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Editorial

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Alzheimer's disease: Issues worthy of attention

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Alzheimer's disease (AD), characterized by progressive decline of memory and other cognitive domains, is the most common form of neurodegenerative disorders leading to dementia. AD has been considered as one of the great health-care challenges in the 21st century, with worldwide estimates of 30 million people with dementia. Currently, given lack of effective treatment at the stage of dementia, many studies have been focusing on the investigations of brain abnormalities in the stages of mild cognitive impairment (MCI) and preclinical AD, which are of great importance for delineating AD-related disease progression and developing biomarkers for early diagnosis and intervention.

Although the pathological mechanisms responsible for the onset of AD and how they lead to the rapid decline of cognitive function remain unclear, it is possible that amyloid β (Aβ) may be the initial accelerator. Aβ is the critically pathological biomarker of AD, and researchers have found that Aβ accelerates tau-related neurodegeneration and then accelerates other neurodegenerative biomarker abnormalities, including neural dysfunction and structural atrophy, which have a more direct correlation with cognitive impairment than Aβ. Nowadays, neurotransmitter regulation is used to relieve AD-related symptoms, but it is still difficult to reverse the disease progression. Therefore, researches involved in drugs targeting Aβ in the treatment of AD have been widely developed in order to intervene the process of AD. Recently, however, most of such clinical trials failed.

Currently, the advance of multiple techniques, such as structural magnetic resonance imaging (sMRI), resting-state functional MRI (rs-fMRI), diffusion tensor imaging (DTI), positron emission tomography (PET), provide a promising prospect that allows to non-invasively investigating characteristics of brain structure and spontaneous functional activities in AD. For example, DTI is sensitive to white matter ultrastructural damage and previous studies have confirmed the reducing fractional anisotropy (FA) and increased mean diffusivity (MD) in several fiber bundles, such as the cingulum bundles, the parahippocampal cingulum and long-distance association fascicles for patients with AD and aMCI. Additionally, numerous studies have demonstrated disrupted functional connectivity within default mode network (DMN) in AD. However, due to the complex pathologically mechanisms and the probably widespread disruption of structural or functional connectivity, investigations from the perspective of whole-brain structural or functional connectome are of great values.

Besides imaging and traditionally cerebrospinal fluid (CSF) biomarkers, researchers are increasingly focusing on the biomarkers in blood and urine due to their comparatively non-invasive, simple and economic characteristics, such as protein phosphatase-2A, leptin, homocysteine, Alzheimer-associated neuronal thread protein (AD7c-NTP), etc. Although above-mentioned new fluid biomarkers have lots of advantages, there are few biomarkers with higher sensitivity and specificity in diagnosing AD, especially in the early stage of the disease. Thus, in the future study, linking multiple biomarkers, including imaging and fluid biomarkers, may be an effective approach for screening prodromal AD.

Of the many non-communicable diseases, dementia is predicted to have the greatest economic and social effect. Improving care and help for patients with AD should always remain a priority and we should try our best to provide a better future for them.

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