CIBM Center for Biomedical Imaging

CIBM Annual Symposium 2022

Campus Biotech, Geneva | 30th November

Association of Apolipoprotein E ε4 with Tau and Amyloid-β PET in a Memory Clinic Cohort

Débora Elisa Peretti[1], Federica Ribaldi[2,3], Jean-Louis Bloin[5], Carine Wyss-Dominguez[5], Marc Abramowicz[5], Giovanni B Frisoni[2,3], Valentina Garibotto[1,6,7]

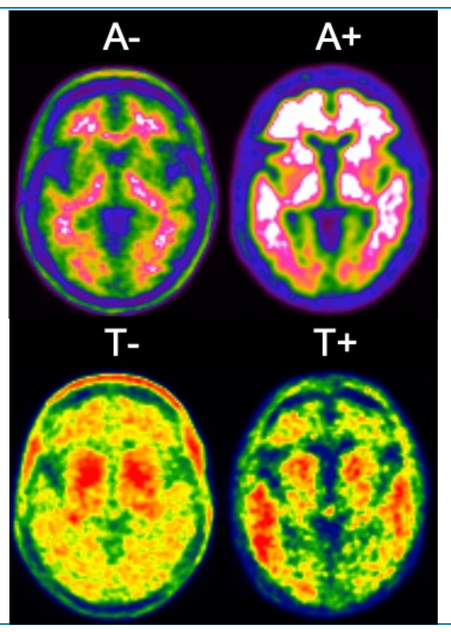
(1) Laboratory of Neuroimaging and Innovative Molecular Tracers, University of Geneva, Geneva, Switzerland, (2) Laboratory of Neuroimaging of Aging, University of Geneva, Geneva, Switzerland (3) Memory Clinic, Geneva University Hospitals, Geneva, Switzerland, (5) Division of Genetic Medicine, Geneva University Hospitals, Geneva, Switzerland (6) Dividion of Nuclear Medicine and Molecular Imaging, Geneva University Hospitals, Geneva, Switzerland, (7) Centre for Biomedical Imaging, University of Geneva, Geneva, Switzerland

AIM

The aim of this study was to assess tau and amyloid deposition depending on subject genotype in a memory clinic cohort.

BACKGROUND

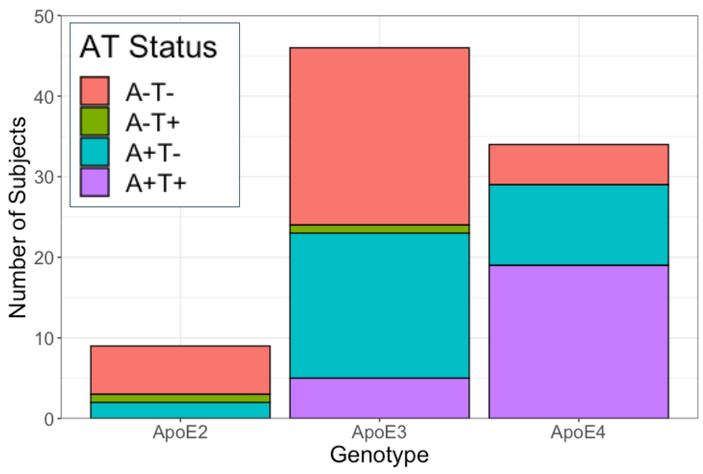
- Alzheimer's disease (AD) is characterised by the deposition of amyloid-β (A) plaques and neurofibrillary tau tangles (T)[1]
- Positron Emission Tomography (PET) allows for the in vivo characterisation of AD pathology through different radiotracers
  - These images can be used to identify subject with (A+, T+) or without (A-, T-) the presence of AD pathology
- The apolipoprotein E ε4 (ApoE4) gene is the strongest genetic risk factor for AD[2]
- Previous studies[3] have found a link between ApoE4 genotype and amyloid positivity as well as tau deposits in the Medial Temporal Lobe (MTL)
  - The influence of genotype on tau and amyloid considered together has not been assessed



METHODS

Subjects

- 89 subjects from the Geneva Memory Clinic underwent amyloid and tau PET imaging and ApoE4 genotyping.
- Subjects were classified as ApoE2 carriers, ApoE3 homozygotes, and ApoE4 carriers
- Amyloid uptake converted to centiloid scale
- Tau uptake converted to Standardised Uptake Value Ratios (SUVR), cerebellum as the reference tissue

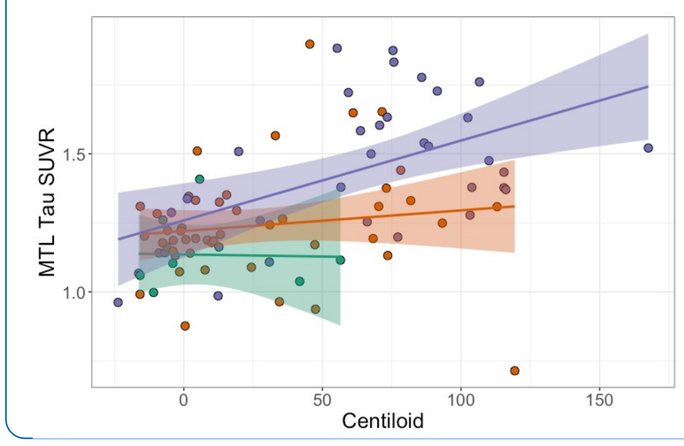


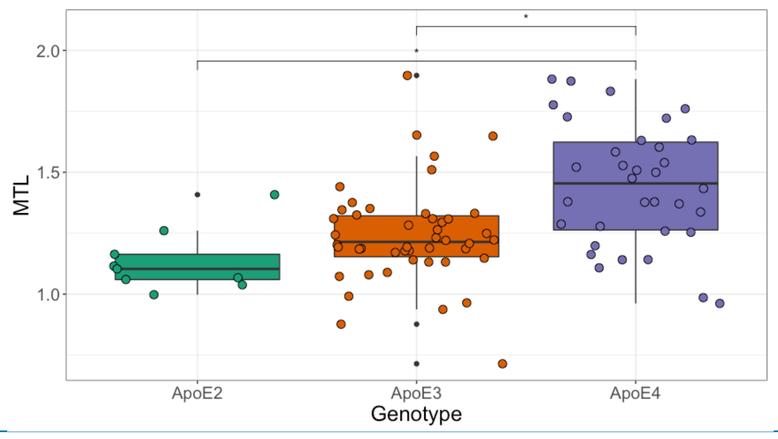
Statistics

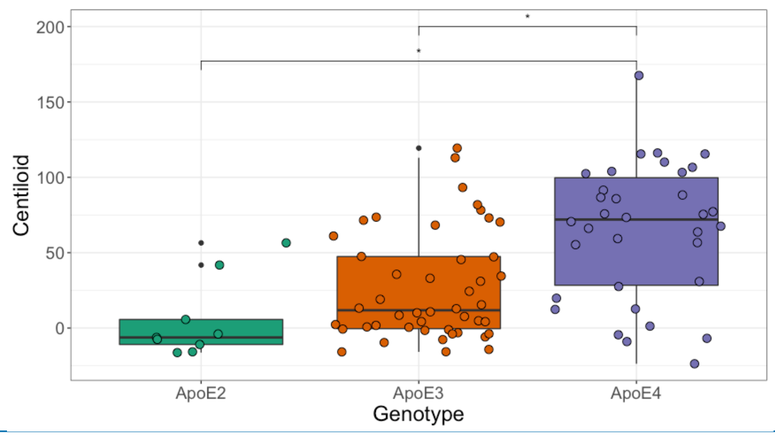
- Correlation and linear regression between amyloid and global tau SUVR
- ANOVA (Tukey corrections) to assess differences between MTL tau or amyloid PET uptake by genotype
- ANOVA (with Tukey corrections) to assess differences between Lateral Temporal Lobe (LTL), Superior Temporal Gyrus (STG), or Primary Visual Cortex (PVC) tau uptake by genotype

RESULTS

- Correlation between MTL tau SUVR and centiloid were only significant for ApoE4 carriers
- MTL tau SUVR and centiloid were significantly higher in ApoE4 carriers when compared to ApoE2 and ApoE3 subjects
- LTL and STG reproduced the same results as MTL. PVC tau uptake was not significantly different between genotypes







CONCLUSION

- ApoE4 carriers present significantly higher amyloid and tau uptake in comparison to non-carriers
- The correlation between amyloid and tau load is significant only in ApoE4 carriers
- Increase in tau deposition is not limited to the MTL, but extends to the entire Temporal Lobe

References:

1. Jack, C. R., et al. (2018). NIA-AA Research Framework: Toward a biological definition of Alzheimer's disease. *Alzheimer's & Dementia*, 14(4), 535–562. https://doi.org/10.1016/j.jalz.2018.02.018
2. Frisoni, G. B., et al. (2022). The probabilistic model of Alzheimer disease: the amyloid hypothesis revised. *Nature Reviews Neuroscience*, 23(1), 53–66. https://doi.org/10.1038/s41583-021-00533-w
3. Therriault, et al. (2020). Association of Apolipoprotein e ε4 with Medial Temporal Tau Independent of Amyloid-β. *JAMA Neuro*logy, 77(4), 470–479. https://doi.org/10.1001/jamaneurol.2019.4421