Aim of this study was to investigate the influence of contrast agent leakage on relative cerebral blood volume (rCBV), using clinical dynamic susceptibility contrast (DSC) protocols. Different correction methods were compared, in order to identify a clinically reliable method. DSC perfusion data from patients with glioma were acquired with a single-shot EPI technique at 3.0T using a pre-dose. Three different post-processing methods for leakage correction were compared, concerning rCBV, the permeability related parameter K2 and the predominant leakage effect in tumor regions (T1 effect: K2>0; T2* effect: K2<0).

Additionally, simulations were performed, to investigate the influence of noise and input curve modifications on correction results. Our results indicate several differences between post-processing methods with regard to rCBV values, reflected by the fact that the distribution of detected leakage effects and the correction strength differed between methods. Leakage was heterogeneous within tumorous tissue and between patients, with a general predominance of T2* effects but an increased amount of T1 effects in low grade glioma. Simulations confirmed differential dependencies on signal-to-noise ratios, mean transit times and input curves as possible reasons. The impact of leakage is complex, thus
adequate correction necessitates care. Standardized input parameters are one important factor for comparability of rCBV and K2 values among patients. The extension of DSC analysis with K2 maps could potentially allow improved differentiation between tumor grades. Further methods need to integrate special advantages of existing approaches to achieve more reliable rCBV estimates within clinically reasonable calculation times.

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