The subgenual cingulate gyrus (SCG) has been proposed as a target for deep brain stimulation (DBS) in neuropsychiatric disorders, mainly major depression. Despite promising clinical results, the mechanism of action of DBS in this region is poorly understood. Knowledge of the connections of the SCG can elucidate the network involved by DBS in this area and can help refine the targeting for DBS electrode placement. OBJECTIVE: To investigate the anatomic connections of the SCG region. METHODS: An anatomic study of the connections of the SCG was performed on postmortem specimens and in vivo with MR diffusion imaging tractography. Postmortem dissections were performed according to the Klingler technique. Specimens were fixed in 10% formalin and frozen at -15°C for 2 weeks. After thawing, dissection was performed with blunt dissectors. Whole brain tractography was performed using spherical deconvolution tractography. RESULTS: Four main connections were found: (1) fibers of the cingulum, originating at the level of the SCG and terminating at the medial aspect of the temporal lobe (parahippocampal gyrus); (2) fibers running toward the base of the frontal lobe, connecting the SCG with frontopolar areas; (3) fibers running more laterally, converging onto the ventral striatum (nucleus accumbens); (4) fibers of the uncinate fasciculus, connecting the orbitofrontal with the anterior temporal region. CONCLUSION: The SCG shows a wide range of white matter connections with limbic, prefrontal, and mesiotemporal areas. These findings can help to explain the role of the SCG in DBS for psychiatric disorders [1)].

A study tested the validity of dividing this tract into subdivisions corresponding to the 'parahippocampal', 'retrosplenial', and 'subgenual cingulate gyrus' portions of the cingulum. These three cingulum subdivisions occupied different medial-lateral locations, producing a topographic arrangement of cingulum fibres. Other comparisons based on these different reconstructions indicate that only a small proportion of the total white matter in the cingulum traverses the length of the tract. In addition, both the radial diffusivity and fractional anisotropy of the subgenual subdivision differed from that of the retrosplenial subdivision which, in turn, differed from that of the parahippocampal subdivision. The extent to which the radial diffusivity scores and the fractional anisotropy scores correlated between the various cingulum subdivisions proved variable, illustrating how one subdivision may not act as a proxy for other cingulum subdivisions. Attempts to relate the status of the cingulum, as measured by MRI-based fibre tracking, with cognitive or affective measures will, therefore, depend greatly on how and where the cingulum is reconstructed. The present study provides a new framework for subdividing the cingulum, based both on its known connectivity and MRI-based properties [2)].

Tinnitus distress has been linked to increased beta oscillatory activity in the dorsal anterior cingulate cortex (dACC). The amount of distress is linked to alpha activity in the medial temporal lobe (amygdala and parahippocampal area), as well as the subgenual (sg)ACC and insula, and the functional connectivity between the parahippocampal area and the sgACC at 10 and 11.5 Hz.

1)
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2)
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