QIN GBM Treatment Response

Summary

This collection contains "double baseline" multi-parametric MRI images collected on patients with newly diagnosed glioblastoma. The value of this collection is to provide clinical image data to establish the test-retest characteristics of parameters calculated from DW-MRI, DCE-MRI, and DSC-MRI such as ADC, Ktrans and rCBV. Data were provided by Dr. Elizabeth Gerstner and Dr. Kalpathy-Cramer (MGH) as part of their participation in the Quantitative Imaging Network.

The patients were scanned after surgery but prior to the start of therapy, typically 2-5 days apart. The structural images included T1-weighted pre- and post-contrast images, T2-weighted images, FLAIR and MEMPRAGE images. Advanced MRI sequences included Diffusion Weighted (DW) Imaging, Dynamic Contrast-Enhanced MRI (DCE-MRI), and Dynamic Susceptibility Contrast MRI (DSC-MRI).

Note: If there was an issue with the scan it was excluded, so not all patients have every type of scan available.

The images were obtained on 32-channel Siemens Trio 3T scanners using Siemens 32-channel head coils.

- **T1-weighted** imaging was performed using a 2D FLASH sequence with TR/TE/ = 600 ms/12 ms/90°, matrix size 256×216, field of view (FOV) 185mm $\times$ 220mm, 23 slices and 5mm slice thickness.
- **T2-weighted** imaging was performed using a 3D SPACE spin-echo sequence with TR/TE = 3200 ms/428 ms, matrix size 256×258, FOV 256mm $\times$ 256mm, 176 slices and 1mm slice thickness.
- **FLAIR** was performed using a 2D spin-echo inversion-recovery sequence with TR/TI/TE = 10000 ms/2500 ms/70 ms, matrix size 256×162, FOV 185mm $\times$ 220mm, 23 slices and 5mm slice thickness.
- **MEMPRAGE** was performed using a 3D multi-echo Magnetization Prepared Rapid Gradient Echo sequence with TR/TI/TE1/TE2/TE3/TE4/ =2530 ms/1200 ms/1.64 ms/3.5 ms/5.36 ms/7.22 ms/7°, matrix size 256×256, FOV 256mm $\times$ 256mm, 176 slices and 1mm slice thickness.
- A **Diffusion-weighted (DW)** echo planar imaging sequence with trace diffusion sensitization and b-values of 0 and 700 s/mm^2, TR/TE = 7980 ms/84 ms, matrix size 128×128, FOV 237mm $\times$ 237mm, 64 slices and 1.86mm slice thickness, provided data for Apparent Diffusion Coefficient (ADC) maps.
- **Dynamic Contrast-enhanced (DCE-MRI)** sequences: To estimate pre-contrast T1 relaxation time for DCE quantitation purposes, T1 mapping was performed by using a 3D FLASH sequence before the injection of contrast agent with TR/TE = 7.3 ms/4.41 ms, matrix size 128×128, FOV 230mm $\times$ 230mm, 20 slices, and 2.1mm slice thickness. This sequence was repeated five times at five different flip-angles of 2°, 5°,10°,15°, and 30°. DCE MRI utilized a 3D FLASH dual gradient-echo sequence with with TR/TE1/TE2/ = 6.8 ms/2.61 ms/3.89 ms/10°, matrix size 128×128, FOV 230mm $\times$ 230mm, 20 slices and 2.1mm slice thickness. The acquisition was repeated for 60 times (frames) for a total scan time of 6 min, corresponding to a temporal resolution of 6 s. A bolus of 0.1 mmol/kg of Gd-DTPA (gadopentetic acid) was injected 52 s after the scan started.
- Finally, a combined gradient-echo (ge) and spin-echo (se) 2D EPI sequence was performed to acquire **DSC-MRI** data with TR/TE(ge)/TE(se)/ = 1500 ms/31 ms/95 ms/80°, matrix size 160×160, FOV 192mm $\times$ 192mm, 12 slices and 5mm slice thickness. The acquisition was repeated 100 times for a total scan time of 2 min and 41 sec, corresponding to a temporal resolution of 1.61 s. A bolus of 0.1 mmol/kg of GD-DTPA was injected 80 s after the scan started.

About the NCI QIN

The mission of the QIN is to improve the role of quantitative imaging for clinical decision making in oncology by developing and validating data acquisition, analysis methods, and tools to tailor treatment for individual patients and predict or monitor the response to drug or radiation therapy. More information is available on the Quantitative Imaging Network Collections page. Interested investigators can apply to the QIN at: Quantitative Imaging for Evaluation of Responses to Cancer Therapies (U01) PAR-11-150.

Data Access

Data Access

Some data in this collection contains images that could potentially be used to reconstruct a human face. To safeguard the privacy of participants, users must sign and submit a TCIA Restricted License Agreement to help@cancerimagingarchive.net before accessing the data.

Data Type	Download all or Query/Filter	License
Images (DICOM, 33.5 GB)	*Download Search* (Download requires the NBIA Data Retriever)	TCIA Restricted

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Detailed Description

Detailed Description

Collection Statistics	
Modalities	MR
Number of Patients	54
Number of Studies	106
Number of Series	1,942
Number of Images	589,314
Images Size (GB)	33.5

NOTE: If you use the **Dynamic Susceptibility Contrast MRI (DSC-MRI)** portion of these data, please cite the Collection by DOI, as well as both of the following articles as sources:

1. Prah MA, Stufflebeam SM, Paulson ES, Kalpathy-Cramer J, Gerstner ER, Batchelor TT, Barboriak DP, Rosen BR, Schmainda KM. (2015). **Repeatability of Standardized and Normalized Relative CBV in Patients with Newly Diagnosed Glioblastoma.** American Journal of Neuroradiology. American Society of Neuroradiology (ASNR). DOI: 10.3174/ajnr.a4374

2. Jafari-Khouzani K, Emblem KE, Kalpathy-Cramer J, Bjørnerud A, Vangel MG, Gerstner ER, Schmainda KM, Paynabar K, Wu O, Wen PY, Batchelor T, Rosen B, Stufflebeam SM. (2015). **Repeatability of Cerebral Perfusion Using Dynamic Susceptibility Contrast MRI in Glioblastoma Patients**. Translational Oncology. Elsevier BV. DOI: 10.1016/j.tranon.2015.03.002

Citations & Data Usage Policy

Users must abide by the TCIA Data Usage Policy and Restrictions. Attribution should include references to the following citations:

ⓘ **Data Citation**

Mamonov AB, Kalpathy-Cramer J. (2016). **Data From QIN GBM Treatment Response**. The Cancer Imaging Archive. DOI: 10.7937/k9/tcia.2016.nQF4gpn2

ⓘ **Publication Citation**

Prah MA, Stufflebeam SM, Paulson ES, Kalpathy-Cramer J, Gerstner ER, Batchelor TT, Barboriak DP, Rosen BR, Schmainda KM. (2015). **Repeatability of Standardized and Normalized Relative CBV in Patients with Newly Diagnosed Glioblastoma.** American Journal of Neuroradiology. American Society of Neuroradiology (ASNR). DOI: 10.3174/ajnr.a4374

ⓘ **Publication Citation - DSC-MRI portion**

Jafari-Khouzani K, Emblem KE, Kalpathy-Cramer J, Bjørnerud A, Vangel MG, Gerstner ER, Schmainda KM, Paynabar K, Wu O, Wen PY, Batchelor T, Rosen B, Stufflebeam SM. (2015). **Repeatability of Cerebral Perfusion Using Dynamic Susceptibility Contrast MRI in Glioblastoma Patients**. Translational Oncology. Elsevier BV. DOI: 10.1016/j.tranon.2015.03.002

ⓘ **TCIA Citation**

Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, Journal of Digital Imaging, Volume 26, Number 6, December, 2013, pp 1045-1057. DOI: 10.1007/s10278-013-9622-7

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Versions

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Lifted access embargo.

Version 1 : Updated 2015/08/12

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