CIP TCGA Radiology Initiative

The Cancer Genome Atlas (TCGA) began in 2006 as a three-year pilot jointly sponsored by the National Cancer Institute (NCI) and National Human Genome Research Institute (NHGRI). The TCGA pilot project (focused initially on glioblastoma, ovary, and lung cancers) confirmed that an atlas of genomic changes could be constructed for specific cancer types. It also showed that national networks of research and technology teams working on related projects could pool their efforts, create an economy of scale, and develop an infrastructure for making the data publicly accessible. The success of that pilot encouraged the National Institutes of Health (NIH) to invest in TCGA's efforts to collect and characterize more than 20 additional tumor types and make findings freely accessible for researchers to download. The genomic, clinical and histopathology images from the project are available via NCI's Genomic Data Commons. NCI's Cancer Imaging Program subsequently leveraged the agreements with TCGA Tissue Source Sites to collect clinical diagnostic images from these subjects and make them available on TCIA. By combining the imaging data from TCIA with the other data types collected by TCGA a research community focused on connecting cancer phenotypes to genotypes was formed, resulting in over one hundred peer-reviewed publications about these data.

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Data Access

Radiology data for TCGA patients are hosted on TCIA. Pathology images were collected prior to TCIA's involvement in the project, and are hosted on NCI's Genomic Data Commons along with the genomic and clinical data from these studies. Use the links in the table to access each type of imaging data.

Collection	Tumor Type	Locations	Modalities	Radiology (Subjects)	Pathology (Subjects)
TCGA-BLCA	Bladder Endothelial Carcinoma	Bladder	CT, CR, MR, PT, DX, Pathology	120	412
TCGA-BRCA	Breast Cancer	Breast	MR, MG, Pathology	139	1098
TCGA-CESC	Cervical Squamous Cell Carcinoma and Endocervical Adenocarcinoma	Cervix	MR, Pathology	54	307
TCGA-COAD	Colon Adenocarcinoma	Colon	CT, Pathology	25	460
TCGA-ESCA	Esophageal Carcinoma	Esophagus	CT, Pathology	16	183
TCGA-GBM	Glioblastoma Multiforme	Brain	MR, CT, DX, Pathology	262	606
TCGA-HNSC	Head and Neck Squamous Cell Carcinoma	Head-Neck	CT, MR, PT, RTSTRUCT, RTPLAN, RTDOSE, Pathology	227	520
TCGA-KICH	Kidney Chromophobe	Kidney	CT, MR, Pathology	15	113
TCGA-KIRC	Kidney Renal Clear Cell Carcinoma	Renal	CT, MR, CR, Pathology	267	537
TCGA-KIRP	Kidney Renal Papillary Cell Carcinoma	Renal	CT, MR, PT, Pathology	33	288
TCGA-LGG	Low Grade Glioma	Brain	MR, CT, Pathology	199	515

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TCGA-LIHC	Liver Hepatocellular Carcinoma	Liver	MR, CT, PT, Pathology	97	377
TCGA-LUAD	Lung Adenocarcinoma	Chest	CT, PT, NM, Pathology	69	514
TCGA-LUSC	Lung Squamous Cell Carcinoma	Lung	CT, NM, PT, Pathology	37	495
TCGA-OV	Ovarian Serous Cystadenocarcinoma	Ovary	CT, MR, Pathology	143	590
TCGA-PRAD	Prostate Cancer	Prostate	CT, PT, MR, Pathology	14	496
TCGA-READ	Rectum Adenocarcinoma	Rectum	CT, MR, Pathology	3	171
TCGA-SARC	Sarcomas	Chest-Abdomen-Pelvis, Leg, TSpine	CT, MR, Pathology	5	261
TCGA-STAD	Stomach Adenocarcinoma	Stomach	CT, Pathology	46	440
TCGA-THCA	Thyroid Cancer	Thyroid	CT, PT, Pathology	6	506
TCGA-UCEC	Uterine Corpus Endometrial Carcinoma	Uterus	CT, CR, MR, PT, Pathology	65	560

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Frederick National Lab Research Efforts

Imaging Source Site (ISS) Groups were organized by the Cancer Imaging Informatics Lab within the Frederick National Laboratory for Cancer Research. The groups were governed by participants from institutions which provided imaging data to the archive for each TCGA cancer type. Modeled after the TCGA genomic analysis groups, ISS groups were given a one year embargo window after 100 cases were accrued to publish a marker paper for a given cancer type. This increased incentive among source sites to contribute their patients' images, which would ultimately become a public resource to enable radiogenomic research. The ISS groups included:

Group Name	**Tumor Type**
TCGA Bladder Phenotype Research Group	Urothelial Bladder Carcinoma (BLCA)
TCGA Breast Phenotype Research Group	Breast invasive carcinoma (BRCA)
TCGA Glioma Phenotype Research Group	Glioblastoma (GBM), lower grade glioma (LGG)
TCGA Renal Phenotype Research Group	Kidney renal clear cell carcinoma (KIRC)
TCGA Ovarian Phenotype Research Group	Ovarian serous cystadenocarcinoma (OV)

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TCGA Collections Publication Guidelines

Historically TCIA had implemented publication guidelines derived from the policy outlined by the The Cancer Genome Atlas, TCGA. These were followed **in addition** to the publication policy of the TCGA Data Portal: http://cancergenome.nih.gov/abouttcga/policies/publicationguidelines. **As of 10/30/2018 all cancer types are now available for use without any special restrictions.** Please be sure to follow TCIA's regular Data Usage Policies and Restrictions, and to also provide attribution recognizing the TCGA data collection efforts. An example of a proper attribution is:

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

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References

The following links contain publications from the main TCGA project as well as their posted publication guidelines:

- TCGA Publications
- TCGA Publication Guidelines

Included below are some posters and presentations which help summarize the CIP TCGA Radiology Initiative and its supporting components such as TCIA.

- TCIA Workshop at 2014 TCGA Symposium - Presented at TCGA Scientific Symposium, May 12, 2014 in Washington, DC.
- Imaging and Genomics: Is There a Synergy? - Published in Radiology 2012 ,*264*:*329–31*.
- A Scalable Methodology for Correlating Clinical Imaging Features with TCGA Data - Presented at TCGA Network Symposium, November 17–18, 2011 Washington, DC.
- The Cancer Imaging Archive: a Repository of Advanced Imaging Information Correlated with TCGA Samples - Presented at TCGA Network Symposium, November 17–18, 2011 Washington, DC.

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