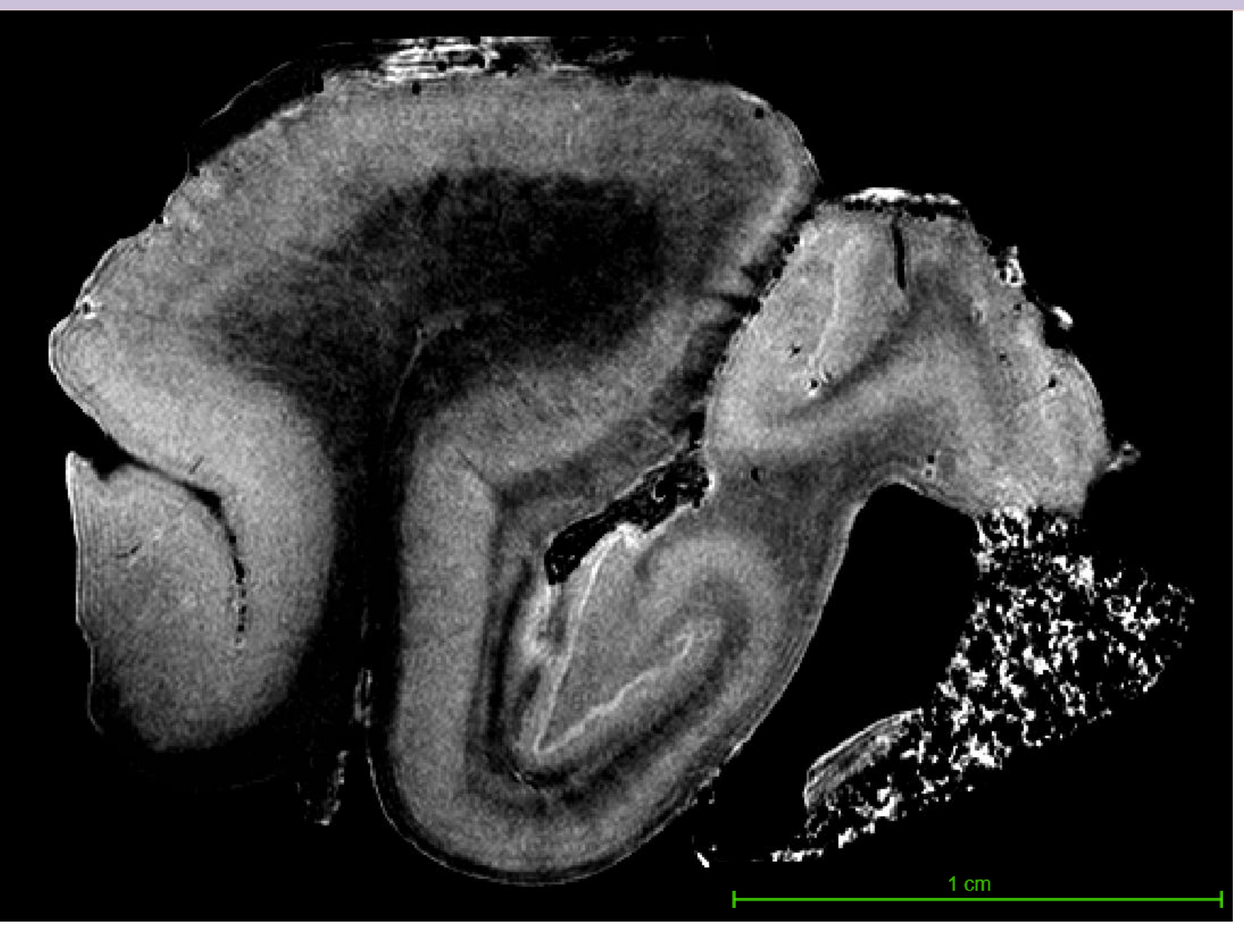
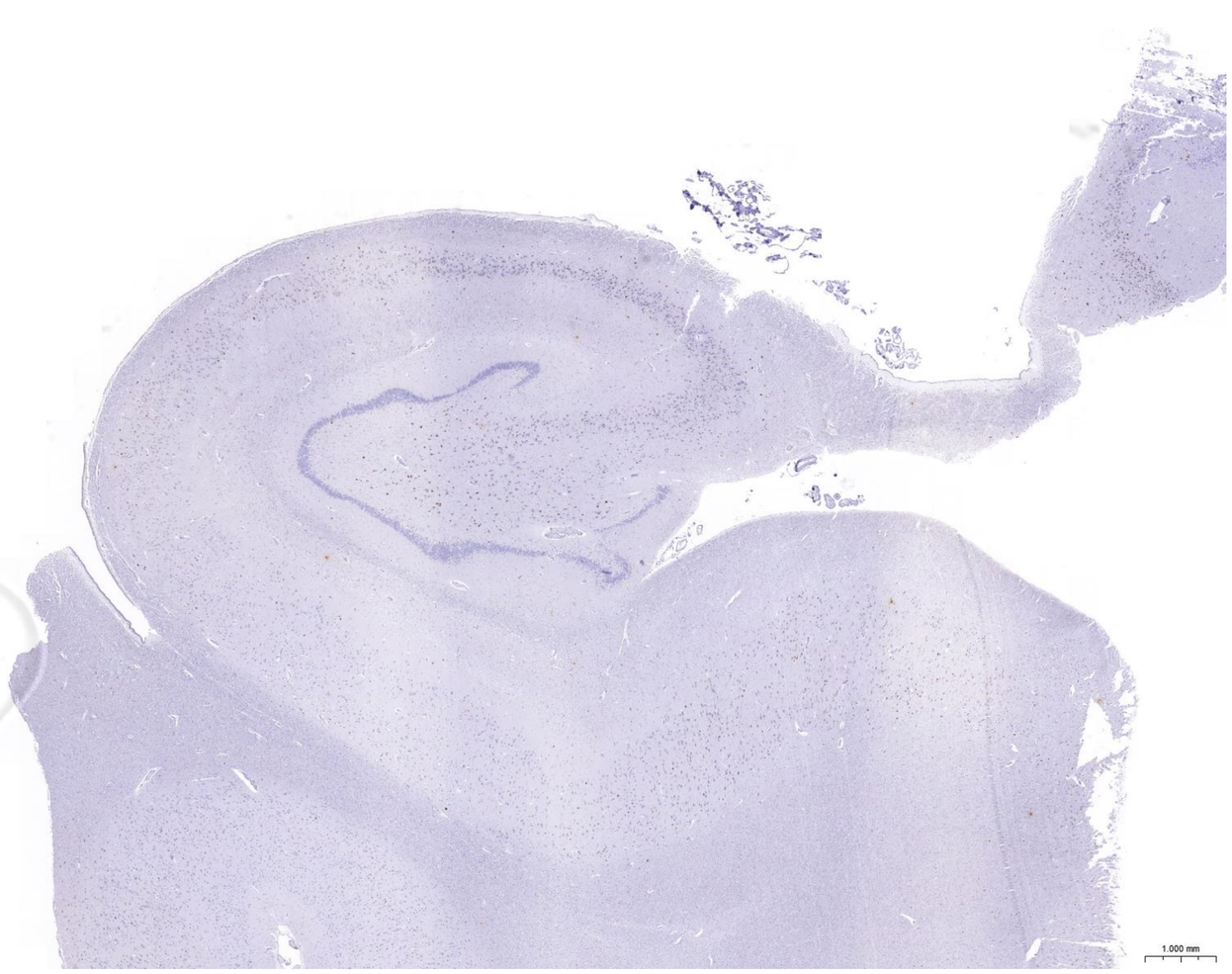
# 11.7T MRI of the medial temporal lobe approximates histology resolution

**Yasmine Salman** (1), **Nicolas Joudiou** (2), **Sandra O. Tomé** (3), **Dietmar Rudolf Thal** (3), **Bernard Gallez** (2), **and Bernard J Hanseeuw** (1)

1. Institute of Neuroscience, UCLouvain, Brussels, Belgium, 2. Louvain Drug Research Institute, UCLouvain, Brussels, Belgium, 3. Laboratory for Neuropathology, KU Leuven, Leuven, Belgium,




**Background:** The anatomy of the medial temporal lobe (MTL) is affected by several neuropathologies, including Tau, TDP-43, α-synuclein and amyloid-β . Histopathology studies suggest that they may originate from different neuron types located in different subregions. However, the current resolution of in-vivo 3T MRI does not allow distinguishing between these pathologies. Post-mortem imaging is therefore a promising tool for studying the detailed anatomy of the MTL, enabling ultra-high resolution. Specifically, 11.7T MRI allows a visual distinction of the certain layers of the hippocampal subfields with a resolution approaching histology resolution.

**Methods:** The MTL of deceased non-demented older aldults was isolated, fixed in formalin for 2 months and scanned on a Bruker 11.7T MRI in fluorinert, an inert oil which produces no MRI signal. A T1-weighted FLASH sequence with a resolution of 50x50x100µm3 was acquired for each specimen (Flip angle = 20°; TE= 4.425 ms; TR= 70 ms). A T2-weighted RARE sequence with a resolution of 100x100x200µm3 (TE= 18.5 ms; TR= 4000 ms) was also acquired (not shown). The scanned specimens were then histologically analyzed to assess neuronal loss and several proteinopathies. Paraffin-embedded tissues from relevant regions of the MTL (hippocampal formation, entorhinal cortex, and amygdala) are quantified for the quantity of neurons/mm2, as well as for Tau, TDP-43, α-synuclein and amyloid-β burdens.

**Image:** The image shows a selected case where 11.7T MRI allows visualizing the molecular and the granular cell layers of the dentate gyrus with a resolution that approximates the one of histology (50µm in-plane resolution).

**Perspectives:** Neuronal loss will soon be correlated to volumetric measures in a small cohort of patients, before defining an anatomical signature for each neuropathology

**Yasmine Salman**
yasmine.salman@uclouvain.be