Defining an MRI signature of Tau pathology

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Abstract

Alzheimer's disease (AD) is the most common form of dementia. Most scientists agree that early detection and prevention would be more effective than trying to cure the disease. However, current AD biomarkers as lumbar puncture or PET are too invasive, too expensive, and not widely available. The most commonly used biomarker for AD in memory clinics is hippocampal atrophy assessed by MRI. Yet, this measure is not specific for AD and is common to other diseases. We therefore aim to develop more specific MRI biomarkers for AD. The aim of this project is to study the impact of neuropathologies, mainly tauopathy, on the anatomy, specifically in the medial temporal lobe (MTL). To this end, we will use a double original approach by first identifying which hippocampal subfields volume best correlate with tau deposition using tau-PET imaging and in-vivo 3T MRI in 150 participants. We will then use ultra-high field MRI (11.7T) and histopathological analysis on post-mortem brains to identify and describe atrophy due to AD-specific neuropathologies (amyloid and tau pathology) with extremely fine spatial resolution. Finally, we will aim to export the observations from the post-mortem study to the living human by proposing 7T MRI to a small subset of patients.

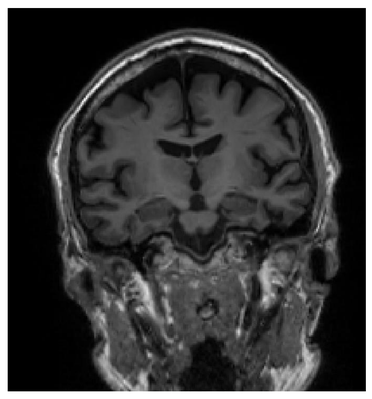
Methods

Work package 1

Aim : Evaluating the in-vivo association between the anatomy and tau pathology

Subjects : 150 subject (>50 years old, AD and controls)

Methods :



3T cerebral MRI

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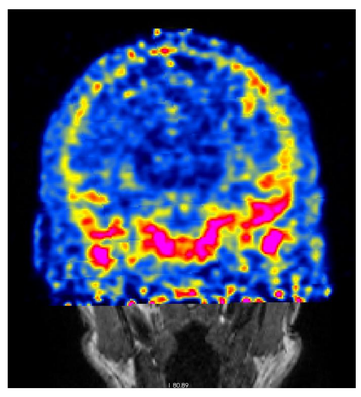
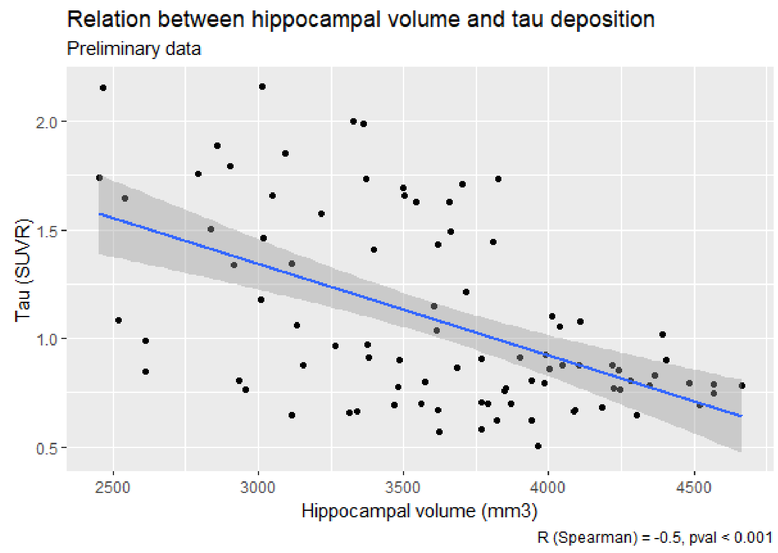


Tau-PET

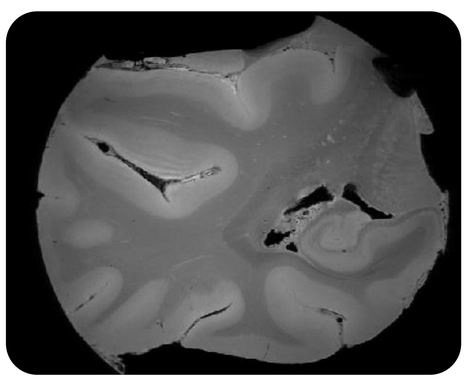


Work package 2

Aim : Identifying AD-specific MRI lesions

Specimens : ~ 25 brains from donnors (AD, controls and other tauoapthies)

Methods :



11.7T MRI scan of the left MTL

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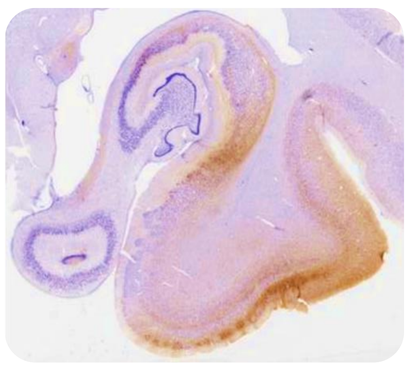
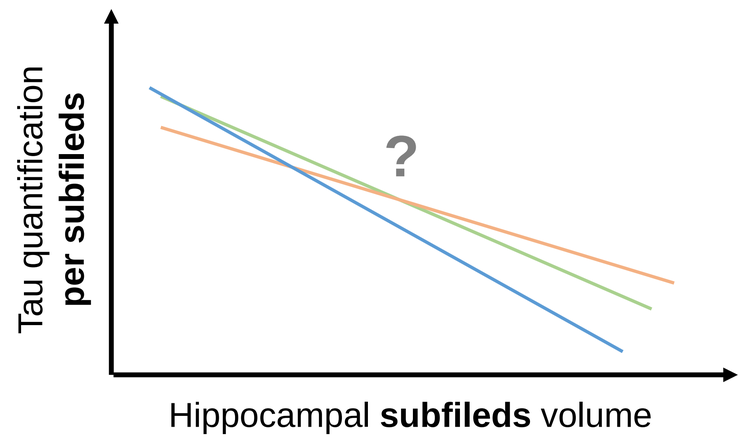
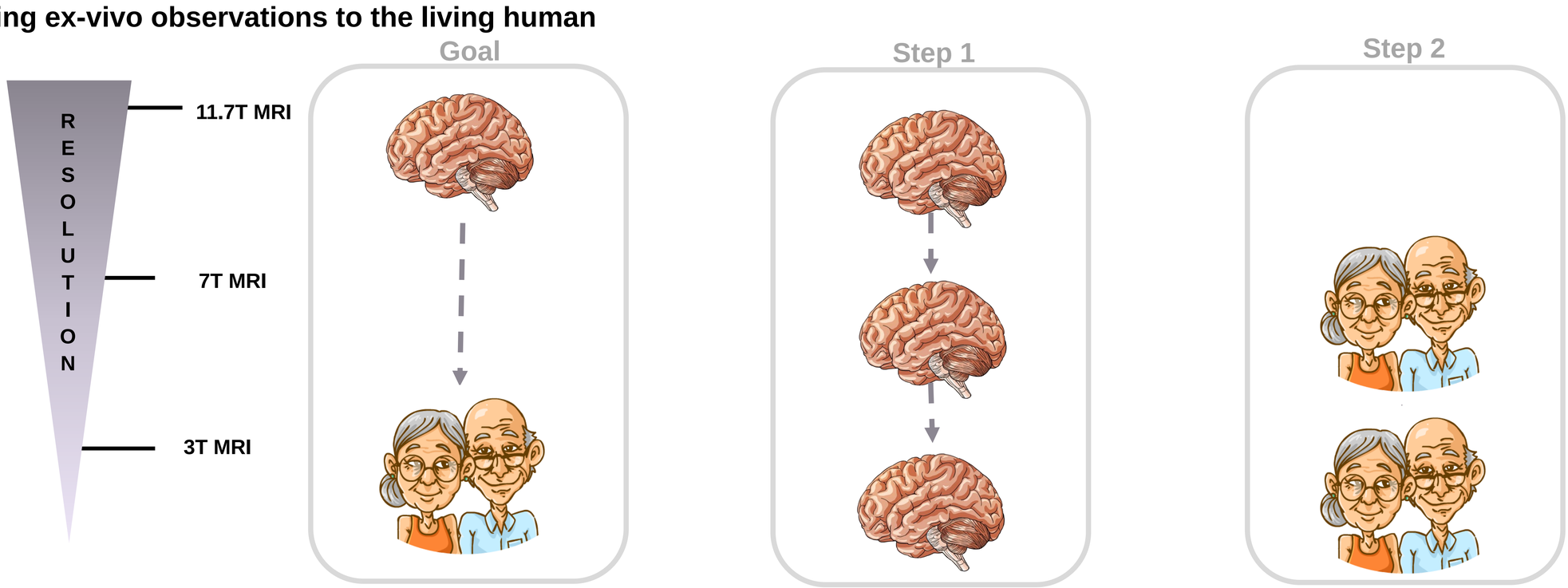


Histopathological analysis of the left MTL



Work package 3

Aim : Exporting ex-vivo observations to the living human



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