

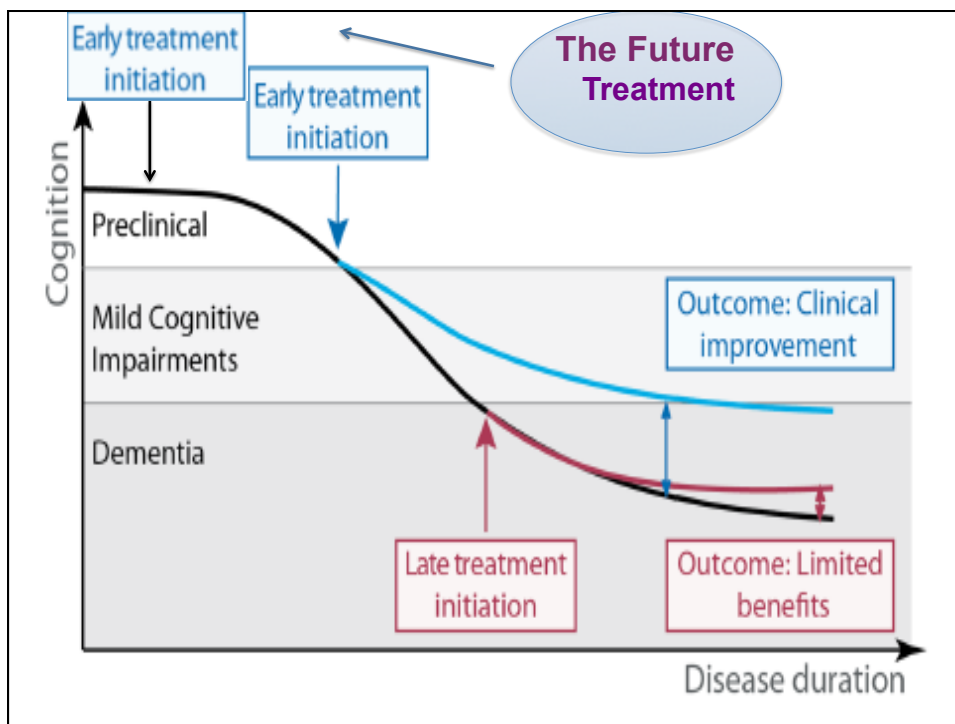
Swedown conference
Oct.3rd, 2019



**Karolinska
Institutet**

Imaging studies Alzheimer/ Down syndrome

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Theme Aging
Karolinska Univ Hospital
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Molecular imaging provides new possibilities to detect and understand disease pathology in vivo

Pathology at autopsy

AD pathology in vivo in patient

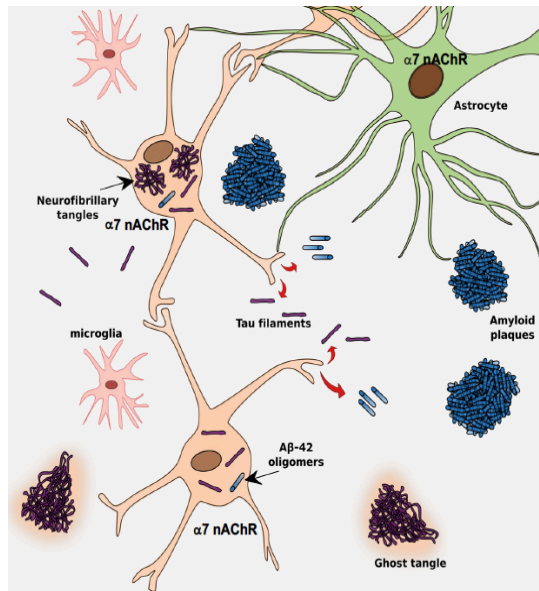
Positron emission tomography (PET)

A.

B.

10/10/19

Complex pathophysiology in Alzheimer's disease



Amyloid plaques
Amyloid beta oligomers

Neurofibrillary tangles
Tau oligomers

Astrocytosis

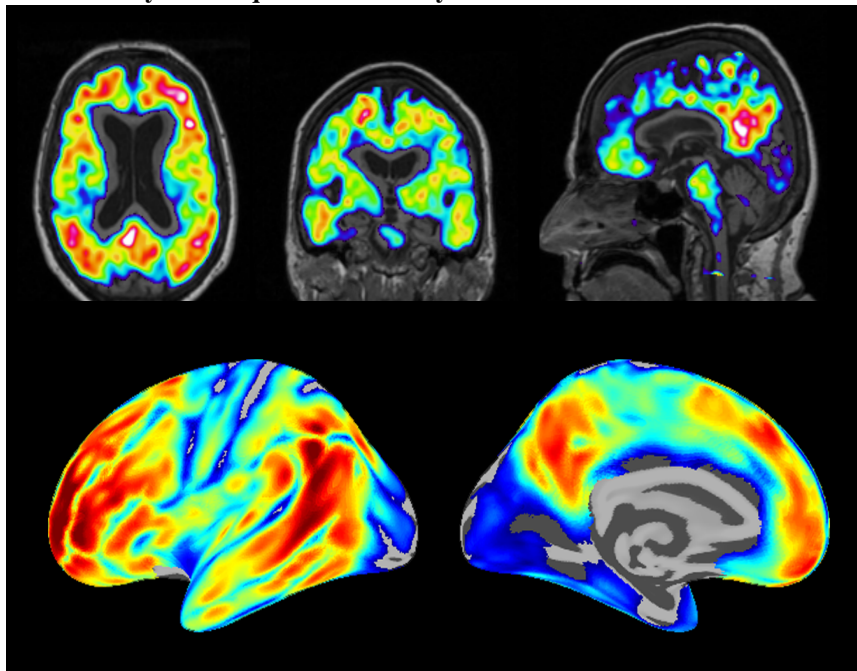
Microglia activation

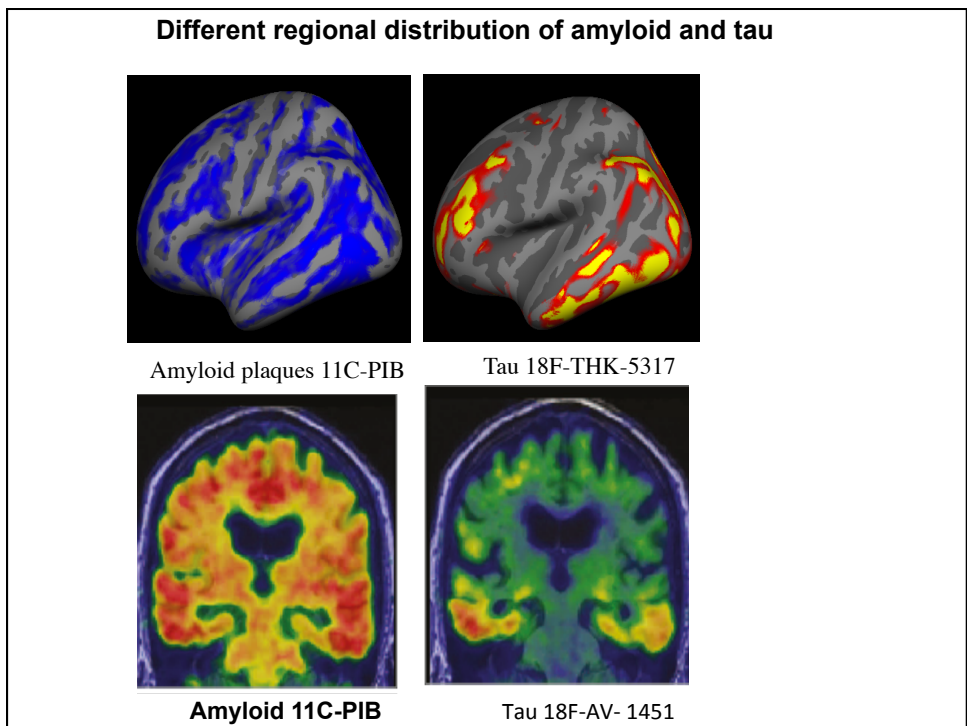
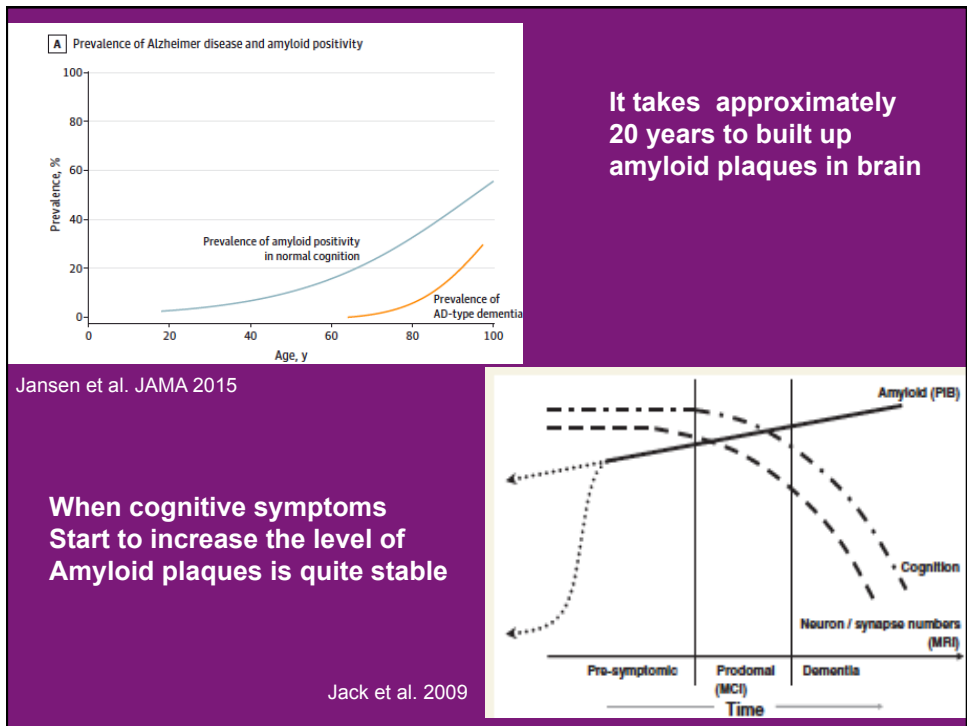
Synapse dysfunction

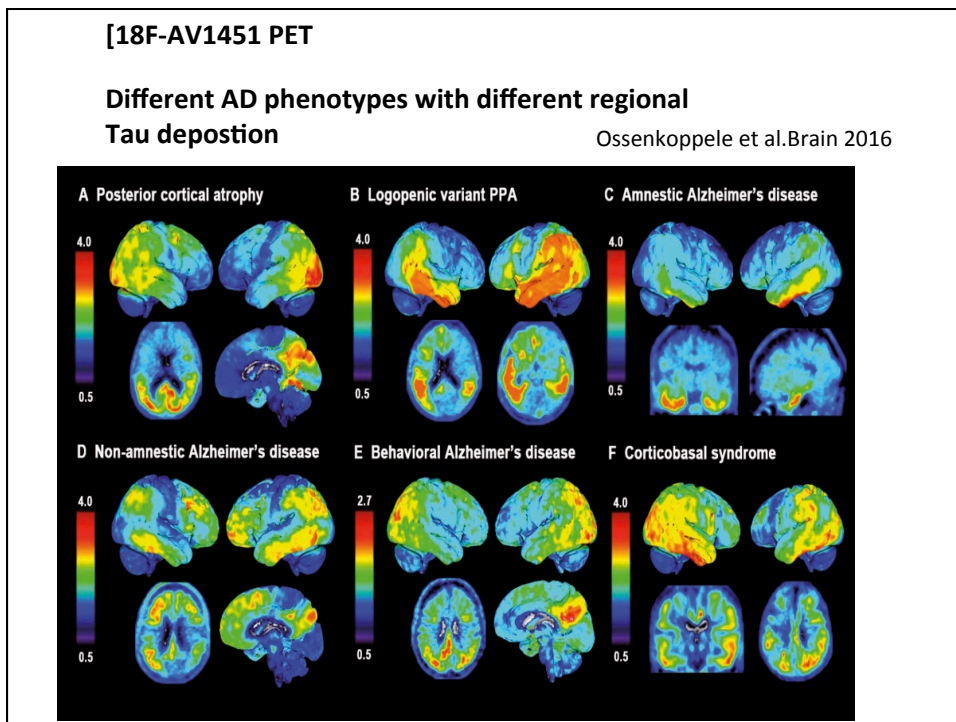
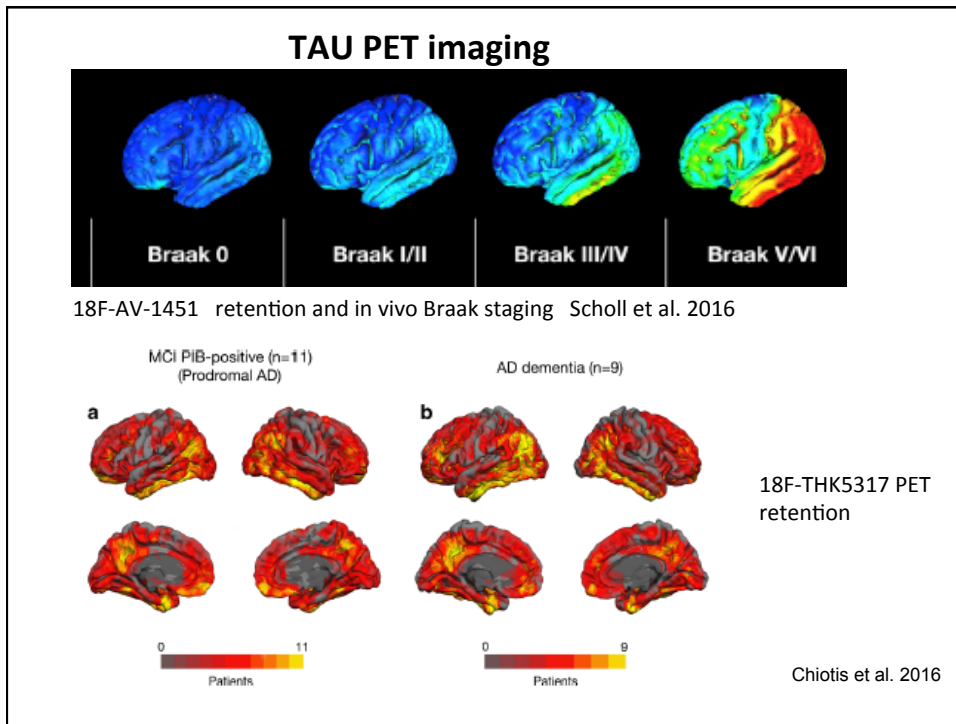
It is a challenge to study these processes in vivo!

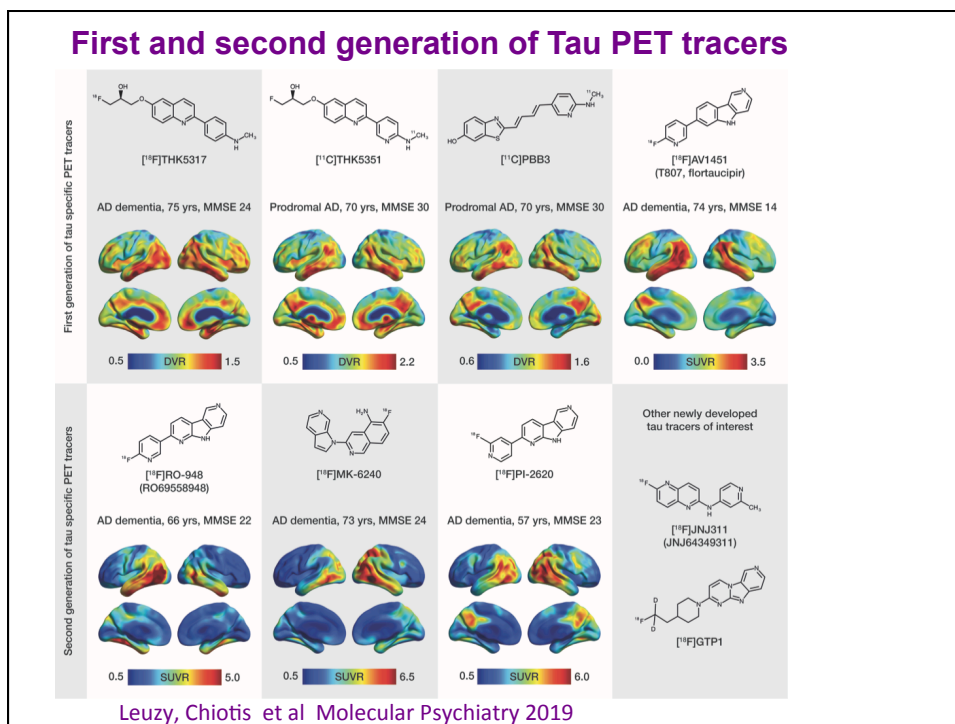
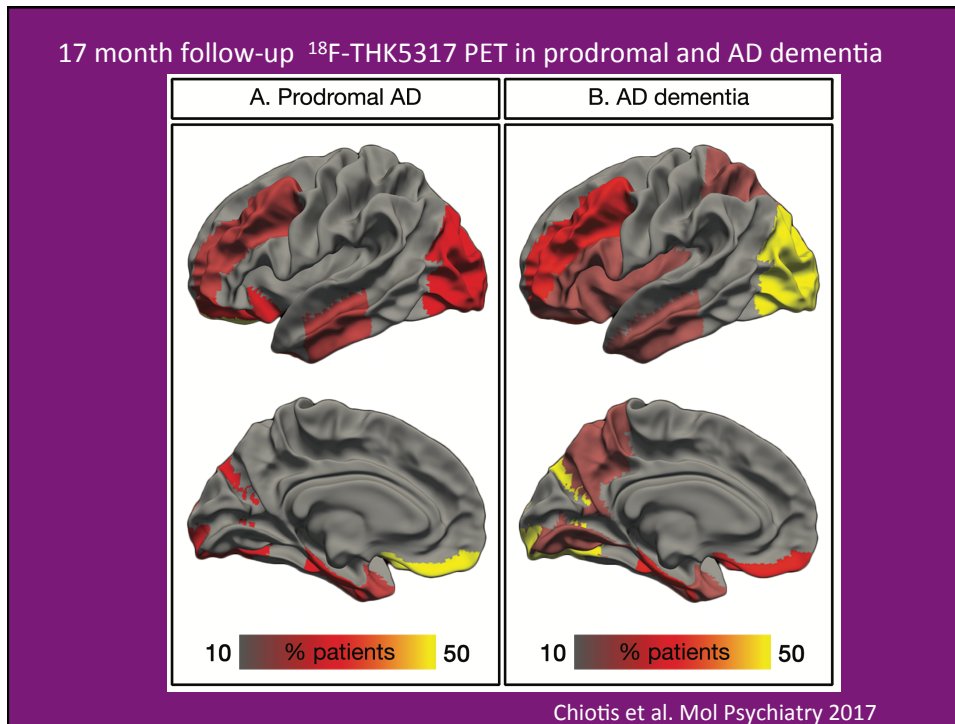
Saint-Aubert et al. 2017

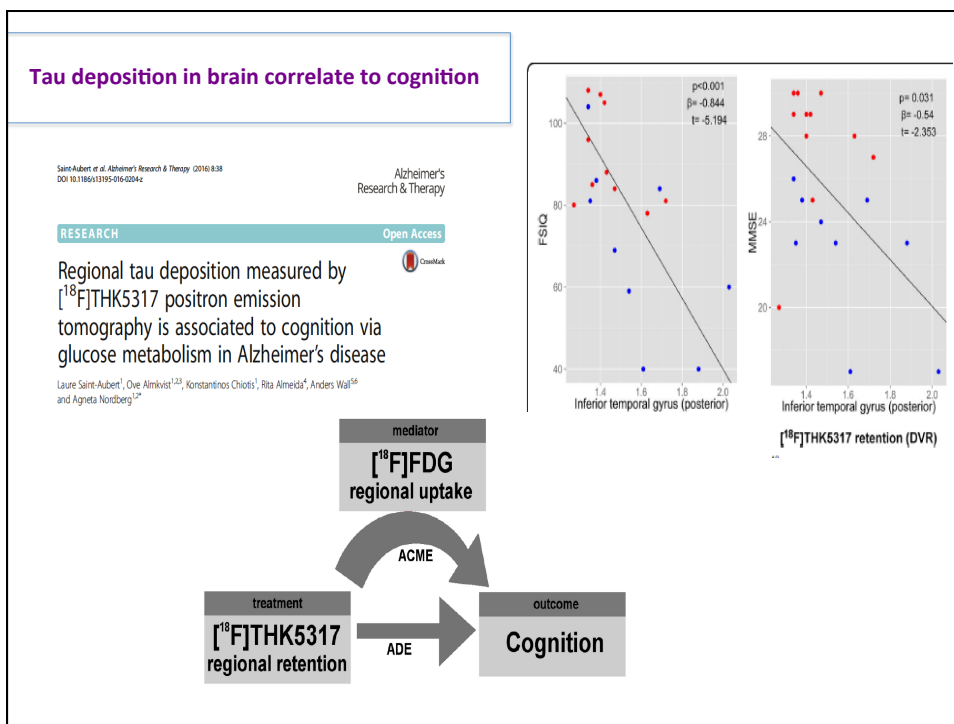
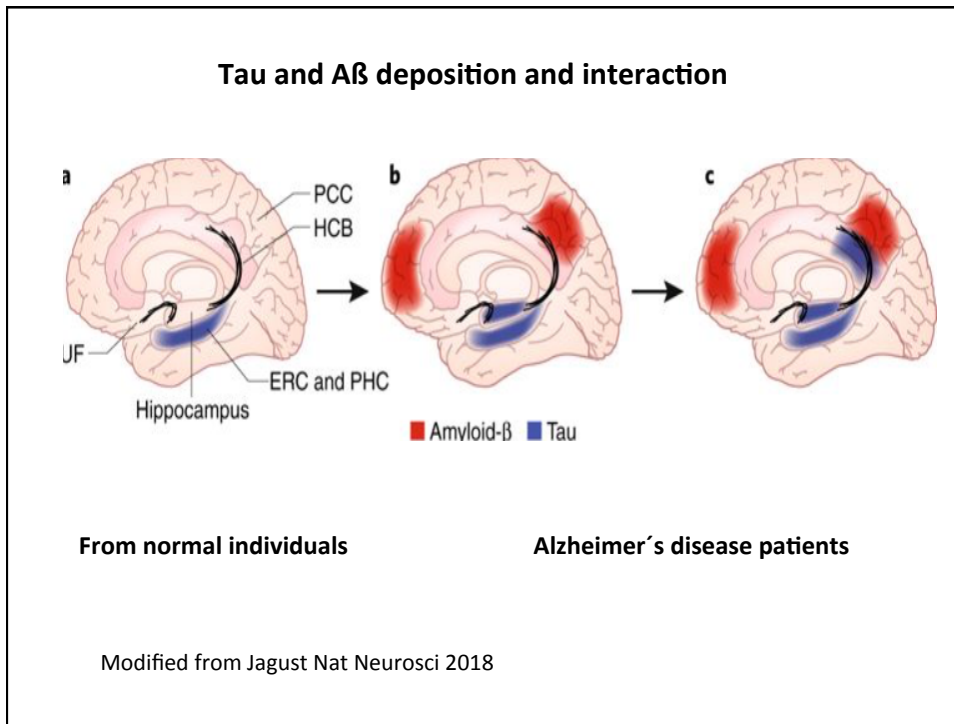
Amyloid Plaques measured by PIB PET in AD












Amyloid-beta pathology Tau pathology

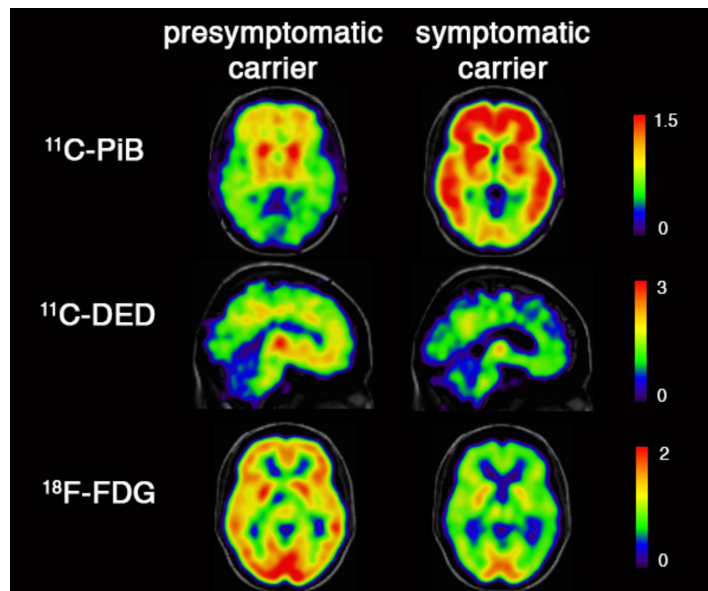


Development of PET ligand for visualizing Amyloid plaques and Tau tangles will enable longitudinal assessment of the spatial pattern of their accumulation in relation to symptomatology

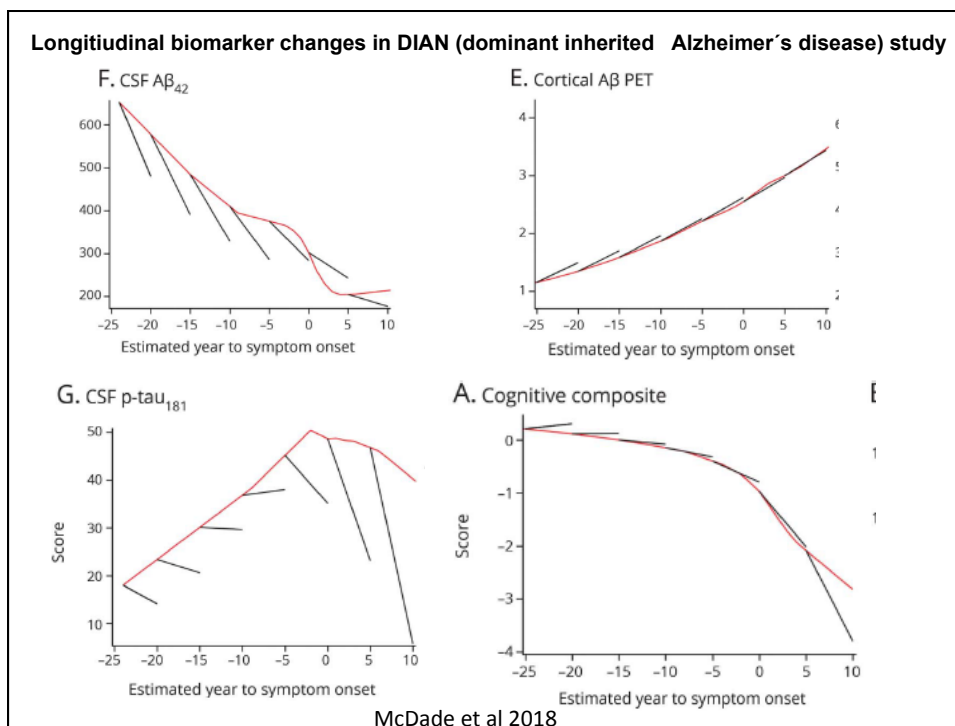
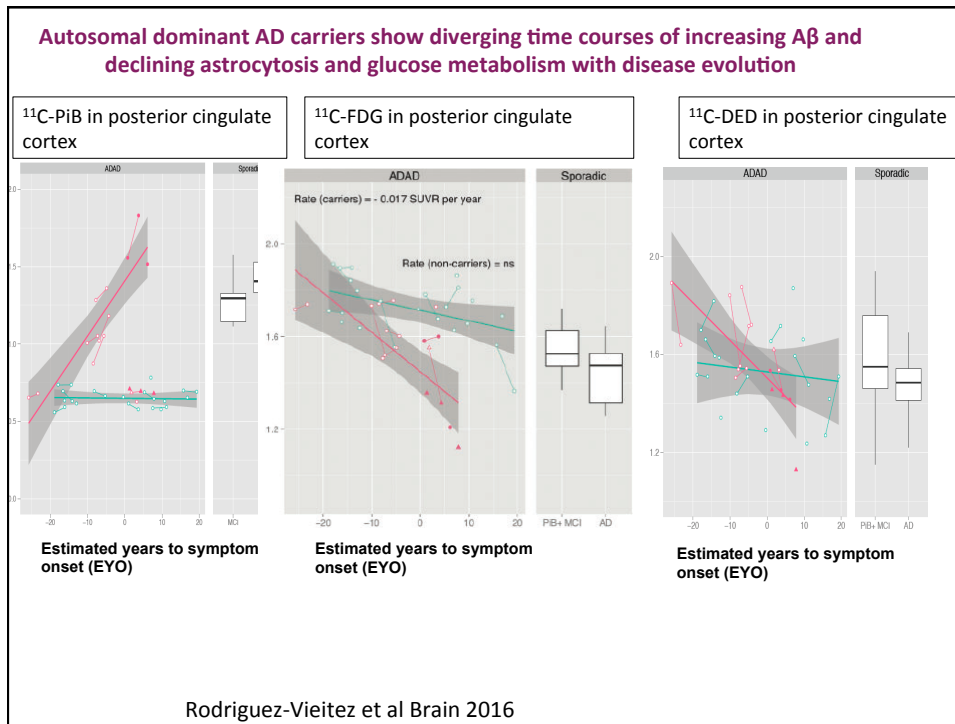
Amyloid plaque pathology seems to start to develop 15-20 years before neurodegeneration and symptom onset.

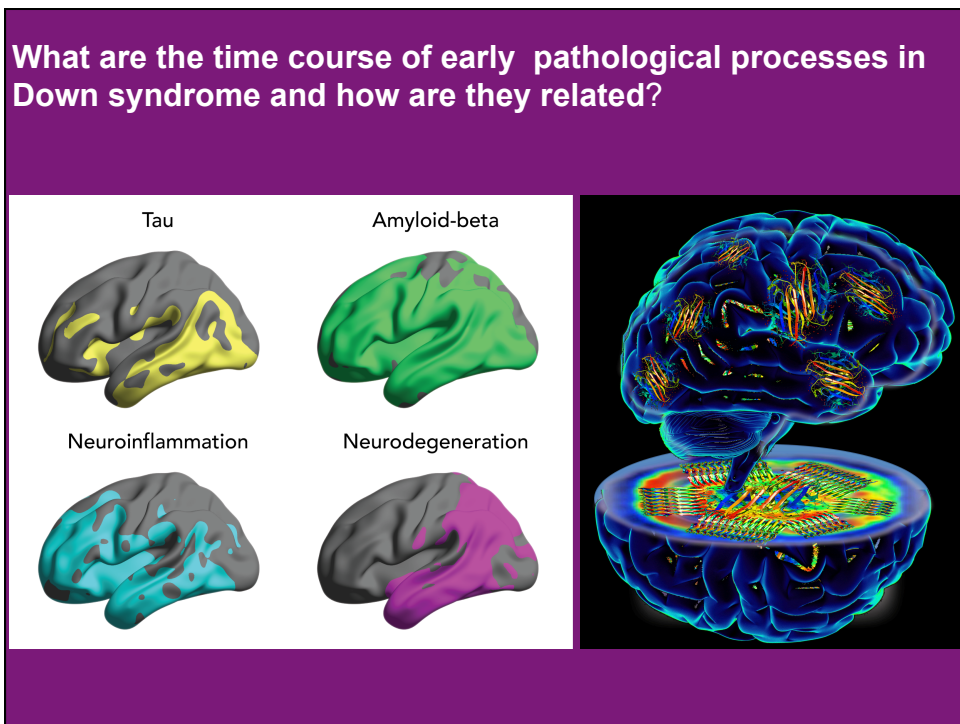
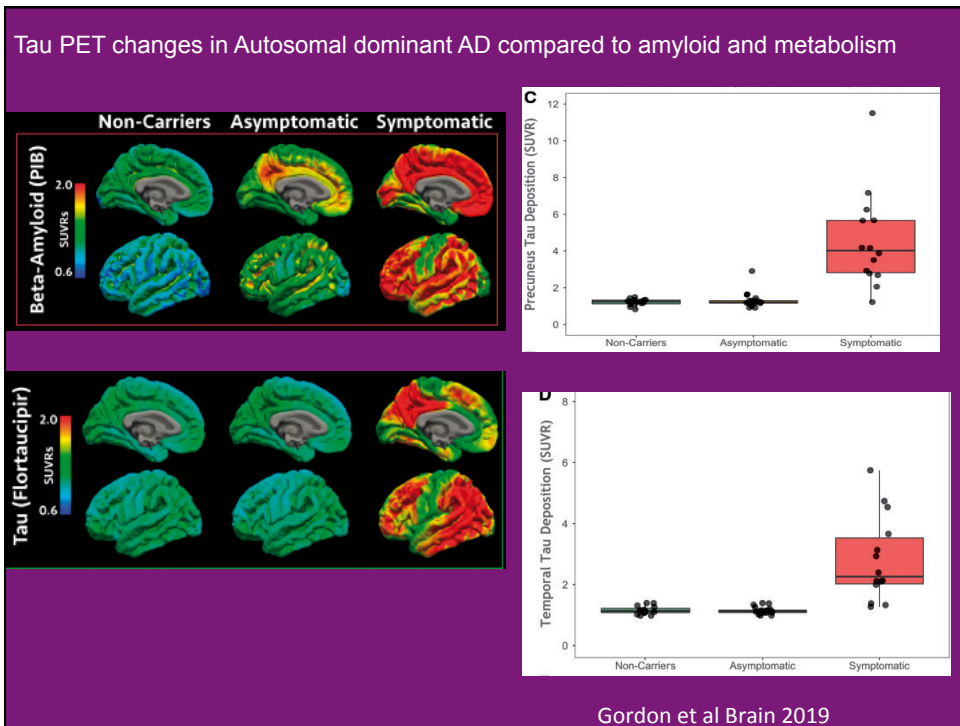
Tau seems to correlate more closely with symptomatic stages evidenced by cognitive decline

Multi-tracer PET in autosomal dominant Alzheimer's disease



Elena Rodriguez-Vieitez et al. Brain 2016





Amyloid PET investigation with individual with Down syndrome and dementia

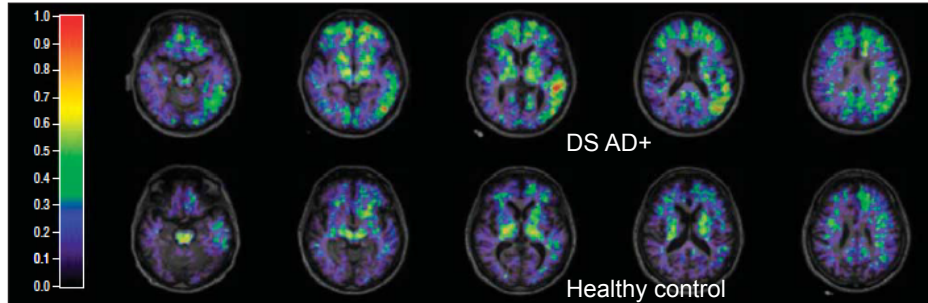
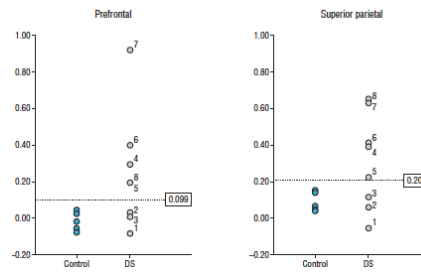
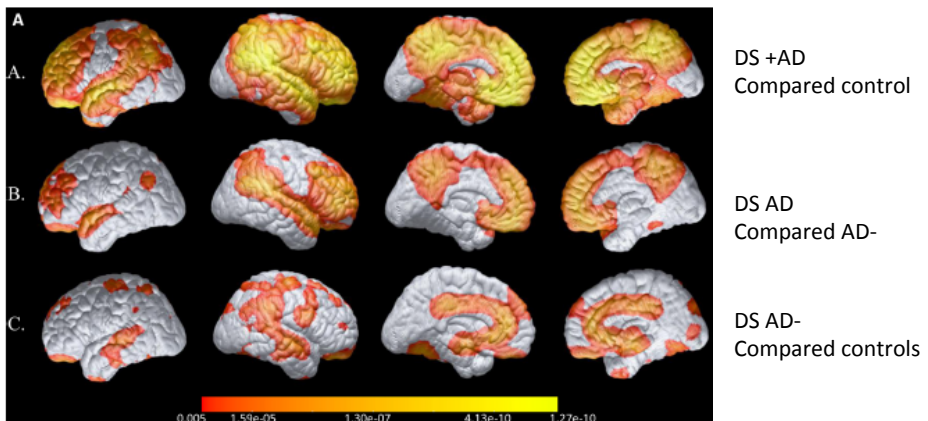


Figure 1. Fused carbon 11-labeled Pittsburgh Compound B nondisplaceable binding potential and magnetic resonance images for a subject with Down syndrome and Alzheimer disease (top) and a control without Down syndrome (bottom).



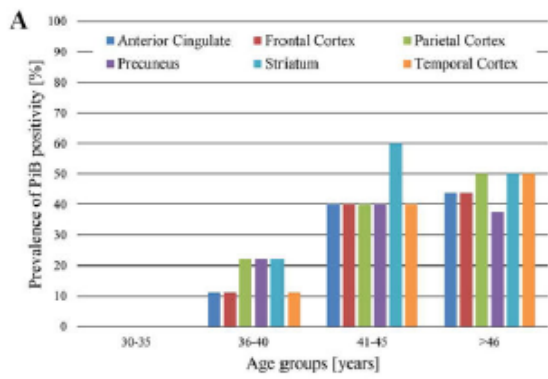
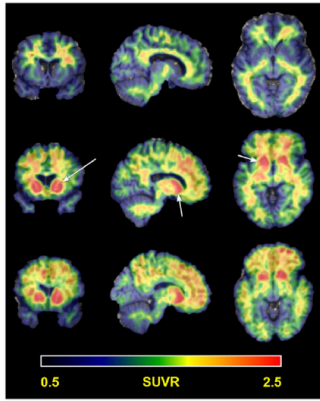
Landt et al. 2011

Amyloid deposition in Down brain with and without dementia



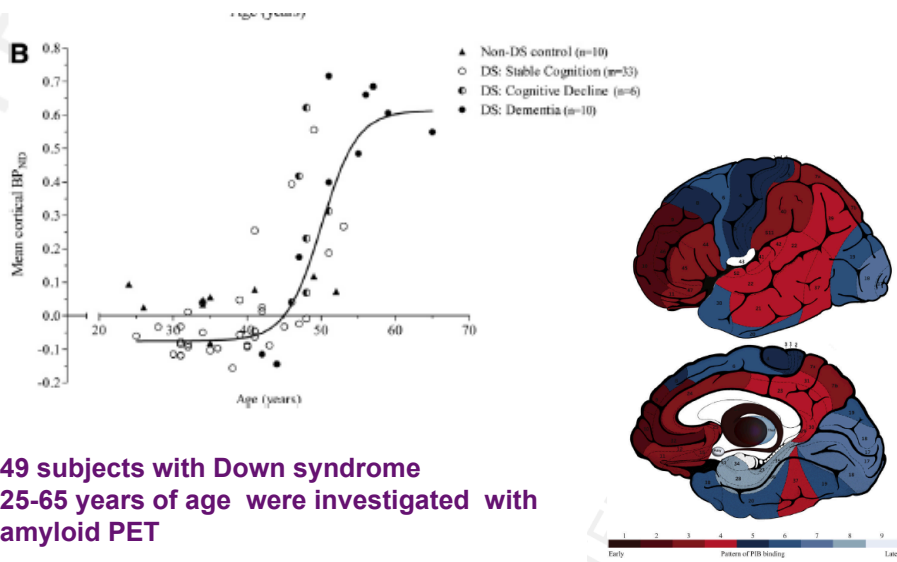
Sabbagh et al. 2015

Amyloid plaques in Down syndrome at different ages measured by PET



Lao et al. 2016

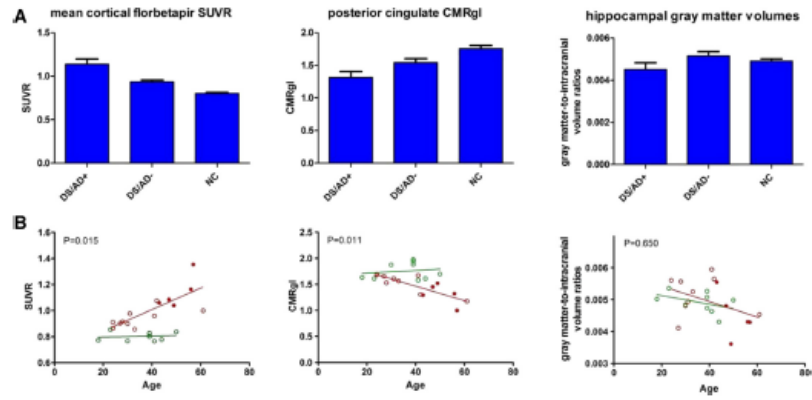
Amyloid plaque brain deposition in Down syndrome



**49 subjects with Down syndrome
25-65 years of age were investigated with
amyloid PET**

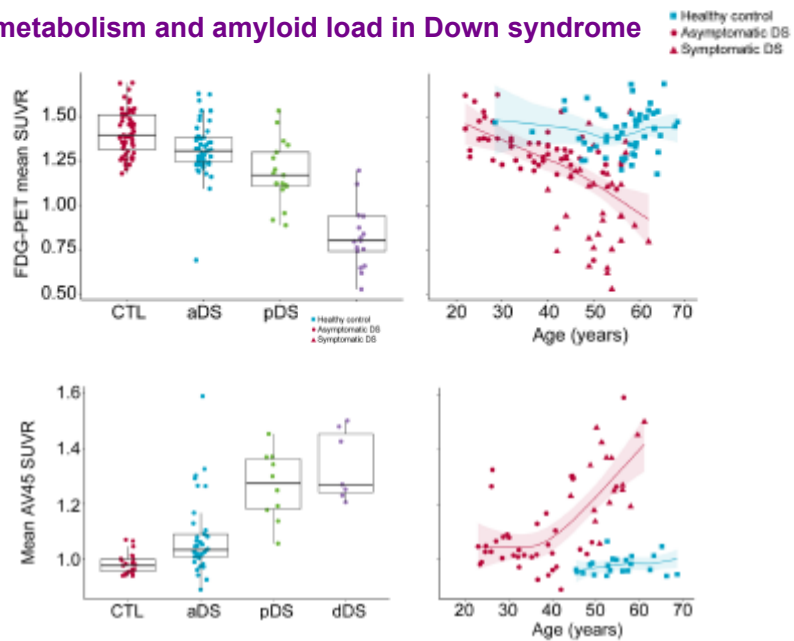
Annus et al. 2015

Amyloid inlagring, glukosmetabolism och hjärnvolym vid Downs syndrom

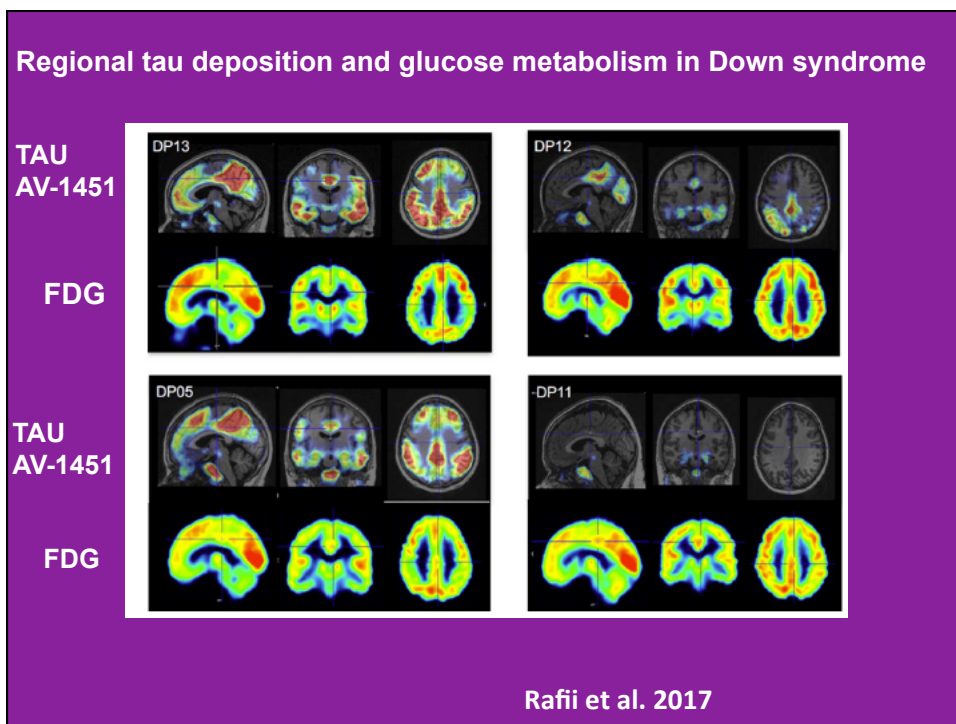
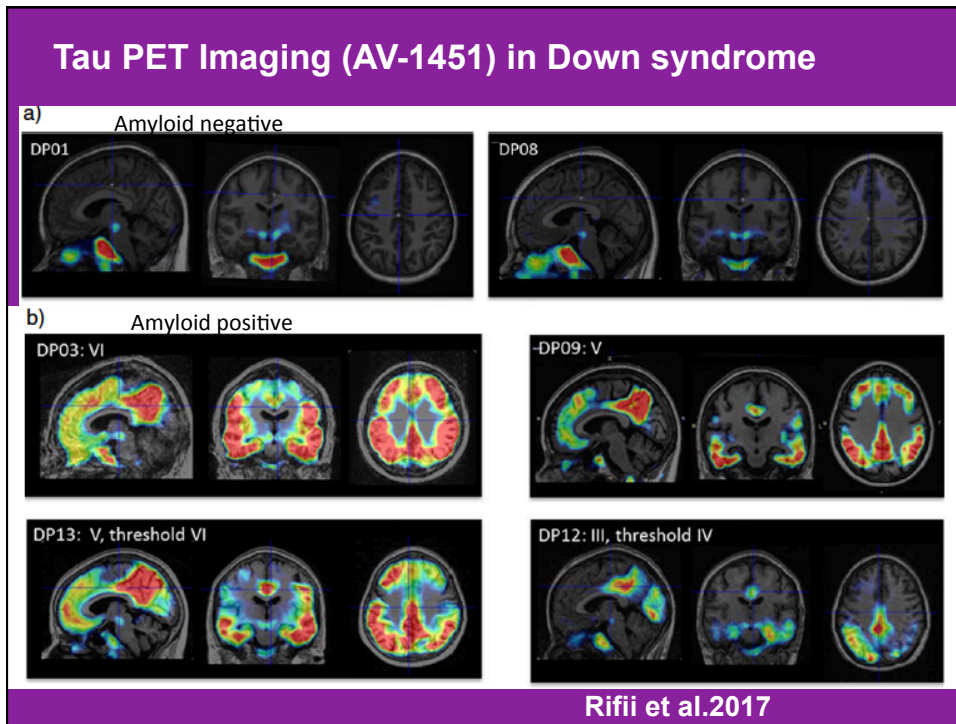


Sabbagh et al. 2015

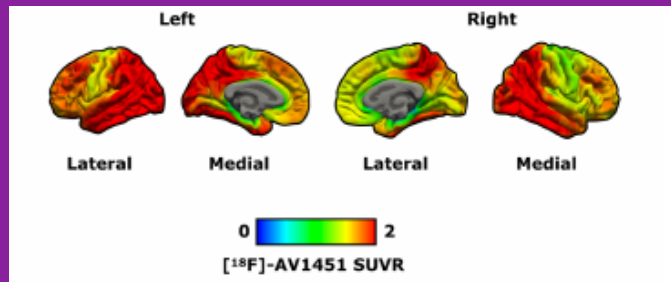
Glucose metabolism and amyloid load in Down syndrome



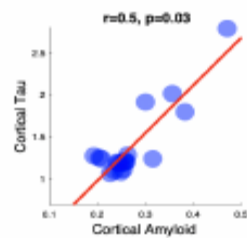
Fortea et al. AAC 2019



Tau PET imaging in 19 adults with Down syndrome



Correlation between amyloid and tau deposition



Mak et al AAIC 2019

Urgent research challenges now for Down syndrome:

- What is the time course of deposition of tau in brain?
- How is tau deposition related to:
 - Astrocytes (inflammation)?
 - Neurodegeneration?
 - Cognition?
 - CSF biomarkers?
 - Plasma biomarkers?

