Effects Of Perfusion And Amyloid Deposition On Cholinergic Pathways In Patients With Alzheimer's Disease

Tianjin Medical University
Tianjin Medical University General Hospital

Qingzheng Lu1, Yu Wang1, Yidi Wang1,2, Fang Liu 1,3, Li Cai4, Ying Wang4, Caixia Wang1,5, Xiao Su1.6, Xiaoyi Zhang1, Zhiyan Piao1, Jincao Wang1, Yuting Lu7, Wen Qin8, Nan Zhang1.

1Department of Neurology, Tianjin Neurological Institute, Tianjin medial university general hospital, Tianjin, China, 2Clinical College of Neurology, Neurosurgery and Neurorehabilitation, Tianjin Medical University, Tianjin, China, 3Department of Neurology, Yulin First Hospital, Yulin City, Shanxi, China, 4PET/CT Center, Tianjin medial university general hospital, Tianjin, China, 5Department of Neurology, Baotou Central Hospital, Baotou, China, 6Inner Mongolia Medical University Affiliated Hospital, Hohho, China, 7Tianjin medial university, Tianjin, China, 8Department of Radiology and Tianjin Key- Laboratory of Functional Imaging, Tianjin medial university general hospital, Tianjin, China.

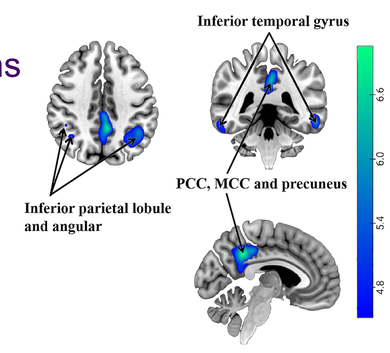
KEYWORDS: Alzheimer's disease, cholinergic pathways, mild cognitive impairment, cerebral blood flow, white matter hyperintensity, amyloid PET

INTRODUCTION

Cholinergic dysfunction is involved in the pathological process of Alzheimer's disease (AD); however, its interaction with other pathophysiological processes remains unclear.

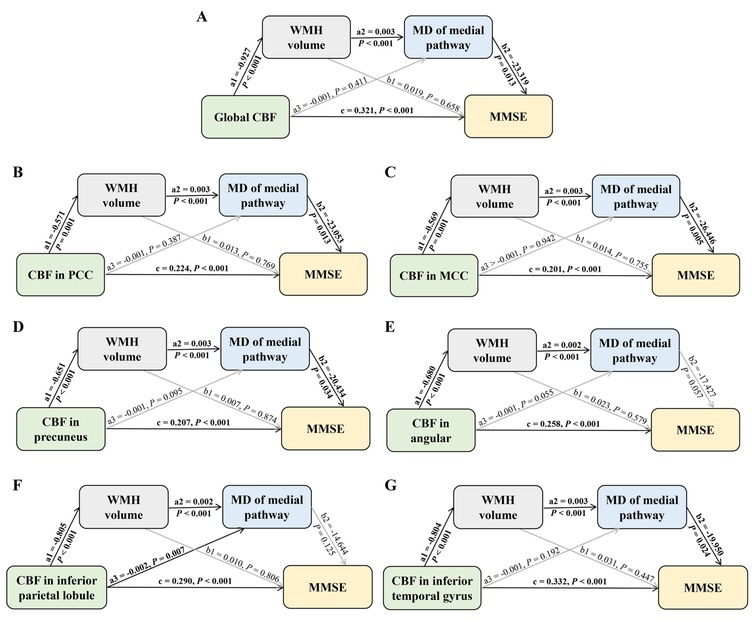
METHODS

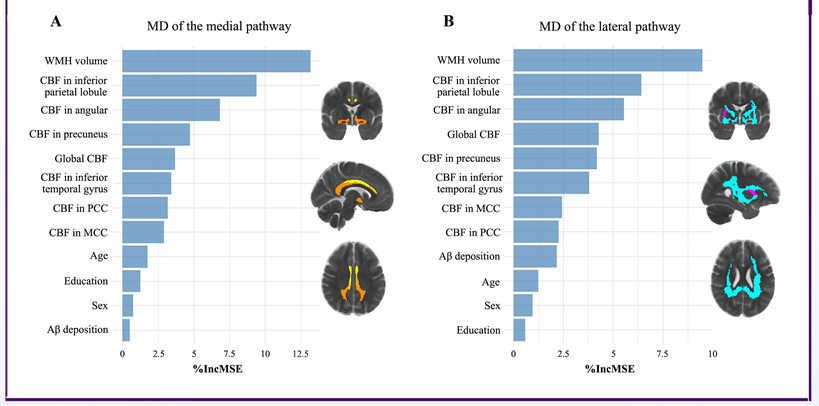
Eighty symptomatic AD patients and thirty cognitively unimpaired controls were recruited. The nucleus basalis of Meynert volume, mean diffusivity (MD) of cholinergic pathways, cerebral blood flow (CBF), and white matter hyperintensity (WMH) volume were obtained from multimodal MRI data. Amyloid-beta (Aβ) deposition was `calculated from PET images. Sequential mediation analyses were employed to investigation the sequential associations among CBF, WMH volume, cholinergic pathway integrity, and cognitive function.



RESULTS

WMH volume and regional CBF, particularly in the inferior parietal lobule, were important contributors to the integrity of both the medial and lateral cholinergic pathways. Global CBF and CBF in the middle cingulate cortex had indirect effects on cognitive function, which were mediated sequentially by WMH volume and the MD of the medial pathway.





CONCLUSIONS

These findings suggest that cerebrovascular pathological change rather than Aβ deposition significantly affects cholinergic pathways in AD patients. WMH volume and medial cholinergic pathway integrity play mediating roles in the association between cerebral perfusion and cognitive function.

ACKNOWLEDGEMENTS

This work was supported by Tianjin Natural Science Foundation (24JCYBJC00650), Tianjin Public Health Science and Technology Major Project (24ZXGZSY00060), and Science and Technology Innovation 2030—Major Projects (2021ZD0201805). Attendance at this conference was supported by an AAIC 2026 Conference Fellowship.

ALZHEIMER'S ASSOCIATION | AAIC 26

References: Whitehouse PJ, Price DL, Clark AW, Coyle JT, DeLong MR. Alzheimer disease: evidence for selective loss of cholinergic neurons in the nucleus basalis. Ann Neurol. 1981 Aug;10(2):122-126.