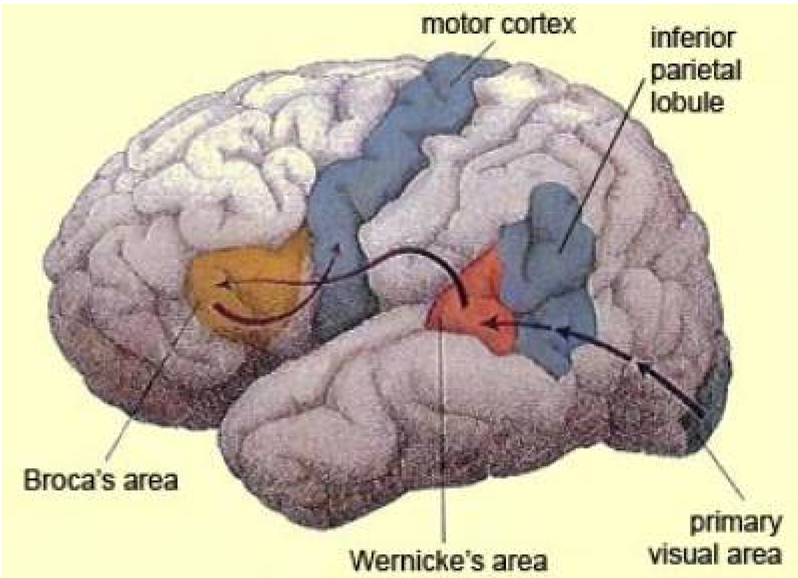
Inferior parietal lobule

- Developmental changes in brain activation and functional connectivity during Chinese handwriting
- Plasma p-tau231 and NfL differently associate with functional connectivity patterns in cognitively unimpaired individuals
- Neuromagnetic evidence of the foot primary somatosensory area in the frontal cortex
- HPC-DMN integration at neural event boundary affects across-boundary BOLD representations and memory recollection
- Altered interhemispheric functional connectivity in end-stage renal disease patients receiving hemodialysis without cognitive impairment
- Neural basis of the association between future time perspective and ADHD characteristics: functional connectivity between Left inferior parietal lobule and mPFC
- Obesity-related alterations of intrinsic functional architecture: a resting-state fMRI study based on the human connectome project
- Abnormal association between neural activity and genetic expressions of impulsivity in attention deficit hyperactivity disorder: an Adolescent Brain Cognitive Development study



The inferior parietal lobule (IPL, subparietal district or lobule) lies below the horizontal portion of the intraparietal sulcus, and behind the lower part of the postcentral sulcus. Also known as Geschwind's territory after Norman Geschwind, an American neurologist, who in the early 1960s foresaw its importance.

The inferior parietal lobule is composed primarily of the angular gyrus and supramarginal gyrus.

The inferior parietal lobule, important in second Language (L2) learning success, is anatomically connected to language areas in the frontal lobe via the superior longitudinal fasciculus (SLF). The second and third branches of the SLF (SLF II and III) have not been examined separately in the context of language, yet they are known to have dissociable frontoparietal connections. Studying these pathways and their functional contributions to L2 learning is thus of great interest. Using diffusion MRI tractography, Sander et al. investigated individuals undergoing language training to explore brain structural predictors of L2 learning success. They dissected SLF II and III using goldstandard anatomical definitions and related prelearning white matter integrity to language improvements corresponding with hypothesized tract functions. SLF II properties predicted improvement in lexical retrieval, while SLF III properties predicted improvement in articulation rate. Finer grained separation of these pathways enables better understanding of their distinct roles in language, which is essential for studying how anatomical connectivity relates to L2 learning abilities [1].

Lesion studies and recent surgical series report important sequelae when the inferior parietal lobe and posterior temporal lobe are damaged. Millions of axons cross through the white matter underlying these cortical areas; however, little is known about the complex organization of these connections. OBJECTIVE: To analyze the subcortical anatomy of a specific region within the parietal and temporal lobes where 7 long-distances tracts intersect, ie, the temporoparietal fiber intersection area (TPFIA). METHODS: Four postmortem human hemispheres were dissected, and 4 healthy hemispheres were analyzed through the use of diffusion tensor imaging–based tractography software. The different tracts that intersect at the posterior temporal and parietal lobes were isolated, and the relations with the surrounding structures were analyzed. RESULTS: Seven tracts pass through the TPFIA: horizontal portion of the superior longitudinal fasciculus, arcuate fasciculus, middle longitudinal fasciculus, inferior longitudinal fasciculus, inferior fronto-occipital fasciculus, optic radiations, and tapetum. The TPFIA was located deep to the angular gyrus, posterior portion of the supramarginal gyrus, and posterior portion of the superior, middle, and inferior temporal gyri.

The TPFIA is a critical neural crossroad; it is traversed by 7 white matter tracts that connect multiple areas of the ipsilateral and contralateral hemisphere. It is also a vulnerable part of the network in that a lesion within this area will produce multiple disconnections. This is valuable information when a surgical approach through the parieto-temporo-occipital junction is planned. To decrease surgical risks, a detailed diffusion tensor imaging tractography reconstruction of the TPFIA should be performed, and intraoperative electric stimulation should be strongly considered [2].

Surgery

see Left inferior parietal lobule surgery.

1)
Sander K, Barbeau EB, Chai X, Kousaie S, Petrides M, Baum S, Klein D. Frontoparietal Anatomical Connectivity Predicts Second Language Learning Success. Cereb Cortex. 2021 Oct 5:bhab367. doi: 10.1093/cercor/bhab367. Epub ahead of print. PMID: 34607363.
2)
Martino J, da Silva-Freitas R, Caballero H, Marco de Lucas E, García-Porrero JA, Vázquez-Barquero A. Fiber dissection and diffusion tensor imaging tractography study of the temporoparietal fiber intersection area. Neurosurgery. 2013 Mar;72(1 Suppl Operative):87-97; discussion 97-8. doi: 10.1227/NEU.0b013e318274294b. PubMed PMID: 23417154.