

Review of new therapy outlooks and challenges in Alzheimer's

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Purpose

- To understand of biological mechanism during formation of Alzheimer's Disease.
- Search the possible biomarkers that can be involved in major pathology.
- Identify the research based ideology to utilize for further investigation guiding treatment modalities for Alzheimer's Disease.

Background

- Alzheimer can be more debilitating health issue with high medical expenditures resulting from the need for long-term management.
- The importance of nutrition in preventing or delaying cognitive disorders in the elderly populations has received great attention.
- On long term, nutrition maintenance can be a potential intervention among the elderly population to delay the development of Alzheimer's.
- Estimates vary, but experts suggest that more than 5.5 million Americans, most of them age 65 or older, may have dementia caused by Alzheimer's(WHO, n.d).
- Alzheimer's disease is currently ranked as the 6th leading cause of death in the United States, but recent estimates indicate that the disorder may rank 3rd, just behind heart disease and cancer, as a cause of death for older people(NIA.NIH.Gov, n.d).

Diagnostic Criteria

What is a biomarker?

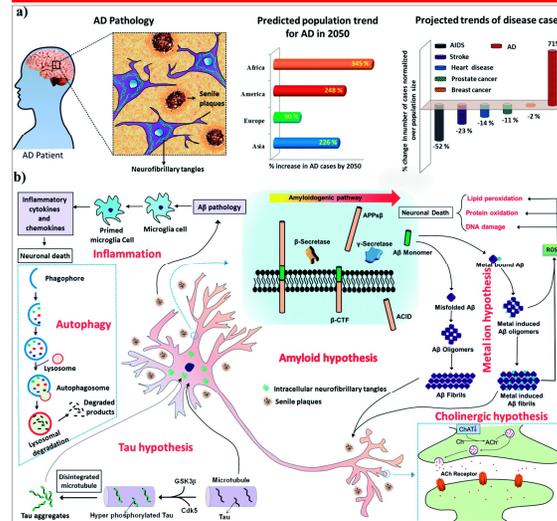


- Biomarkers, such as those sought for Alzheimer's disease, are benchmarks in the body that can be reliably measured to indicate the presence or absence of a disease, or the likelihood of later developing a disease(strimbu k, 2010).



- The strongest biomarker candidates for Alzheimer's disease include brain imaging studies using magnetic resonance imaging (MRI) or positron emission tomography (PET), and proteins in cerebrospinal fluid (CSF)(Earlier diagnosis, n.d).

Mechanism of action



Reference: Rajasekhar, K., & Govindaraju, T. (2018). Current progress, challenges and future prospects of diagnostic and therapeutic interventions in Alzheimer's disease. *RSC advances*, 8(42), 23780-23804.

Findings

- In AD, Biomarkers have included amyloid β_{1-42} , total tau (t-tau), and phospho-tau (p-tau)(WHO icd 10, 1992). In AD, the concentration of A β_{42} in cerebrospinal fluid is low and that of t-tau is high compared with those in healthy controls (Motter R, 1995).
- Combinations of abnormal markers (low A β_{42} , high t-tau, high p-tau 181) reached a hazard ratio of 17 to 20 for predicting AD in a follow-up of 4-6 years.47 Sensitivities and specificities in this study were >90% and >85%, respectively.(Hansson, 2006).
- The major goal for the AD drug discovery is to slow or stop the cascade of neurodegenerative change characterizing the disease.
- Information of nutrition towards the biomarker was collected from previously conducted studies to find the burden of various nutrients on biomarkers of Alzheimer's.
- Higher content intake of Omega 3 PUFA has reduced amount of Amyloid beta 40($\beta = -24.7, p < 0.001$)(Gu et al, 2012).
- High intake of vitamin B12 and folate associated to glucose metabolism with beta coefficient of 0.35($P = 0.001$) and vitamin B12 shows negative association with PiB(biomarker related to Amyloid beta) with beta coefficient -0.32($p = 0.006$).
- These associations with high intake of proper nutrients are related to better cognitive functioning and lower Alzheimer's disease risk in the elderly(L. Mosconi et al 2014).
- There has been a lot of research into the usefulness of AD-specific biomarkers that are reflective of the central pathogenic processes of amyloid β aggregation and hyperphosphorylation of tau protein.

Summary and future studies

- Treatment of Alzheimer's disease has been palliative with medications of dementia that help in mood swings, increase blood pressure and improve mental function.
- Nutritional effect on preventing the growth of biomarkers may be a substantial reason to delay the formation of amyloid plaques.
- Further studies are needed on human trials to reach a potential treatment formulation. But a success can bring in delaying the formation of Alzheimer's disease which can increase the quality years of life of millions of the geriatrics.

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