

DSC T2* MR Perfusion Analysis

Summary

Imaging biomarkers, particularly tumor blood volume estimates, have provided additional patient prognostic information (1–6) independent of the histological grade in gliomas and within the high-grade glioma group.

Raw and post-processed image subsets of the [TCGA-glioblastoma multiforme \(GBM\)](#) collection can be used to evaluate the role of tumor blood volume estimated using DSC T2* magnetic resonance (MR) perfusion in GBM. This data can be correlated with information in genomic publications or from the [TCGA Data Portal](#) for survival prediction and other genomic and clinical result comparison.

The post-processed studies were generated with [nordicICE](#) software (NordicImagingLab AS) using the FDA-approved DSC T2* perfusion module, which corrects for contrast agent leakage from intravascular to extracellular space using the method published by Boxerman, *et al.* (1). Normalized relative cerebral blood volume (rCBV) maps with leakage correction were produced by the software, which normalizes the CBV relative to a globally determined mean value.

All the regions of interest (ROI) were drawn by Rajan Jain and Jayant Narang (HenryFordHospital) in consensus on the rCBV maps fused with post-contrast T1-weighted (T1W) images and *fluid attenuated inversion recovery* (FLAIR) images. $rCBV_{\text{mean}}$, $rCBV_{\text{max}}$, and rCBV of the non-enhancing part of the lesion (NEL) were measured from the rCBV maps and stored in a spreadsheet. To measure rCBV, mean ROIs were drawn on the contrast-enhancing portion of the tumor image (excluding any areas of necrosis and blood vessels) on all slices which contained the tumor to obtain a mean. To measure $rCBV_{\text{max}}$, an ROI of 10 x 10 voxels was placed on the hottest-appearing part of the tumor, based on qualitative perfusion maps. An ROI of 10 x 10 voxels was placed on three spots on the non-enhancing FLAIR abnormality within 1 cm of the edge of the enhancing lesion to measure rCBVNEL and obtain a mean.

This work was published in the following manuscript:

i Genomic Mapping and Survival Prediction in Glioblastoma: Molecular Subclassification Strengthened by Hemodynamic Imaging Biomarkers.

Jain R, Poisson L, Narang J, Gutman D, Scarpace L, Hwang SN, Holder C, Wintermark M, Colen RR, Kirby J, Freymann J, Brat DJ, Jaffe C, Mikkelsen T.

Radiology. 2013 Apr;267(1):212-20. doi: 10.1148/radiol.12120846. Epub 2012 Dec 13. ([link](#))

Note: References listed at the bottom of this page

Supporting Documentation and Metadata

The following supporting documentation is available for download. This information was updated on 2012-02-27 and includes information relevant to the 55 processed cases in the archive. More data is expected in the future.

- [Spreadsheet](#)— contains scaling factors, rCBV values, and scanner info.
- [Text files](#)— contain text dumps of DICOM elements for nordicICE perfusion image studies.

Shared Lists

The following 2 shared lists provide an easy way to download only the raw and post-processed image subsets of the [TCGA-GBM](#) collection described in the project summary.

- **TCGA-GBM DSC T2* MR Perfusion**—contains the raw perfusion image studies
- **TCGA-GBM DSC T2* nordicICE**—contains the post-processed nordiceICE perfusion image studies

If you are not familiar with TCIA's **Shared List** functionality, more information can be found in [section 3.7 of The Cancer Imaging Archive User's Guide](#).

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References

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2. Aronen HJ, Gazit IE, Louis DN, *et al.* Cerebral blood volume maps of gliomas: comparison with tumor grade and histologic findings. *Radiology* 1994;191(1):41–51.
3. Lev MH, Ozsunar Y, Henson JW, *et al.* Glial tumor grading and outcome prediction using dynamic spin-echo MR susceptibility mapping compared with conventional contrast-enhanced MR: confounding effect of elevated rCBV of oligodendrogliomas [corrected](#). *AJNR Am J Neuroradiol* 2004;25(2):214–221.
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7. Mills SJ, Patankar TA, Haroon HA, Baleriaux D, Swindell R, Jackson A. Do cerebral blood volume and contrast transfer coefficient predict prognosis in human glioma? *AJNR Am J Neuroradiol* 2006;27(4):853–858.