CANCER GENOMICS CONSORTIUM

Educating for Best Practices in Clinical Cancer Genomics

ICGC

International Cancer Genome Consortium (ICGC) Data Portal

Data portal: http://dcc.icgc.org/

Project homepage: http://icgc.org/

ICGC Aim Statement

- **ICGC Goal:** To obtain a comprehensive description of genomic, transcriptomic and epigenomic changes in 50 different tumor types and/or subtypes which are of clinical and societal importance across the globe.

- 89 Cancer Genome Projects supported by ICGC
  - 76 projects on Data Portal

- Media link on Project homepage – many PDFs related to this resource

ICGC Data Portal

Cancer Projects | Advanced Search | Data Analysis | DCC Data Releases | Data Repositories

e.g. BRAF, KRAS G12D, DO35100, MU7870, FI998, apoptosis, Cancer Gene Censu

Overview of Data Represented

About Us

The ICGC Data Portal provides tools for visualizing, querying and downloading the data released quarterly by the consortium's member projects.

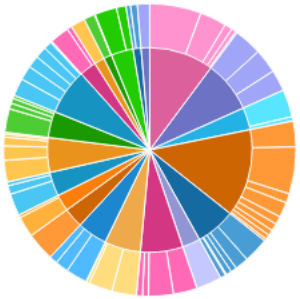
To access ICGC controlled tier data, please read these instructions.

New features will be regularly added by the DCC development team. Feedback is welcome.

Data Release 23

Dec 7, 2016

Donor Distribution by Primary Site



Cancer projects	70
Cancer primary sites	21
Donors with molecular data in DCC	16,246
Total Donors	19,305
Simple somatic mutations	46,693,172
Mutated Genes	57,658

Tutorial

EXAMPLE QUERIES

1. BRAF missense mutations in colorectal cancer
2. Most frequently mutated genes by high impact mutations in stage III malignant lymphoma
3. Brain cancer donors with frameshift mutations and having methylation data available

Can use as starting point if asking similar question

PCAWG PanCancer Analysis OF WHOLE GENOMES

The Pancancer Analysis of Whole Genomes (PCAWG) study is an international collaboration to identify common patterns of mutation in more than 2,800 cancer whole genomes from the International Cancer Genome Consortium.

ICGC International Cancer Genome Consortium in the cloud

ICGC data is now available on commercial and academic compute cloud. Read more...

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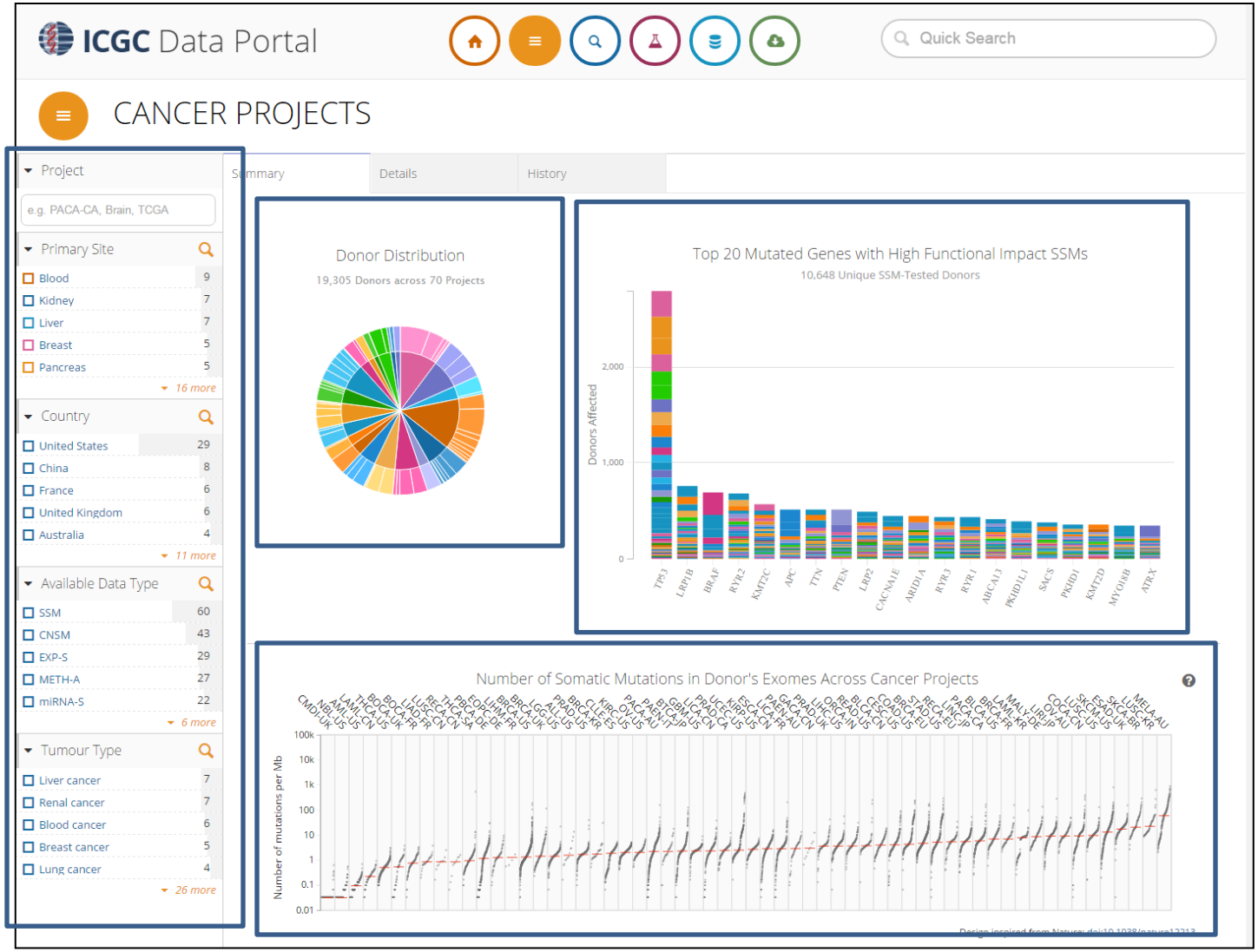
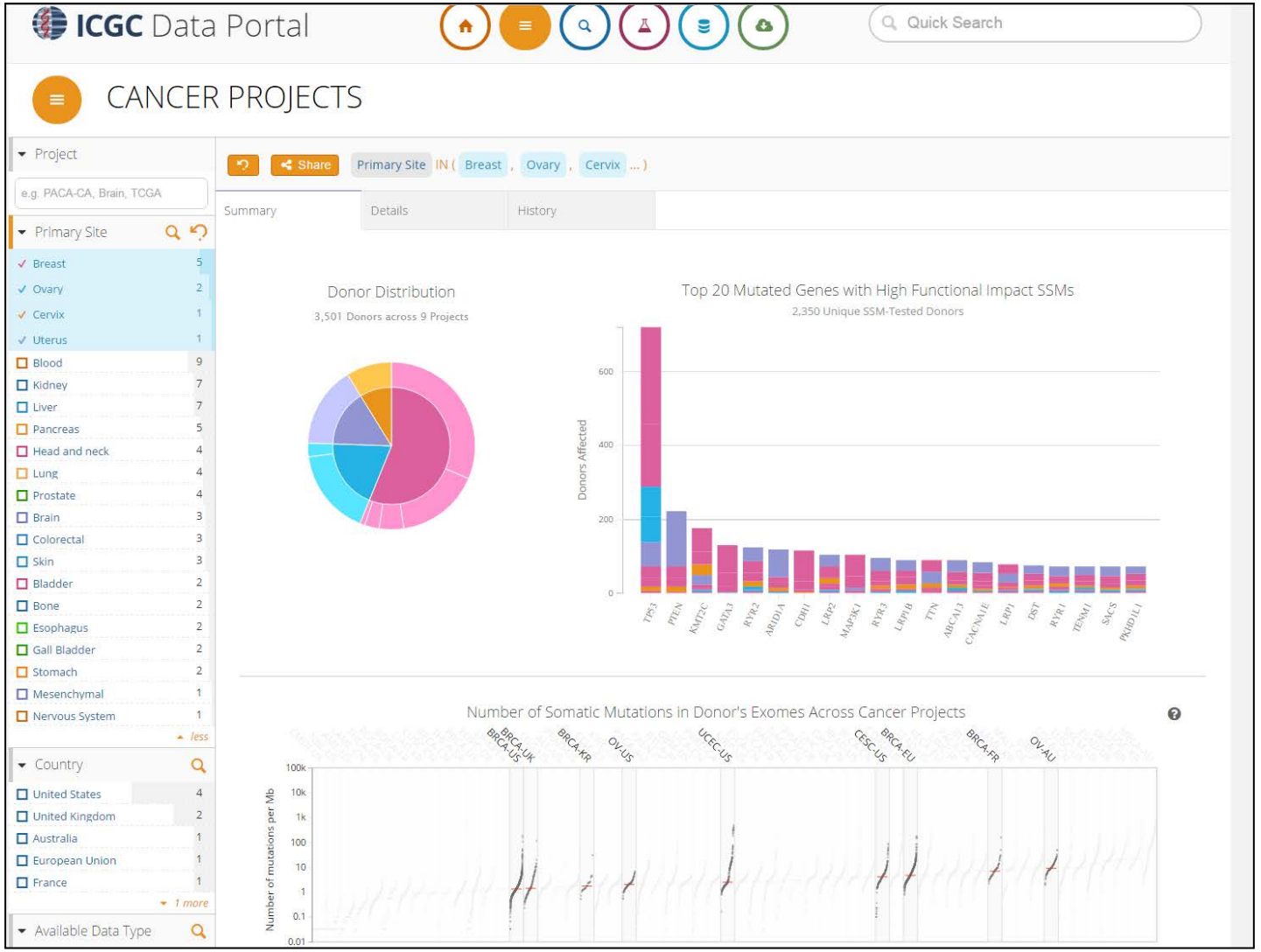
OICR Ontario Institute for Cancer Research

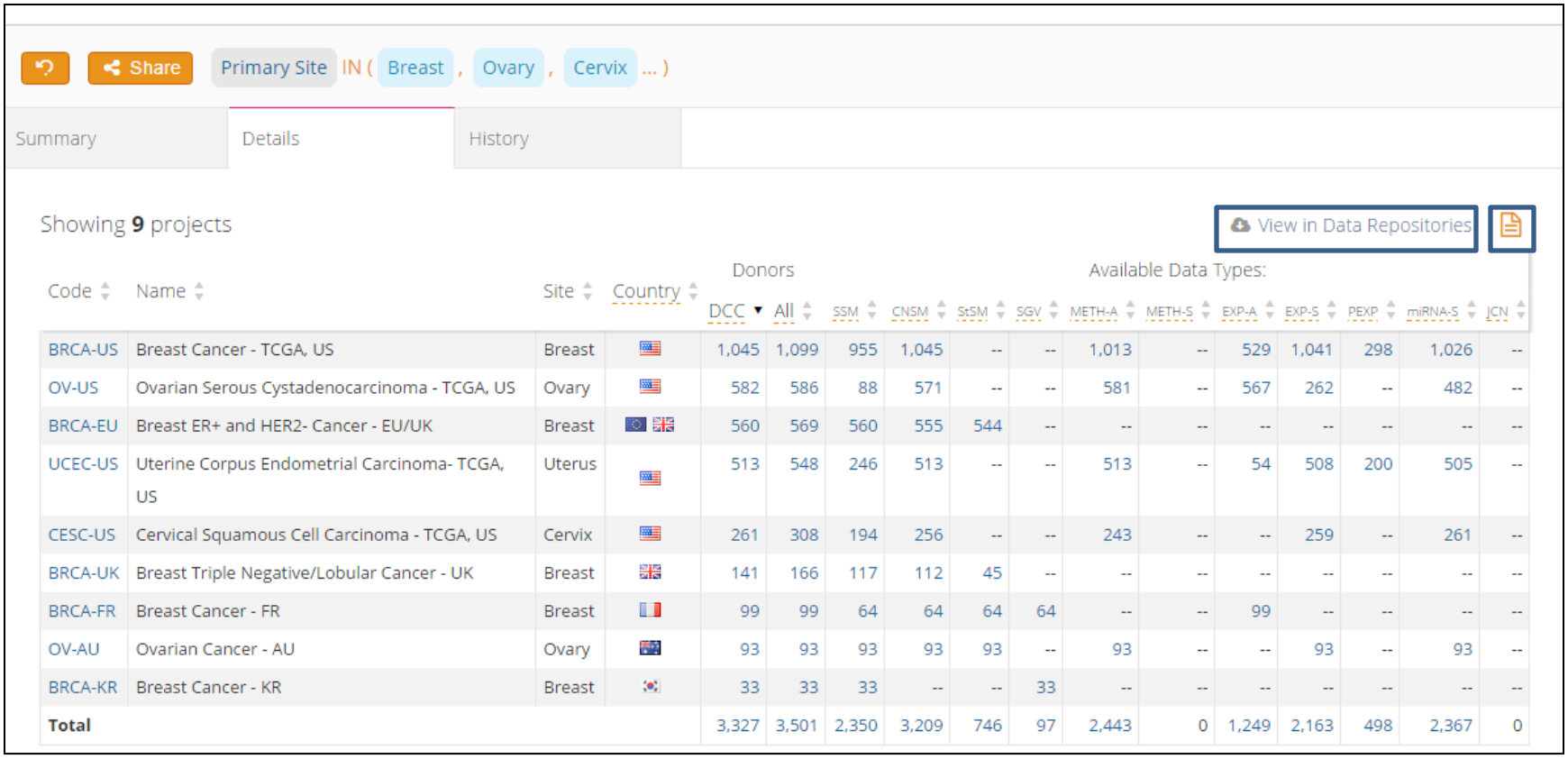


- Search by selecting project, primary site, country conducting study, data types (abbreviations defined by hovering over with mouse), or tumor types
- Search by selecting a primary site or study from pie chart
- See gene in formation by selecting part of bar graph
- See study information by selecting data set from # of somatic mutations graph



- Selection a subset of studies will update summary page to only include the desired information and help stratify data and identify genes that may be of importance in particular cancer types.

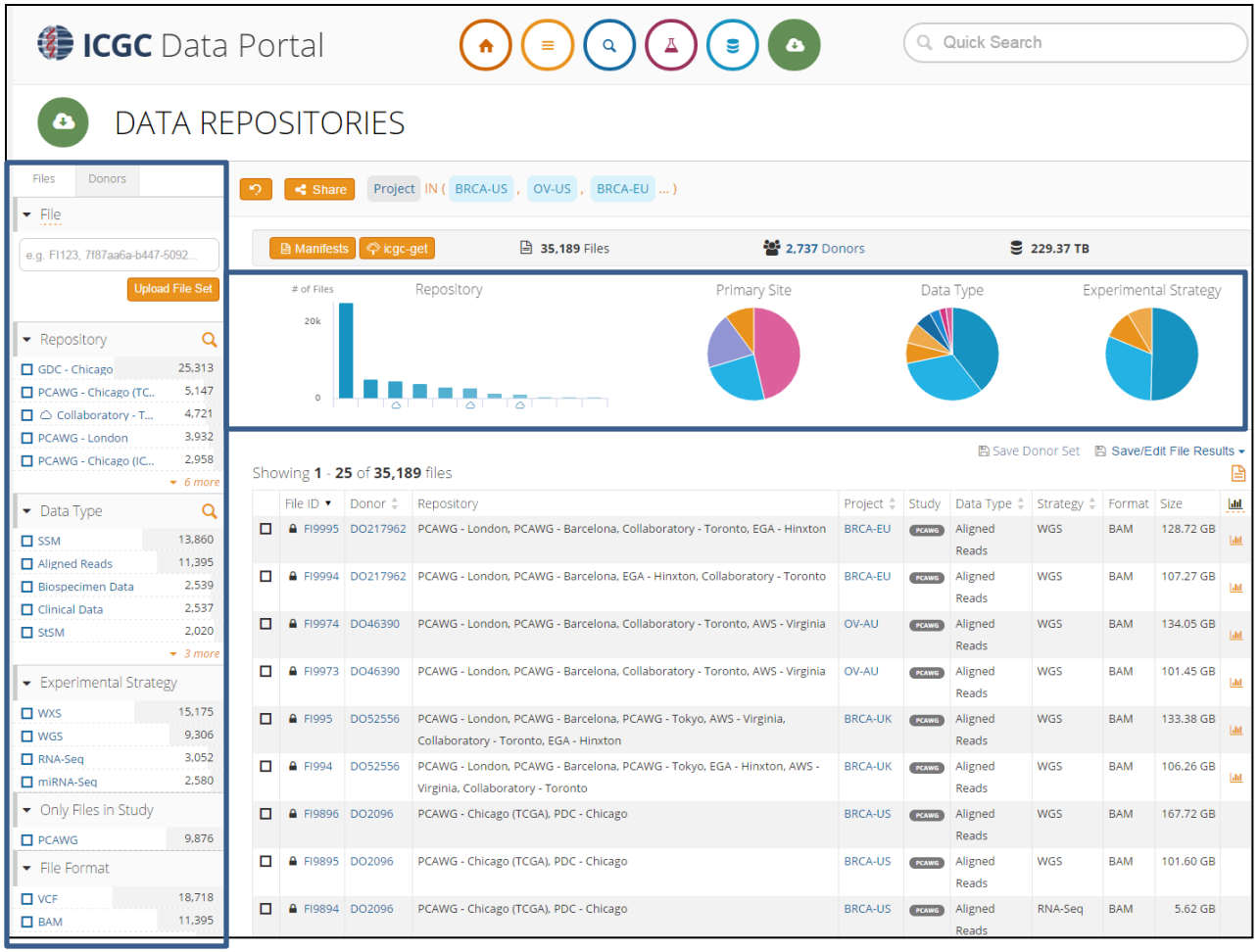
Details Page



Code	Name	Site	Country	Donors DCC	Donors All	Available Data Types: SSM	CNSM	StSM	SGV	METH-A	METH-S	EXP-A	EXP-S	PEXP	miRNA-S	JCN
BRCA-US	Breast Cancer - TCGA, US	Breast		1,045	1,099	955	1,045	--	--	1,013	--	529	1,041	298	1,026	--
OV-US	Ovarian Serous Cystadenocarcinoma - TCGA, US	Ovary		582	586	88	571	--	--	581	--	567	262	--	482	--
BRCA-EU	Breast ER+ and HER2- Cancer - EU/UK	Breast		560	569	560	555	544	--	--	--	--	--	--	--	--
UCEC-US	Uterine Corpus Endometrial Carcinoma- TCGA, US	Uterus		513	548	246	513	--	--	513	--	54	508	200	505	--
CESC-US	Cervical Squamous Cell Carcinoma - TCGA, US	Cervix		261	308	194	256	--	--	243	--	--	259	--	261	--
BRCA-UK	Breast Triple Negative/Lobular Cancer - UK	Breast		141	166	117	112	45	--	--	--	--	--	--	--	--
BRCA-FR	Breast Cancer - FR	Breast		99	99	64	64	64	64	--	--	99	--	--	--	--
OV-AU	Ovarian Cancer - AU	Ovary		93	93	93	93	93	--	93	--	--	93	--	93	--
BRCA-KR	Breast Cancer - KR	Breast		33	33	33	--	--	33	--	--	--	--	--	--	--
Total				3,327	3,501	2,350	3,209	746	97	2,443	0	1,249	2,163	498	2,367	0

- Table is exportable as .TSV
- Can view data in Data Repositories

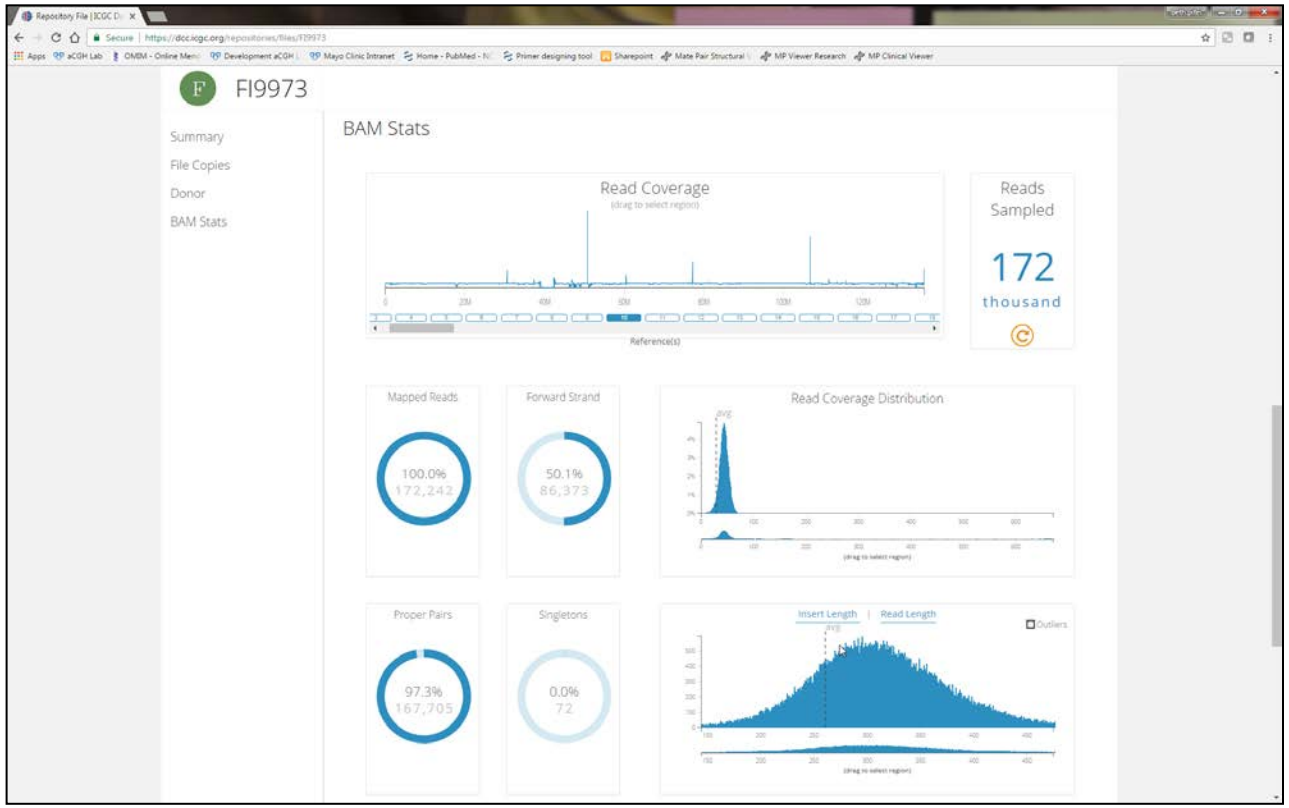
Data Repositories



- Left panel: Can select by file, repository, data type, experimental strategy, file format, analysis software, and open/controlled access.
- Can also select by picking a segment of pie chart or bar graph.
- Repositories with Cloud icon have BAM metrics (or similar) available.

Inside Controlled Data

- Downloadable Reference Genome, BAM files
- Visible Quality metrics by chromosome
- Scroll down for % proper pairs, % singletons, % both pairs mapped, % duplicates, and mapping/base quality



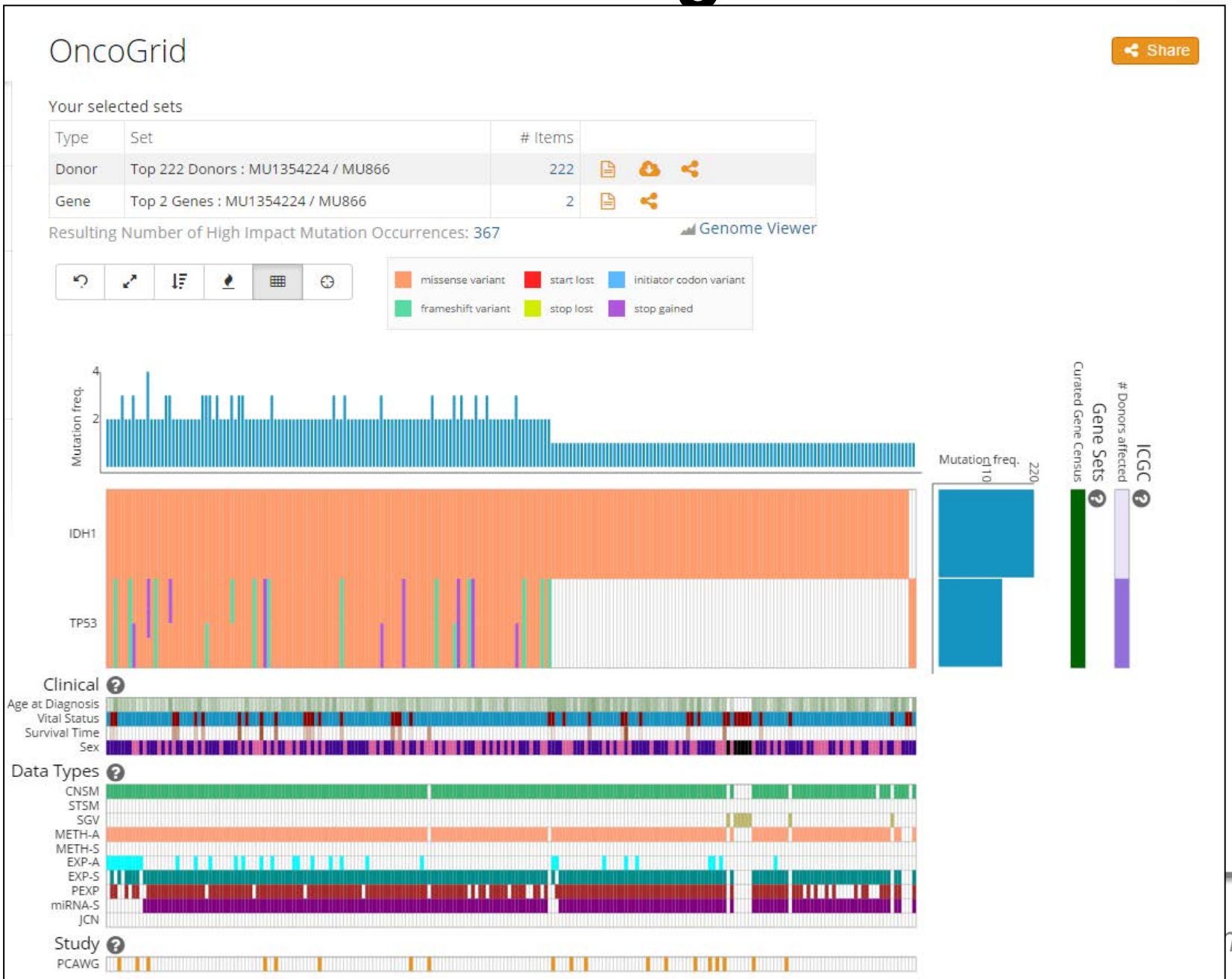
Search for Gene or Mutation

- Type gene name in search bar
- Start typing in gene name followed by mutation, then select appropriate mutation ID (MU###)
- Under 'Donors' Tab in main panel, find most common primary site and tumor stage for mutation/gene alteration

Search for Gene/Mutation

- On ‘Genes’ tab in main panel, mutations in table can be analyzed.
  - Oncogrid
  - Enrichment analysis
  - Genome Viewer
  - Save your gene set
  - Download as .TSV

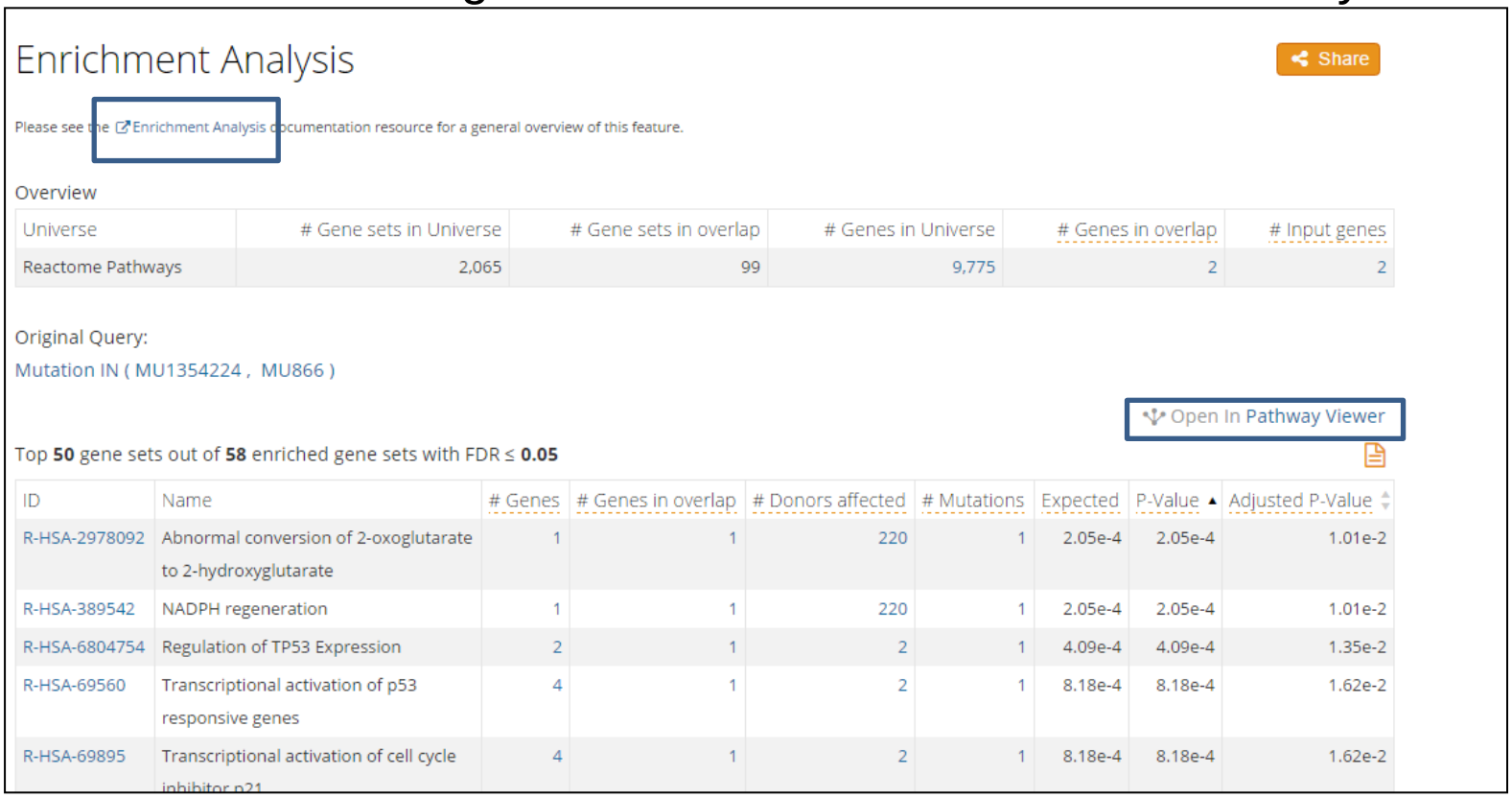
Oncogrid



mics

Enrichment Analysis

- Can select to view enrichment in Go Molecular/Biological/Cellular or Reactome Pathways



Enrichment Analysis

Share

Please see the Enrichment Analysis documentation resource for a general overview of this feature.

Overview

Universe	# Gene sets in Universe	# Gene sets in overlap	# Genes in Universe	# Genes in overlap	# Input genes
Reactome Pathways	2,065	99	9,775	2	2

Original Query:

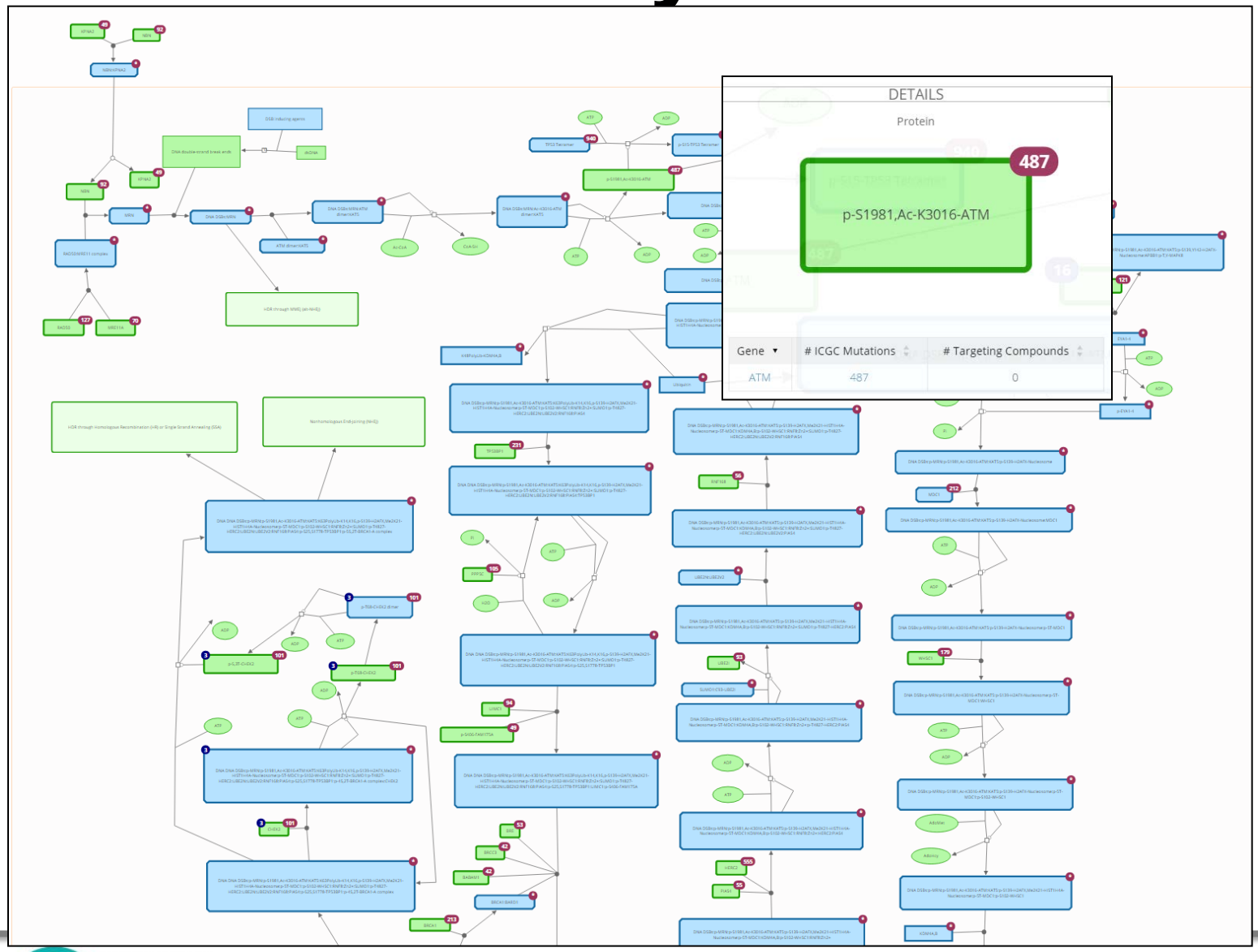
Mutation IN (MU1354224 , MU866)

Open In Pathway Viewer

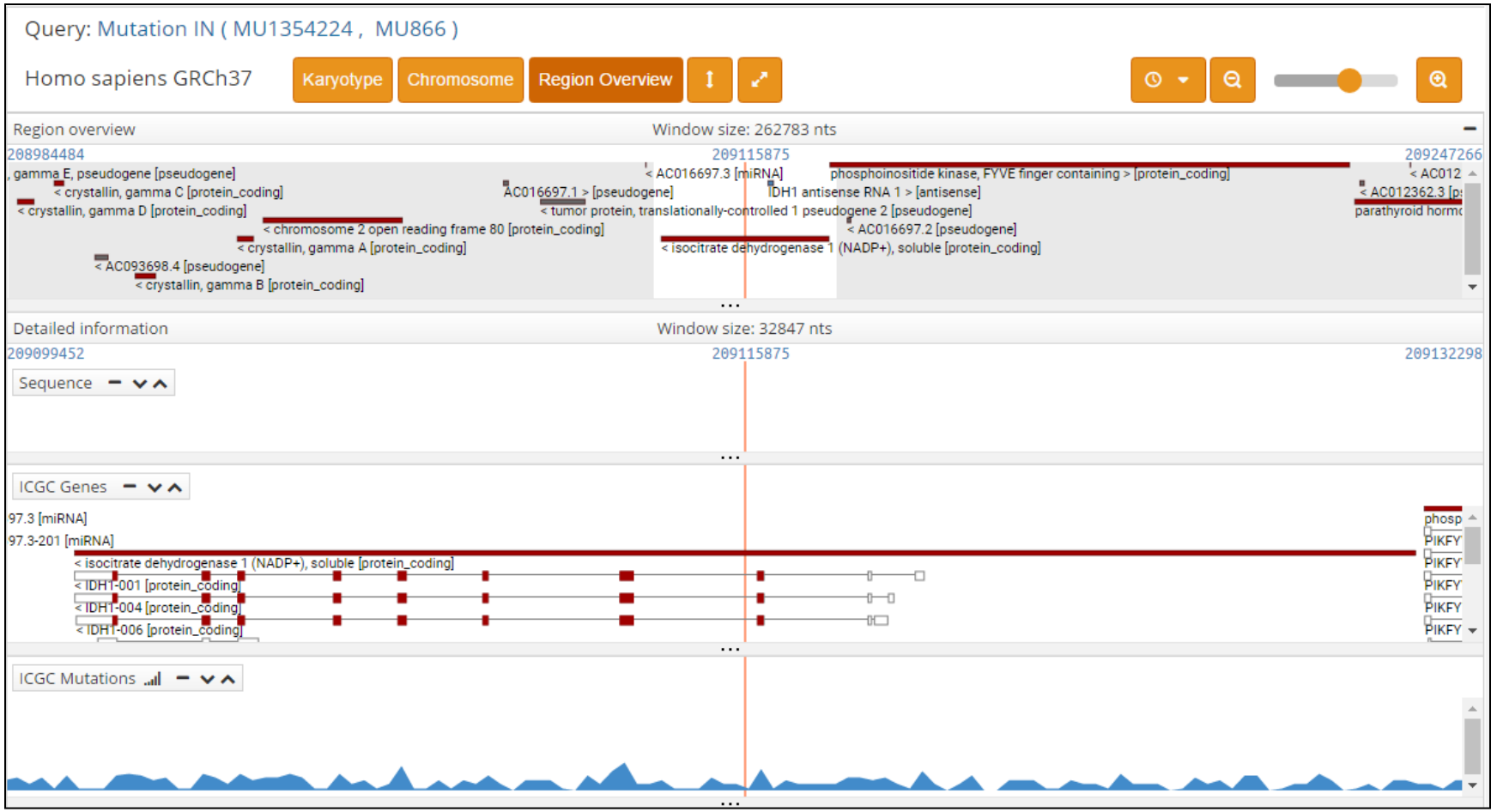
Top **50** gene sets out of **58** enriched gene sets with FDR ≤ **0.05**

ID	Name	# Genes	# Genes in overlap	# Donors affected	# Mutations	Expected	P-Value ▲	Adjusted P-Value
R-HSA-2978092	Abnormal conversion of 2-oxoglutarate to 2-hydroxyglutarate	1	1	220	1	2.05e-4	2.05e-4	1.01e-2
R-HSA-389542	NADPH regeneration	1	1	220	1	2.05e-4	2.05e-4	1.01e-2
R-HSA-6804754	Regulation of TP53 Expression	2	1	2	1	4.09e-4	4.09e-4	1.35e-2
R-HSA-69560	Transcriptional activation of p53 responsive genes	4	1	2	1	8.18e-4	8.18e-4	1.62e-2
R-HSA-69895	Transcriptional activation of cell cycle inhibitor p21	4	1	2	1	8.18e-4	8.18e-4	1.62e-2

Pathway Viewer



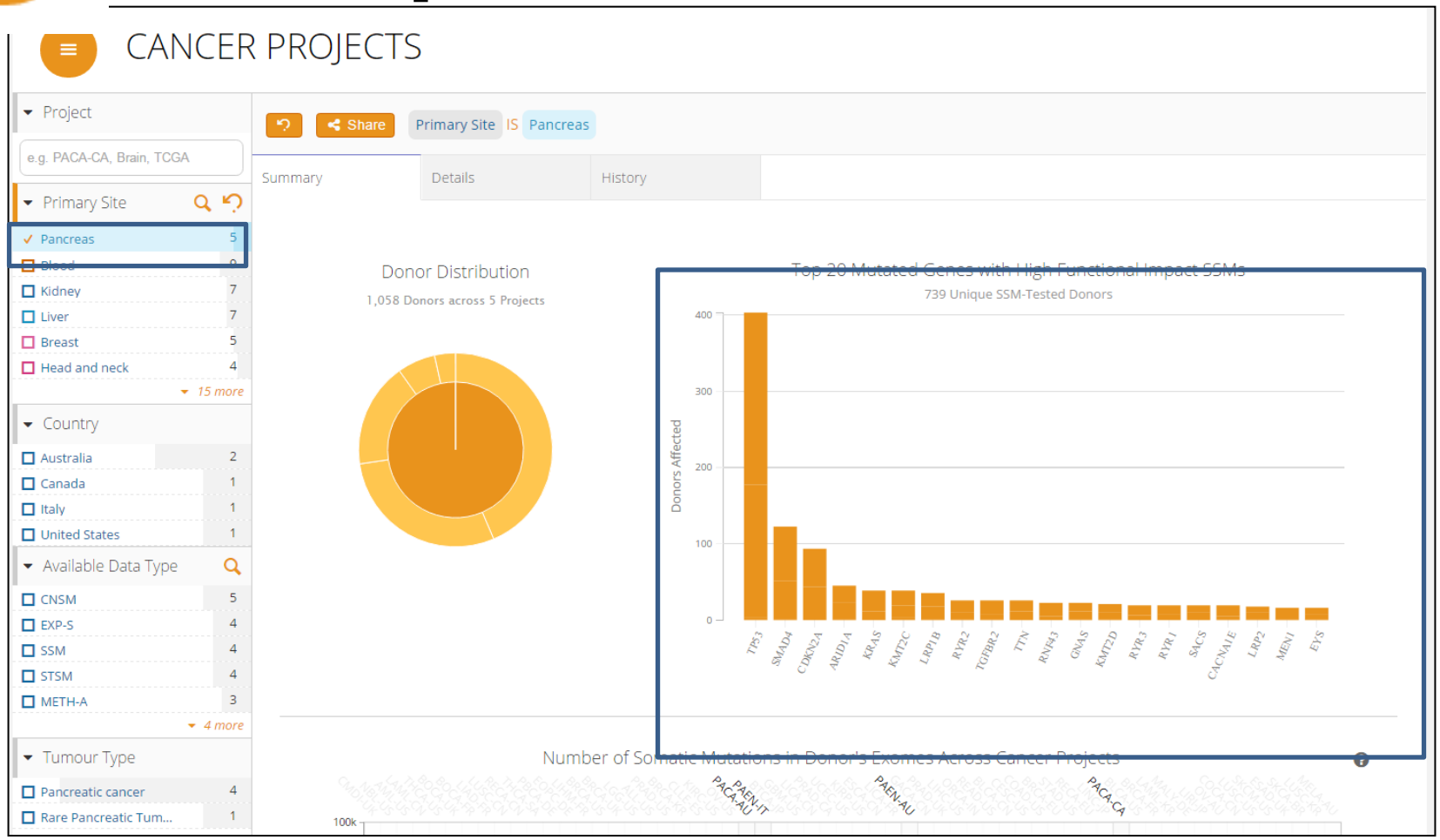
Genome Viewer



Scenario #1

- You are a laboratory professional looking to add new genes to your pancreatic cancer NGS panel. How can you find candidate genes?
  - Find Top Mutated genes
  - Pathway Analysis

Find Top Mutated Genes



- Select Pancreas from Primary Site menu on left panel. Top 20 mutated genes for that cancer type will appear on bar graph.

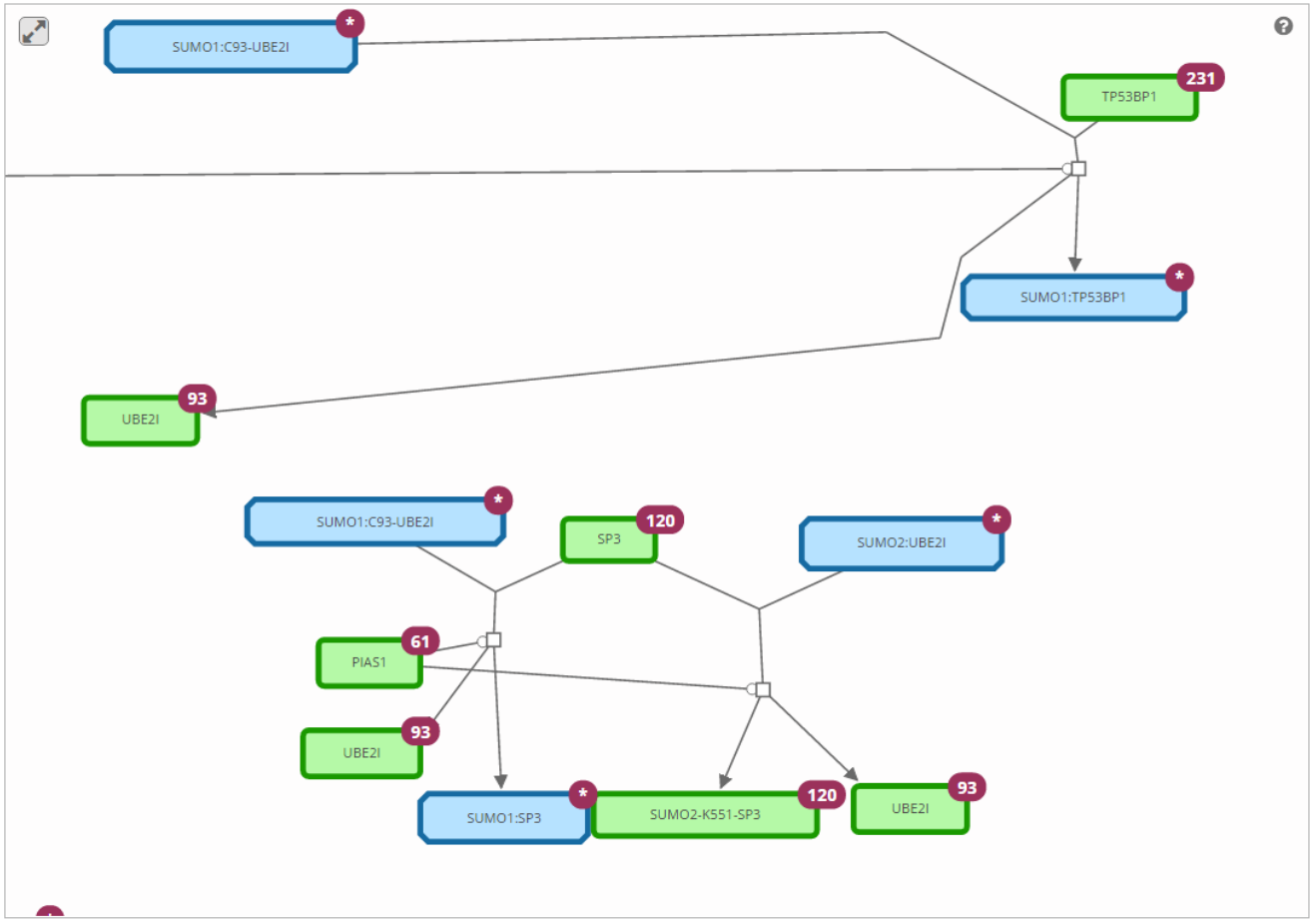
Pathway Analysis

- Input
  - Top 5 mutated Pancreatic Cancer Genes into Advanced Search window under ‘Gene’ tab on left panel
  - Select ‘Pancreas’ from primary site on ‘Donor’ tab on left panel
  - Select “Enrichment Analysis” from above data table on ‘Gene’ tab on main panel
  - Select Reactome and Open in Pathway Viewer

Pathway Analysis

ID	Name	# Genes	# Genes in overlap	# Donors affected	# Mutations	Expected	P-Value	Adjusted P-Value
R-HSA-3232118	SUMOylation of transcription factors	16	2	485	404	8.18e-3	2.50e-5	5.13e-3

DRAG AND SCROLL TO EXPLORE THE PATHWAY. DOUBLE CLICK TO RESET THE VIEW.



Scenario #2

- You would like to know survival statistics and prognostic data for a mutation observed in your laboratory.
  - TP53 MU397
    - chr17:g.7577114C>A

Survival Analysis

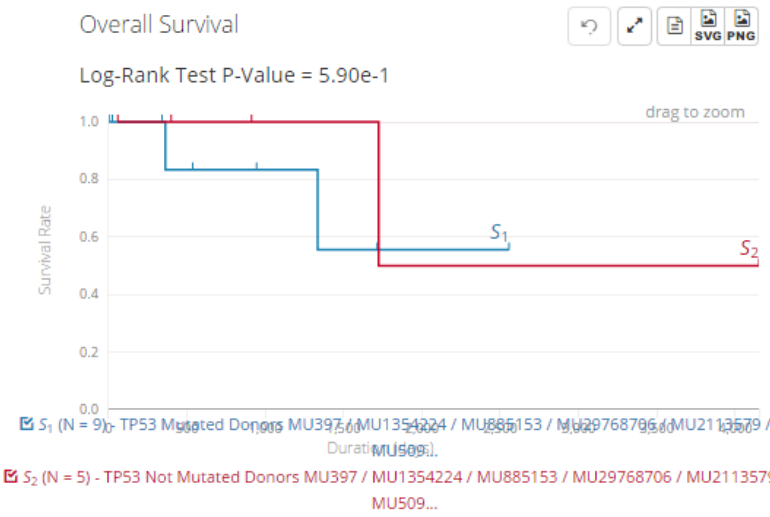
Cohort Comparison

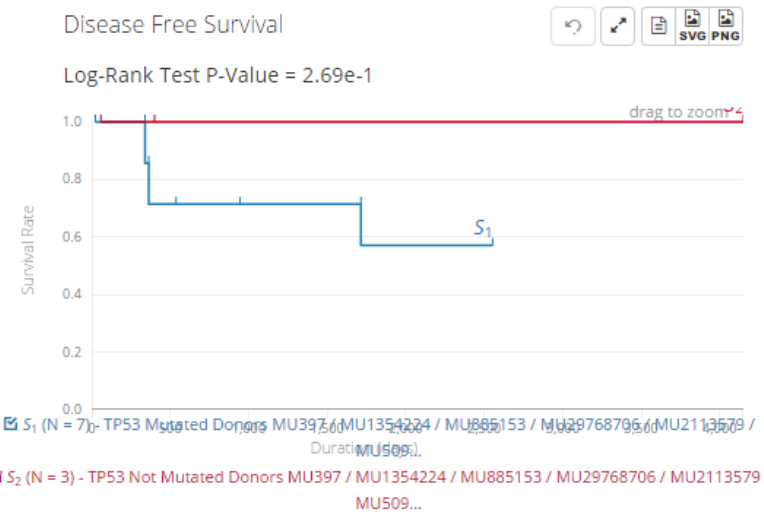
Share

Your selected donor sets

Set Name	# Donors
TP53 Mutated Donors MU397 / MU1354224 / MU885153 / MU29768706 / MU2113579 / MU509...	11
TP53 Not Mutated Donors MU397 / MU1354224 / MU885153 / MU29768706 / MU2113579 / MU509...	7

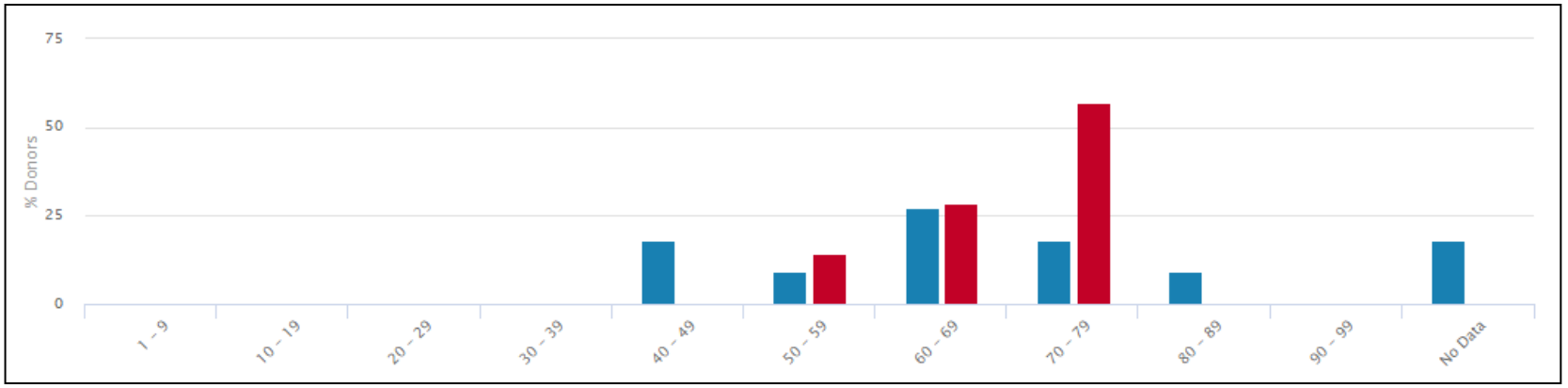
Survival Analysis





Demographics Available

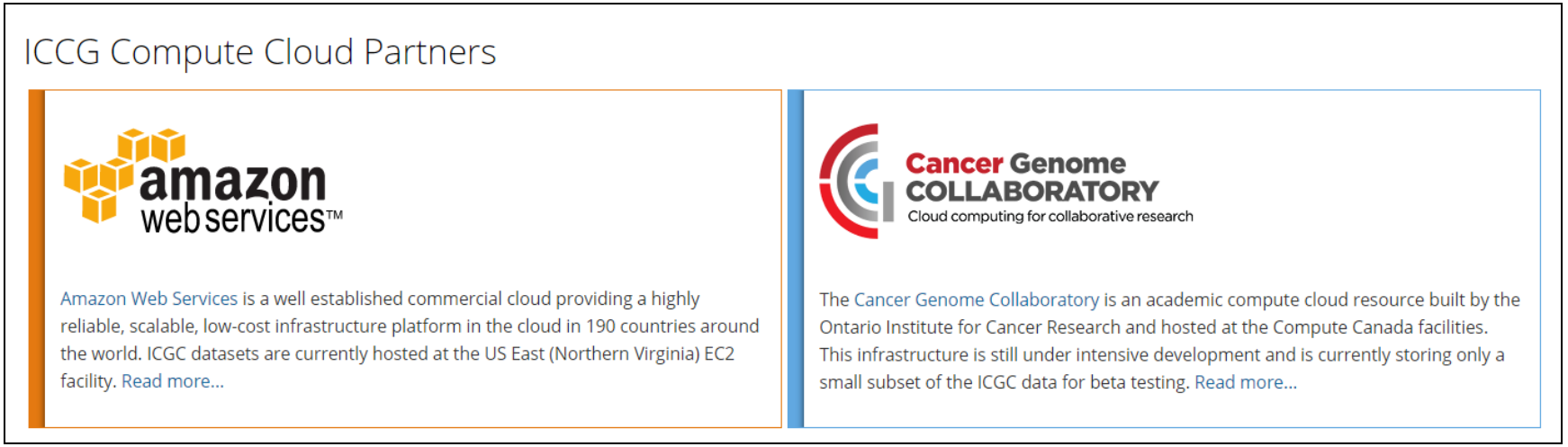
- Age at Diagnosis
- Vital Status – Alive or Deceased
- Gender



Scenario #3

- You are looking to combine your lab's research computing effort with ICGC to better compare data with TCGA data.

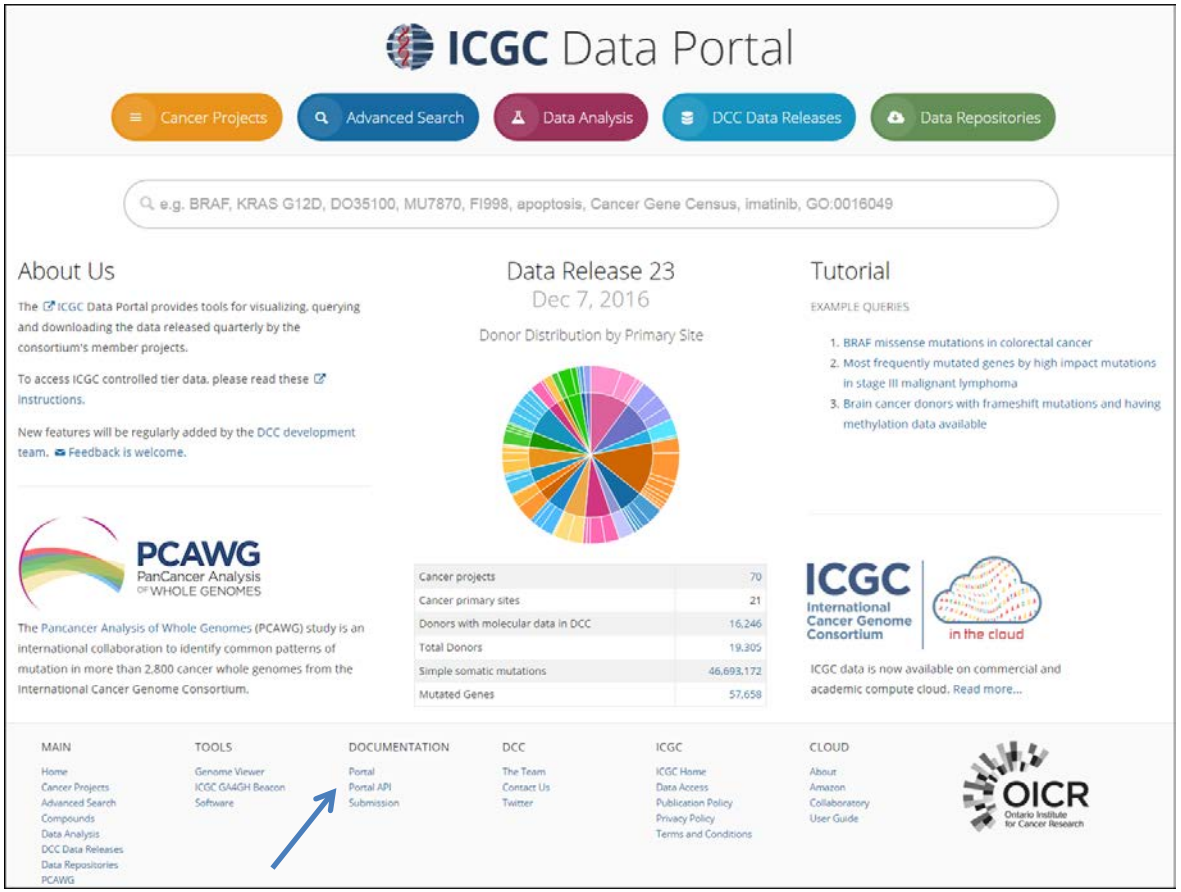
Cloud Computing and Collaborative Effort



- https://dcc.icgc.org/icgc-in-the-cloud

Portal API

- API Endpoints are available for trial and use.



Online Tutorial

- https://vimeo.com/75522669

Contact

- dcc-support@icgc.org