3D based radiotherapy

Seventeen patients with a histologically proven glioblastoma multiforme

A functional MRI examination was performed alongside the planning CT and conventional MRI prior to the delivery of conventional 3D based radiotherapy. All patients received 3D based postoperative radiotherapy (up to 60 Gy) combined with temozolomide. Follow-up fMRI examinations were performed after completion of the treatment in the 6th week and in 3 months time. Changes of the task related activation areas were registered and analyzed. The difference in changes of high dose and low dose areas of the brain were also registered and analyzed. The comparison of the pretreatment and 6th week control fMRI activation areas revealed significant changes in motor activation and listening tasks in the case of brain areas which received a high dose (over 40 Gy). Based on the population level statistical parametric images (motor activation tasks) acquired at the 6th week control examination, a significant increase of signal was registered in the precuneus region and in the globus pallidus region. When comparing the 6th week and 3rd month activation signals, no significant changes were registered.

The results demonstrate the influence of radiotherapy on functional MRI signals within the human brain. Based on this findings, functional activation transfers from high dose areas to low dose areas. In case of the motor activation tasks, activations of the secondary motor area were observed following radiotherapy. [1)].

1)
Kovács Á, Emri M, Opposits G, Pisák T, Vandulek C, Glavák C, Szalai Z, Biró G, Bajzik G, Repa I. Changes in functional MRI signals after 3D based radiotherapy of glioblastoma multiforme. J Neurooncol. 2015 Oct;125(1):157-66. doi: 10.1007/s11060-015-1882-2. Epub 2015 Aug 19. PubMed PMID: 26285767.