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 single study view
  - Study Summary
  - Clinical Data
  - Heatmaps
  - CN Segments
- Show how to run a query from the single study view

cBioPortal Main Page

Browse available datasets and select studies to explore or query

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

Search studies

List of all studies, organized by organ system

Link to this page

Selecting a study: from Query

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

Link to this page

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

3. Click on data set of interest

Link to this page

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

Number of samples/patients

Interactive charts: these can be used to select a subset of the samples. All charts will then update to reflect the features of that subset.

Ⓜ and Ⓖ indicate that a gene is significantly frequently altered according to MutSig and GISTIC respectively.

Link to this page

Study Summary Tab: Charts

Hover over a chart to find these buttons

Sex | ℹ | ✕ | ☰

⊞ Show Table
vs. Compare Groups
⬇ Download ▶
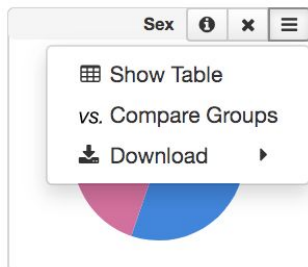
ℹ Hover for a description of the data in this chart.

✕ 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.

vs. 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).

Link to this page

Study Summary Tab: Charts

Many studies have additional charts that that can be added using this button.
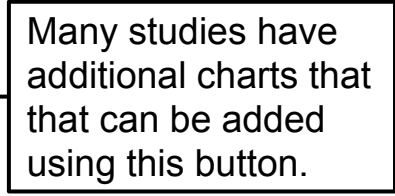
Charts can always be reordered by dragging on the grey bar with the chart name.

Link to this page

Study Summary Tab: Selecting subsets of data

1. You can use any chart or plot to select a subset of samples. Here, IDH1 mutated samples are selected.

2. All plots update to include just the samples with IDH1 mutations.

3. Click on the blue arrow to revert back to the full dataset.

Link to this page

Clinical Data Tab

Download clinical data table

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

Brain Lower Grade Glioma (TCGA, Provisional) 📥
TCGA Brain Lower Grade Glioma; raw data at the NCI; source mutation data from GDAC Firehose.

[IDH1 ✖] [Clear All Filters] ← Filters applied in the Summary tab apply to this table

Summary | **Clinical Data** | Heatmaps

Selected: 221 patients | 221 samples [👤] [🔖] [📥] [Custom Selection] [Columns] [Groups ▾]

[☁] [_____ 🔍]

Patient ID	Sample ID	Cancer Type Detailed	Number of Samples Per Patient	Mutation Count	Fraction Genome Altered	Diagnosis Age	Sex	Ethnicity Category	Race Category	Sample Type	Tumor Site	Adjuvant Postoperative Targeted Therapy Administered Indicator	Age of Food Allergy	Animal Insect Allergy Age	Animal Insect Allergy History	Asthma History	D in p s
TCGA-CS-4938	TCGA-CS-4938-01	Astrocytoma	1	14	0.0518	31	Female	NOT HISPANIC OR LATINO	WHITE	Primary	Supratentorial, Frontal Lobe			12 - 20 Years	YES	NO	-
TCGA-CS-4942	TCGA-CS-4942-01	Anaplastic Astrocytoma	1	19	0.0937	44	Female		BLACK OR AFRICAN AMERICAN	Primary	Supratentorial, Frontal Lobe				NO	NO	-
TCGA-CS-4943	TCGA-CS-4943-01	Anaplastic Astrocytoma	1	21	0.1625	37	Male		WHITE	Primary	Supratentorial, Frontal Lobe						⑨
TCGA-CS-4944	TCGA-CS-4944-01	Astrocytoma	1	19	0.0603	50	Male		WHITE	Primary	Supratentorial, Temporal Lobe						-
TCGA-CS-5390	TCGA-CS-5390-01	Oligodendroglioma	1	30	0.0511	47	Female		WHITE	Primary	Supratentorial, Parietal Lobe						
TCGA-CS-	TCGA-CS-	Anaplastic Astrocytoma	1	21	0.0569	39	Male		WHITE	Primary	Supratentorial, Temporal						

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

Heatmaps Tab

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

CN Segments Tab

Filters applied in the Summary tab also apply to this tab

Enter a gene name or genomic coordinates

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.

Link to this page
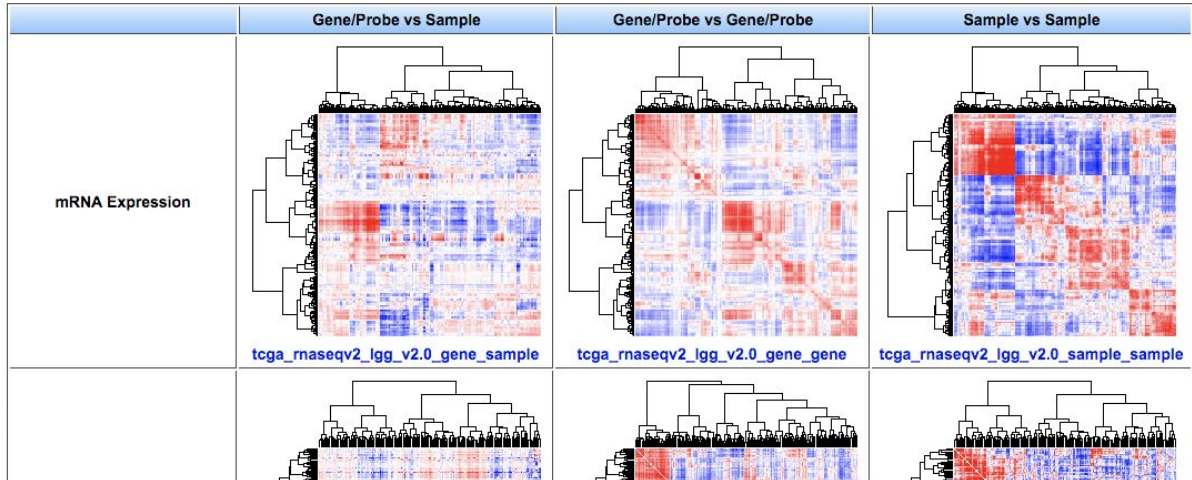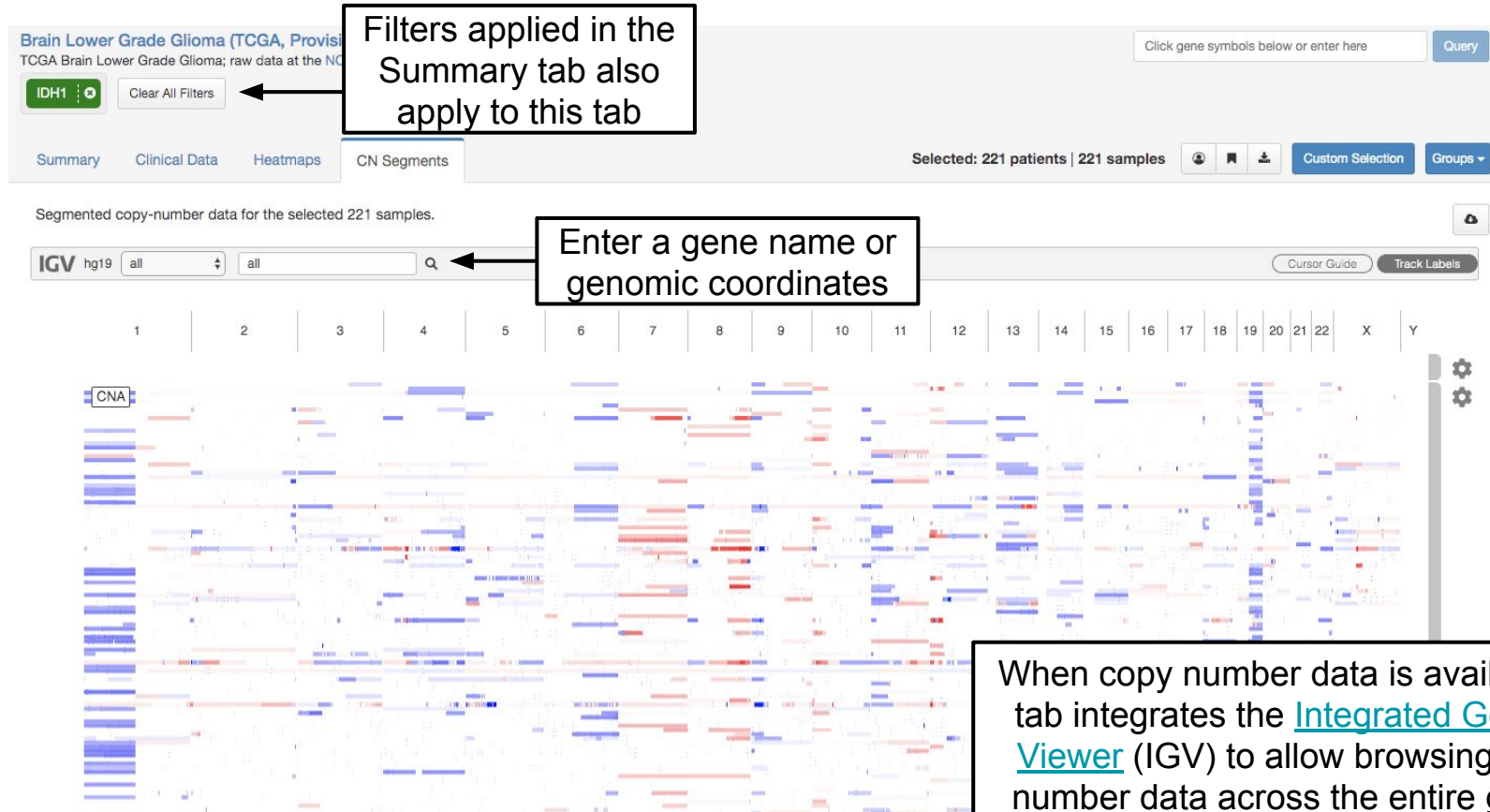
Study Summary Tab: Additional Features

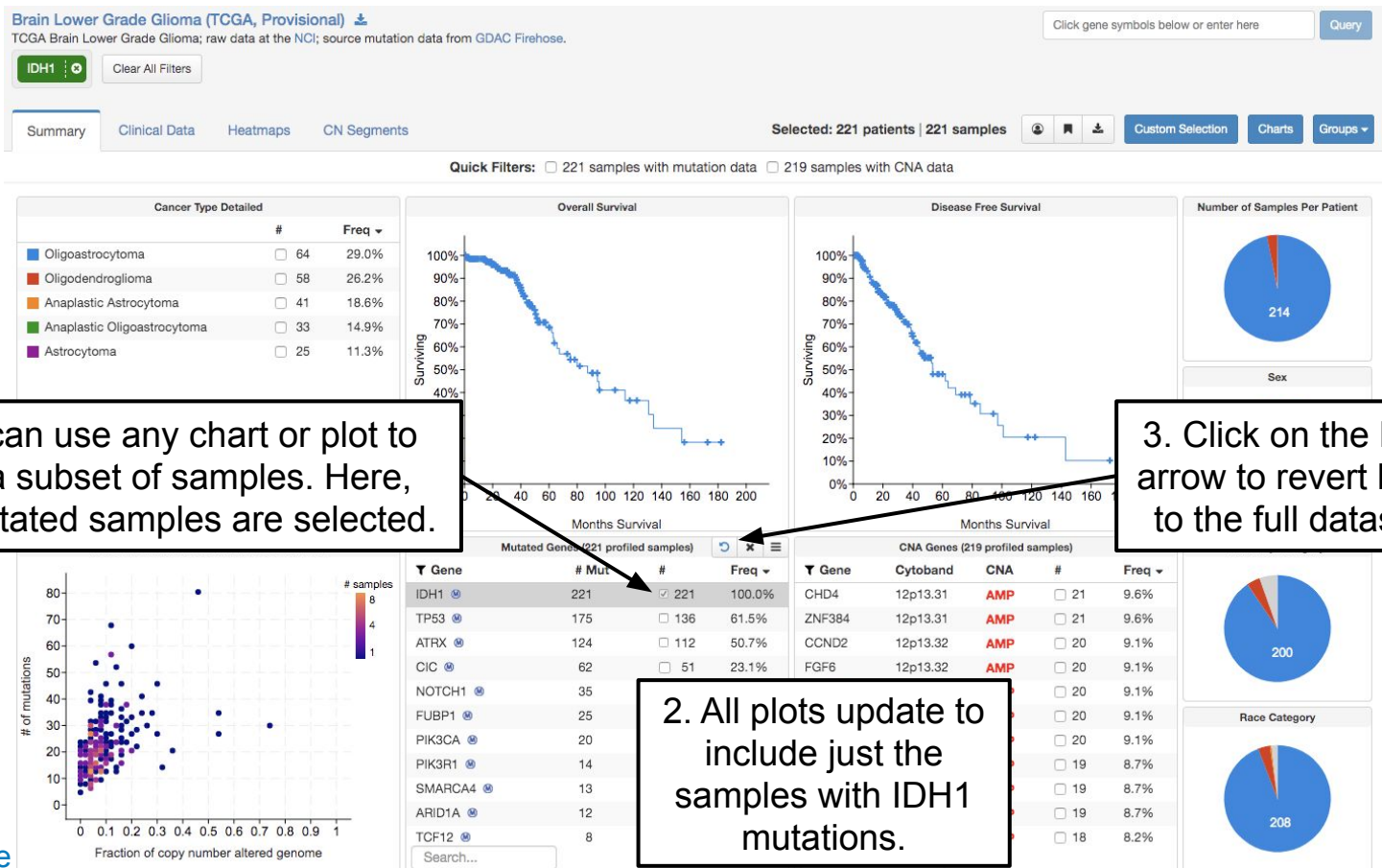Use this box to run a query (see next slide).

Brain Lower Grade Glioma (TCGA, Provisional) ⬇
TCGA Brain Lower Grade Glioma; raw data at the NCI; source mutation data from GDAC Firehose.

Click gene symbols below or enter here   [Query]

Summary | Clinical Data | Heatmaps | CN Segments

Selected: 516 patients | 530 samples   [👤] [🔖] [⬇]   **Custom Selection**   **Charts**   **Groups ▾**

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.

Link to this page

Study Summary Tab: Run a query

3. Then click here to run the query

Brain Lower Grade Glioma (TCGA, Provisional) ⬇
TCGA Brain Lower Grade Glioma; raw data at the NCI; source mutation data from GDAC Firehose.

| Summary | Clinical Data | Heatmaps | CN Segments |

IDH1   [Query]

1. Type a gene name here

tients | 550 samples   [👤] [🔖] [⬇]   [Custom Selection]   [Charts]   [Groups ▾]

Quick Filters: ☐ 286 samp   th CNA data

Cancer Type Detailed

		#	Freq ▾
🟦 Oligoastrocytoma		134	25.3%
🟥 Anaplastic Astrocytoma		130	24.5%
🟧 Oligodendroglioma		120	22.6%
🟩 Anaplastic Oligoastrocytoma		78	14.7%
🟪 Astrocytoma		67	12.6%
🟦 Diffuse Glioma		1	0.2%

Search...

Overall Survival

Disease Free Survival

Number of Samples Per Patient
502

Sex
230   285

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

Advanced feature: Select a subset of the data (samples with IDH1 mutations or females or …) before running the query. The query will then run in only those selected samples.

Mutation Count vs Fraction of Genome Altered

Mutated Genes (286 profiled samples)

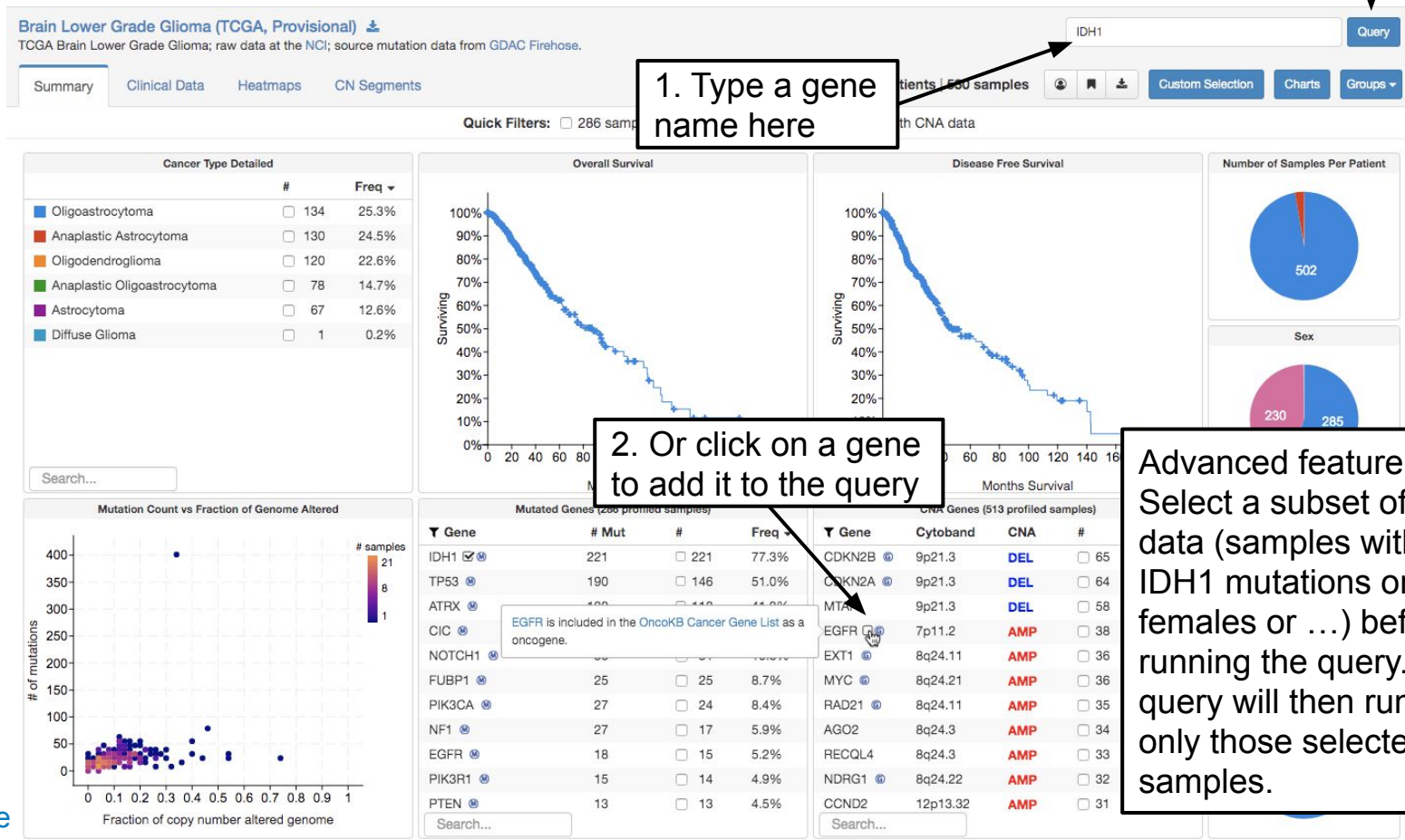| ▼ Gene	# Mut	#	Freq ▾
IDH1 ☑ Ⓜ	221	☐ 221	77.3%
TP53 Ⓜ	190	☐ 146	51.0%
ATRX Ⓜ		☐	44.0%
CIC Ⓜ	EGFR is included in the OncoKB Cancer Gene List as a oncogene.		
NOTCH1 Ⓜ		☐	
FUBP1 Ⓜ	25	☐	8.7%
PIK3CA Ⓜ	27	☐ 24	8.4%
NF1 Ⓜ	27	☐ 17	5.9%
EGFR Ⓜ	18	☐ 15	5.2%
PIK3R1 Ⓜ	15	☐ 14	4.9%
PTEN Ⓜ	13	☐ 13	4.5%

Search...

CNA Genes (513 profiled samples)

▼ Gene	Cytoband	CNA	#
CDKN2B Ⓖ	9p21.3	DEL	☐ 65
CDKN2A Ⓖ	9p21.3	DEL	☐ 64
MTA...	9p21.3	DEL	☐ 58
EGFR Ⓖ	7p11.2	AMP	☐ 38
EXT1 Ⓖ	8q24.11	AMP	☐ 36
MYC Ⓖ	8q24.21	AMP	☐ 36
RAD21 Ⓖ	8q24.11	AMP	☐ 35
AGO2 Ⓖ	8q24.3	AMP	☐ 34
RECQL4 Ⓖ	8q24.3	AMP	☐ 33
NDRG1 Ⓖ	8q24.22	AMP	☐ 32
CCND2 Ⓖ	12p13.32	AMP	☐ 31

Search...

Link to this page

See Tutorial #2: Single Study Query

Questions?
Check out our other tutorials
or email us at:
cbioportal@googlegroups.com