Purpose. The aim of this study was to evaluate the effect of using different softwares on the reproducibility of perfusion parameters obtained in a group of gliomas. Data obtained were used to evaluate intra and interobserver reproducibility (intra-software reproducibility) and inter-software reproducibility.

Methods. We retrospectively evaluated DCE (Dynamic Contrast-enhanced MRI) and DSC (Dynamic Susceptibility Contrast MRI) data sets of 20 patients with gliomas (8 WHO II, 4 WHO III and 8 WHO IV) using a 3.0 Tesla magnet. Perfusion data were postprocessed with two software packages: NordicIce (NordicNeuroLab, Bergen, Norway) and Olea Sphere (Olea Sphere, Olea Medical Solutions, La Ciotat, France); in Olea Sphere both automatic and manual detection of vascular input function (VIF) was used. Parametric maps of Ktrans and Vp were obtained from DCE data sets; parametric map of CBV from DSC data sets. For each parameter we evaluated the maximal abnormality through hotspots-based method. All patients were analyzed by two independent observers blinded to the histological grade using both softwares. Each observer repeated the analysis after one month to evaluate intraobserver reproducibility. Additionally, in each patient we compared DCE parameters obtained selecting the same ROIs with the two softwares. To assess reproducibility of data we used the ICC (intraclass correlation coefficient) and Bland-Altman analysis.

As a secondary aim of the study we also compared the perfusion findings with the WHO histological grade.

Results. The ICC for intra and interobserver reproducibility was higher than 0.8 in almost all cases for each parameter and each software suggesting almost perfect agreement. The ICC for intersoftware reproducibility ranged from 0.3 to 0.6 suggesting only poor to moderate agreement. The comparison of the WHO histological grade and the perfusion parameters showed different accuracy depending on the software used.

Conclusions. Our results show that each software guarantees almost perfect intra and interobserver reproducibility for each perfusion parameter. Best reproducibility is obtained when automatic detecting of VIF is selected in Olea Sphere. The finding of low inter-software reproducibility suggests that caution has to be made when comparing results obtained with different softwares platforms.