

MOTOR AND LANGUAGE DEFICITS CORRELATE WITH RESTING STATE FUNCTIONAL MAGNETIC RESONANCE IMAGING NETWORKS IN PATIENTS WITH BRAIN TUMORS (FAB)

Liouta E^{1,3}, Katsaros VK^{2,3}, Stranjalis G¹, Leks E⁴, Klose U³, Bisdas S^{3,5,6}

¹Department of Neurosurgery, University of Athens, 'Evangelismos' Hospital, Greece

²Department of Radiology, General Anti-Cancer and Oncological Hospital of Athens "St. Savvas", Greece

³Department of Neuroradiology, University Hospital of Tübingen, Germany

⁴Department of Biomedical Magnetic Resonance University Hospital of Tübingen, Germany,

⁵Department of Neuroradiology, National Hospital for Neurology and Neurosurgery, University College London Hospitals, United Kingdom

⁶Institute of Neurology, University College London, United Kingdom

Abstract

OBJECTIVE: Evidence of preoperative resting state functional magnetic resonance's (RS-fMRI) validation by correlating it with clinical preoperative status in brain tumor patients is scarce. Our aim was to validate the functional relevance of RS-fMRI by investigating the association between RS-fMRI and preoperative motor and language function performance in patients with brain tumor.

MATERIAL-METHOD: 69 patients with brain tumors were prospectively recruited. Patients with tumors near pre-central gyrus (n=49) underwent assessment for apparent (paresis) and subtle (finger tapping) deficits. Patients with left frontal tumors in the vicinity of the inferior frontal gyrus (n=29) underwent assessment for gross (aphasia) and mild language (phonological verbal fluency) deficits. RS-fMRI results were extracted by spatial Independent Component Analysis (ICA).

RESULTS: Motor group: paretic patients showed significantly ($P=0.01$) decreased BOLD-signal in ipsilesional pre-central gyrus when compared to contralesional one. Significantly ($P<0.01$) lower BOLD-signal was also observed in ipsilesional pre-central gyrus of paretics when compared with the non-paretics. In asymptomatic patients, a strong positive correlation ($r=0.68$, $P<0.01$) between ipsilesional motor cortex BOLD-signal and contralesional finger tapping performance was observed. Language group: patients with aphasia showed significantly ($P=0.01$) decreased RS-fMRI BOLD-signal in left BA 44 when compared with non-aphasics. In asymptomatic patients, a strong positive correlation ($r=0.72$, $P<0.01$) between BA 44 BOLD-signal and phonological fluency performance was observed.

CONCLUSIONS: Our results showed significant affection of RS-fMRI BOLD-signal of motor and language networks in the vicinity of tumors implying the usefulness of the method for assessment of the underlying functions in brain tumors patients.