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Titel des Beitrags:
Prognostic value of combined visualization of MR diffusion and perfusion maps in glioblastoma.

Abstract:
We analyzed whether the combined visualization of decreased apparent diffusion coefficient (ADC) values and increased cerebral blood volume (CBV) in perfusion imaging can identify prognosis-related growth patterns in patients with newly diagnosed glioblastoma. Sixty-five consecutive patients were examined with diffusion and dynamic susceptibility-weighted contrast-enhanced perfusion weighted MRI. ADC and CBV maps were co-registered on the T1-w image and a region of interest (ROI) was manually delineated encompassing the enhancing lesion. Within this ROI pixels with ADC values the 70th percentile (CBVmax) and the intersection of pixels with ADCmin and CBVmax were automatically calculated and visualized. Initially, all tumors with a mean intersection greater than the upper quartile of the normally distributed mean intersection of all patients were subsumed to the first growth pattern termed big intersection (BI). Subsequently, the remaining tumors’ growth patterns were categorized depending on the qualitative representation of ADCmin, CBVmax and their intersection. Log-rank test exposed a significantly longer overall survival of BI (n = 16) compared to non-BI group (n = 49) (p = 0.0057). Thirty-one, four and 14
patients of the non-BI group were classified as predominant ADC-, CBV- and mixed growth group, respectively. In a multivariate Cox regression model, the BI-, CBV- and mixed groups had significantly lower adjusted hazard ratios (p-value, \( ?(\text{Bonferroni}) < 0.006 \)) when compared to the reference group ADC: 0.29 (0.0027), 0.11 (0.038) and 0.33 (0.0059). Our study provides evidence that the combination of diffusion and perfusion imaging allows visualization of different glioblastoma growth patterns that are associated with prognosis. A possible biological hypothesis for this finding could be the interpretation of the ADC\text{min} fraction as the invasion-front of tumor cells while the CBV\text{max} fraction might represent the vascular rich tumor border that is "trailing behind" the invasion-front in the ADC group.

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