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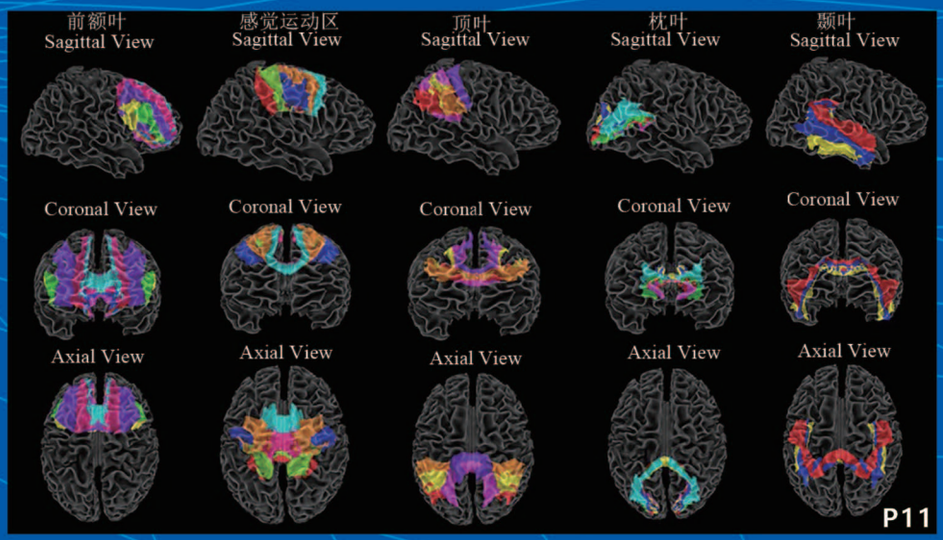

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目　次

病例报告

综　述

封面文章

阿尔茨海默病(Alzheimer's disease, AD)是一种中枢神经系统原发性、进行性发展的退行性疾病，目前已上升为常见死亡原因的第4位。由于目前对于AD 的治疗仍缺乏有效的方法，越来越多的研究更加关注其前驱阶段——轻度认知障碍(mild cognitive impairment, MCI)。但对于AD和MCI的脑结构异常的差异及其与临床表现的关系仍不明确。

胼胝体是脑内最大的、连接两个半球的神经纤维束，它是脑半球间信息交流和协调的结构基础。已有磁共振弥散张量成像研究显示AD和MCI胼胝体纤维束的具体受累部位和严重程度尚存很大争议，这可能与所采用的胼胝体区段划分方法不够精细有关。最近的研究提出高分辨经胼胝体纤维束模板(trancallosal tract template, TCATT)，依据胼胝体纤维束连接半球间不同的同位脑区，将其划分为32条。TCATT模板克服了难以将胼胝体纤维束与所连接的脑区进行准确对应的不足，为进一步明确AD和MCI经胼胝体神经纤维束受损位置提供了有效工具。

本研究采用TCATT模板对比分析了AD组、MCI组和健康对照组的胼胝体纤维束精细微结构，计算弥散张量成像的水弥散指标——分数各向异性(fractional anisotropy, FA)和平均弥散率(mean diffusivity, MD)。组间比较采用单因素方差分析ANOVA，然后进行事后比较(LSD-t)，最后利用Pearson相关性分析分别计算AD组和MCI组的差异脑区的经胼胝体神经纤维束的水弥散指标值与蒙特利尔认知评估基本量表(Montreal Cognitive Basic Assessment, MoCA_B)评分和日常生活活动能力(Activities of Daily Living, ADL)评分的相关性。研究结果显示，AD组比MCI组的胼胝体结构损伤更严重且区域更为广泛；AD组的半球间微结构损伤(FA值降低和MD值升高)与日常生活活动能力(ADL评分)下降显著相关，表明大脑半球间多个同位脑区的经胼胝体纤维束结构完整性损伤或许可作为评估AD患者日常生活活动能力减退程度的重要参考指标。详见内文第9页。

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Contents

About the cover

Alzheimer's disease (AD) is a primary, progressive degenerative disease of the central nervous system, and has been currently considered the fourth-leading cause of death. As lacking of effective treatments for AD, a growing body of studies have focused on the precursor stage of AD—mild cognitive impairment (MCI). However, the differences of brain structural abnormalities between AD and MCI and their relationship with clinical manifestations are still largely unclear.

The corpus callosum, which is the largest nerve fiber bundle in human brain, connects the two cerebral hemispheres. It is the structural basis of information exchange and coordination between the two hemispheres. The specific regions and severity of the corpus callosum damage in AD and MCI remain controversial, which may be attributed to the insufficient segmentation of the corpus callosum in previous diffusion tensor imaging studies. A recent study created a high-resolution trancallosal tract template (TCATT), which identified 32 trancallosal tracts connecting the interhemispheric homologous brain areas. The TCATT template overcomes the difficulty of accurately mapping the corpus callosum fiber bundles to the connected brain regions, providing an effective tool for precisely identifying the damaged locations of the corpus callosum in AD and MCI.

This study used TCATT template to analyze and compare the fine microstructure of the 32 trancallosal tracts in AD, MCI and healthy control groups. The commonly used diffusive metrics, i.e. fractional anisotropy (FA) and mean diffusivity (MD) were calculated based on diffusion tensor imaging. One-way analysis of variance (ANOVA) was used for comparison between groups, followed by post hoc comparison (LSD-*t*). Finally, in the AD and MCI groups, Pearson correlation analysis was performed between the diffusive metrics (FA and MD) of trancallosal tracts with Montreal Cognitive Basic Assessment (MoCA_B) scores and Activities of Daily Living (ADL) scores. The results showed that structural damage of the corpus callosum was more severe and extensive in AD group than that in MCI group. In AD group, interhemispherical microstructure damage (decreased FA values and increased MD values of trancallosal tracts) was significantly associated with the ADL scores, suggesting that the severity of the trancallosal tracts damage may be used as an important reference index to assess the ability of living activities in AD. Please see text page 9.