

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. The top navigation bar includes links for Data Sets, Web API, R/MATLAB, Tutorials/Webinars, FAQ, News, Visualize Your Data, About, and cBioPortal. A search bar is located in the top right corner. The main content area is divided into several sections. On the left, there is a sidebar with a list of studies categorized by tissue of origin, such as PanCancer Studies (7), Pediatric Cancer Studies (13), Immunogenomic Studies (8), Cell lines (3), Adrenal Gland (3), Ampulla of Vater (1), Biliary Tract (9), Bladder/Urinary Tract (16), Bone (2), Bowel (10), Breast (18), CNS/Brain (20), Cervix (2), and Esophagus/Stomach (16). The main content area displays a list of studies under the heading 'Select Studies for Visualization & Analysis:'. This list is organized by organ system, with sections for PanCancer Studies and Pediatric Cancer Studies. Each study entry includes a checkbox, the study name, and the number of samples. For example, under PanCancer Studies, there is a checkbox for 'MSK-IMPACT Clinical Sequencing Cohort (MSKCC, Nat Med 2017)' with 10945 samples. Under Pediatric Cancer Studies, there is a checkbox for 'Pediatric Preclinical Testing Consortium (CHOP, Cell Rep 2019)' with 261 samples. The bottom of the page features a search bar and two buttons: 'Query By Gene' and 'Explore Selected Studies'. The right sidebar contains a 'What's New' section with a list of recent updates and a 'Local Installations' section with a world map showing the locations of various cBioPortal instances.

Browse available datasets and select studies to explore or query

Search studies

Number of studies for each tissue of origin (click to filter)

List of all studies, organized by organ system

What's New

Local Installations

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

3. Or click "View study summary" button




cBioPortal
@cbioportal



What's New @cbioportal

If you are running your own local / private installation of cBioPortal, please consider adding it to our new map. Use this form to register your instance: bit.ly/2XW3wNG. We will count all entries!



Sign up for

3. Or click


"View study summary" button

Example Queries

- Primary vs. metastatic
- RAS/RAF alterations
- BRCA1 and BRCA2 mutations in ovarian cancer
- POLE hotspot mutations in endometrial cancer
- TP53 and MDM2/4 alterations in GBM
- PTEN mutations in GBM in text format
- Patient view of an endometrial cancer case
- All TCGA Pan-Cancer
- MSK-IMPACT clinical cohort, Zehir et al. 2017
- Histone mutations across cancer types

Local Installations

Host your own



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.

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)	TCGA, Cell 2018	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)	Mitali 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)	Martelotto 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)	TCGA, Cell 2018	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
Ampullary 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)	Kim et al. Eur Urol 2015	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)	TCGA, Cell 2018	413	130	408	408
Bladder Urothelial Carcinoma (TCGA, Nature 2014)	TCGA, Cell 2018	131	130	128	129
Bladder Urothelial Carcinoma (TCGA, PanCancer Atlas)	TCGA, Cell 2018	411	410	408	407
Brain Lower Grade Glioma (TCGA, Firehose Legacy)	TCGA, Cell 2018	530	286	513	530
Brain Lower Grade Glioma (TCGA, PanCancer Atlas)	TCGA, Cell 2018	514	512	511	514
Brain Tumor PDXs (Mayo Clinic, 2019)	TCGA, Cell 2018	97	83	83	66

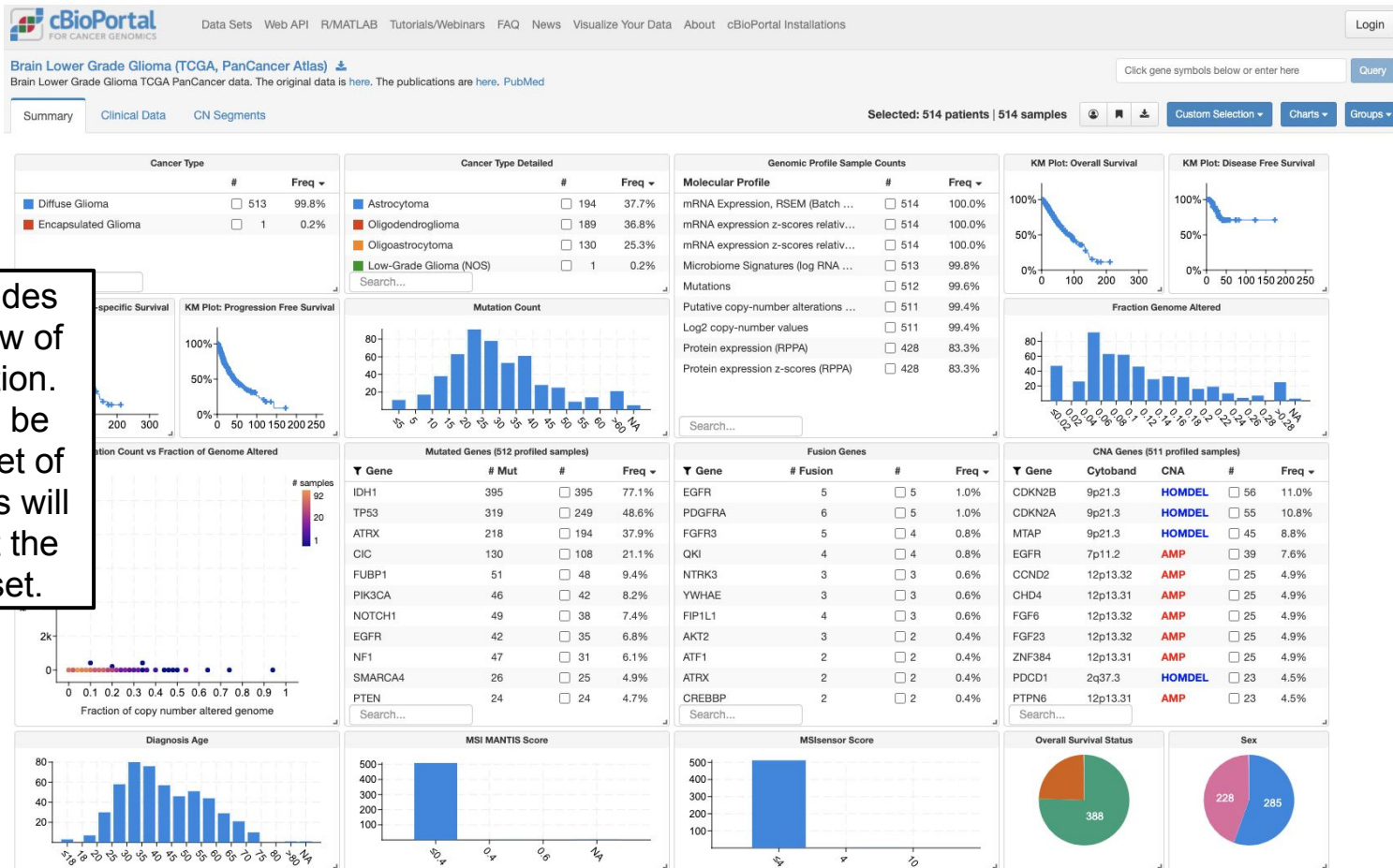
3. Click on data set of interest

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.

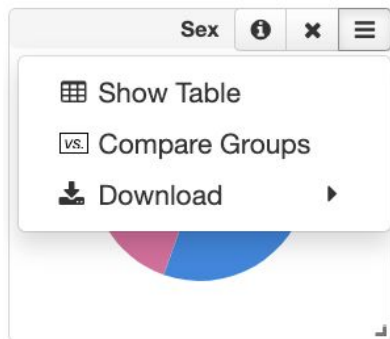
Study Summary Tab: Overview









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

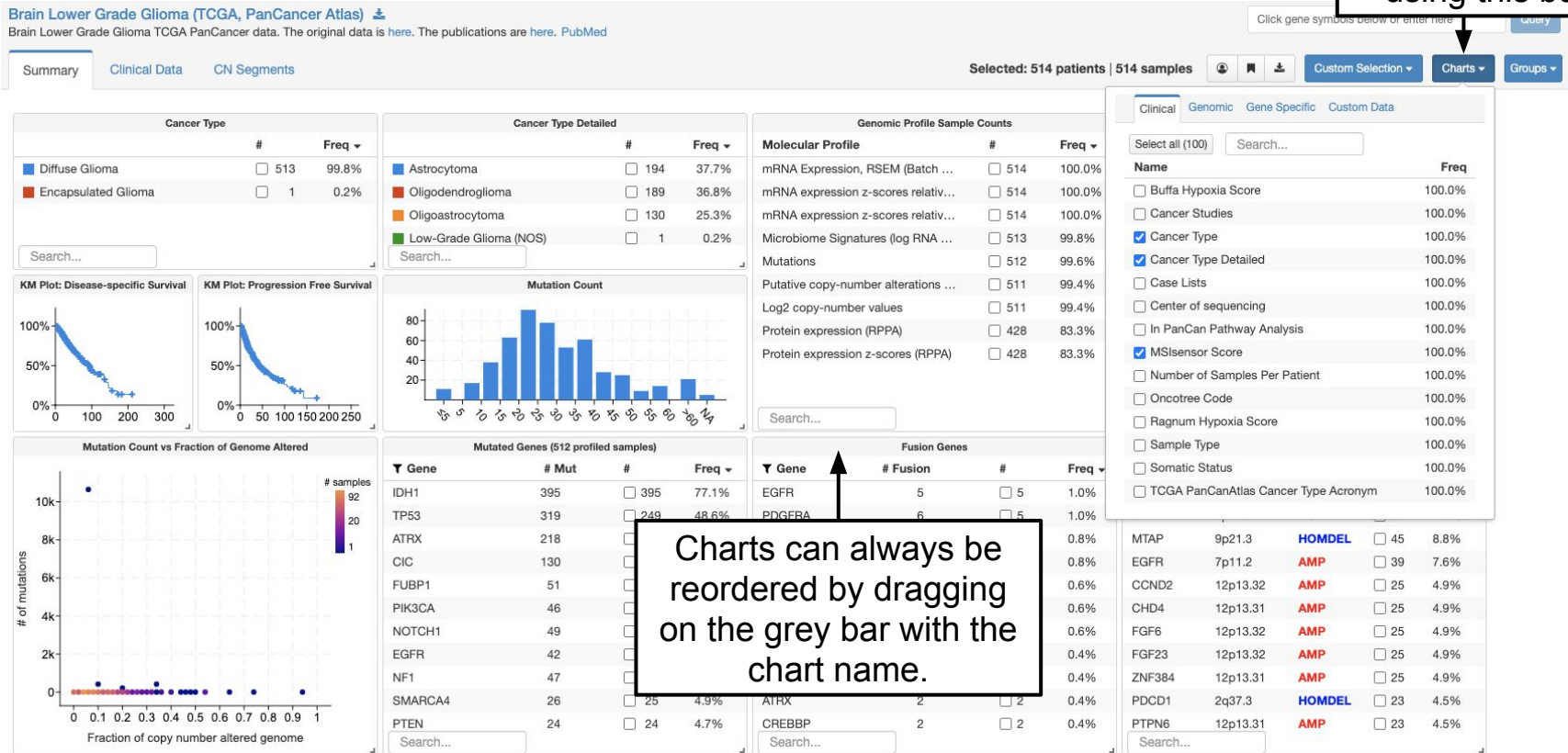


Click and drag to resize a chart

-  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).

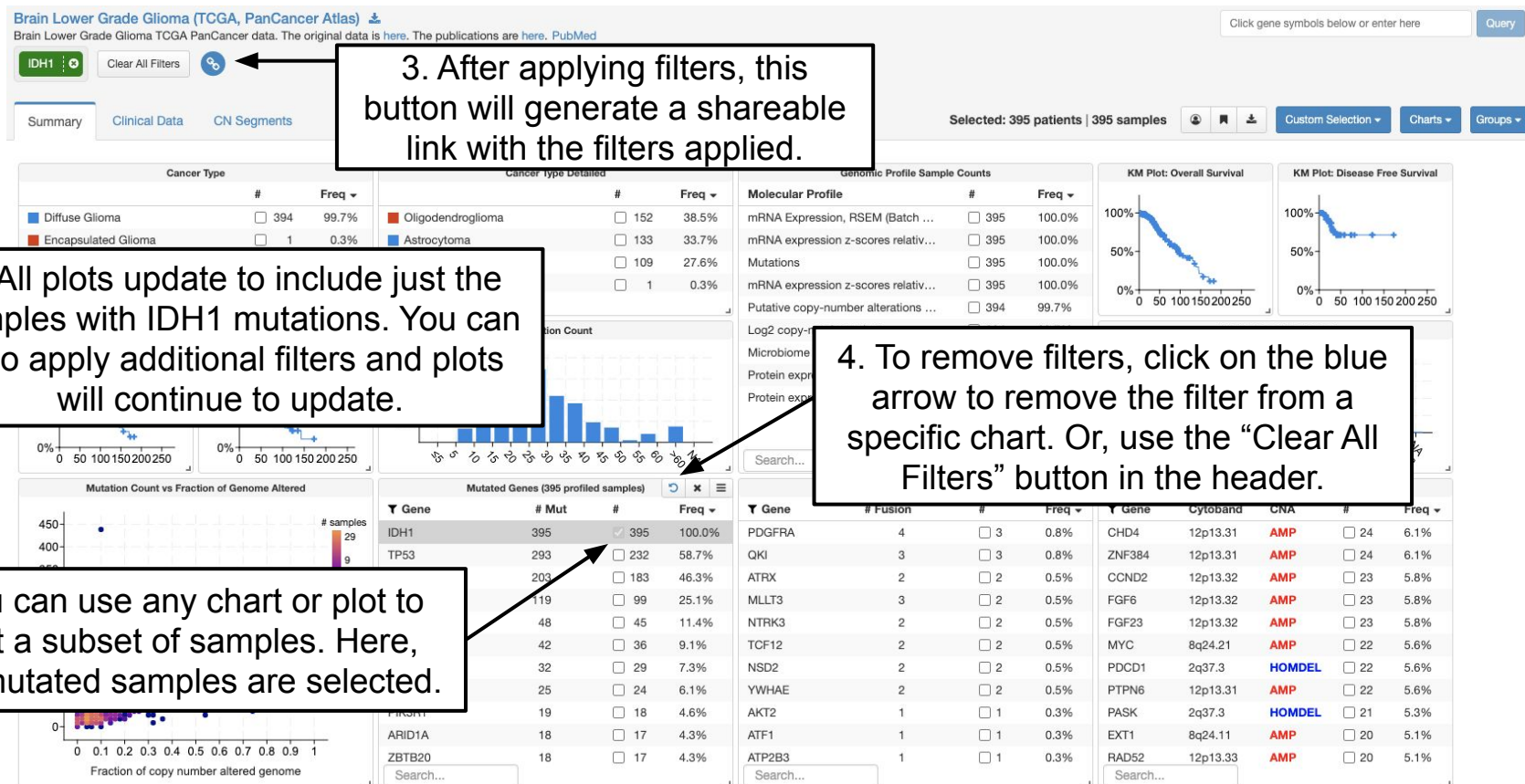
Study Summary Tab: Charts

Many studies have additional charts that can be added using this button.



Charts can always be reordered by dragging on the grey bar with the chart name.

[Link to this page](#)



Clinical Data Tab

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

IDH1

Clear filters

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

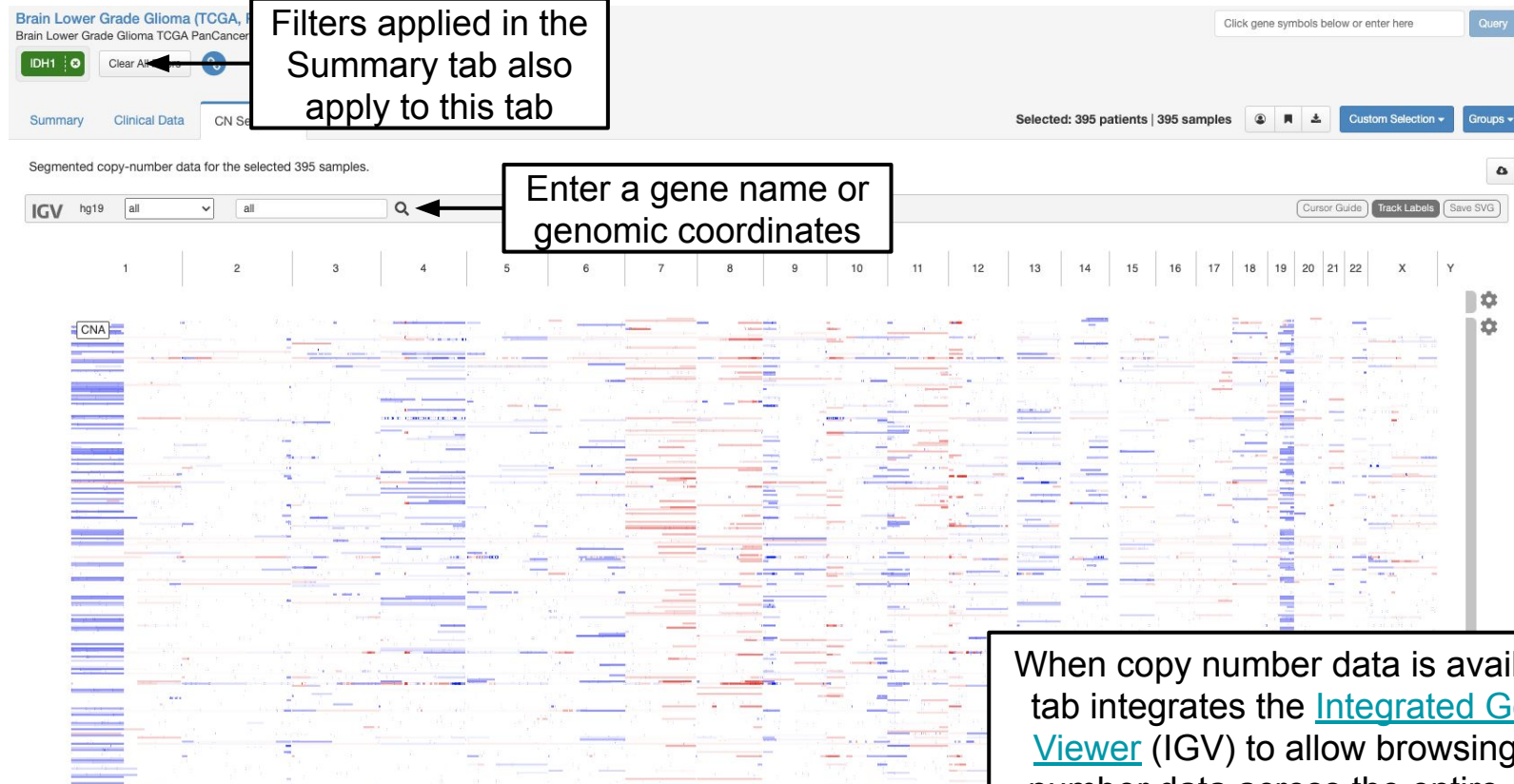
Columns

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	10p Status	10q Status	11p Status	11q Status	12p Status
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	Not Called	Not Called	Not Called	Not Called	Not Called
TCGA-CS-4942	TCGA-CS-4942-01	Diffuse Glioma	Astrocytoma	25	0.0937	44.0	0.281	0.02	1:DECEASED	Female		Black or African American	LGG_IDHmut-non-codel	Astrocytoma	Not Called	Not Called	Not Called	Not Called	Not Called
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		Not Called		Not Called	Gained
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	Not Called	Not Called	Not Called	Not Called	Not Called
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	Not Called	Not Called	Not Called	Not Called	Not Called
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	Not	Not	Not	Not	
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					

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

CN Segments Tab



When copy number data is available, this tab integrates the [Integrated Genomics Viewer](#) (IGV) to allow browsing of copy number data across the entire genome. Each row is a single sample.

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](#)

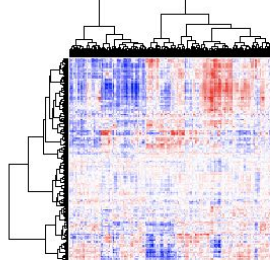
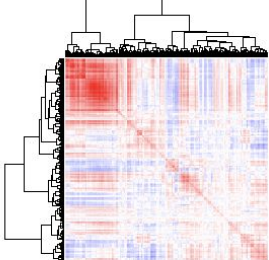
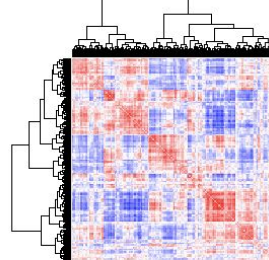
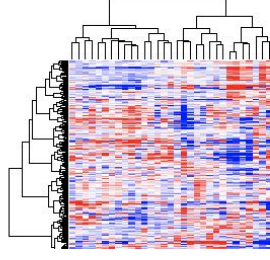
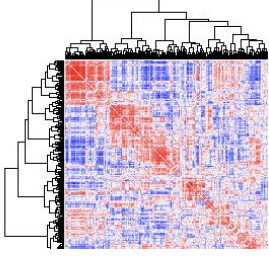
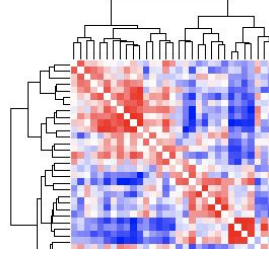
[Bookmark Link for Current View](#)

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) 

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



Custom Selection ▾

Charts ▾

Groups ▾

Use this box to run a query (see next slide).

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](#)

Putative copy-number alterations from GISTIC ☒ and Mutations ☒ 

Summary Clinical Data CN Segments

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.

2. Type a gene name here

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