The Cancer Genome Atlas Low Grade Glioma Collection (TCGA-LGG)

Summary

> **Redirection Notice**
>
> This page will redirect to https://www.cancerimagingarchive.net/collection/tcga-lgg/ in about 5 seconds.

The Cancer Genome Atlas Low Grade Glioma (TCGA-LGG) data collection is part of a larger effort to build a research community focused on connecting cancer phenotypes to genotypes by providing clinical images matched to subjects from The Cancer Genome Atlas (TCGA). Clinical, genetic, and pathological data resides in the Genomic Data Commons (GDC) Data Portal while the radiological data is stored on The Cancer Imaging Archive (TCIA).

Matched TCGA patient identifiers allow researchers to explore the TCGA/TCIA databases for correlations between tissue genotype, radiological phenotype and patient outcomes. Tissues for TCGA were collected from many sites all over the world in order to reach their accrual targets, usually around 500 specimens per cancer type. For this reason the image data sets are also extremely heterogeneous in terms of scanner modalities, manufacturers and acquisition protocols. In most cases the images were acquired as part of routine care and not as part of a controlled research study or clinical trial.

CIP TCGA Radiology Initiative

Imaging Source Site (ISS) Groups are being populated and governed by participants from institutions that have provided imaging data to the archive for a given cancer type. Modeled after TCGA analysis groups, ISS groups are given the opportunity to publish a marker paper for a given cancer type per the guidelines in the table above. This opportunity will generate increased participation in building these multi-institutional data sets as they become an open community resource. Learn more about the TCGA Glioma Phenotype Research Group.

Acknowledgements

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- Case Western Reserve University, Cleveland, OH -Special thanks to **Jill Barnholtz, MD**. and **Quinn Ostrom**.
- University of North Carolina, Chapel Hill, NC - Special thanks to **J. Keith Smith, M.D.,Ph.D.** and **Shanah Kirk**.

<u>Data Access</u>

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, 42.8GB)	Download Search (Download requires the NBIA Data Retriever)	TCIA Restricted

Click the Versions tab for more info about data releases.

- ## Additional Resources for this Dataset

  The NCI Cancer Research Data Commons (CRDC) provides access to additional data and a cloud-based data science infrastructure that connects data sets with analytics tools to allow users to share, integrate, analyze, and visualize cancer research data.

  - Imaging Data Commons (IDC) (Imaging Data)
  - Genomic Data Commons (GDC) (Genomic, Digitized Histopathology & Clinical Data)

Third Party Analyses of this Dataset

TCIA encourages the community to publish your analyses of our datasets. Below is a list of such third party analyses published using this Collection:

- Segmentation Labels and Radiomic Features for the Pre-operative Scans of the TCGA-LGG collection (BraTS-TCGA-LGG)
- DICOM-SEG Conversions for TCGA-LGG and TCGA-GBM Segmentation Datasets (DICOM-Glioma-SEG)
- ROI Masks Defining Low-Grade Glioma Tumor Regions In the TCGA-LGG Image Collection (TCGA-LGG-Mask)

Detailed Description

Detailed Description

Image Statistics	
Modalities	CT, MR
Number of Participants	199
Number of Studies	219
Number of Series	2,275
Number of Images	241,183
Images Size (GB)	42.8

GDC Data Portal - Clinical and Genomic Data

The GDC Data Portal has extensive clinical and genomic data, which can be matched to the patient identifiers on the images here in TCIA. Below is a snapshot of clinical data extracted on 1/5/2016.

- TCGA-LGG Clinical Data.zip

Explanations of the clinical data can be found on the Biospecimen Core Resource Clinical Data Forms linked below:

- Lower Grade Glioma Case Quality Control Form

- Lower Grade Glioma Enrollment Form
- Lower Grade Glioma Follow-Up Form

A Note about TCIA and TCGA Subject Identifiers and Dates

Subject Identifiers: a subject with radiology images stored in TCIA is identified with a Patient ID that is identical to the Patient ID of the same subject with demographic, clinical, pathological, and/or genomic data stored in TCGA. For each TCGA case, the baseline TCGA imaging studies found on TCIA are pre-surgical.

Dates: TCIA and TCGA handle dates differently, and there are no immediate plans to reconcile:

- TCIA Dates: dates (be they birth dates, imaging study dates, etc.) in the Digital Imaging and Communications in Medicine (DICOM) headers of TCIA radiology images have been offset by a random number of days. The offset is a number of days between 3 and 10 years prior to the real date that is consistent for each TCIA image-submitting site and collection, but that varies among sites and among collections from the same site. Thus, the number of days between a subject's longitudinal imaging studies are accurately preserved when more than one study has been archived while still meeting HIPAA requirements.
- TCGA Dates: the patient demographic and clinical event dates are all the number of days from the index date, which is the actual date of pathologic diagnosis. So all the dates in the data are relative negative or positive integers, except for the "days_to_pathologic_diagnosis" value, which is 0 – the index date. The years of birth and diagnosis are maintained in the distributed clinical data file. The NCI retains a copy of the data with complete dates, but those data are not made available.With regard to other TCGA dates, if a date comes from a HIPAA "covered entity's" medical record, it is turned into the relative day count from the index date. Dates like the date TCGA received the specimen or when the TCGA case report form was filled out are not such covered dates, and they will appear as real dates (month, day, and year).

Citations & Data Usage Policy

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

Pedano, N., Flanders, A. E., Scarpace, L., Mikkelsen, T., Eschbacher, J. M., Hermes, B., Sisneros, V., Barnholtz-Sloan, J., & Ostrom, Q. (2016). The Cancer Genome Atlas Low Grade Glioma Collection (TCGA-LGG) (Version 3) [Data set]. The Cancer Imaging Archive. https://doi.org/10.7937/K9/TCIA.2016.L4LTD3TK

Acknowledgement

"The results <published or shown> here are in whole or part based upon data generated by the TCGA Research Network: http://cancergenome.nih.gov/."

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. (2013). The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository. In Journal of Digital Imaging (Vol. 26, Issue 6, pp. 1045–1057). Springer Science and Business Media LLC. https://doi.org/10.1007/s10278-013-9622-7

Other Publications Using This Data

TCIA maintains a list of publications which leverage our data.

1. Buda, Mateusz et al. "Association of Genomic Subtypes of Lower-Grade Gliomas with Shape Features Automatically Extracted by a Deep Learning Algorithm." Computers in Biology and Medicine, vol. 109, 2019, pp. 218-225, doi:10.1016/j.compbiomed.2019.05.002.
2. Chang, Ken et al. "Residual Convolutional Neural Network for the Determination of Idh Status in Low-and High-Grade Gliomas from Mr Imaging." Clinical Cancer Research, vol. 24, no. 5, 2018, pp. 1073-1081, doi:10.1158/1078-0432.CCR-17-2236.
3. Chang, Ken et al. "Automatic Assessment of Glioma Burden: A Deep Learning Algorithm for Fully Automated Volumetric and Bi-Dimensional Measurement." Neuro Oncol, 2019, doi:10.1093/neuonc/noz106.
4. Chang, P et al. "Deep-Learning Convolutional Neural Networks Accurately Classify Genetic Mutations in Gliomas." American Journal of Neuroradiology, 2018, pp. 1-7, doi:10.3174/ajnr.A5667.
5. Halani, Sameer H et al. "Multi-Faceted Computational Assessment of Risk and Progression in Oligodendroglioma Implicates Notch and Pi3k Pathways." NPJ precision oncology, vol. 2, no. 1, 2018, p. 24, doi: 10.1038/s41698-018-0067-9 .
6. Hsieh, Kevin Li-Chun et al. "Computer-Aided Grading of Gliomas Based on Local and Global Mri Features." Computer Methods and Programs in Biomedicine, vol. 139, 2016, pp. 31-38.
7. Hu, Kai et al. "Brain Tumor Segmentation Using Multi-Cascaded Convolutional Neural Networks and Conditional Random Field." IEEE Access, vol. 7, 2019, pp. 92615-92629, doi:10.1109/access.2019.2927433.
8. Iqbal, Sajid et al. "Brain Tumor Segmentation in MultiSpectral Mri Using Convolutional Neural Networks (Cnn)." Microscopy research and technique, vol. 81, no. 4, 2018, pp. 419-427, doi:doi.org/10.1002/jemt.22994. Jiang, Chendan et al. "Fusion Radiomics Features from Conventional Mri Predict Mgmt Promoter Methylation Status in Lower Grade Gliomas." Eur J Radiol, vol. 121, 2019, p. 108714, doi:10.1016/j.ejrad.2019.108714.
9. Juratli, Tareq A et al. "Radiographic Assessment of Contrast Enhancement and T2/Flair Mismatch Sign in Lower Grade Gliomas: Correlation with Molecular Groups." Journal of Neuro-Oncology, 2018, pp. 1-9, doi:10.1007/s11060-018-03034-6.
10. Lambrecht, Joren. "Textural Analysis of Tumour Imaging: A Radiomics Approach." Electronics and Information Systems, vol. MS in Biomedical Engineering, Ghent University, 2017, p. 108. general editor, Prof. dr. Roel Van Holen, (Link to Thesis)
11. Lehrer, Michael et al. "Multiple-Response Regression Analysis Links Magnetic Resonance Imaging Features to De-Regulated Protein Expression and Pathway Activity in Lower Grade Glioma." Oncoscience, vol. 4, no. 5-6, 2017, p. 57.
12. Li, Y. et al. "Genotype Prediction of Atrx Mutation in Lower-Grade Gliomas Using an Mri Radiomics Signature." Eur Radiol, 2018, doi:10.1007/s00330-017-5267-0.
13. Liu, Z., Zhang, T., Jiang, H., Xu, W., & Zhang, J. (2018). "Conventional MR-based preoperative nomograms for prediction of IDH/1p19q subtype in low-grade glioma" Academic Radiology. DOI: 10.1016/j.acra.2018.09.022
14. Lu, Chia-Feng et al. "Machine Learning-Based Radiomics for Molecular Subtyping of Gliomas." Clinical Cancer Research, 2018, p. clincanres. 3445.2017, doi:10.1158/1078-0432.CCR-17-3445.
15. Mazurowski, Maciej A et al. "Radiogenomics of Lower-Grade Glioma: Algorithmically-Assessed Tumor Shape Is Associated with Tumor Genomic Subtypes and Patient Outcomes in a Multi-Institutional Study with the Cancer Genome Atlas Data." Journal of Neuro-Oncology, 2017, pp. 1-9.
16. Nakamoto, Takahiro et al. "Prediction of Malignant Glioma Grades Using Contrast-Enhanced T1-Weighted and T2-Weighted Magnetic Resonance Images Based on a Radiomic Analysis." Sci Rep, vol. 9, no. 1, 2019, p. 19411, doi:10.1038/s41598-019-55922-0.
17. Patel, Sohil H et al. "Mri and Ct Identify Isocitrate Dehydrogenase (Idh)-Mutant Lower-Grade Gliomas Misclassified to 1p/19q Codeletion Status with Fluorescence in Situ Hybridization." Radiology, vol. 294, no. 1, 2020, pp. 160-167, doi:10.1148/radiol.2019191140.

18. Rezaei, Mina et al. "Conditional Generative Adversarial Refinement Networks for Unbalanced Medical Image Semantic Segmentation." 2019 IEEE Winter Conference on Applications of Computer Vision (WACV), IEEE, 2019, pp. 1836-1845. doi:10.1109/WACV.2019.00200.
19. Zeng, Ke et al. "Segmentation of Gliomas in Pre-Operative and Post-Operative Multimodal Magnetic Resonance Imaging Volumes Based on a Hybrid Generative-Discriminative Framework." International Workshop on Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries, Springer, 2016, pp. 184-194.
20. Zhou, Hao et al. "Mri Features Predict Survival and Molecular Markers in Diffuse Lower-Grade Gliomas." Neuro-Oncology, vol. 19, no. 6, 2017, pp. 862-870.

If you have a manuscript you'd like to add please contact the TCIA Helpdesk.

Versions

Version 3 (Current): Updated 2020/05/29

Data Type	Download all or Query/Filter
Images (DICOM, 42.8GB)	*Download* *Search* (Download requires the NBIA Data Retriever)
Tissue Slide Images (web)	*Search*
Clinical Data (TXT)	*Download*
Biomedical Data (TXT)	*Download*
Genomics (web)	*Search*

Updated clinical data link with latest spreadsheets from GDC. Added new biomedical spreadsheets from GDC.

Version 2: Updated 2016/01/05

Data Type	Download all or Query/Filter
Images (DICOM, 42.8GB)	*Download* (Download requires the NBIA Data Retriever)
Clinical Data (TXT)	*Download*
Genomics (web)	*Search*

Extracted latest release of clinical data (TXT) from the GDC Data Portal.

Version 1: Updated 2014/09/04

Data Type	Download all or Query/Filter
Images (DICOM, 42.8GB)	*Download* (Download requires the NBIA Data Retriever)
Clinical Data (TXT)	*Download*

Genomics (web)	*Search*