Associations between amyloid-β and tau pathology, structural brain properties, and cognitive performance during preclinical and prodromal Alzheimer's disease

Ting Qiu

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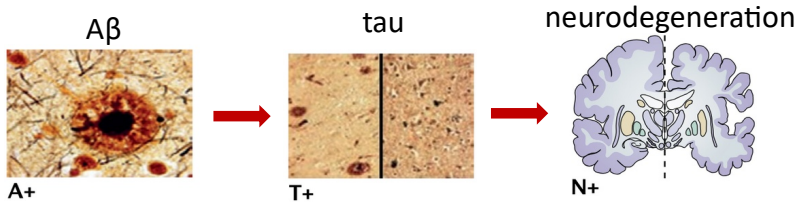
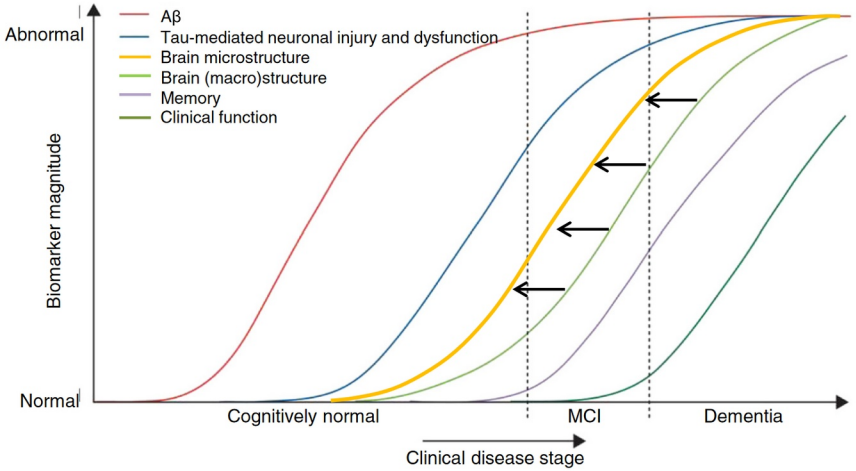
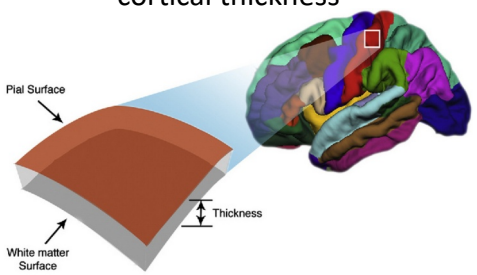
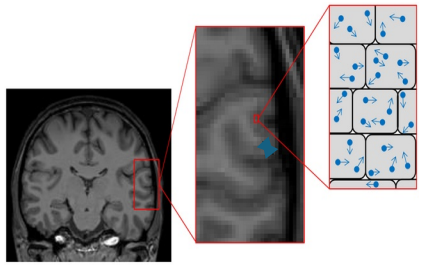




cortical thickness



cortical mean diffusivity



Studying how AD pathology affects brain structure provides deeper insights into the disease.

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- examine associations between AD pathology and cortical structure in different stage of AD (CU Aβ-, CU Aβ+, MCI Aβ+).
- examine associations between AD pathology, cortical structure, neurodegeneration and cognition.

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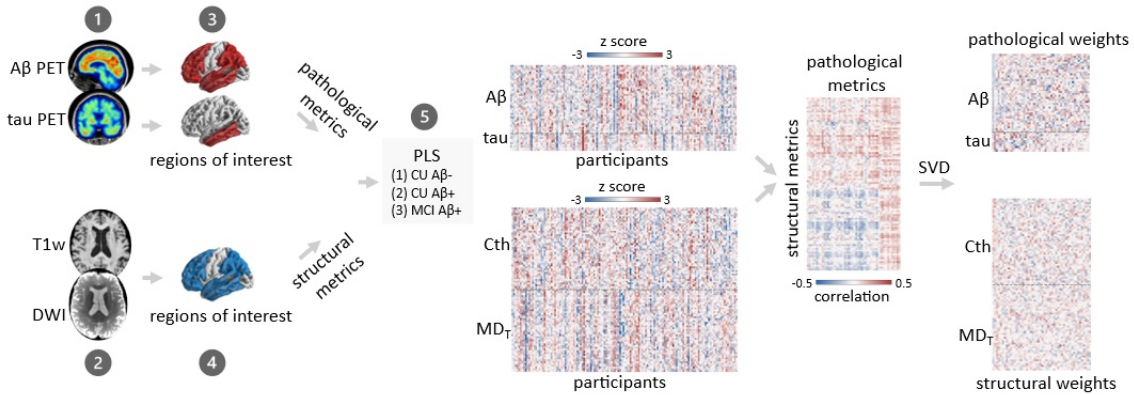
Partial least square (PLS) analyses flowchart



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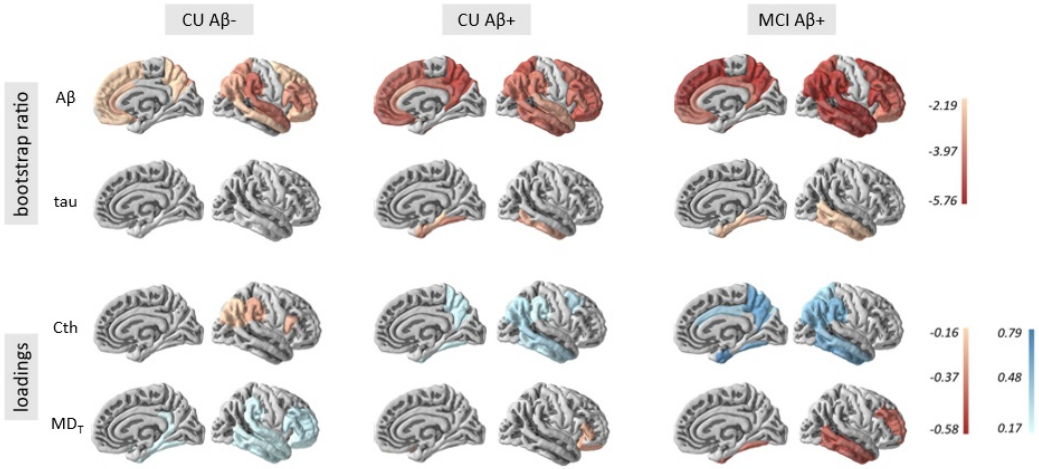

Bootstrap ratio and loadings with same sign covary positively, while those with negative sign covary negatively.

	latent variable 1	latent variable 2
CU Aβ-	45.8%	27.84%
CU Aβ+	82.80%	N.S.
MCI Aβ+	94.25%	N.S.

In the CU Aβ- group, higher Aβ was associated with higher cortical thickness and lower cortical MD_T.

In CU Aβ+ and MCI Aβ+ groups, higher Aβ and tau were associated with lower cortical thickness and higher cortical MD_T.

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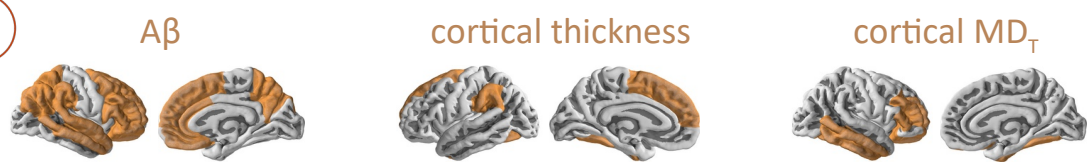
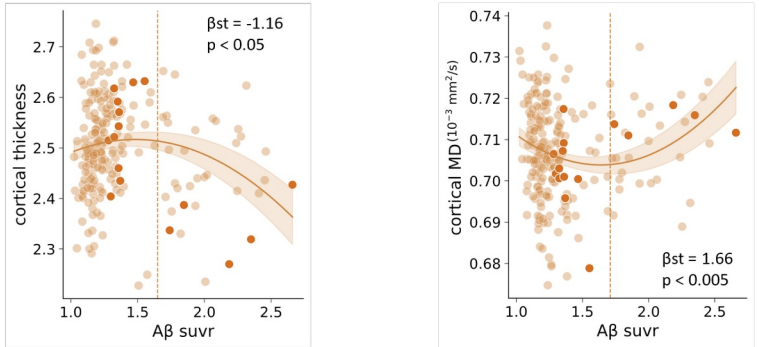


Cth/ MD ~ Aβ + Aβ² + age+ sex + apoe4 status



an inverse U-shaped association between Aβ and cortical thickness;
a U-shaped association between Aβ and cortical MD_T.

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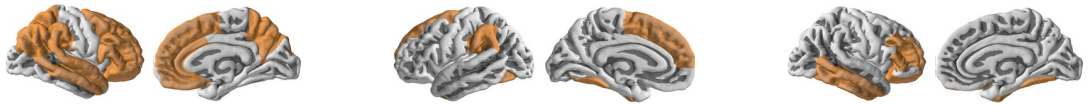
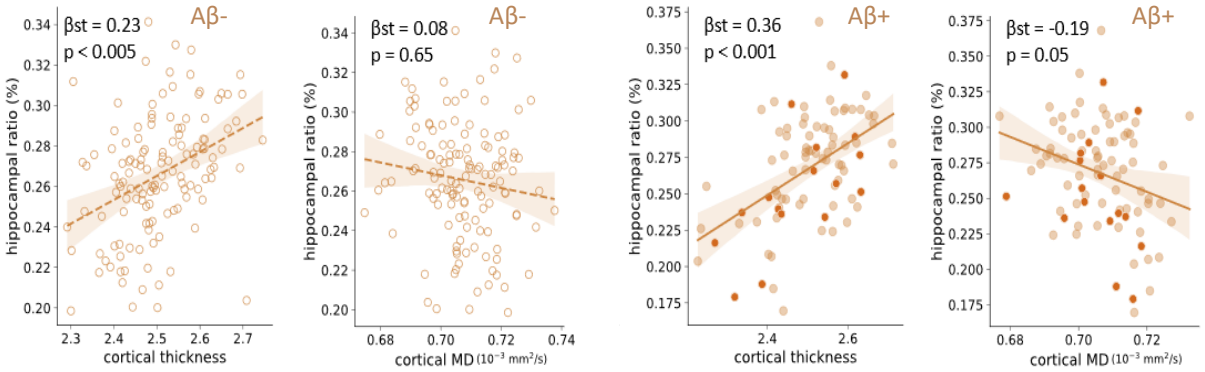
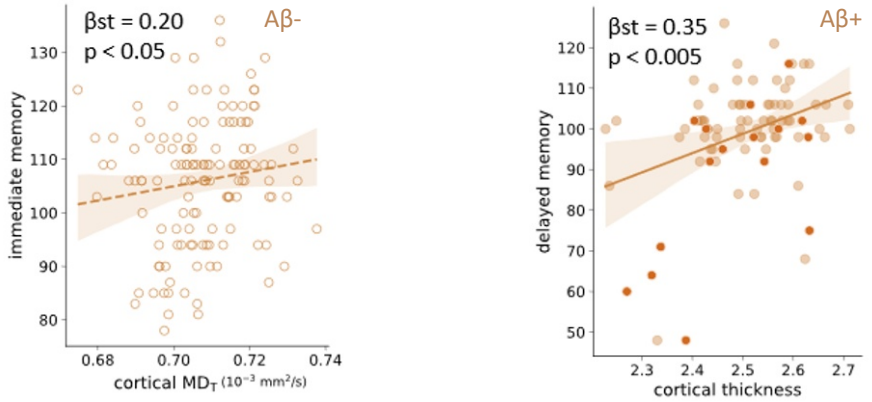
Aβ | cortical thickness | cortical MD_T



- **Hippocampal volume ~ Cth/ MD + age+ sex + apoe4 status**
- **Immediate/delayed memory ~ Cth/ MD + age+ sex + apoe4 status**



cortical thickness was associated with hippocampal volume in both Aβ- and Aβ+ group; a subtle association was found with MD_T in the Aβ+ group.



cortical thickness was associated with memory performance in the Aβ+ group; MD_T was associated with memory performance in the Aβ- group.

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Summary:

- In the Aβ- CU group, higher Aβ levels are linked to higher cortical thickness and lower MD_T.
- In the Aβ+ CU and Aβ+ MCI groups, higher Aβ and tau levels are linked to lower cortical thickness and higher MD_T.
- Cortical thickness and MD_T are associated with hippocampal volume loss and memory impairments, especially in the Aβ+ group.

Take-Home Message: This study highlights distinct patterns of how AD pathology affects cortical structure and memory. Our results contribute to the understanding of the pathological mechanisms underlying the preclinical and prodromal phases of the AD continuum.

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RBIQ Journée scientifique 2024 23 mai, Université Concordia | QBIN Scientific Day 2024 May 23rd, Concordia University | McGill University | Douglas

Villeneuve Lab
Imagerie multimodale du vieillissement cérébral
Multimodal Imaging of the Aging Brain

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