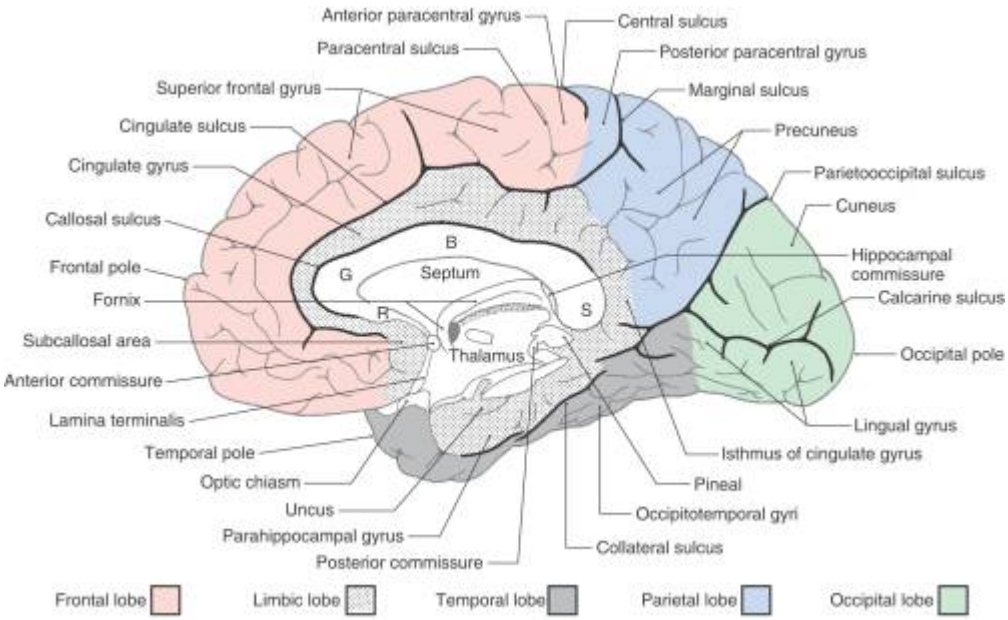
Sulci



Depression or fissure in the surface of the brain. It surrounds the gyri, creating the characteristic appearance of the brain.

The brain sulci constitute the main microanatomic delimiting landmarks and surgical corridors of modern micro neurosurgery. Because of the frequent difficulty in intraoperatively localizing and visually identifying the brain sulci with assurance.

Sulci/gyri are topological cerebral landmarks in individual patients and do shift with the brain parenchyma during lesion removal, but remain independent from brain shift in relation to the sulci/gyri. Tomaiuolo et al. reported a case report of a novel strategy based on anatomical landmarks to guide intra-operative brain tumor resection, without using a standard neuronavigation system. A pre-operative brain mapping of the peri-tumoral sulci by the MRI and surface reconstruction was followed by confirmation of the anatomical landmarks for the motor cortex using navigated transcranial magnetic stimulation. The resulting location was used as a seed for diffusion tensor imaging tractography to reconstruct the corticospinal tracts. These selected cortical landmarks (sulci/gyri) delimited the margins of the two lesions and the specific location under which the corticospinal tract courses, thus facilitating monitoring of the peri-tumoral region during brain resection. In this case, 96% of the brain tumor from the peri-central somatomotor region was successfully removed without chronic post-operative motor impairments. This approach is based on cortical anatomy that is fixed during surgery and does not suffer from the brain shift that could misplace the lesion according to the neuronavigation system [1)].

Books

Ono M, Kubik S, Abernathey CD. Atlas of cerebral sulci. Stuttgart: Thieme; 1990

Notable sulci

Calcarine sulcus

Central sulcus

Central sulcus of insula

Cingulate sulcus

Circular sulcus of insula

Collateral sulcus

Fimbrodentate sulcus

Hippocampal sulcus

Inferior frontal sulcus

Inferior temporal sulcus

Intermammary sulcus

Intraparietal sulcus

Lateral sulcus

Lunate sulcus

Occipitotemporal sulcus

Olfactory sulcus

Paracentral sulcus

Parietooccipital sulcus

Postcentral sulcus

Precentral sulcus

Rhinal sulcus

Subparietal sulcus

Sulcus of corpus callosum

Superior frontal sulcus

Superior parietal sulcus

Superior temporal sulcus

Transverse occipital sulcus

Transverse temporal sulcus.

The inclusion of sulci in future finite element analysis (FEA) for the brain is strongly advised, especially for models used to investigate space-occupying lesions.

1)
Tomaiuolo F, Raffa G, Morelli A, Rizzo V, Germanó A, Petrides M. Sulci and gyri are topological cerebral landmarks in individual subjects: a study of brain navigation during tumor resection. Eur J Neurosci. 2022 Apr 19. doi: 10.1111/ejn.15668. Epub ahead of print. PMID: 35441404.