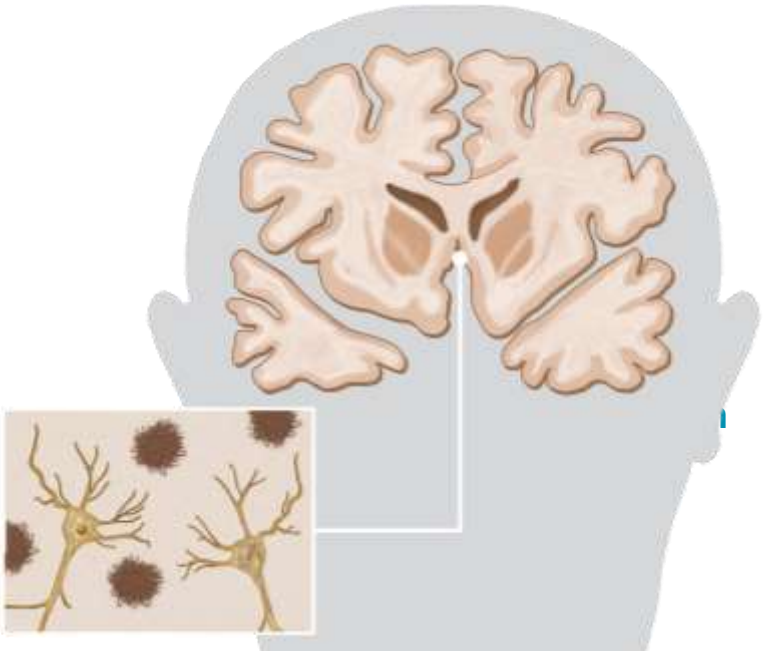
UNDERSTANDING THE SCIENCE BEHIND ALZHEIMER'S DISEASE

The Brain & Alzheimer's Disease

A healthy human brain contains tens of billions of specialized nerve cells, called neurons, that process and transmit information. Neurons are critical for healthy brain function, as they are responsible for sending messages between different parts of the brain, and to muscles and organs.[1]



In Alzheimer's disease, neurons die causing the brain to shrink in a process called neurodegeneration.[1-3] Emerging evidence suggests the **accumulation of amyloid beta (Aβ)** protein into plaques outside neurons **and tau proteins** into tangles inside the brain may cause **neurodegeneration** by disrupting cell function.[1,3]



Cross section of brain with Alzheimer's

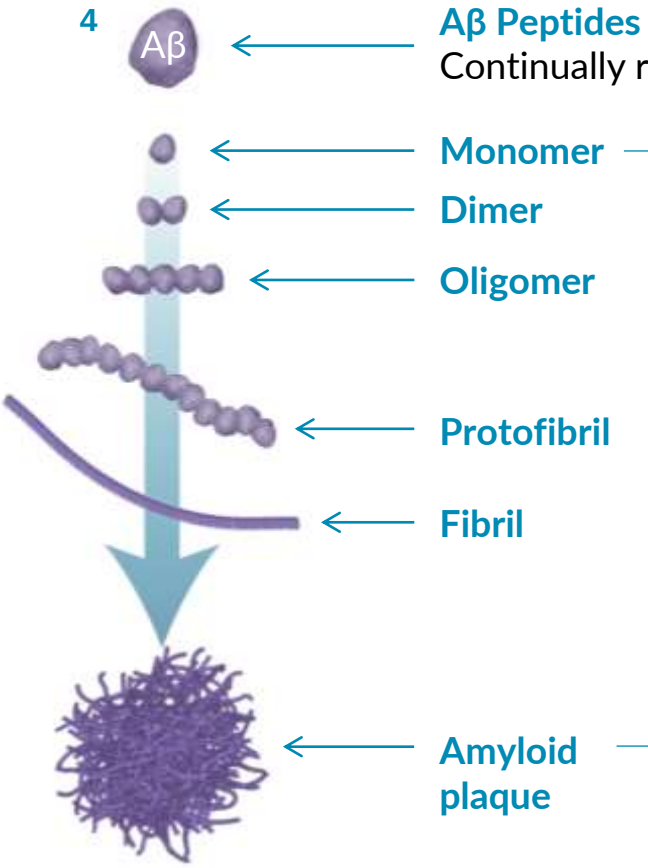
FACTSHEET:

UNDERSTANDING THE SCIENCE BEHIND ALZHEIMER'S DISEASE

Amyloid Aggregation Progression[4]

Aβ comes from a larger protein found in the fatty membrane surrounding nerve cells.[3]

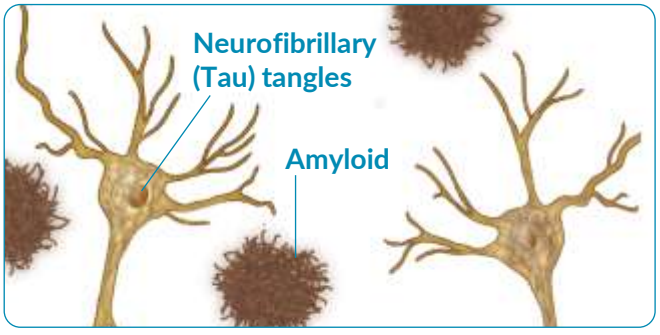
It can form into small formations known as protofibrils and eventually into plaques. Evidence suggests that protofibrils are the most toxic Aβ species [4].



As it accumulates, Aβ can aggregate and separate into larger and smaller species, including oligomers and protofibrils, as well as plaque, that contribute to neurodegeneration.[1]

Tau Tangle Formation

Abnormal chemical changes cause a protein called tau to destabilize and join together to form tangles inside neurons, blocking the neuron's communication systems.[1]



FACTSHEET:

UNDERSTANDING THE SCIENCE BEHIND ALZHEIMER'S DISEASE

Visual Representation of Alzheimer's Progression

Changes in the brain related to AD may begin to develop decades before any outward symptoms appears. As amyloid plaques build up throughout the brain, neurodegeneration and subsequent functional and cognitive impairment increases.[3,5]

Early Alzheimer's

Changes may begin 20 years or more before diagnosis[3,6]

Mild to Moderate Alzheimer's

Generally lasts 2-10 years[3]

Severe Alzheimer's

May last from 1-5 years[3]

Conclusion

Although many factors contribute to the development of AD, **Aβ** has shown to be an **early pathophysiological alteration** in the AD continuum. There is scientific rationale that supports exploring the **Aβ pathway to understand the progression of AD**.[7]

References

1. U.S. Department of Health and Human Services. What happens to the brain in alzheimer's disease? National Institute on Aging. Available at: https://www.nia.nih.gov/health/what-happens-brain-alzheimers-disease. (Accessed July 2023) **2.** Przedborski S, Vila M, Jackson-Lewis V. Neurodegeneration: what is it and where are we? J Clin Invest. 2003 Jan;111(1):3-10. **3.** Alzheimer's Association. Brain Tour Part 2 - Alzheimer's Effect. Available at: https://www.alz.org/alzheimers-dementia/what-is-alzheimers/brain_tour_part_2 (Accessed July 2023) **4.** Broersen, K et al. The culprit behind amyloid beta peptide related neurotoxicity in Alzheimer's disease: oligomer size or conformation?. Alz Res Therapy. 2010. 2(12). https://doi.org/10.1186/alzrt36 **5.** Subramanian J et al. Synaptic Loss in Alzheimer's Disease: Mechanistic Insights Provided by Two-Photon in vivo Imaging of Transgenic Mouse Models. Front Cell Neuroscience. 2020. 17;14:592607. **6.** Villemagne VL, et al. Australian Imaging Biomarkers and Lifestyle (AIBL) Research Group. Amyloid β deposition, neurodegeneration, and cognitive decline in sporadic Alzheimer's disease: a prospective cohort study. Lancet Neurology. 2013 12(4):357-67 **7.** Hampel H, et al. The amyloid-β pathway in Alzheimer's disease. Molecular Psychiatry. 2021. 26(10):5481-5503

hhc human health care