

cBioPortal Tutorial #1: Single Study Exploration

Explore all data in a dataset

Tutorial Objectives

- Introduce cBioPortal main page
- Show two ways to select a study
 - From the Query box on the main page
 - From the Data Sets page
- Walk through the four possible tabs in the study view
 - Study Summary
 - Clinical Data
 - Heatmaps
 - CN Segments
- Show how to run a query from the study view

cBioPortal Main Page

The screenshot shows the cBioPortal main page with several annotations:

- Search studies**: A box pointing to the search bar at the top right.
- Browse available datasets and select studies to explore or query**: A box pointing to the 'Query' tab and the 'Quick Search Beta!' button.
- Number of studies for each tissue of origin (click to filter)**: A box pointing to the list of tissues on the left side of the page.
- List of all studies, organized by organ system**: A box pointing to the list of studies under the 'PanCancer Studies' section.

The page layout includes a header with navigation links (Data Sets, Web API, R/MATLAB, Tutorials/Webinars, FAQ, News, Visualize Your Data, About, cBio), a login button, and a 'What's New' section on the right. The main content area is divided into a left sidebar for tissue filtering and a central area for study selection and analysis.

Query Quick Search Beta! Download

Please cite: Cerami et al., 2012; Gao et al., 2013

Select Studies for Visualization & Analysis: 0 studies selected (0 samples)

Search...

PanCancer Studies 9

Pediatric Cancer Studies 13

Immunogenomic Studies 8

Cell lines 3

Adrenal Gland 3

Ampulla of Vater 1

Biliary Tract 13

Bladder/Urinary Tract 17

Bone 2

Bowel 12

Breast 23

CNS/Brain 23

Cervix 2

Esophagus/Stomach 17

Quick select: TCGA PanCancer Atlas Studies Curated set of non-redundant studies

PanCancer Studies

- ☐ MSK-IMPACT Clinical Sequencing Cohort (MSKCC, Nat Med 2017)
- ☐ Metastatic Solid Cancers (UMich, Nature 2017)
- ☐ MSS Mixed Solid Tumors (Broad/Dana-Farber, Nat Genet 2018)
- ☐ SUMMIT - Neratinib Basket Study (Multi-Institute, Nature 2018)
- ☐ TMB and Immunotherapy (MSKCC, Nat Genet 2019)
- ☐ Tumors with TRK fusions (MSK, Clin Cancer Res 2020)
- ☐ Cancer Therapy and Clonal Hematopoiesis (MSK, Nat Genet 2020)
- ☐ China Pan-cancer (Origimed2020)
- ☐ Pan-cancer analysis of whole genomes (ICGC/TCGA, Nature 2020)

10945 samples

Pediatric Cancer Studies

- ☐ Pediatric Preclinical Testing Consortium (CHOP, Cell Rep 2019)
- ☐ Pediatric Acute Lymphoid Leukemia - Phase II (TARGET, 2018)
- ☐ Pediatric Rhabdoid Tumor (TARGET, 2018)
- ☐ Pediatric Wilms' Tumor (TARGET, 2018)
- ☐ Pediatric Acute Myeloid Leukemia (TARGET, 2018)
- ☐ Pediatric Neuroblastoma (TARGET, 2018)
- ☐ Pediatric Pan-Cancer (DKFZ, Nature 2017)
- ☐ Pediatric Pan-cancer (Columbia U, Genome Med 2016)
- ☐ Acute Lymphoblastic Leukemia (St Jude, Nat Genet 2016)

261 samples

1978 samples

72 samples

657 samples

1025 samples

1089 samples

961 samples

103 samples

73 samples

0 studies selected (0 samples)

Query By Gene OR Explore Selected Studies

What's New @cbioportal

Another How-To video is posted! This one shows how to use patient view to explore the longitudinal evolution of patients, for patients with multiple profiled samples or available clinical histories. [youtube.com/watch?v=Hbbs-t...](https://www.youtube.com/watch?v=Hbbs-t...)

Subscribe

Local Installations Host your own

World map showing global distribution of installations.

Selecting a study: from Query

The screenshot displays the cBioPortal interface for selecting studies. The top navigation bar includes links for Data Sets, Web API, R/MATLAB, Tutorials/Webinars, FAQ, News, Visualize Your Data, and a Login button. The main content area is titled "Select Studies for Visualization & Analysis:" and shows a search filter for "glioma" with 1 study selected (514 samples). The left sidebar lists categories: Immunogenomic Studies (1), CNS/Brain (18), and Soft Tissue (2). The main list shows various studies, with "Brain Lower Grade Glioma (TCGA, PanCancer Atlas)" selected. The bottom right features a "What's New" section with a tweet and a YouTube video, and a "Local Installations" section with a world map.

1. Filter the list of studies (optional)

2. Select the checkbox next to the study of interest and click "Explore Selected Studies"

3. Or click on "View study summary" button

1 study selected (514 samples) Deselect all

glioma X

Immunogenomic Studies 1 ☐ Select all listed studies matching filter (20)

CNS/Brain 18 ☐ Glioblastoma (Columbia, Nat Med. 2019) 42 samples

Soft Tissue 2 ☐ Integrated Proteogenomic Characterization across Major Histological T... 218 samples

Diffuse Glioma

- ☐ Brain Lower Grade Glioma (TCGA, Firehose Legacy) 530 samples
- ☒ Brain Lower Grade Glioma (TCGA, PanCancer Atlas) 514 samples
- ☐ Diffuse Glioma (GLASS Consortium, Nature 2019) 444 samples

1 study selected (514 samples) Deselect all

Query By Gene OR Explore Selected Studies

Selecting a study: from Data Sets page

1. Use search functionality to find datasets of interest

2. Or sort by number of samples with each data type

cBioPortal
FOR CANCER GENOMICS

[Data Sets](#) [Web API](#) [R/MATLAB](#) [Tutorials/Webinars](#) [FAQ](#) [News](#) [Visualize Your Data](#) [About](#) [cBioPortal Installations](#)

Datasets

The table below lists the number of available samples per cancer study and data type. It also provides links to download the data for each study. For alternative ways of downloading, see the [Download](#) [Documentation](#).

Columns ▾

Name ▾	Reference	All	Mutations	CNA	RNA-Seq
Acinar Cell Carcinoma of the Pancreas (JHU, J Pathol 2014)	Jial et al. J Pathol 2014	23	23	0	0
Acral Melanoma (TCGA, Genome Res 2017)	Liang et al. Genome Res 2017	38	38	38	36
Acute Lymphoblastic Leukemia (St Jude, Nat Genet 2015)	Andersson et al. Nat Genet 2015	93	93	0	0
Acute Lymphoblastic Leukemia (St Jude, Nat Genet 2016)	Zhang et al. Nat Genet 2016	73	73	0	0
Acute Myeloid Leukemia (OHSU, Nature 2018)	Tyner et al. Nature 2018	672	622	0	451
Acute Myeloid Leukemia (TCGA, Firehose Legacy)		200	197	191	173
Acute Myeloid Leukemia (TCGA, NEJM 2013)	TCGA, NEJM 2013	200	200	191	173
Acute Myeloid Leukemia (TCGA, PanCancer Atlas)	TCGA, Cell 2018	200	200	191	173
Acute myeloid leukemia or myelodysplastic syndromes (WashU, 2016)	Welch et al. N Engl J Med. 2016	136	136	0	0
Adenoid Cystic Carcinoma (FMI, Am J Surg Pathol. 2014)	Ross et al. Am J Surg Pathol 2014	28	28	28	0
Adenoid Cystic Carcinoma (JHU, Cancer Prev Res 2016)	Rettig et al. Cancer Prev Res 2016	25	25	0	0
Adenoid Cystic Carcinoma (MDA, Clin Cancer Res 2015)	Mitani et al. Clin Cancer Res 2015	102	65	0	0
Adenoid Cystic Carcinoma (MGH, Nat Gen 2016)	Drier et al. Nature Genetics 2016	10	10	0	0
Adenoid Cystic Carcinoma (MSKCC, Nat Genet 2013)	Ho et al. Nat Genet 2013	60	60	60	0
Adenoid Cystic Carcinoma (Sanger/MDA, JCI 2013)	Stephens et al. JCI 2013	24	24	0	0
Adenoid Cystic Carcinoma of the Breast (MSKCC, J Pathol. 2015)	Marteliotto et al. J Pathol 2015	12	12	12	0
Adenoid Cystic Carcinoma Project (J Clin Invest 2019)	Allen et al. J Clin Invest 2019	1049	1049	928	0
Adrenocortical Carcinoma (TCGA, Firehose Legacy)		92	90	90	79
Adrenocortical Carcinoma (TCGA, PanCancer Atlas)	TCGA, Cell 2018	92	91	89	78
Adult Soft Tissue Sarcomas (TCGA, Cell 2017)	TCGA, Cell 2017	206	206	206	206
Amputary Carcinoma (Baylor College of Medicine, Cell Reports 2016)	Gingras et al. Cell Rep 2016	160	160	0	0
Anaplastic Oligodendroglioma and Anaplastic Oligoastrocytoma (MSKCC, Neuro Oncol 2017)	Thomas et al. Neuro Oncol 2017	22	22	22	0
Basal Cell Carcinoma (UNIGE, Nat Genet 2016)	Bonilla et al. Nat Genet 2016	293	293	0	0
Bladder Cancer (MSK/TCGA, 2020)		476	474	442	296
Bladder Cancer (MSKCC, Eur Urol 2014)	Kim et al. Eur Urol 2015	109	109	109	0
Bladder Cancer (MSKCC, J Clin Oncol 2013)	Iyer et al. J Clin Oncol 2013	97	97	97	0
Bladder Cancer (MSKCC, Nat Genet 2016)	Al-Ahmadie et al. Nat Genet 2016	34	34	33	0
Bladder Cancer (TCGA, Cell 2017)	Robertson et al. Cell 2017	413	412	408	408
Bladder Urothelial Carcinoma (BGI, Nat Genet 2013)	Guo et al. Nat Genet 2013	99	99	0	0
Bladder Urothelial Carcinoma (DFCI/MSKCC, Cancer Discov 2014)	Van Allen et al. Cancer Discov 2014	50	50	0	0
Bladder Urothelial Carcinoma (TCGA, Firehose Legacy)		413	130	408	408
Bladder Urothelial Carcinoma (TCGA, Nature 2014)		131	130	128	129
Bladder Urothelial Carcinoma (TCGA, PanCancer Atlas)		411	410	408	407
Brain Lower Grade Glioma (TCGA, Firehose Legacy)		530	286	513	530
Brain Lower Grade Glioma (TCGA, PanCancer Atlas)		514	514	511	514
Brain Tumor PDXs (Mayo Clinic, 2019)		97	83	83	66

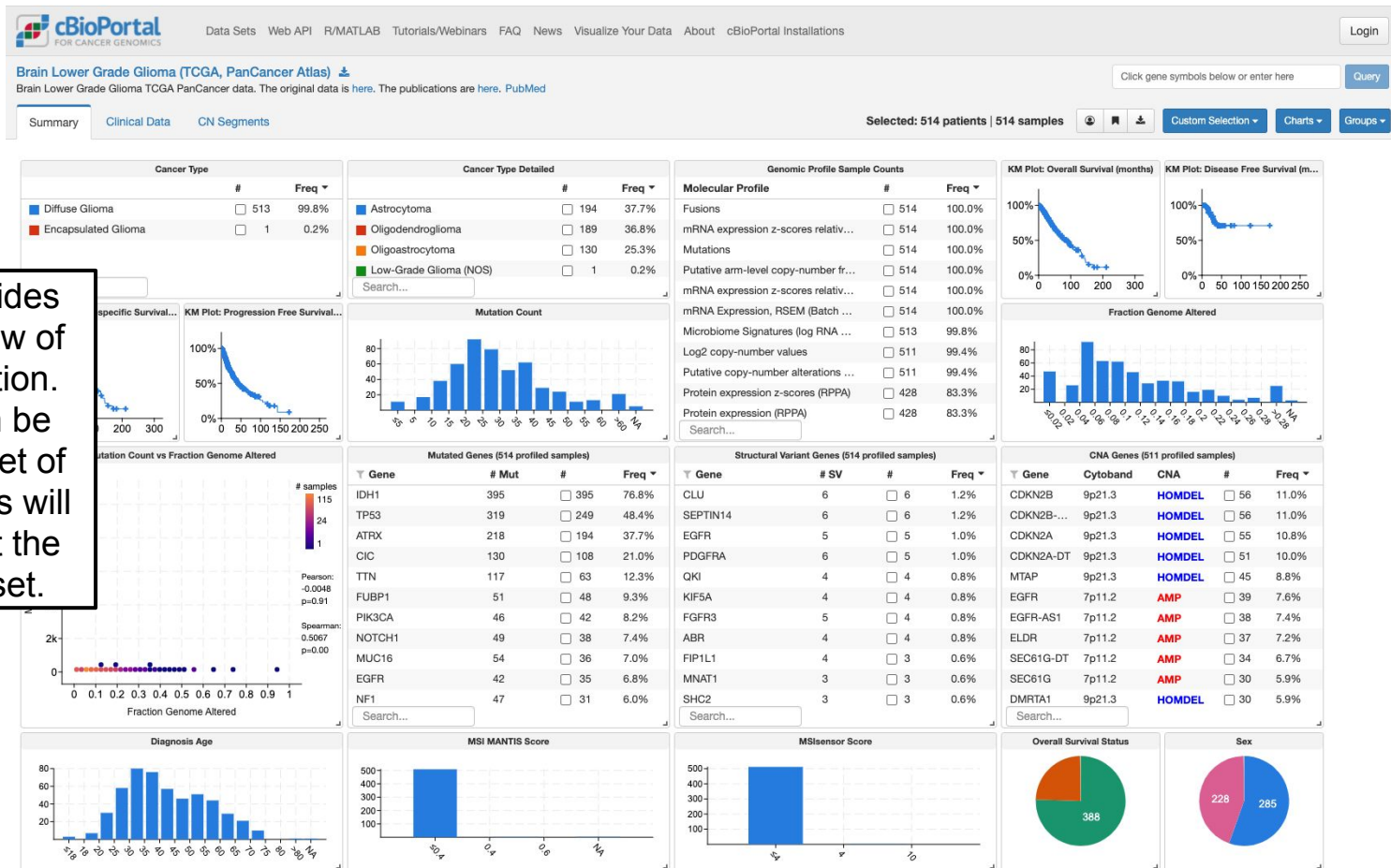
3. Click on data set of interest

Once you select a study by either method you land on the Study Summary Tab.

Here you can explore features (e.g. mutated genes or gender) of the samples in the study (or of a subset of samples in the study) or initiate a query.

The features available to explore will depend on the data available for the particular study selected.

Study Summary Tab: Overview

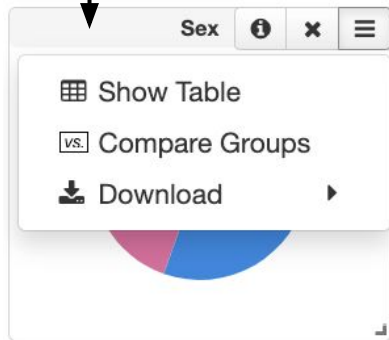


Study summary provides an interactive overview of the study for exploration. Individual charts can be used to select a subset of the samples. All charts will then update to reflect the features of that subset.

Study Summary Tab: Charts


Hover over a chart to find these buttons


Click and drag on the grey bar with the chart name to move a chart





Click and drag to resize a chart


 Hover for a description of the data in this chart.

 Click to remove this chart from view.

 Hover over this button to bring up a menu with the options below:

 Click to convert the pie chart to a table. Note that hovering over the chart will also bring up a tooltip with tabular data.

 Click to go to a group comparison session with groups based on these values. See the [group comparison tutorial](#) for more details.

 Click to download data (text file) or plot (PDF or SVG).

Study Summary Tab: Charts

Add charts using this button. Added charts can be used like any other chart to filter or define groups for comparison.

Click gene symbols below or enter here

Selected: 514 patients | 514 samples

Name	Freq
<input type="checkbox"/> Buffa Hypoxia Score	100.0%
<input type="checkbox"/> Cancer Studies	100.0%
<input checked="" type="checkbox"/> Cancer Type	100.0%
<input checked="" type="checkbox"/> Cancer Type Detailed	100.0%
<input type="checkbox"/> Case Lists	100.0%
<input type="checkbox"/> Center of sequencing	100.0%
<input type="checkbox"/> In PanCan Pathway Analysis	100.0%
<input checked="" type="checkbox"/> MSIsensor Score	100.0%
<input type="checkbox"/> Number of Samples Per Patient	100.0%
<input type="checkbox"/> Oncotree Code	100.0%
<input type="checkbox"/> Ragnum Hypoxia Score	100.0%
<input type="checkbox"/> Sample Type	100.0%
<input type="checkbox"/> Somatic Status	100.0%
<input type="checkbox"/> TCGA PanCanAtlas Cancer Type Acronym	100.0%

Clinical: lists all patient- and sample-level data available for this study

Selected: 514 patients | 514 samples

Name	Freq
<input checked="" type="checkbox"/> Genomic Profile Sample Counts	100.0%
<input checked="" type="checkbox"/> Mutated Genes	100.0%
<input checked="" type="checkbox"/> Structural Variant Genes	100.0%
<input checked="" type="checkbox"/> CNA Genes	99.4%
<input checked="" type="checkbox"/> Fraction Genome Altered	99.4%
<input checked="" type="checkbox"/> Mutation Count	99.0%

Genomic: lists charts summarizing genomic data

Selected: 514 patients | 514 samples

EGFR

☒ All gene symbols are valid.

mRNA Expression, RSEM (Batch normalized from Illumina HiSeq_RNASeqV2) (514 sa...

Gene Specific: add charts for individual genes from any molecular profile with continuous data, e.g. mRNA expression.

Study Summary Tab: Charts

This screenshot shows the 'Custom Data' tab in the 'Charts' section. At the top, it indicates 'Selected: 514 patients | 514 samples'. Below this, there are tabs for 'Clinical', 'Genomic', 'Gene Specific', 'Custom Data', 'X vs Y Beta!', 'Arm-level CNA', and 'Microbiome Signature'. The 'Custom Data' tab is active. It features two radio buttons: 'By sample ID' (selected) and 'By patient ID'. Below these are two sections: 'currently selected' and 'currently unselected'. The 'currently selected' section contains a list of TCGA sample IDs and their corresponding groups, such as 'lgg_tcga_pan_can_atlas_2018:TCGA-CS-4938-01 group1'. At the bottom, there is a text input field for a 'Title (optional)' and an 'Add Chart' button.

Custom Data: add charts with new data for the existing samples, for example results of your own analysis that classifies TCGA samples into groups.

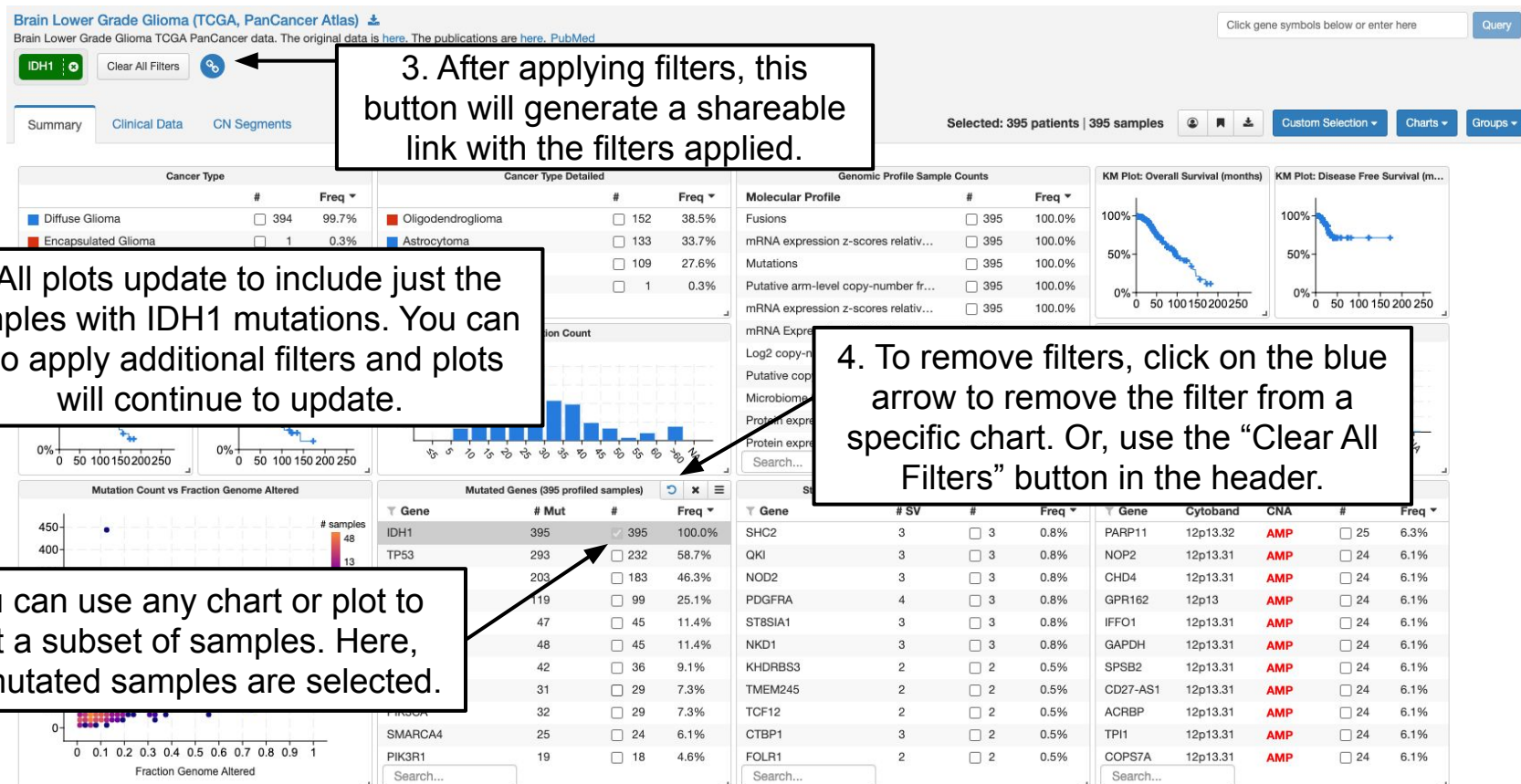
This screenshot shows the 'X vs Y Beta!' tab in the 'Charts' section. It has the same top navigation as the previous interface. The 'X vs Y Beta!' tab is active. It contains two dropdown menus: 'X-Axis: Select x-axis clinical attribute' and 'Y-Axis: Select y-axis clinical attribute'. Below these is a large blue 'Add Chart' button.

X vs Y: add charts comparing two clinical attributes. Note this feature is still under development.

This screenshot shows the 'Arm-level CNA' tab in the 'Charts' section. It has the same top navigation. The 'Arm-level CNA' tab is active. It contains a search input field labeled 'Search for Arm-level CNAs...' and a dropdown menu showing 'Putative arm-level copy-number from GISTIC (514 samples)'. An 'Add Chart' button is located at the bottom right.

Arm-level CNA, Microbiome Signature and others: add charts for additional datatypes that are available for some studies. Not all studies will have these subtabs.

Study Summary Tab: Selecting subsets of data



Clinical Data Tab

Brain Lower Grade Glioma (TCGA, PanCancer Atlas) [📄](#)

Brain Lower Grade Glioma TCGA PanCancer data. The original data is [here](#). The publications are [here](#). PubMed

IDH1

Clear filters

Summary

Clinical Data

Genomics

Filters applied in the Summary tab apply to this table

Download clinical data table

Show additional data (available data will vary based on the study)

Selected: 395 patients | 395 samples

Custom Selection

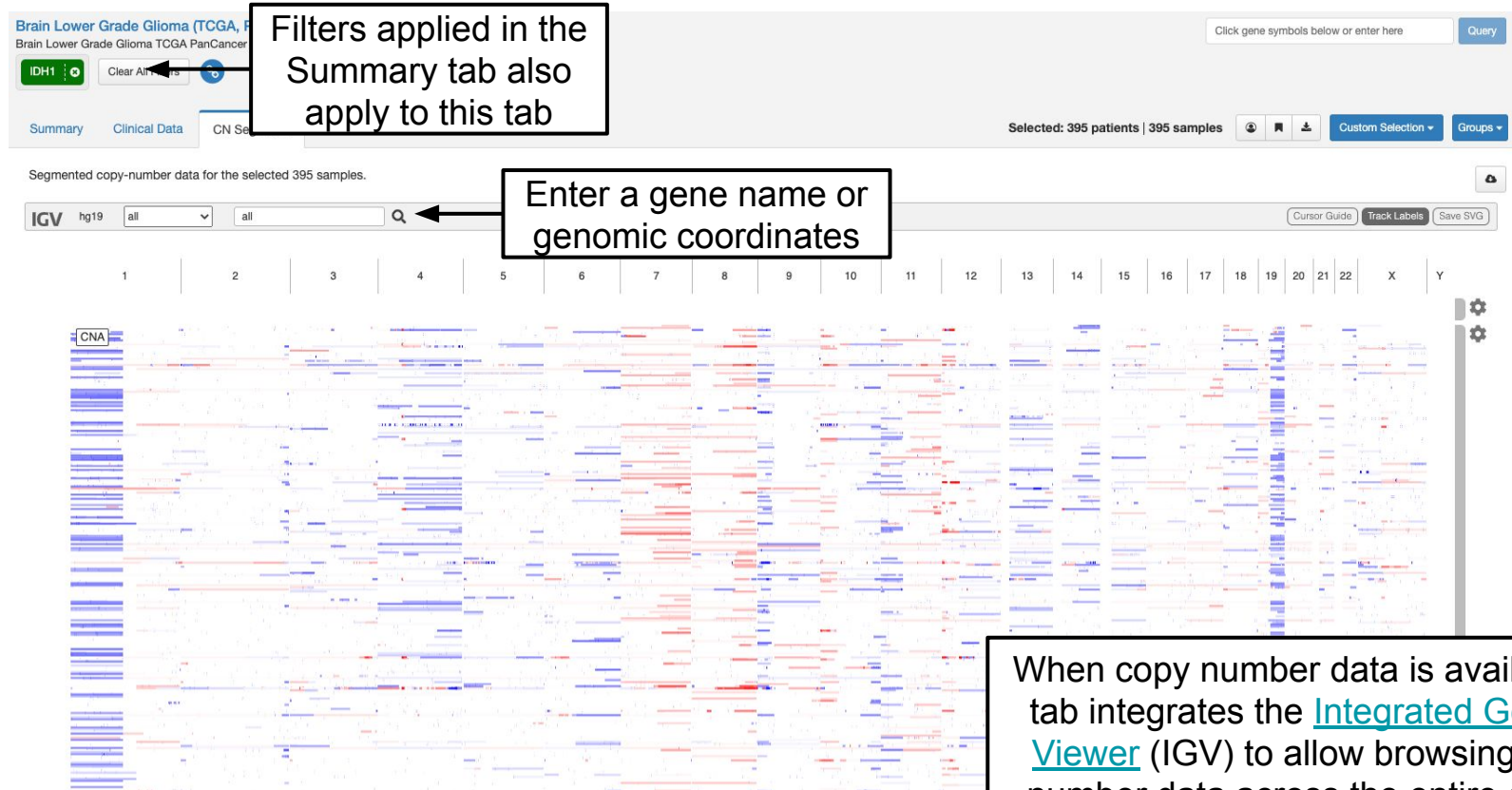
Columns

Groups

Patient ID	Sample ID	Cancer Type	Cancer Type Detailed	Mutation Count	Fraction Genome Altered	Diagnosis Age	MSI MANTIS Score	MSIsensor Score	Overall Survival Status	Sex	Ethnicity Category	Race Category	Subtype	Tumor Type	Aneuploidy Score	Birth from Initial Pathologic Diagnosis Date
TCGA-CS-4938	TCGA-CS-4938-01	Diffuse Glioma	Astrocytoma	14	0.0518	31.0	0.303	0	0:LIVING	Female	Not Hispanic Or Latino	White	LGG_IDHmut-non-codel	Astrocytoma	1	-11509.0
TCGA-CS-4942	TCGA-CS-4942-01	Diffuse Glioma	Astrocytoma	26	0.0937	44.0	0.281	0.02	1:DECEASED	Female		Black or African American	LGG_IDHmut-non-codel	Astrocytoma	2	-16297.0
TCGA-CS-4943	TCGA-CS-4943-01	Diffuse Glioma	Astrocytoma	24	0.1625	37.0	0.2751	0.25	1:DECEASED	Male		White	LGG_IDHmut-non-codel	Astrocytoma	5	-13565.0
TCGA-CS-4944	TCGA-CS-4944-01	Diffuse Glioma	Astrocytoma	21	0.0603	50.0	0.2697	0.04	0:LIVING	Male		White	LGG_IDHmut-non-codel	Astrocytoma	1	-18494.0
TCGA-CS-5390	TCGA-CS-5390-01	Diffuse Glioma	Oligodendroglioma	44	0.0511	47.0	0.2623	0.1	0:LIVING	Female		White	LGG_IDHmut-codel	Oligodendroglioma	2	-17460.0
TCGA-CS-5393	TCGA-CS-5393-01	Diffuse Glioma	Astrocytoma	24	0.0569	39.0	0.2715	0	0:LIVING	Male		White	LGG_IDHmut-non-codel	Astrocytoma	0	-14418.0
TCGA-CS-5394	TCGA-CS-5394-01	Diffuse Glioma	Astrocytoma	22	0.0469	40.0	0.3295	0.16	0:LIVING	Male		White	LGG_IDHmut-non-codel	Astrocytoma	1	-14920.0
TCGA-CS-5396	TCGA-CS-5396-01	Diffuse Glioma	Oligodendroglioma	28	0.1259	53.0	0.2798	0	0:LIVING	Female	Not Hispanic Or Latino	White	LGG_IDHmut-codel			
TCGA-CS-6290	TCGA-CS-6290-01	Diffuse Glioma	Astrocytoma	20	0.0133	31.0	0.2888	0	1:DECEASED	Male			LGG_IDHmut-non-codel			
TCGA-CS-6290	TCGA-CS-6290-01	Diffuse Glioma	Astrocytoma	61	0.1319	51.0	0.2995	0.05	0:LIVING	Female	Not Hispanic Or Latino	White	LGG_IDHmut-non-codel			

Scroll to the right to see more columns. Each column can be sorted by clicking on the column header.

CN Segments Tab



Additional Tabs: Heatmaps

Colorectal Adenocarcinoma (TCGA, Firehose Legacy) 

TCGA Colorectal Adenocarcinoma. Source data from GDAC Firehose. Previously known as TCGA Provisional.

Summary Clinical Data **Heatmaps** CN Segments

This tab will only appear for some TCGA studies. It is an embedding of the [Next-Generation Clustered Heat Map](#) interactive heatmap tool.

THE UNIVERSITY OF TEXAS

MDAnderson
Cancer Center

TCGA Next-Generation Clustered Heat Map (NG-CHM) Compendium

Single Study Maps

Choose one or more criteria:

Cancer Type

COAD - Colon adenocarcinoma

Platform

Select platform

Heatmap Type

Select heat map type

[See other Heat Map Collections](#)

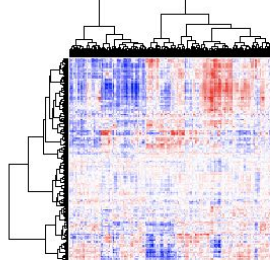
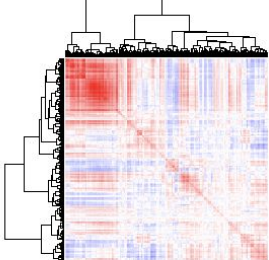
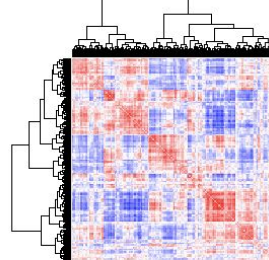
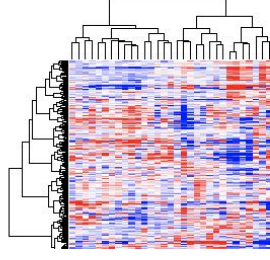
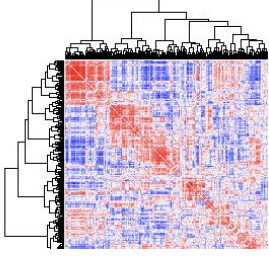
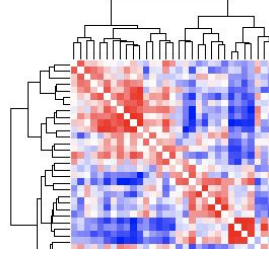
[Bookmark Link for Current View](#)

NG-CHM Viewer Help

[Quick User Guide \(Video\)](#)

[Other User Guides / Videos](#)

Click on any thumbnail image shown below to open in the NG-CHM viewer.

	Gene/Probe vs Sample	Gene/Probe vs Gene/Probe	Sample vs Sample
mRNA Expression	 tcga_rnaseqv2_coad_v2.0_gene_sample	 tcga_rnaseqv2_coad_v2.0_gene_gene	 tcga_rnaseqv2_coad_v2.0_sample_sample
Reverse Phase Protein Array			

Study View: Additional Features

Brain Lower Grade Glioma (TCGA, PanCancer Atlas) [Download](#)

Brain Lower Grade Glioma TCGA PanCancer data. The original data is [here](#). The publications are [here](#). [PubMed](#)

Summary

Clinical Data

CN Segments

Selected: 514 patients | 514 samples

Click gene symbols below or enter here

Query

Click here to see all selected samples/patients in Patient View.
See [tutorial](#).

Click here to create a virtual study of the selected samples/patients.
See [tutorial](#).

Click here to enter a list of sample or patient IDs for a custom filter.

Click here for group comparison.
See [tutorial](#).

3. Then click here to run the query

Brain Lower Grade Glioma TCGA PanCancer data. The original data is [here](#). The publications are [here](#). [PubMed](#)

Mutations and Putative copy-number alterations from GISTIC [Clear All Filters](#)

2. Type a gene name here

1. Apply filters (optional). Here, we are filtering to samples that have both mutation and copy number data. The query will run in only these selected samples.

3. Or click on a gene to add it to the query

[Link to this page](#)

See Tutorial #2: Single Study Query

Questions?

Check out our other tutorials
or email us at:

cbioportal@googlegroups.com