Clinical Neuropsychology: Open Access

Mini Review Open Access

Usage of Neuroimaging Biomarkers Alzheimer's Disease for Assessment

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Mini Review

Alzheimer`s disorder (AD) is one of the major reason of dementia amongst human beings nearly 60 years and older [1]. The main medical characteristic of AD is growing impairment accompanied via various ways of impairment of different cognitive domains, a function pathological cortical and hippocampal atrophy, histological characteristic of senile plaques of amyloid deposits and neurofibrillary tangles which includes intraneuronal tau fibrillary tangles [2]. The occurrence of AD is predicted to rise dramatically because of the population around the world which continues to age. Better knowledge of this disorder is required; therefore it is essential, and necessary to maintain early analysis mixed with a complete control method initiated early along the direction of the cognitive decline will be the simplest approach of controlling the development of AD [3].

Currently one of the foremost pushbacks toward accomplishing that is the issue in early and definitive analysis of AD [. Over the decade there was an exquisite quantity of studies output regarding the discipline of biomarkers of AD. In this opinion we have reviewed the structural MRI research which includes PET and SPECT which are being broadly researched along with the analysis of AD [4, 5]. Structural and purposeful imaging can be beneficial for the early analysis of AD [6, 7]. With growing studies in disorder editing remedy in AD and popularity of moderate cognitive impairment (MCI) as a totally incipient level of AD, early analysis of AD will help in early initiation of disorder editing remedy. These will be resourceful in enhancing the fine of existence of people with AD.

Biomarkers have diagnostic and prognostic value in the early detection of AD [8]. Research on a wide range of biomarkers related to AD is developing. Among these, neuroimaging has the potential to predict the transition from MCI to AD [9]. Various brain imaging modalities are commonly used to study the neuropathological processes and morphological and functional changes that occur in AD [10, 11]. Neuroimaging is not only useful for early detection, but also for distinguishing AD from other neurodegenerative diseases [12]. Studies have shown that imaging can be used to predict the conversion of MCI to AD. Neuroimaging techniques can be primarily classified structurally and functionally. The most important structural imaging methods are Computed tomography (CT) and magnetic resonance imaging (MRI) [5]. CT imaging technology provides high resolution and has the ability to distinguish between the two structures separately. However, due to its high spatial resolution, MRI imaging techniques can be used to distinguish between two tissues that are arbitrarily similar but not identical. Other techniques such as positron emission tomography (PET), single photon emission computer tomography (SPECT), and functional MRI (fMRI) are examples of functional neuroimaging techniques. Functional imaging provides some structural information, but their spatial resolution is lower than that of structural imaging techniques.

Imaging Techniques used in diagnosis

Computed tomography (CT)

CT is not used as a standard technique for early diagnosis of AD but is used to rule out potentially surgically treatable causes of dementia such as tumors and sub-dural hemorrhage. In AD, the CT scan analysis may help in identifying the diffuse cerebral atrophy with enlargement of the cortical sulci and increased size of ventricles. Which are some late changes in AD. Some studies have suggested that, medial temporal lobe atrophy could predict the earlier detection of AD [13, 14, 15]. The main advantage of this imaging technique is that, it may help in the differential diagnosis of dementia, such as ruling out a paramedian tumor or a normal pressure hydrocephalus. In developing resource constrained nations, it is also less expensive, faster and more widely available than MRI [16]. Other than the afore mentioned, CT does not have any role in the early diagnosis of AD.

Structural magnetic resonance imaging

MRI is one of the non-invasive imaging techniques for the structural analysis of AD brains [17]. Frisoni and colleagues demonstrated convincingly the phenomenon of medial temporal lobe atrophy as an early marker in AD [18]. The decline from normal to MCI and to AD has been investigated mainly using MRI studies [19]. Most of the MRI studies demonstrated that atrophy of the medial temporal lobe structures (hippocampus, and entorhinal cortex) is common in AD. Structural MRI analysis has demonstrated that medial temporal atrophy is associated with increased risk of developing AD and can predict future memory decline in healthy adults. Current research focuses on some of the volumetric analysis techniques for the early detection of AD [20]. Earliest technique was the visual impression which evolved to manual volumetry and later into automated volumetry. Volumetric analysis of MRI can detect significant changes in the size of brain regions. Regional atrophy measurement during the progress of AD is a potentially promising diagnostics indicator.

Conclusion

The development of neuroimaging technique for AD has the ability to detect clinical or pathological change overtime. Neuroimaging techniques have important role in research and clinical practice. Advances in structural and functional neuroimaging techniques allow detection of AD, years before the symptoms of dementia develop. A recent major advance is the development of amyloid imaging techniques that allows in vivo identification of amyloid deposition in the brain. Longitudinal structural and functional imaging studies seem currently most robust to evaluate progressive impairment in MCI and AD. However, from the perspective of developing countries of the

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many technologies available, CT head scan and structural MRI imaging are the most useful, widely available and affordable imaging modalities.

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Conflict of Interest

None

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