Precuneus

The precuneus is a part of the superior parietal lobe forward of the occipital lobe (cuneus). It is hidden in the medial longitudinal fissure between the two cerebral hemispheres. It is sometimes described as the medial area of the superior parietal cortex. The precuneus is bounded anteriorly by the marginal branch of the cingulate sulcus, posteriorly by the parietooccipital sulcus, and inferiorly by the subparietal sulcus. It is involved with episodic memory, visuospatial processing, reflections upon self, and aspects of consciousness.

The location of the precuneus makes it difficult to study. Furthermore, it is rarely subject to isolated injury due to strokes, or trauma such as gunshot wounds. This has resulted in it being "one of the less accurately mapped areas of the whole cortical surface".

While originally described as homogeneous by Korbinian Brodmann, it is now appreciated to contain three subdivisions.

It is also known after Achille-Louis Foville as the quadrate lobule of Foville.

The Latin form of praecuneus was first used in 1868 and the English precuneus in 1879.

It has been implicated in several brain functions and is not silent brain. Higher mental functioning, memory, and other neurocognitive functions are thought to take place in this area.

The precuneus and posterior cingulate, two interacting hubs engaged during various cognitive functions, including reflective self-awareness; visuospatial and sensorimotor processing; and processing social cues. This inseparable duo ensures the cortico-subcortical connectivity that underlies these processes. An adult presenting a right precuneal low-grade glioma invading the posterior cingulum underwent awake craniotomy with direct electrical stimulation (DES). A supramaximal resection was achieved after locating the superior longitudinal fasciculus II. During surgery, they found sites of positive stimulation for line bisection and mentalizing tests that enabled the identification of surgical corridors and boundaries for lesion resection. When post-processing the intraoperative recordings, we further identified areas that positively responded to DES during the trail-making and mentalizing tests. In addition, a clear worsening of the patient's self-assessment ability was observed throughout the surgery. An awake cognitive neurosurgery approach allowed supramaximal resection by reaching the cortico-subcortical functional limits. The mapping of complex functions such as social cognition and self-awareness is key to preserving patients' postoperative cognitive health by maximizing the ability to resect the lesion and surrounding areas [1)]

Khoo et al investigated alterations in the Default mode network (DMN) of patients with iNPH and sought to determine whether a relationship exists between the resting-state functional connectivity of the DMN and a patient's clinical symptoms.

Resting-state functional magnetic resonance imaging (rs-fMRI) was performed in 16 preoperative patients with Idiopathic normal pressure hydrocephalus (iNPH) and 15 neurologically healthy control subjects of a similar age. Independent component and dual-regression analyses were used to quantify

DMN connectivity. The patients' clinical symptoms were rated according to the iNPH scale (iNPHGS). Each of their specific clinical symptoms were rated according to the cognitive, gait, and urinary continence domains of iNPHGS, and neurocognitive status was assessed using the Mini Mental State Examination, Frontal Assessment Battery (FAB), and Trail Making Test Part A. The strength of DMN connectivity was compared between patients and controls, and the correlation between DMN connectivity and iNPHGS was examined using both region of interest (ROI)-based analysis and voxel-based analysis. The correlation between DMN connectivity and each of the specific clinical symptoms, as well as neurocognitive status, was examined using voxel-based analysis.

Both ROI-based and voxel-based analyses revealed reduced DMN connectivity in patients with iNPH. ROI-based analysis showed increased DMN connectivity with worsening clinical symptoms of iNPH. Consistently, voxel-based analyses revealed that DMN connectivity correlated positively with the iNPHGS score, as well as the cognitive and urinary continence domain scores, and negatively with the FAB score. The significant peak in correlation in each case was localized to the precuneus.

This is the first study to establish alterations in the DMN of patients with iNPH. DMN connectivity may be a useful indicator of the severity of clinical symptoms in patients with iNPH [2].

[1]
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[2]
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