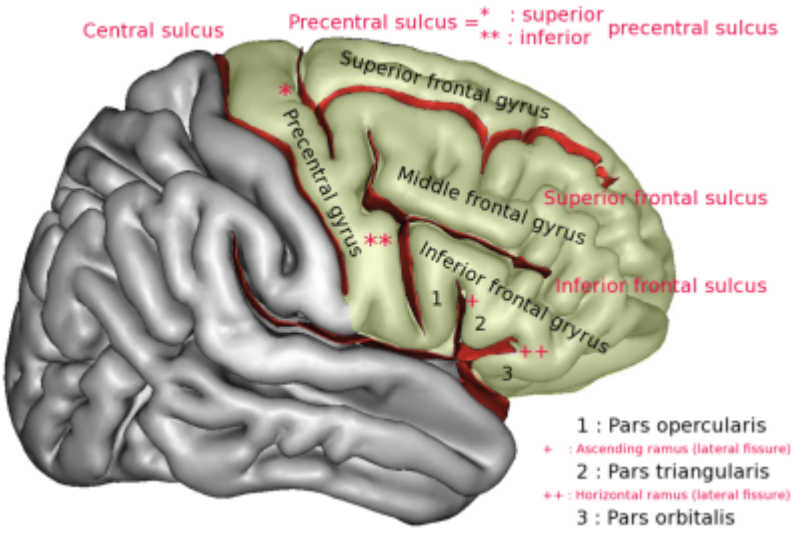
# Precentral gyrus

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- Expectations related to the use of theta burst stimulation protocols for pain relief. A systematic review
- Information processing in the Hand Laterality Judgement Task: Fundamental differences between dorsal and palmar views revealed by a "forced response" paradigm
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- Emerging adulthood is marked by a cortical dendritic arborization phase depending on the actin nucleator Cobl
- Huang Lian Jie Du Decoction Prevents Chronic Alcoholic Encephalopathy and Improves Gut Microbiota Imbalance in Mice

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## Central sulcus region

Central sulcus region.

The precentral gyrus, forming the posterior border of the frontal lobe, contains the primary motor cortex.

see Brodmann area 4.

The middle frontal gyrus (MFG) often connects to the pre-central gyrus via a thin isthmus [1)].

Several methods have been created to aid both neurosurgeons and neuroradiologists in precisely

localizing the precentral gyrus. One of them consists of recognizing the intersection between the superior frontal sulcus and the precentral sulcus, being the motor hand area at the same sagittal plane on the precentral gyrus [2) 3)].

The intersectional point between the superior frontal sulcus and precentral sulcus (**) is the invagination base of the knob on the precentral gyrus.

Hand “Knob”: The alpha motor neurons for hand motor function are located in the superior aspect of the prefrontal gyrus [4)]. On axial imaging, this appears as a knob-like protrusion (shaped like an inverted greek letter omega Ω) of the precentral gyrus projecting posterolaterally into the central sulcus [5)]. On sagittal imaging, it has a posteriorly projecting hook-like appearance and is even with the posterior limit of the Sylvian fissure [6)].

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The cortical representation for facial movement occurs in the motor strip along the lateral aspect (just above the most inferior opercular portion of the precentral gyrus).

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Direct cortical stimulation studies and functional magnetic resonance imaging studies have demonstrated that the precentral gyrus lodges the motor primary cortex and the second curvature of the central sulcus, which corresponds to the knob-like form in the precentral gyrus, are specifically associated with contralateral motor hand skills.

Brain surface reformatted imaging improves the diagnostic accuracy of standard anatomical MR imaging for localizing superficial brain lesions in relation to the precentral gyrus. The complementary use of this technique with standard two-dimensional imaging is supported by the fast and simple postprocessing technique and may provide useful information for preoperative surgical planning [7)].

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Kim et al. reviewed 33 consecutive patients who experienced pharmacologically intractable epilepsy and underwent Precentral gyrus resection (PGR) with intraoperative cortical stimulation and mapping while under awake anesthesia. The etiological diagnoses were brain neoplasm in 26 patients (78.8%), cortical lesion in 4 (12.1%), and no lesion in 3 (9.1%). The mean follow-up period was 62.6 months (range, 12-146 months). All topographical analyses of the resected quadrant area were performed based on postoperative magnetic resonance images.

After PGR, 22 patients (66.7%) experienced neurological worsening, including 5 permanent deficits (15.2%) and 17 transient deficits (51.5%). Permanent deficits included 2 instances of weakness, 1 dysarthria, 1 dysesthesia, and 1 fine-movement disturbance of the hand. While the neurological risk for anterior lower quadrant PGR was 20.0% (1/5), the risk for posterior upper quadrant PGR was 100.0% (10/10). The anterior upper and posterior lower quadrant PGR caused neurological deteriorations in 60.0% (6/10) and 62.5% (5/8) of the patients, respectively. In a multivariate analysis, PGR of the posterior and upper quadrant sections were significant risk factors for post-PGR neurological deteriorations (P = .022 and 0.030, respectively).

The posterior upper quadrant of the precentral gyrus was vulnerable to post-resective neurological impairment [8)].

# Left precentral gyrus

see Left precentral gyrus

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Garcia Santos et al aimed to investigate whether magnetic resonance spectroscopy (MRS) metabolite ratios change in the precentral gyrus of patients with amyotrophic lateral sclerosis (ALS) after spinal cord surgical injection of bone marrow mononuclear cells, as well as their relationship with disability and survival and demonstrates that spinal cord injection of stem cells shows metabolic improvement in the brain that might be related to longer survival and less disability [9].

# Precentral gyrus tumor

Precentral gyrus tumor.

# References


1)
Naidich TP. MR Imaging of Brain Surface Anatomy. Neuroradiology. 1991; 33:S95–S99

2)
Ebeling U, Steinmetz H, Huang YX, Kahn T. Topography and identification of the inferior precentral sulcus in MR imaging. AJR Am J Roentgenol. 1989;153(5):1051-6. doi:10.2214/ajr.153.5.1051

3)
Kido DK, LeMay M, Levinson AW, Benson WE. Computed tomographic localization of the precentral gyrus. Radiology. 1980;135(2):373-7. doi:10.1148/radiology.135.2.7367629

4)
Penfield W, Boldrey E. Somatic motor and sensory representation in the cerebral cortex of man as studied by electrical stimulation. Brain. 1937; 986 60:389–443

5) , 6)
Yousry TA, Schmid UD, Alkadhi H, Schmidt D, Peraud A, Buettner A, Winkler P. Localization of the motor hand area to a knob on the precentral gyrus. A new landmark.Brain.1997;120(Pt1):141–157

7)
Hattingen E, Good C, Weidauer S, Herminghaus S, Raab P, Marquardt G, Raabe A, Seifert V, Zanella FE. Brain surface reformatted images for fast and easy localization of perirolandic lesions. J Neurosurg. 2005 Feb;102(2):302-10. PubMed PMID: 15739559.

8)
Kim YH, Kim CH, Kim JS, Lee SK, Han JH, Kim CY, Chung CK. Topographical risk factor analysis of new neurological deficits following precentral gyrus resection. Neurosurgery. 2015 Jun;76(6):714-20; discussion 720. doi: 10.1227/NEU.0000000000000712. PubMed PMID: 25734322.

9)
García Santos JM, Inuggi A, Gómez Espuch J, Vázquez C, Iniesta F, Blanquer M, María Moraleda J, Martínez S. Spinal cord infusion of stem cells in amyotrophic lateral sclerosis: Magnetic resonance spectroscopy shows metabolite improvement in the precentral gyrus. Cytotherapy. 2016 Jun;18(6):785-96. doi: 10.1016/j.jcyt.2016.03.296. PubMed PMID: 27173751.