Chapter 3
Biomarkers for Alzheimer's Disease: Early Diagnosis

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ABSTRACT

Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and memory impairment. As the most common form of dementia, AD affects millions of individuals worldwide and poses significant challenges for diagnosis and management. Early and accurate detection of AD is critical for effective intervention and management, which has led to increasing interest in identifying and utilizing biomarkers. Biomarkers for AD include neuroimaging findings, cerebrospinal fluid (CSF) proteins, and blood-based markers. Neuroimaging techniques such as magnetic resonance imaging (MRI) and positron emission tomography (PET) are

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instrumental in visualizing structural and functional changes in the brain associated with AD. CSF biomarkers, including amyloid-beta (Aβ) plaques and tau proteins, provide valuable insights into the pathological processes underlying the disease. Recent advancements in blood-based biomarkers offer promising non-invasive alternatives for early detection.

INTRODUCTION

Brain disease (AD) is a condition that affects the brain and usually presents as memory loss. However, it can also lead to (problems, delays, etc.) in (communicating a lot of thought or emotion) speech, visuospatial processing, and mental flexible athletic ability. The disease is seen as the presence of (outside of a cell) plaques containing Aβ and (within a cell) neurofibrillary tangles containing tau. While most cases of Brain disease are not most in control/most commonly received, there is a complex relationship with (the study of tiny chemical assembly instructions inside of living things) for many people with the disease.

The severity of cognitive impairment in Alzheimer's ailment sufferers varies. The first signs could be a subjective decline in mental abilities in the absence of poor performance on objective cognitive tests (Jessen F et al, 2014). Mild cognitive impairment (MCI) is the first symptomatic stage of cognitive impairment in which a single or possibly multiple cognitive domains are mildly impaired while functional capacities remain relatively intact (Petersen RC, 2004). Dementia is defined by a loss of cognitive function to the point where it interferes with independence and daily activities. The classic clinical presentation of Alzheimer's disease is a progressive decline in cognitive function, with significant amnesia symptoms and manifestations (McKhann GM et al. 2011).

Initially, AD was concept to be a clinicopathological entity, which meant that if a patient confirmed scientific symptoms of amnestic dementia and different possible reasons were ruled out, ad pathology became assumed to be the purpose (Petersen RC, 2018). But, advancements in scientific information and the identity of ad biomarkers consisting of cerebrospinal fluid (CSF) and pet markers for Aβ and tau have reshaped the idea of advert as a neurobiological situation impacting various cognitive functions. There's a better knowledge of the connection between Alzheimer's ailment and other reasons of cognitive decline. while this Primer does not move into multi-aetiology dementia (the favored term over'blended dementia'), it is important to note that ad pathology not often takes place in isolation in human beings over the age of 65.