Cortico cortical evoked potential

Cortico-cortical evoked potential (CCEP) mapping using single pulse electrical stimulation in 25 patients undergoing seizure monitoring with subdural electrode arrays. Mapping was performed by stimulating adjacent electrode pairs and recording CCEPs from the remainder of the electrode array. CCEPs reliably revealed functional networks and showed an inverse relationship to distance between sites. Coregistration to Brodmann areas (BA) permitted group analysis. Connections were frequently directional with 43% of early responses and 50% of late responses of connections reflecting relative dominance of incoming or outgoing connections. The most consistent connections were seen as outgoing from motor cortex, BA6-BA9, somatosensory (SS) cortex, anterior cingulate cortex, and Broca's area. Network topology revealed motor, SS, and premotor cortices along with BA9 and BA10 and language areas to serve as hubs for cortical connections. BA20 and BA39 demonstrated the most consistent dominance of outdegree connections, while BA5, BA7, auditory cortex, and anterior cingulum demonstrated relatively greater indegree. This multicenter, large-scale, directional study of local and long-range cortical connectivity using direct recordings from awake, humans will aid the interpretation of noninvasive functional connectome studies [1)].

1)
Entz L, Tóth E, Keller CJ, Bickel S, Groppe DM, Fabó D, Kozák LR, Erőss L, Ulbert I, Mehta AD. Evoked effective connectivity of the human neocortex. Hum Brain Mapp. 2014 Dec;35(12):5736-53. doi: 10.1002/hbm.22581. Epub 2014 Jul 12. PubMed PMID: 25044884.