Thalamic prefrontal peduncle

The thalamic-prefrontal peduncle (TPP) is a large bundle connecting the thalamus and prefrontal cortex.

Function

The definitive structure and function of the TPP are still controversial. To investigate the connectivity and segmentation patterns of the TPP, Sun et al., employed DSI diffusion spectrum imaging with Generalized q-sampling imaging reconstruction to perform both subject-specific and template-based analyses.

The results confirmed the trajectory and spatial relationship of the TPP in the human brain and identified the connection areas in the prefrontal cortex. The TPP-connecting areas identified based on Brodmann areas (BAs) were BAs 8-11 and 45-47. Based on the automated anatomical atlas, these areas were the medial superior frontal gyrus, superior frontal gyrus, middle frontal gyrus, pars triangularis, pars orbitalis, anterior orbital gyrus, and lateral orbital gyrus. In addition, they identified the TPP connection areas in the thalamus, including the anterior and medial nuclei, and the lateral dorsal/lateral posterior nuclei. TPP fibers connected the thalamus with the ipsilateral prefrontal BAs 11, 47, 10, 46, 45, 9, and 8 seriatim from medial to lateral, layer by layer. Our results provide further details of the thalamic-prefrontal peduncle structure, and may aid future studies and a better understanding of the functional roles of the TPP in the human brain [1].

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Sun C, Wang Y, Cui R, Wu C, Li X, Bao Y, Wang Y. Human Thalamic-Prefrontal Peduncle Connectivity Revealed by Diffusion Spectrum Imaging Fiber Tracking. Front Neuroanat. 2018 Apr 17;12:24. doi: 10.3389/fnana.2018.00024. eCollection 2018. PubMed PMID: 29719502; PubMed Central PMCID: PMC5913328.