Central core

The central core between the insula and midline includes the extreme, external, and internal capsules; claustrum; putamen; globus pallidus; caudate nucleus; amygdala; diencephalon; substantia innominata; fornix; anterior commissure; mammillothalamic tract; fasciculus retroflexus; thalamic peduncles, including optic and auditory radiations; ansa peduncularis; thalamic fasciculus; and lenticular fasciculus. It is attached to the remainder of the cerebral hemisphere by the cerebral isthmus, which is composed of white matter fibers located between the dorsolateral margin of the caudate nucleus and the full circumference of the circular sulcus of insula. The rostral fibers of the corpus callosum are included in the frontal portion of the cerebral isthmus.

It is very useful for neurosurgeons to facilitate the understanding of spatial relationships and pertinent surgical approaches in and around the central core with a highly complex anatomy by using fiber dissection [1)].

The insular surface is the most superficial aspect of the central core and is divided by a central sulcus into an anterior portion, usually containing 3 short gyri, and a posterior portion, with 2 long gyri. It is bounded by the anterior limiting sulcus, the superior limiting sulcus, and the inferior limiting sulcus. The extreme capsule is directly underneath the insular surface and is composed of short association fibers that extend toward all the opercula. The claustrum lies deep to the extreme capsule, and the external capsule is found medial to it. Three fiber pathways contribute to form both the extreme and external capsules, and they lie in a sequential anteroposterior disposition: the uncinate fasciculus, the inferior frontooccipital fascicle, and claustrocortical fibers. The putamen and the globus pallidus are between the external capsule, laterally, and the internal capsule, medially. The internal capsule is present medial to almost all insular limiting sulci and most of the insular surface, but not to their most anteroinferior portions. This anteroinferior portion of the central core has a more complex anatomy and is distinguished in this paper as the “anterior perforated substance region.” The caudate nucleus and thalamus lie medial to the internal capsule, as the most medial structures of the central core. While the anterior half of the central core is related to the head of the caudate nucleus, the posterior half is related to the thalamus, and hence to each associated portion of the internal capsule between these structures and the insular surface. The central core stands on top of the brainstem. The brainstem and central core are connected by several white matter pathways and are not separated from each other by any natural division. The authors propose a subdivision of the central core into quadrants and describe each in detail. The functional importance of each structure is highlighted, and surgical approaches are suggested for each quadrant of the central core. CONCLUSIONS As a general rule, the internal capsule and its vascularization should be seen as a parasagittal barrier with great functional importance. This is of particular importance in choosing surgical approaches within this region [2)].

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Choi CY, Han SR, Yee GT, Lee CH. Central core of the cerebrum. J Neurosurg. 2011 Feb;114(2):463-9. doi: 10.3171/2010.9.JNS10530. Epub 2010 Oct 29. PubMed PMID: 21029041.
2)
Ribas EC, Yağmurlu K, de Oliveira E, Ribas GC, Rhoton A Jr. Microsurgical anatomy of the central core of the brain. J Neurosurg. 2018 Sep;129(3):752-769. doi: 10.3171/2017.5.JNS162897. Epub 2017 Dec 22. PubMed PMID: 29271710.