Sensorimotor cortex

Area of the cortex including the precentral gyrus and the postcentral gyrus and combining sensory and motor functions.

Zimmermann et al., from Erlangen find that localization of cortical sensorimotor areas with fMRI and MEG showed good congruency with a mean spatial distance of around 10 mm, with differences depending on the localization method. The smallest mean differences for the centroids were found for MEF with MNE 8 mm and SEF with sLORETA 8 mm. Primary motor area (M1) reorganization was found in 5 of 12 patients in fMRI and confirmed with MEG data. In these 5 patients with M1-reorganization the distance between the border of the fMRI-based cortical M1-localization and the tumor border on T1w MR images varied between 0-4 mm, which was significant (P = 0.025) different to the distance in glioma patients without M1-reorganization (5-26 mm).

A multimodal preoperative mapping approach combining fMRI and MEG reveals a high degree of spatial congruence and provided high evidence for the presence of motor cortex reorganization [1)].

Low signal intensity of the precentral cortex (PCC) in normal brain on turbo FLAIR images is an objective finding, confirmed by ROI measurement [2)].

Resection of abnormal brain tissue lying near the sensorimotor cortex entails precise localization of the central sulcus. Mapping of this area is achieved by applying invasive direct Cortical stimulation(DCES). However, non-invasive methods, particularly functional magnetic resonance imaging (fMRI), are also utilized. As a supplement to fMRI, localization of somatosensory evoked potentials (SEP) recorded with electroencephalogram (EEG) has been proposed, but did not find its place in clinical practice.

SEP source imaging, based on high-density EEG, reliably identifies the depth of the central sulcus. Moreover, it is a simple, flexible, and relatively inexpensive alternative to fMRI [3)].

On turbo FLAIR images the Perirolandic cortex (PRC) generally has a low signal intensity (SI) in the neurologically normal brain, and this helps as an additional landmark in identifying the sensorimotor cortex [4)].

The perirolandic low signal intensity seen on T2-weighted MR images is located exactly in the anatomic sensorimotor cortex in normal brains, whereas a mismatch can occur in abnormal brains [5)].

1)
Zimmermann M, Rössler K, Kaltenhäuser M, Grummich P, Brandner N, Buchfelder M, Dörfler A, Kölble K, Stadlbauer A. Comparative fMRI and MEG localization of cortical sensorimotor function: Bimodal mapping supports motor area reorganization in glioma patients. PLoS One. 2019 Mar 7;14(3):e0213371. doi: 10.1371/journal.pone.0213371. eCollection 2019. PubMed PMID: 30845241.
2)
Karaarslan E, Arslan A. ROI measurement of the signal intensity of precentral cortex in the normal

brain. Eur J Radiol. 2004 Dec;52(3):221-3. PubMed PMID: 15544898.

[3] http://journals.lww.com/neurosurgery/Abstract/publishahead/Surgically_Relevant_Localization_of_the_Central.98118.aspx

[4] http://pubs.rsna.org/doi/abs/10.1148/radiol.2272020311?journalCode=radiology

[5] Yoshiura T, Iwanaga S, Yamada K, Shrier DA, Patel U, Shibata DK, Numaguchi Y. Perirolandic cortex in infants: signal intensity on MR images as a landmark of the sensorimotor cortex. Radiology. 1998 May;207(2):385-8. PubMed PMID: 9577485.