



Introduction

The functional connectivity of the precuneus with regions of the medial temporal lobe is a major component of our default mode network and underlies high order functions.(1-5) Stronger connectivity of these regions is corelated with higher cognitive performances(7) while in neurological and psychiatric conditions this is found disrupted.(7-9) Although a growing body of evidence demonstrates this functional connectivity and its importance, the underlying structural circuit remains anonymous. During a laboratory investigation of the anatomical connectivity of these regions, we identified a previously unknown fiber tract, thus prompting its further exploration.

Methods

Nine normal cadaveric hemispheres were studied through the fiber micro-dissection technique(10) and a tailored DTI protocol including a two region-of-interest (ROI) approach was applied in three healthy adults.

Results

A distinct fiber tract is consistently identified at the depth of the posteromedial cortex running between the precuneus and temporal pole. This tract follows the direction

the parieto-occipital sulcus, and passing through the parahippocampal place area (PPA), it curves laterally and projects towards the temporal horn to finally reach the temporal pole. (Figures 1,3,4) On its way to the temporal pole this tracts also displays connections with the lingual, parahippocampal and fusiform gyri, inferior longitudinal gyri, inferior longitudinal fasciculus and hippocampal formation.(Figures 1-3)

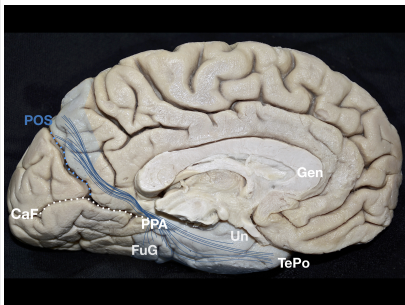
Conclusions

This study demonstrates the direct connectivity of the precuneus with medial temporal lobe regions through a distinct fiber tract, which we named the retrosplenial aslant tract (RAT) due to its oblique trajectory and highest fiber density at the retrosplenial area. Our results indicate that the RAT is responsible for the connectivity of high order areas implicated in memory, attention, consciousness, spatial updating, navigation, and visuomotor planning; thus, calling for studies that will enhance our understanding of its function

Learning Objectives

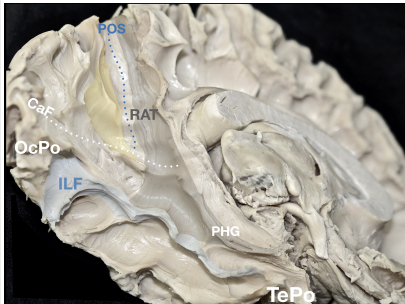
To introduce a previously unknown fiber tract which redefines neuroanatomical knowledge regarding the connectivity of the precuneus and temporal lobe.

Trajectory



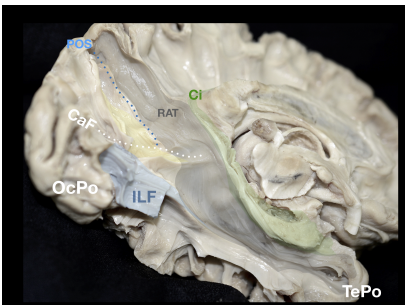
Dark blue continuous lines, RAT trajectory; highlighted light blue, RAT Cortical Projections; CaF, calcarine fissure; FuG, fusiform gyrus; PPA, parahippocampal place area; POS, parieto-occipital sulcus TePo, temporal pole; Un, uncus

RAT fibers & ILF



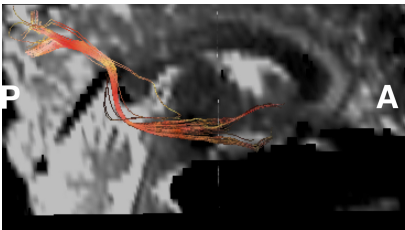
Left hemisphere, infero-medial view following cortical and U-fiber microdissection. The RAT can be observed at the anterior bank of the POS highlighted in grey, running between the precuneus, and the ILF. Grey, retrosplenial aslant tract; yellow, sledge runner dark; CaF, calcarine fissure; OcPo, occipital pole; POS, parieto-occipital sulcus

RAT fibers terminating at the temporal pole



Left hemisphere infero-medial view demonstrating the regional fiber tract anatomy after dissection of the inferior longitudinal fasciculus and most of the cingulum fibers. grey, retrosplenial aslant tract; yellow, sledge runner fasciculus; blue, inferior longitudinal fasciculus; green, resected cingulum; CAF, calcarine fissure; Ci, cingulum; OcPo, occipital pole; POS, parieto-occipital sulcus; TePo, temporal pole

DTI



DTI Representation and projection over a sagittal MRI image.

References

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