Lesion studies and recent surgical series report important sequelae when the inferior parietal lobule 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.

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).

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.

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 [1)].

1)
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.