

Introduction

Efforts are underway to develop practical methods for mapping functions of the inferior parietal lobe, such as spatial cognition and attention. However, the subcortical anatomy of the region remains poorly understood. Knowledge of the associated white tracts could go far in preventing post-operative deficits in higher functioning that may occur without a detailed understanding of their exact locations. Through DTI-based fiber tracking validated by gross anatomical dissection as ground truth, we have characterized these connections based on relationships to other well-known structures.

Methods

Diffusion imaging from the Human Connectome Project for 10 healthy adult controls was used for tractography analysis. We evaluated the inferior parietal lobe as a whole based on connectivity with other regions. All inferior parietal lobe tracts were mapped in both hemispheres, and lateralization index was calculated with resultant tract volumes. Ten postmortem dissections were then performed using a modified Klingler technique to demonstrate the location of major tracts.

Results

We identified three major types of connections of the inferior parietal lobe: short U-fibers connect the supramarginal and angular gyri, and connect both gyri to the superior parietal lobe; fiber bundles join the superior longitudinal fasciculus near the Sylvian point to reach the frontal lobe; and fiber bundles connecting to the temporal lobe course within the inferior longitudinal fasciculus, joining just inferior to the margin of the superior temporal sulcus. None of the tracts described demonstrated laterality.

Conclusions

Understanding relationships among subcortical structures of the supramarginal and angular gyri may aid surgeons in preventing postoperative deficits, and this study highlights the principle underlying white-matter pathways.

Learning Objectives

By the conclusion of this session, participants should be able to 1.) Describe important cortical and subcortical anatomic features of the inferior parietal lobe. 2.) Describe the key connections of the inferior parietal lobe to other regions of the cerebrum. 3.) Describe fiber bundles responsible for these connections, and their spatial relationship relative to other well known cerebral structures and major tracts.