

Mouse models of GBM: MRI characterization and caBIG[®] tools

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Outline

- The *Mouse GBM* project
- How do caBIG[®] tools support *Mouse GBM*?
 - Standardize MRI features (VASARI)
 - Archive and organize DICOM data (NBIA)
 - Integrate imaging and biology (caIntegrator)
- Summary and remaining challenges

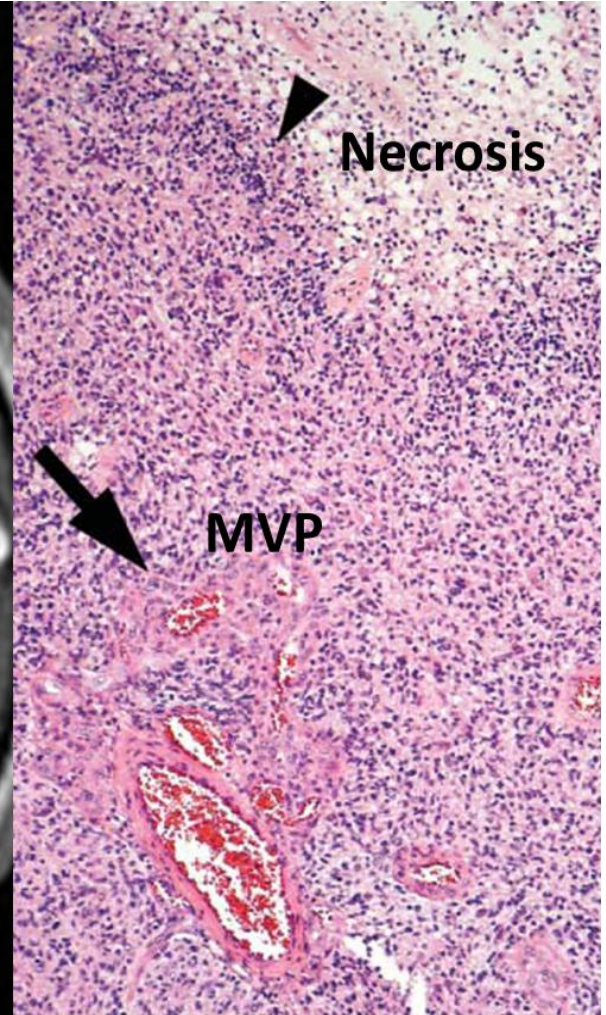
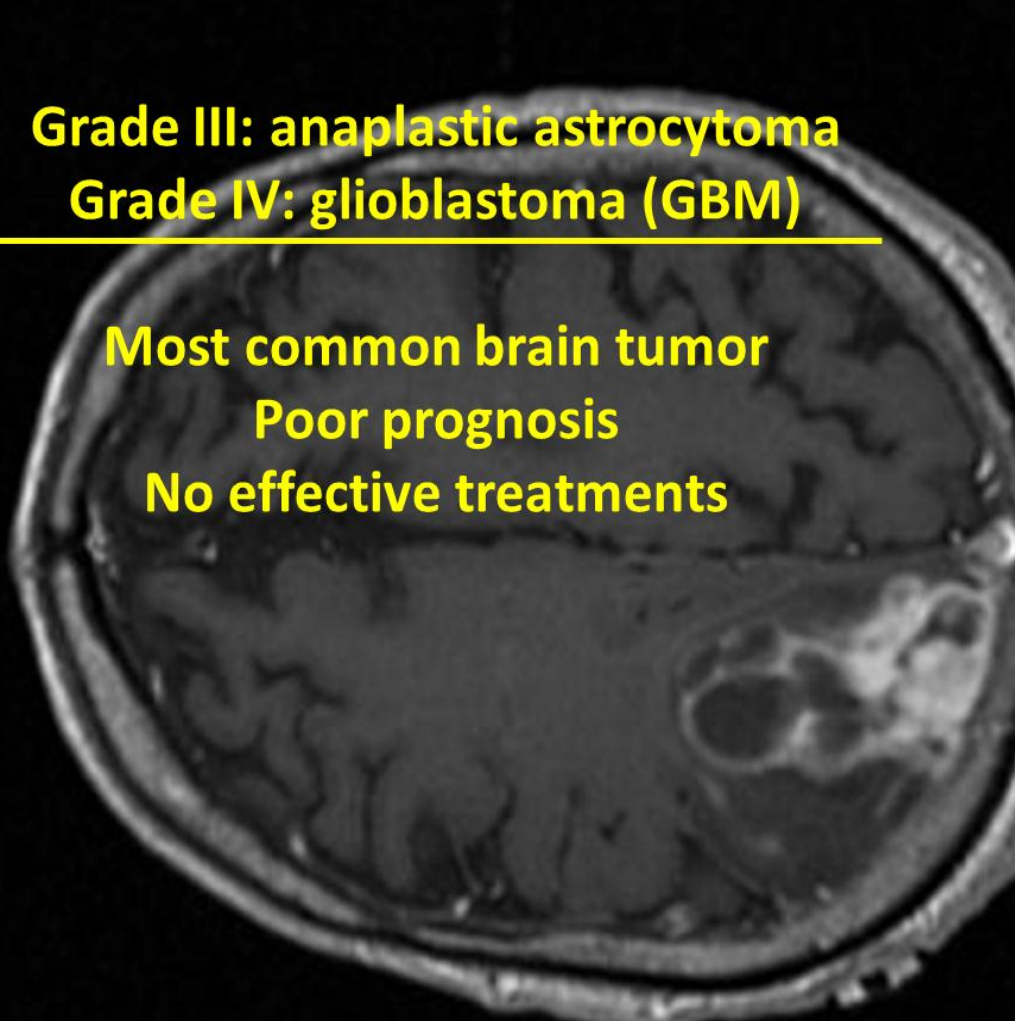
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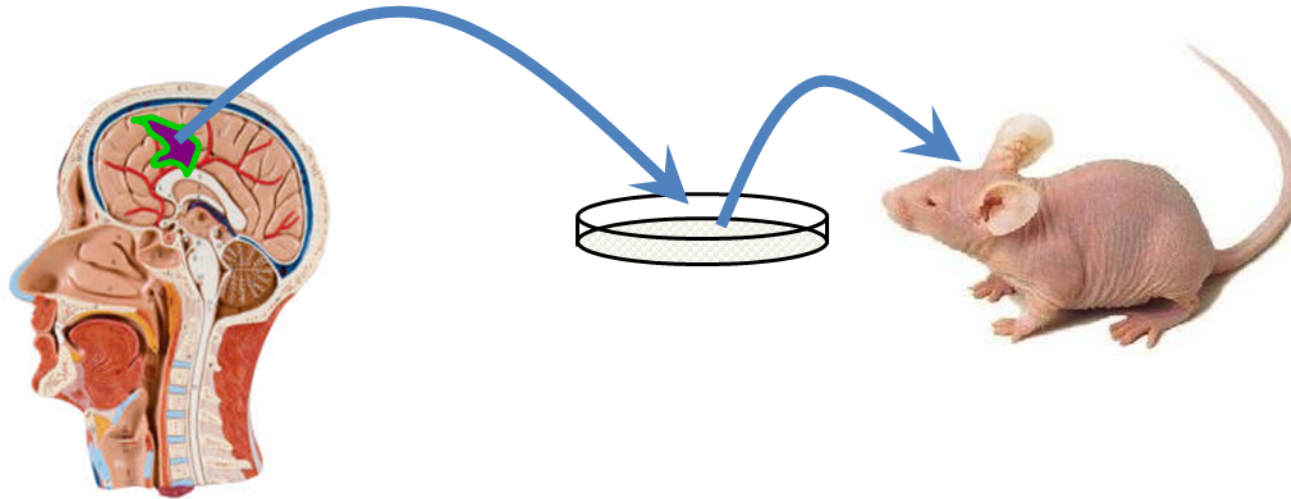
High grade astrocytoma

Grade III: anaplastic astrocytoma
Grade IV: glioblastoma (GBM)

Most common brain tumor
Poor prognosis
No effective treatments

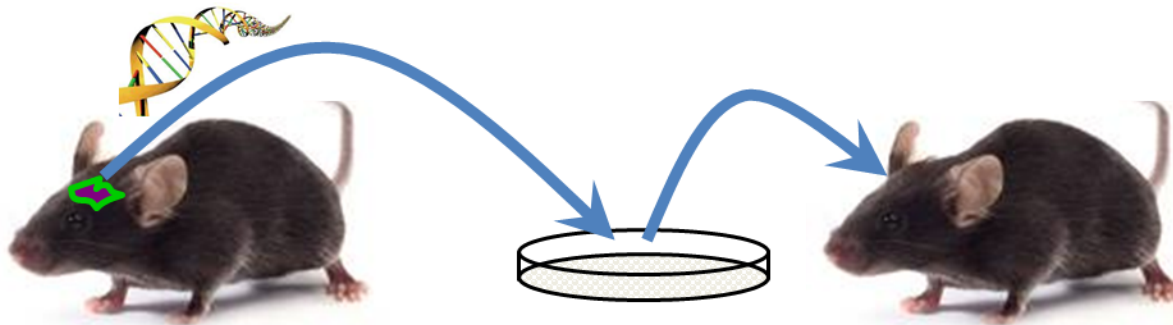


Mouse models of GBM



**Established cell
lines xenograft**

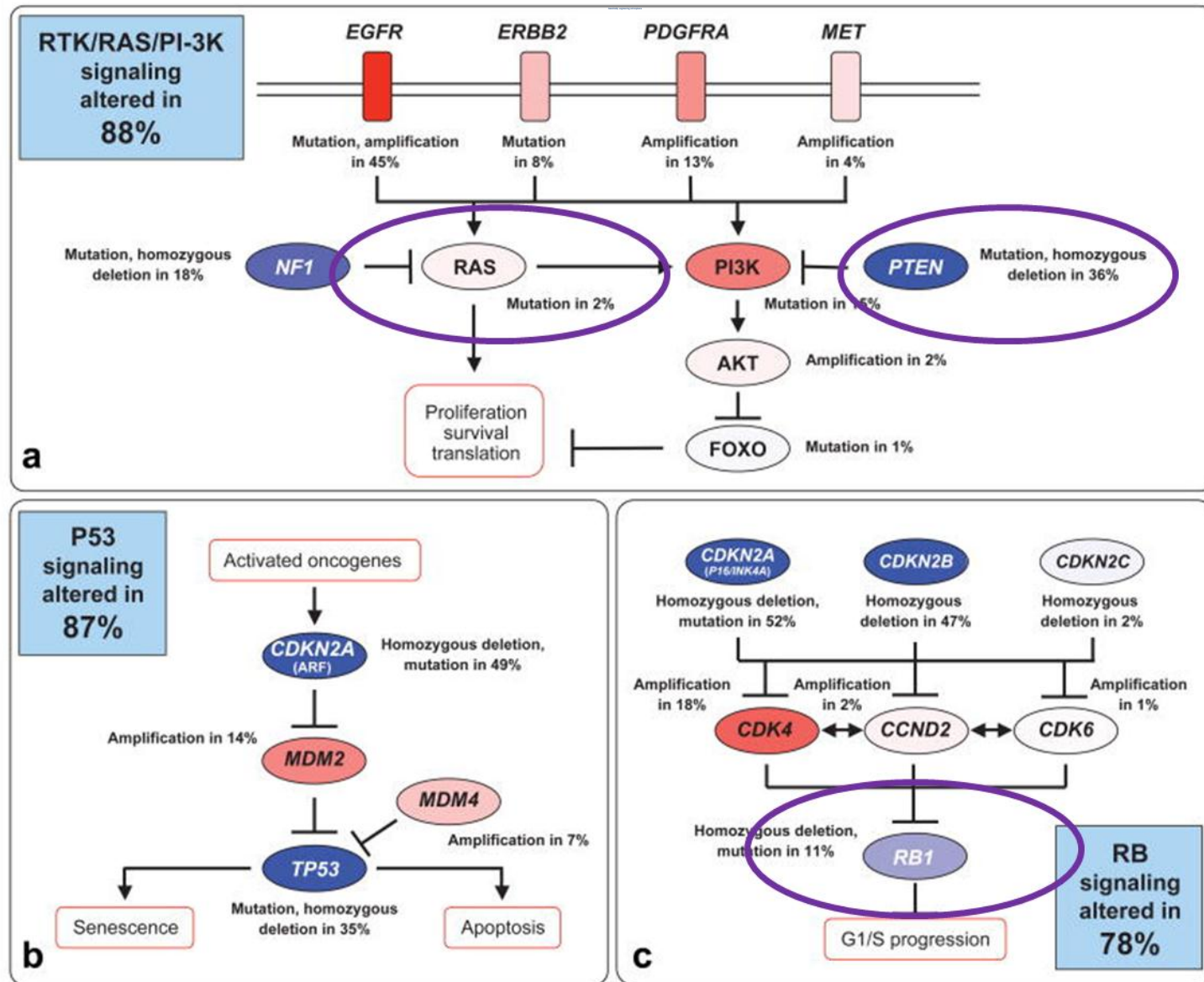
**Patient derived
xenograft**



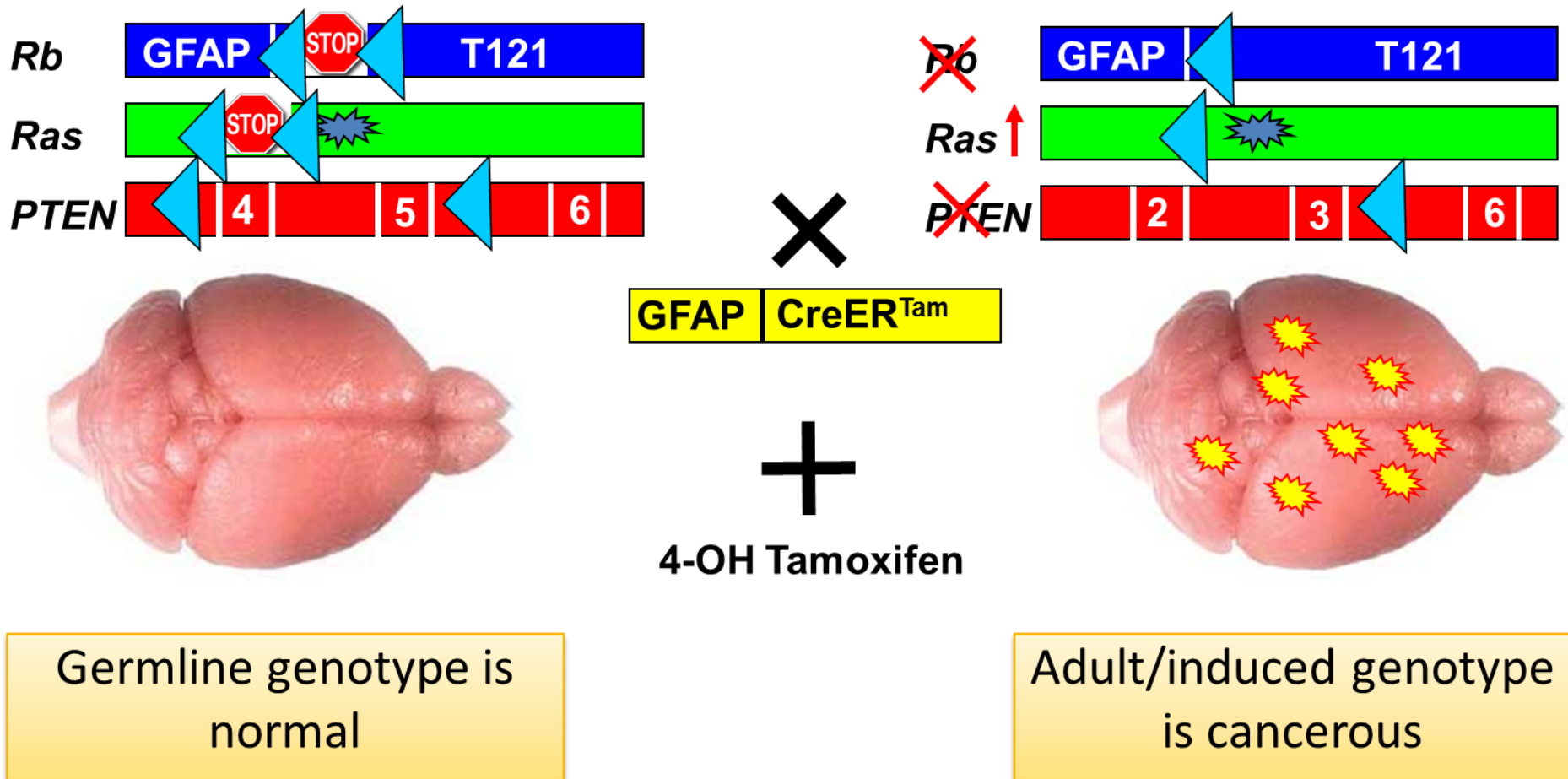
**Genetically
engineered
mouse (GEM)**

**Syngeneic
allograft**

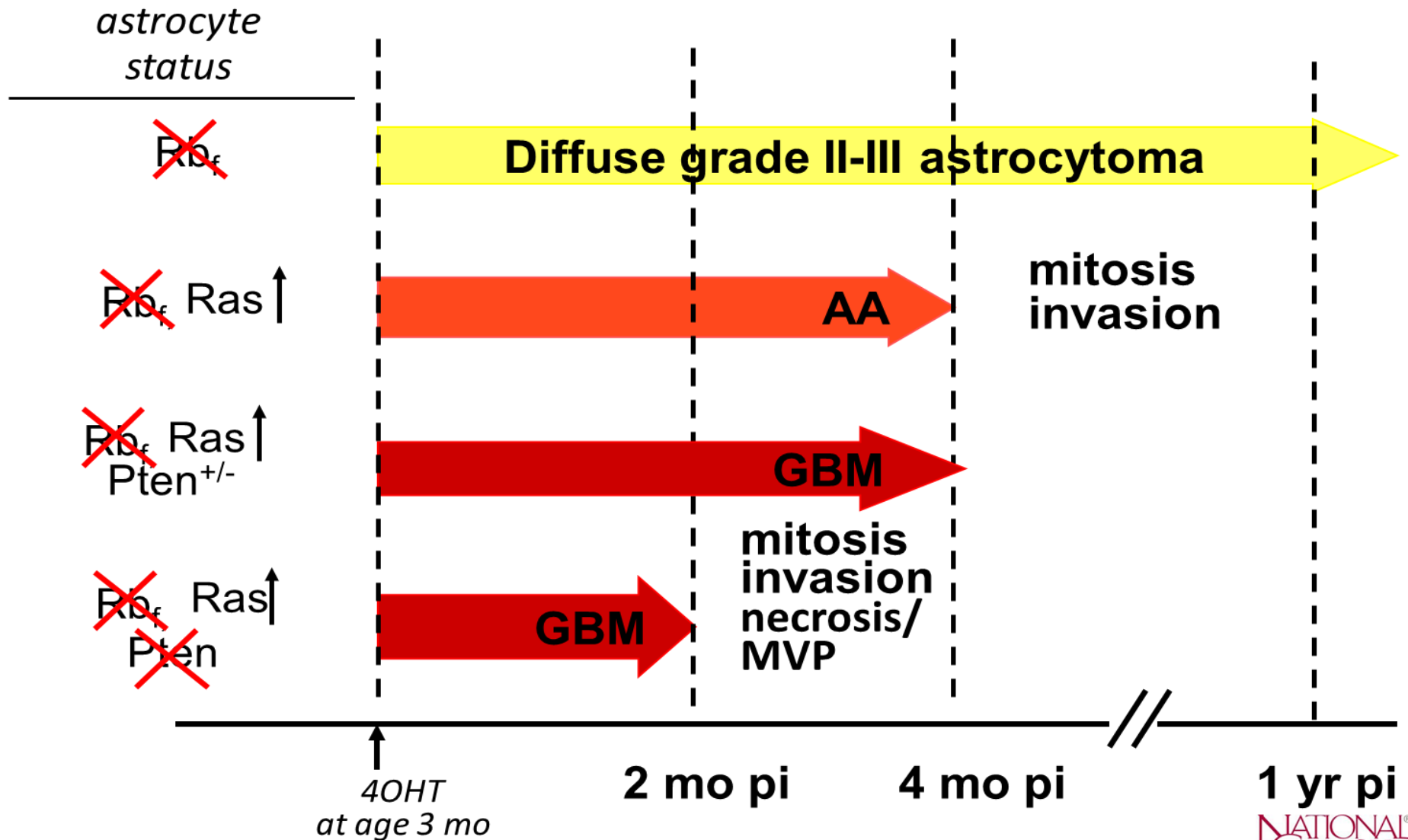
Core pathways altered in human GBMs



Genetically engineering astrocytoma

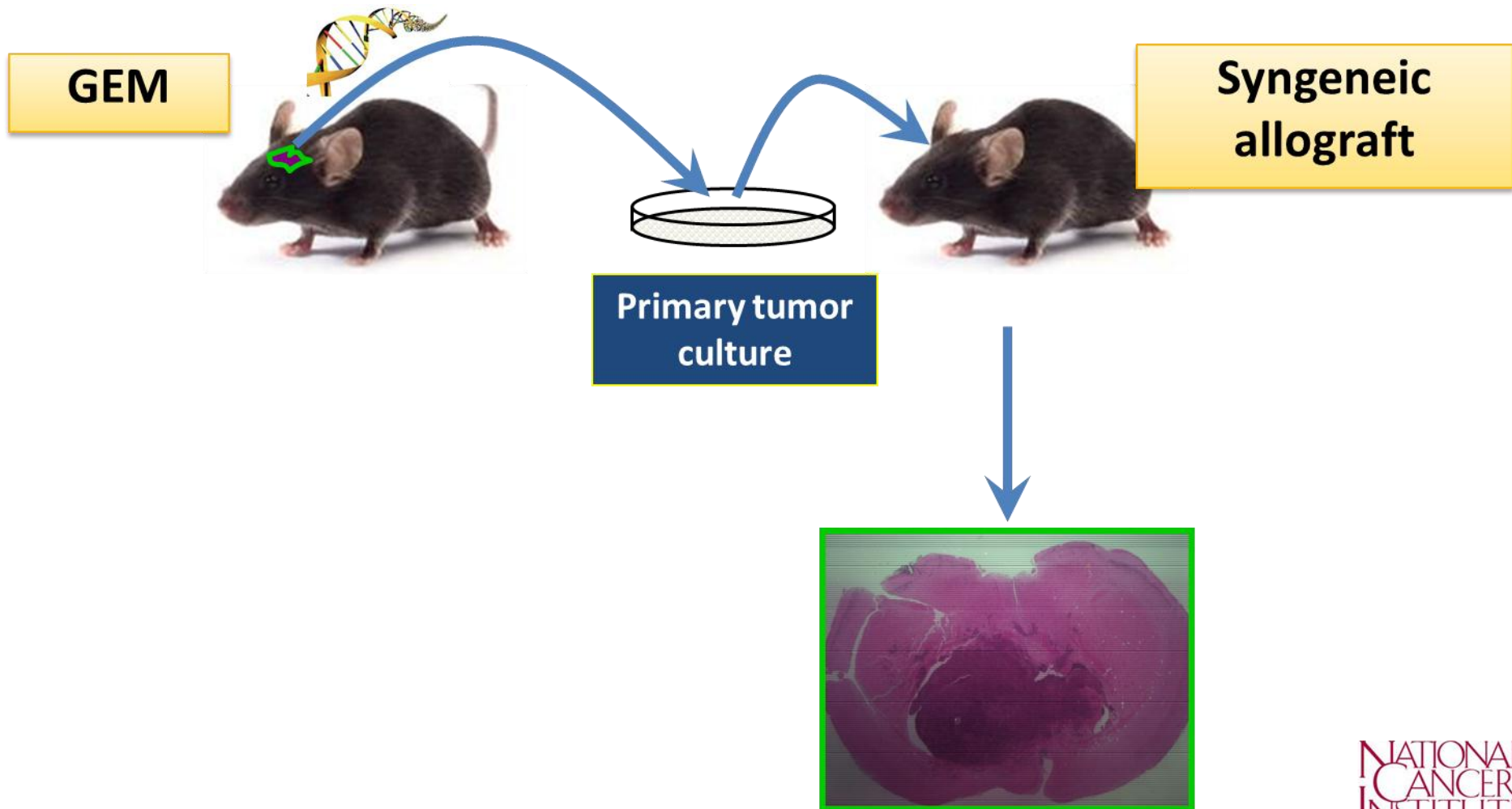


Inducible astrocytoma GEM models



Mouse GBM

Syngeneic orthotopic transplant



Mouse GBM

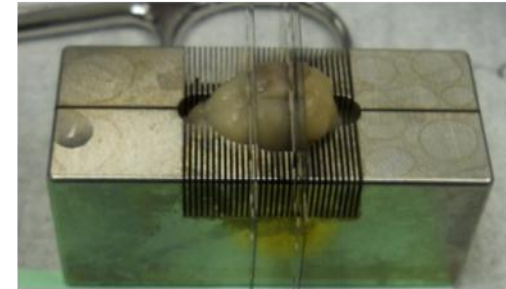
Brain imaging workflow



Four mice imaged
at once



Philips Intera Achieva
3.0T MRI clinical scanner
~1hour imaging time



Post imaging euthanize
and histology

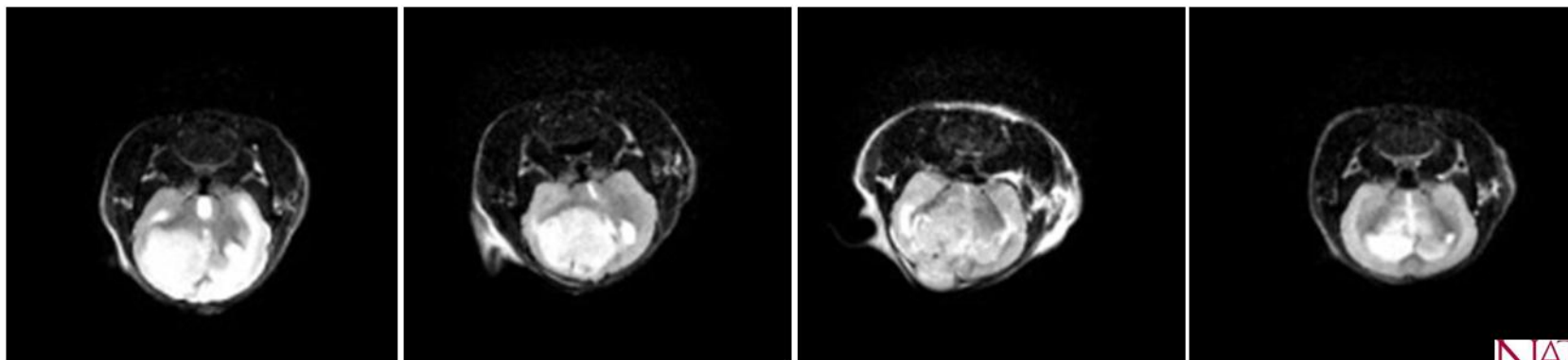
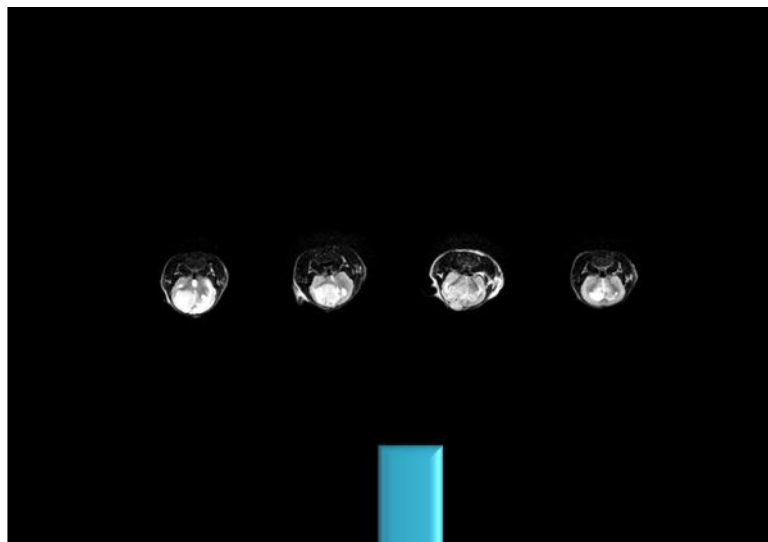
MRI acquisitions

- Pre-contrast T_1 FFE
- Pre-contrast T_2 TSE
- Dynamic contrast enhanced MRI (DCEMRI)
- Post-contrast T_1 FFE

Mouse GBM

Challenge: cropping and splitting the data

Crop and split
DICOM data and
headers

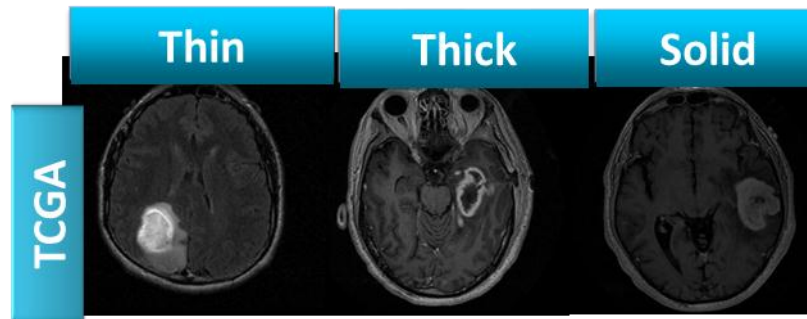


Mouse GBM

MRI features: mVASARI

- VASARI lexicon used for analysis of human GBM in TCGA

e.g.. Thickness of Enhancing Margin (F11)

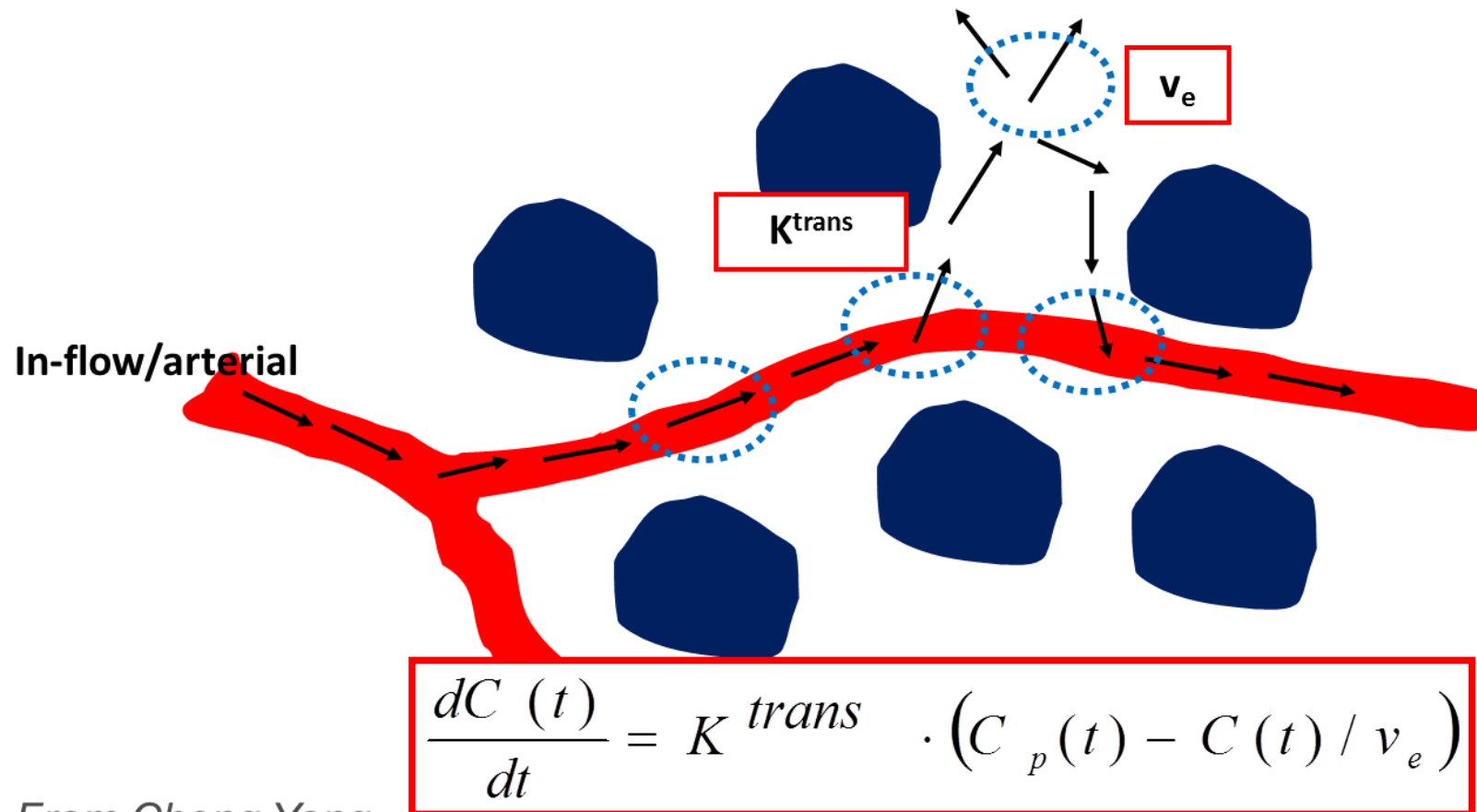


- Mouse VASARI=mVASARI
- Publically available VASARI features for human GBM from caIntegrator

Mouse GBM

MRI features: BBB permeability

- Quantifiable information on the blood brain barrier permeability is extracted from the pattern of contrast agent uptake



Mouse GBM

MRI reveals disease pathology noninvasively

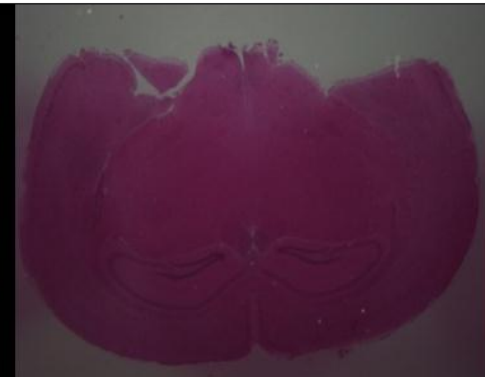
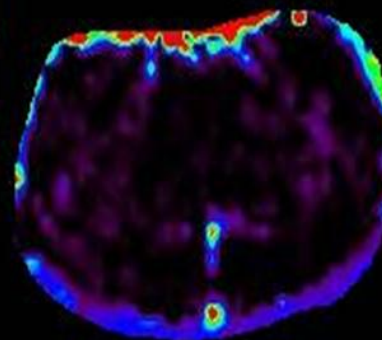
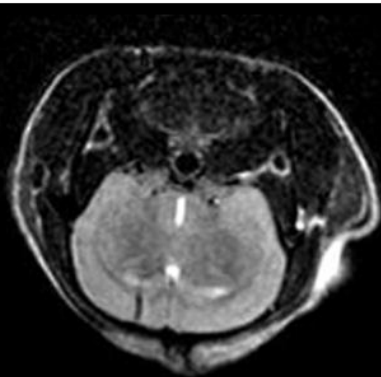
T_2

Subtraction

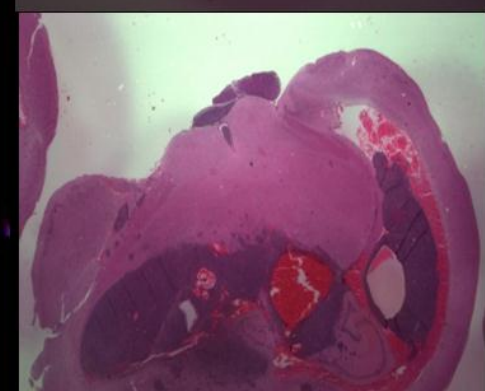
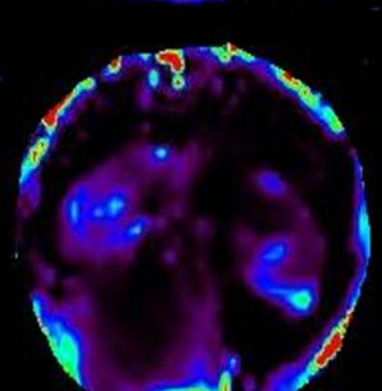
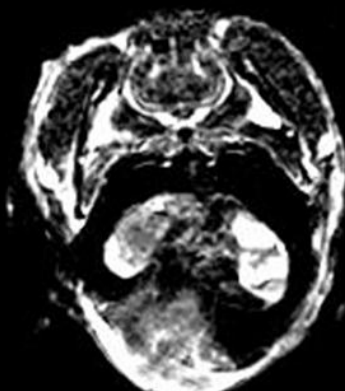
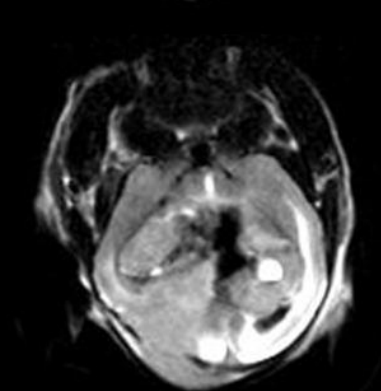
K^{trans}

H&E

Normal



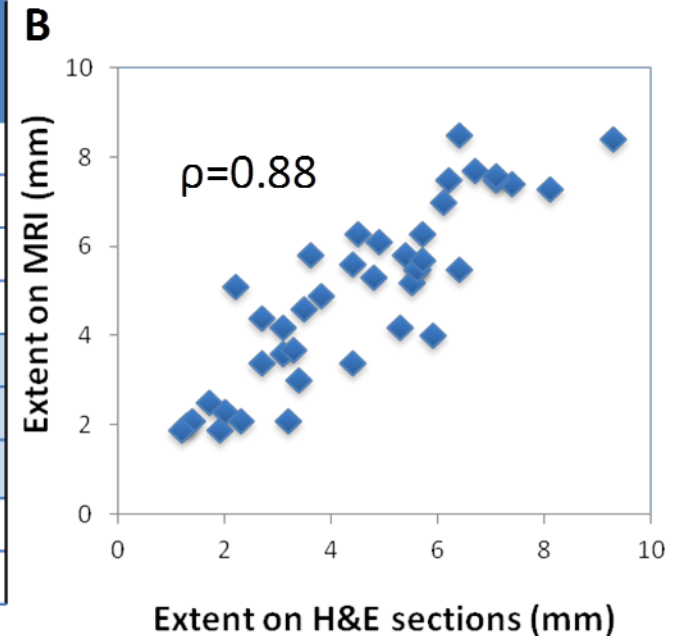
GBM

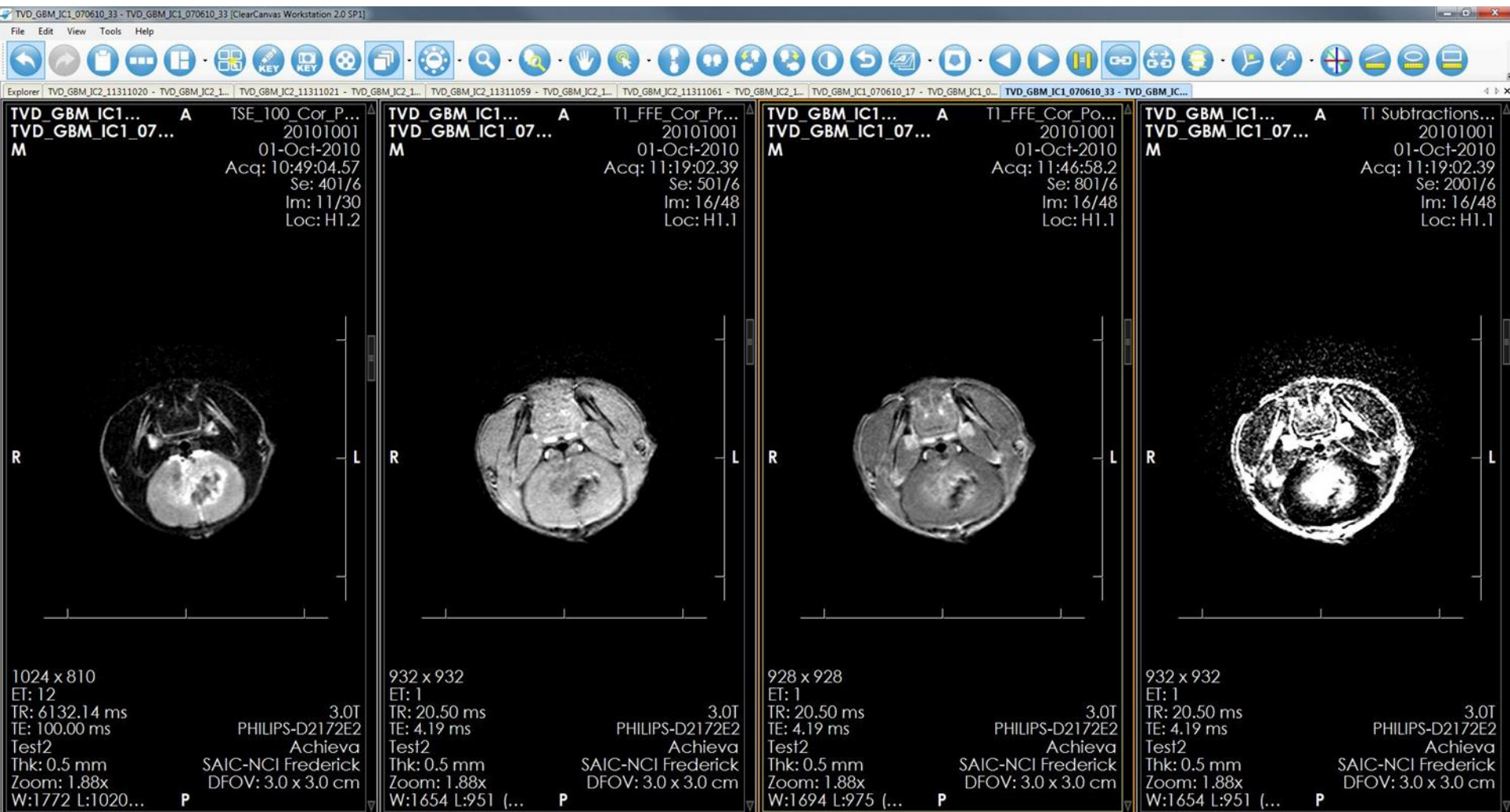


Mouse GBM

MRI reveals disease pathology noninvasively

A		
Pathology Features	Categories	No.
Diagnosis	Normal	8
	Grade II	1 <i>MRI missed 1</i>
	Grade III	7 <i>MRI missed 1</i>
	GBM	36 <i>MRI missed 1</i>
Necrosis	No	8
	Yes, pseudopalisading	16
	Yes, not pseudopalisading	20
Microvascular Proliferation	No	42
	Yes	2







Explorer TVD_GBM_IC2_11311020 - TVD_GBM_IC2_1... TVD_GBM_IC2_11311021 - TVD_GBM_IC2_1... TVD_GBM_IC2_11311045 - TVD_GBM_IC2_1...

TVD_GBM_IC2... A TSE_100_Cor_P...
TVD_GBM_IC2_11... 20110223
M 23-Feb-2011
 Acq: 13:34:13.94
 Se: 401/6
 Im: 16/30
 Loc: F1.7

1024 x 810
 ET: 12
 TR: 6132.14 ms
 TE: 100.00 ms
 Test2
 Thk: 0.5 mm
 Zoom: 1.88x
 W:1863 L:1072... P

3.0T
 PHILIPS-D2172E2
 Achieva
 SAIC-NCI Frederick
 DFOV: 3.0 x 3.0 cm

TVD_GBM_IC2... A T1_FFE_Cor.Pr...
TVD_GBM_IC2_11... 20110223
M 23-Feb-2011
 Acq: 14:04:11.88
 Se: 501/6
 Im: 25/48
 Loc: F1.6

932 x 932
 ET: 1
 TR: 20.50 ms
 TE: 4.19 ms
 Test2
 Thk: 0.5 mm
 Zoom: 1.88x
 W:1887 L:1085... P

3.0T
 PHILIPS-D2172E2
 Achieva
 SAIC-NCI Frederick
 DFOV: 3.0 x 3.0 cm

TVD_GBM_IC2... A T1_FFE_Cor.Po...
TVD_GBM_IC2_11... 20110223
M 23-Feb-2011
 Acq: 14:32:15.53
 Se: 801/6
 Im: 25/48
 Loc: F1.6

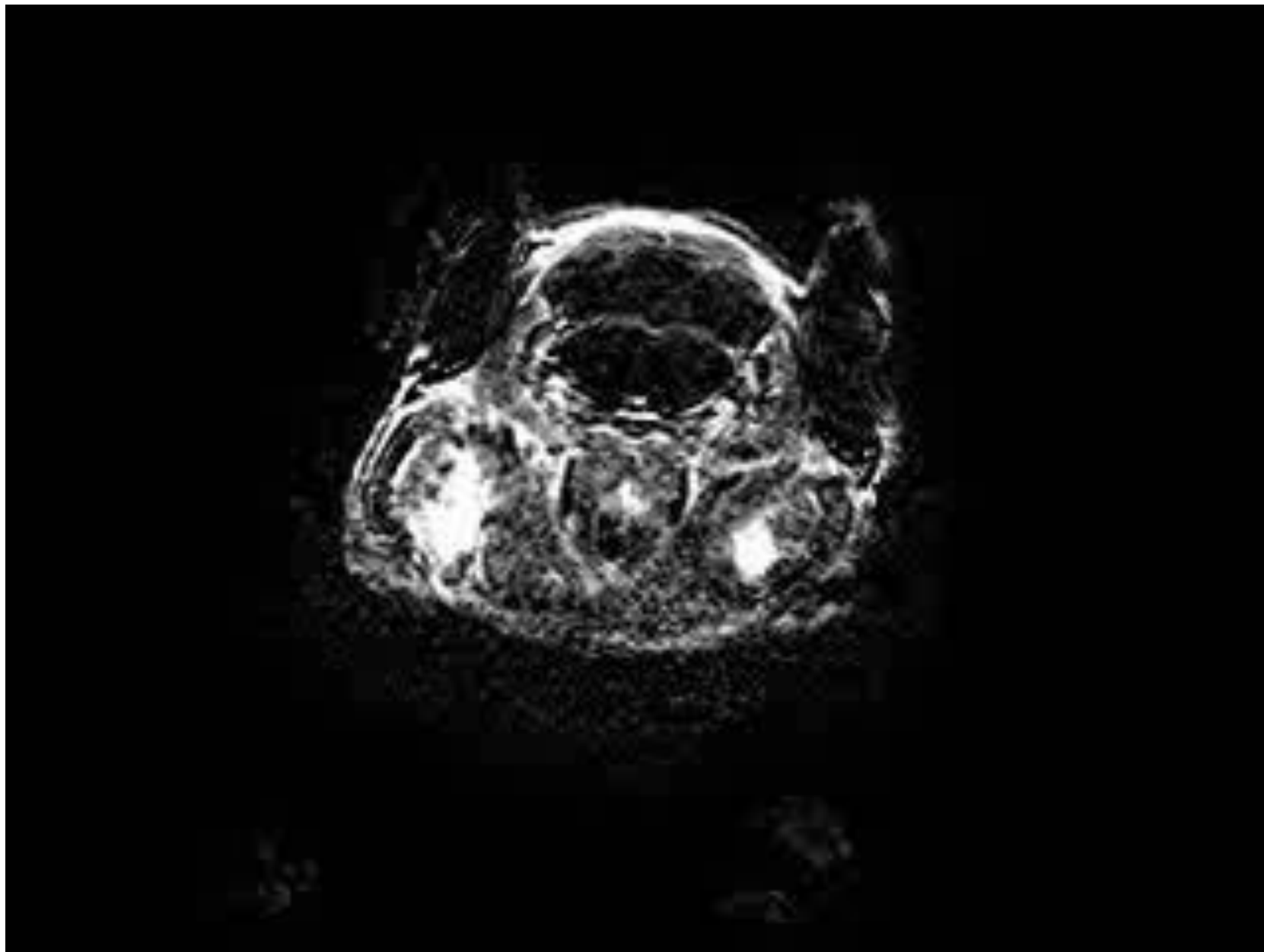
928 x 928
 ET: 1
 TR: 20.50 ms
 TE: 4.19 ms
 Test2
 Thk: 0.5 mm
 Zoom: 1.88x
 W:1872 L:1077... P

3.0T
 PHILIPS-D2172E2
 Achieva
 SAIC-NCI Frederick
 DFOV: 3.0 x 3.0 cm

TVD_GBM_IC2... A T1 Subtractions...
TVD_GBM_IC2_11... 20110223
M 23-Feb-2011
 Acq: 14:04:11.88
 Se: 2001/6
 Im: 25/48
 Loc: F1.6

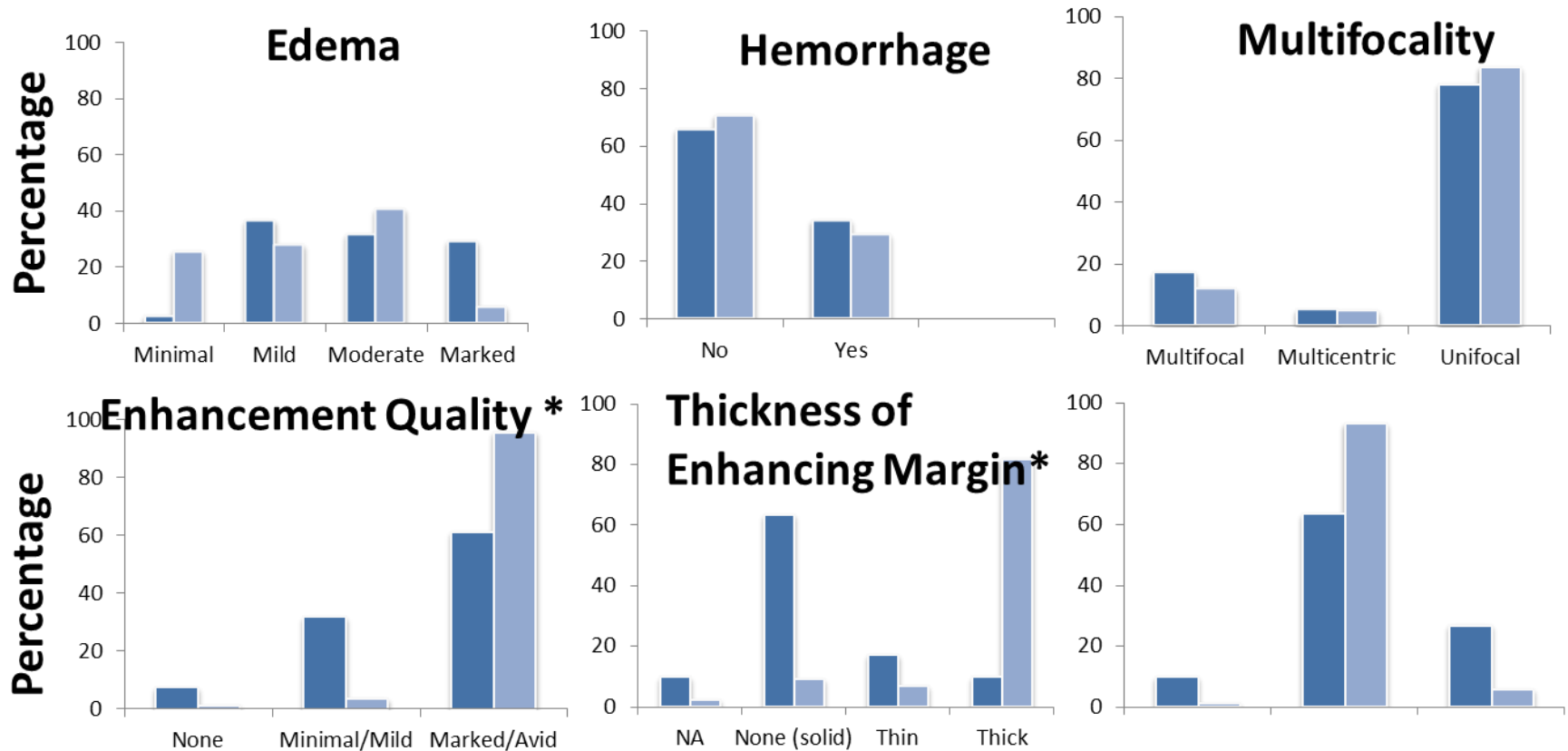
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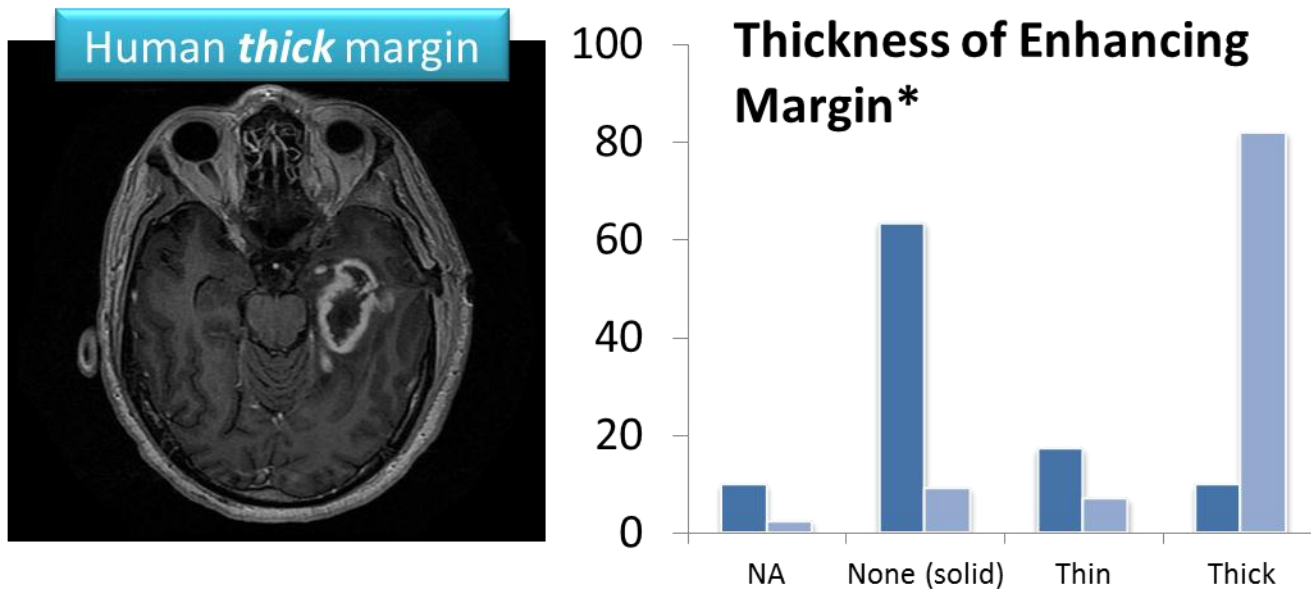
Mouse GBM

Mouse models can capture many features of human GBM...



Mouse GBM

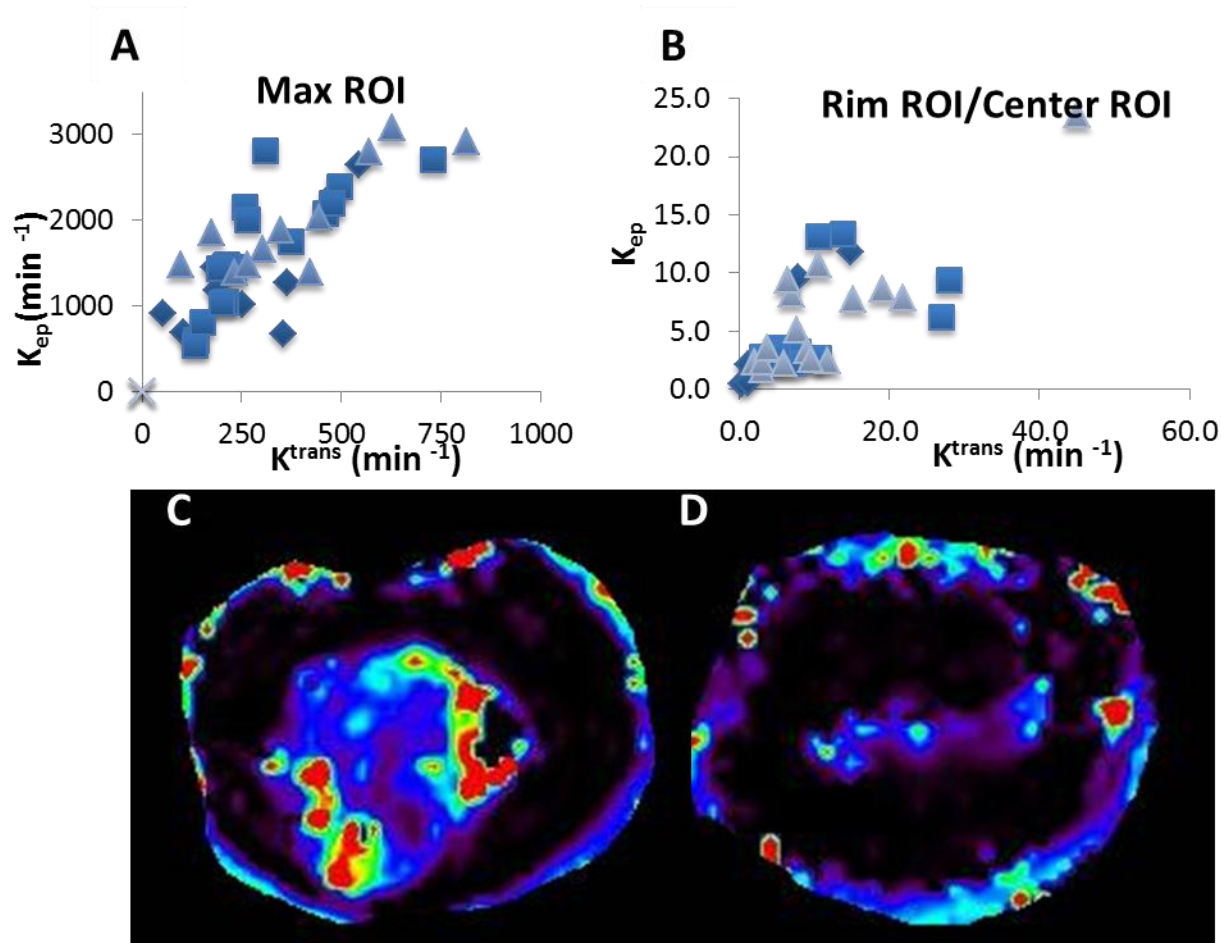
... but not the necrosis?



- ***Thick*** enhancing margin rarely seen in mice

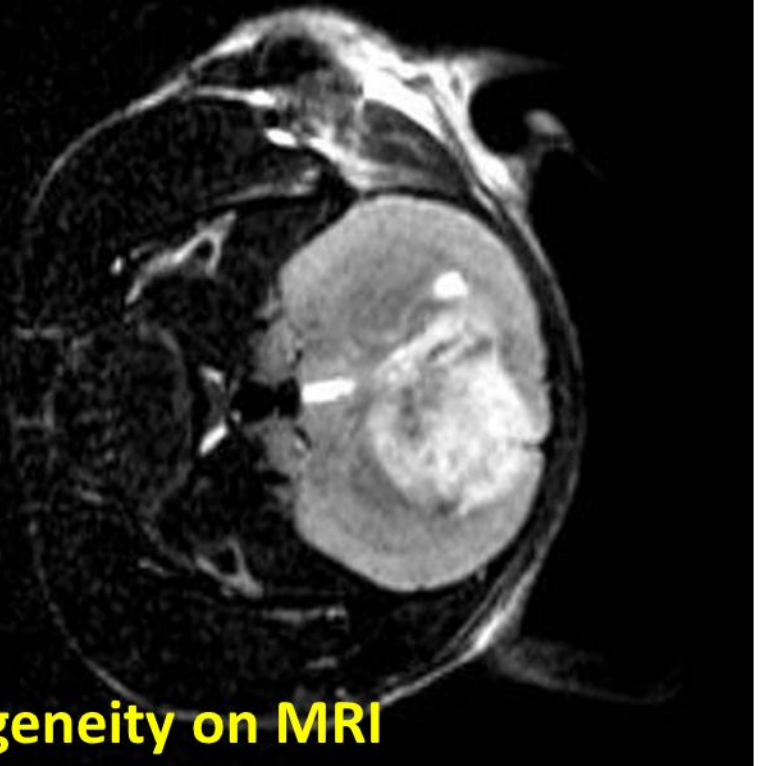
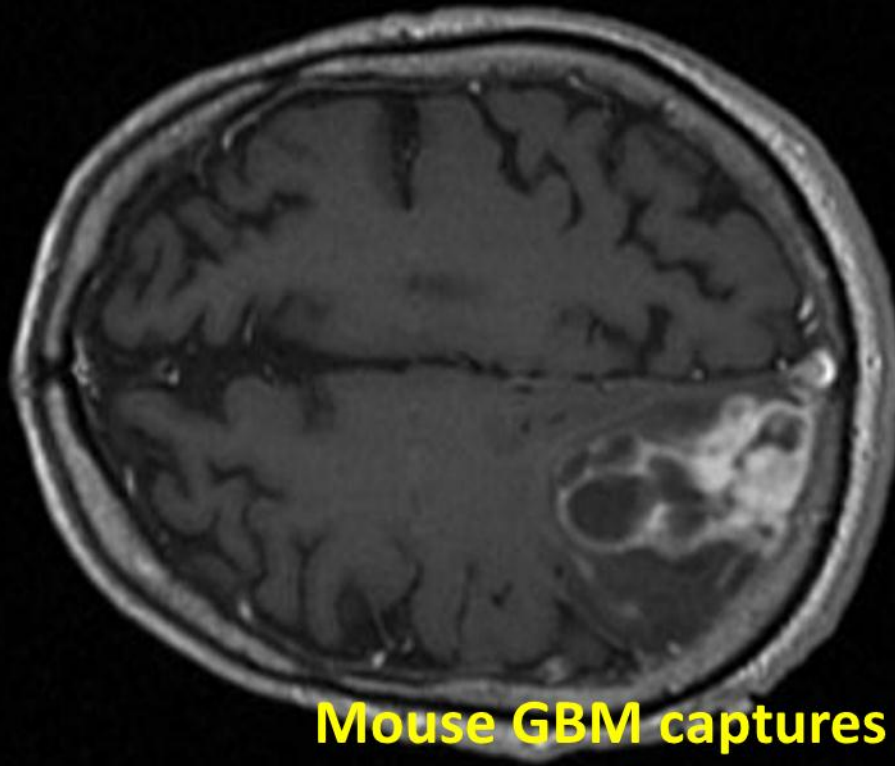
Mouse GBM

Heterogeneous patterns of BBB permeability



Mouse GBM

Summary



Mouse GBM captures heterogeneity on MRI
But where is the enhancing rim?
Why such diverse patterns of BBB leakiness?

Outline

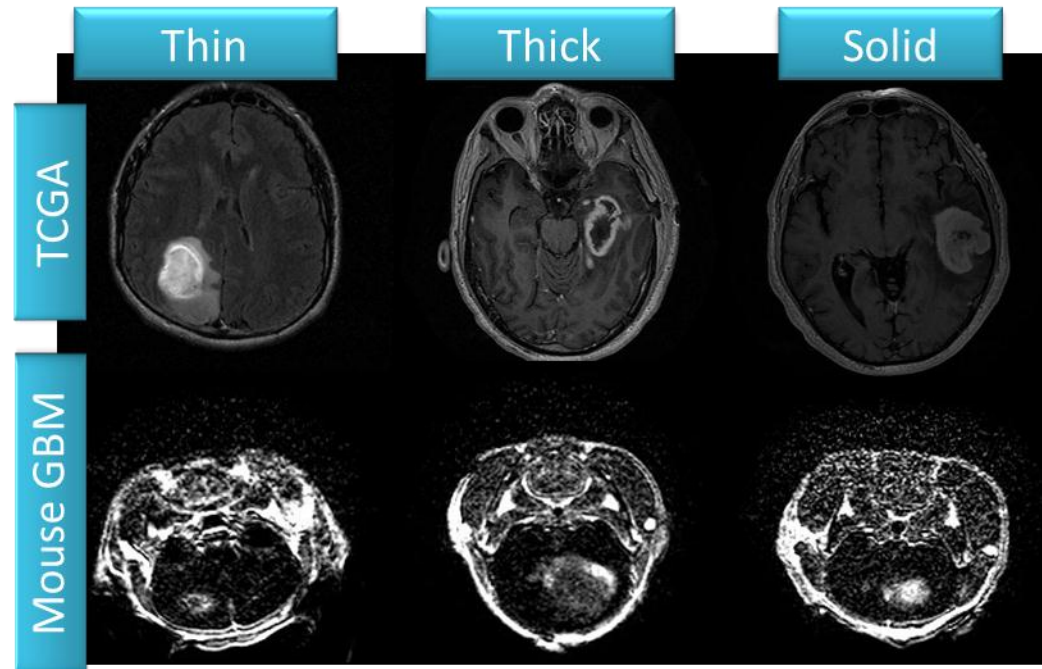
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caBIG[®] tools support *Mouse GBM*

Standardized lexicon: mVASARI features

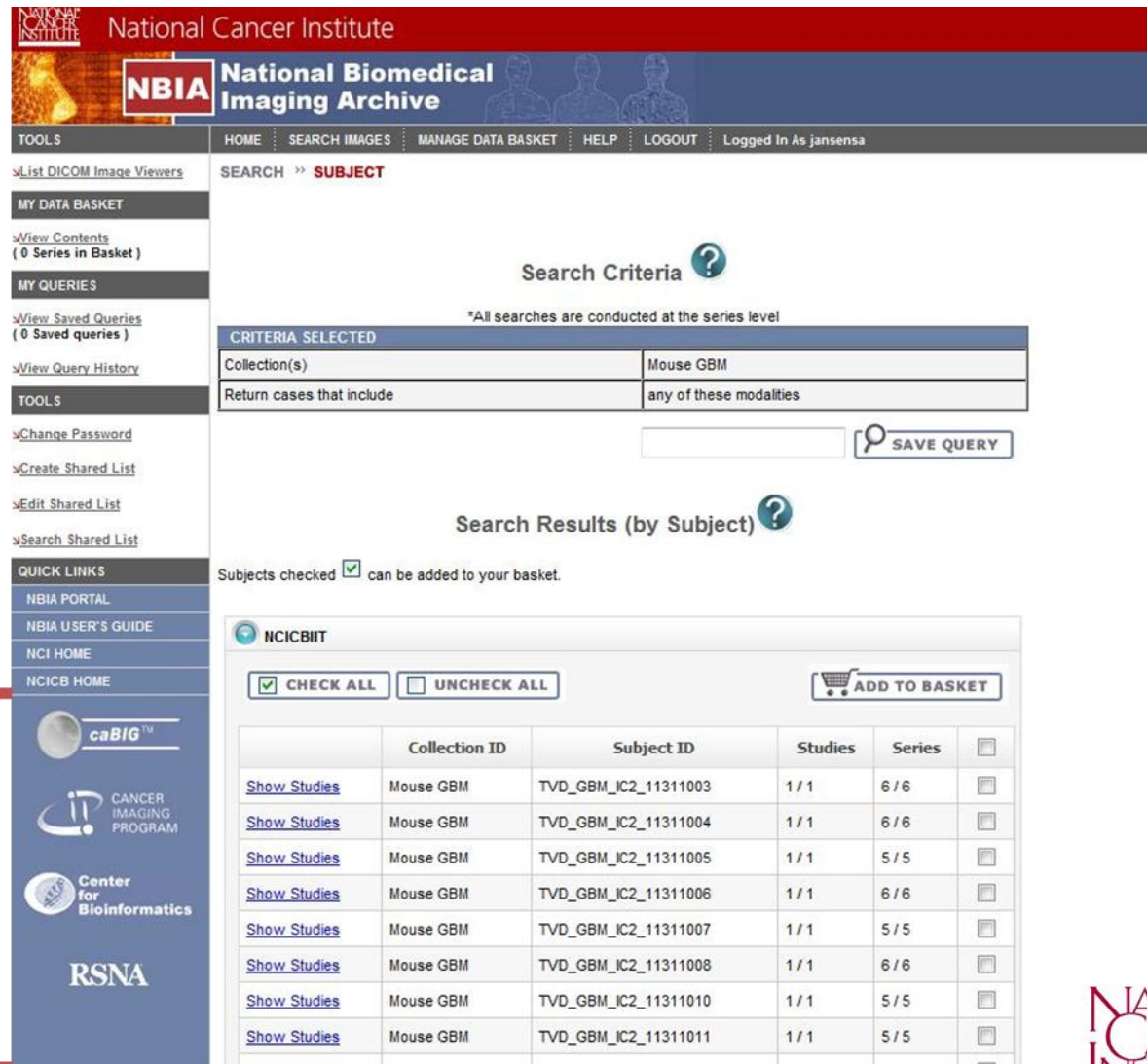
Thickness of the Enhancing Margin (VASARI feature 11)

VASARI features
essential for
comparing
Mouse GBM to
human GBM



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NBIA: Demo



National Cancer Institute

NBIA National Biomedical Imaging Archive

TOOLS HOME SEARCH IMAGES MANAGE DATA BASKET HELP LOGOUT Logged In As jansensa

SEARCH >> **SUBJECT**

Search Criteria ?

*All searches are conducted at the series level

CRITERIA SELECTED	
Collection(s)	Mouse GBM
Return cases that include	any of these modalities

SAVE QUERY

Search Results (by Subject) ?

Subjects checked ☒ can be added to your basket.

	Collection ID	Subject ID	Studies	Series	
Show Studies	Mouse GBM	TVD_GBM_IC2_11311003	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311004	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311005	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311006	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311007	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311008	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311010	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311011	1 / 1	5 / 5	<input type="checkbox"/>

NCICBIIT

☒ CHECK ALL ☐ UNCHECK ALL

Images from
Mouse GBM
stored in NBIA

caBIG[®] tools support *Mouse GBM*

NBIA: Demo

The screenshot displays the NBIA (National Biomedical Imaging Archive) website interface. The top navigation bar includes links for TOOLS, HOME, SEARCH IMAGES, MANAGE DATA BASKET, HELP, and LOGOUT. The user is logged in as 'jansensa'. The left sidebar contains sections for MY DATA BASKET, MY QUERIES, TOOLS, and QUICK LINKS. The main content area shows the search criteria for 'Mouse GBM' and a table of search results. A red arrow points from a yellow callout box to the 'Show Studies' link for the first result in the table.

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NCICBIIT

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	Collection ID	Subject ID	Studies	Series	
Show Studies	Mouse GBM	TVD_GBM_IC2_11311003	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311004	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311005	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311006	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311007	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311008	1 / 1	6 / 6	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311010	1 / 1	5 / 5	<input type="checkbox"/>
Show Studies	Mouse GBM	TVD_GBM_IC2_11311011	1 / 1	5 / 5	<input type="checkbox"/>

Images from
Mouse GBM
stored in NBIA

Click
→

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NBIA: Demo

National Cancer Institute
NBIA National Biomedical Imaging Archive

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SEARCH >> SUBJECT >> **STUDY**

Search Results (Studies for Subject TVD_GBM_IC2_11311010) ?

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Study Instance UID	Date
1.3.46.670589.11.17169.5.0.4584.2011021511013196216.1	Baseline
Description	Data Location
GBM_intracranial	NCICBIT

	Series	Images	Description	Modality	Manufacturer	
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Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512305717015.1	48	T1_FFE_Cor_PreC SENSE	MR	Philips Medical Systems	<input type="checkbox"/>
Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512383914016.1	12	T1_FFE_PreFA5 SENSE	MR	Philips Medical Systems	<input type="checkbox"/>
Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512390881054.1	600	Dyn22s_AP_TR9/TE3 SENSE	MR	Philips Medical Systems	<input type="checkbox"/>
Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512574228302.1	48	T1_FFE_Cor_PostC SENSE	MR	Philips Medical Systems	<input type="checkbox"/>

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Image series organized

QUICK LINKS

- NBIA PORTAL
- NBIA USER'S GUIDE
- NCI HOME
- NCICB HOME

caBIG[™]

CANCER IMAGING PROGRAM

Center for Bioinformatics

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NBIA: Demo

National Cancer Institute
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Search Results (Studies for Subject TVD_GBM_IC2_11311010) ?

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1.3.46.670589.11.17169.5.0.4564.2011021511013196216.1	Baseline					
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Series	Images	Description	Modality	Manufacturer		
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Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512383914016.1	12	T1_FFE_PreFA5 SENSE	MR	Philips Medical Systems	<input type="checkbox"/>
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Show Images	1.3.46.670589.11.17169.5.0.4564.2011021512574228302.1	48	T1_FFE_Cor_PostC SENSE	MR	Philips Medical Systems	<input type="checkbox"/>

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Image series
organized

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NBIA National Biomedical Imaging Archive

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SEARCH >> SUBJECT >> STUDY >> **SERIES**

DICOM Series Number 1.3.46.670589.11.17169.5.0.4584.2011021511582801965.1

Images on this page are meant to aid selection only. The downloaded DICOM files will be provided at their original resolution.

Subject ID	Study Instance UID	Date	Modality	Manufacturer	DICOM
TVD_GBM_IC2_11311010	1.3.46.670589.11.17169.5.0.4584.2011021511013196216.1	2011-02-15 00:00:00.0	MR	Philips Medical Systems	

[View series in Cine mode.](#)

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DICOM Series Number 401 TSE_100_Cor_P4 SENSE

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15

Images from
series are
displayed

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NBIA: Demo

National Cancer Institute

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SEARCH >> SUBJECT >> STUDY >> **SERIES**

DICOM Series Number 1.3.46.670589.11.17169.5.0.4564.2011021511582801965.1

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Click [View series in Cine mode.](#)

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DICOM Series Number 401 TSE_100_Cor_P4 SENSE

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15

Images from
series are
displayed

caBIG[®] tools support *Mouse GBM*

NBIA: Demo

Images can be
viewed in
Cine mode

The screenshot displays the National Cancer Institute's National Biomedical Imaging Archive (NBIA) website. The page features a sidebar with navigation links such as 'TOOLS', 'MY DATA BASKET', 'MY QUERIES', 'QUICK LINKS', and logos for 'caBIG', 'CANCER IMAGING PROGRAM', 'Center for Bioinformatics', and 'RSNA'. The main content area shows a web browser window displaying a brain MRI scan. The browser's address bar indicates the URL: <https://imaging.nci.nih.gov/ncia/slideShowViewSeries.xhtml>. The MRI image is a cross-sectional view of a brain, showing a bright, irregular mass in the center, likely representing a glioblastoma. Below the image is a playback control interface with a yellow progress bar and navigation buttons. A warning message at the bottom of the browser window states: 'Warning: Especially on low-bandwidth connection, please ensure your browser is configured to cache data on SSL connections. Otherwise, the performance of the slide show can be poor. For example, to enable caching on Firefox, set browser.cache.disk_cache_ssl to true. Click [here](#) to preload the entire slide show.'

caBIG[®] tools support *Mouse GBM*

NBIA: Demo

National Cancer Institute
NBIA National Biomedical Imaging Archive

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SEARCH >> SUBJECT >> **STUDY**

Download DICOM data from web to local computer

To VISUALIZE IMAGES, a 3rd party software is required. Click [here](#) to download Cedara I-Response software.

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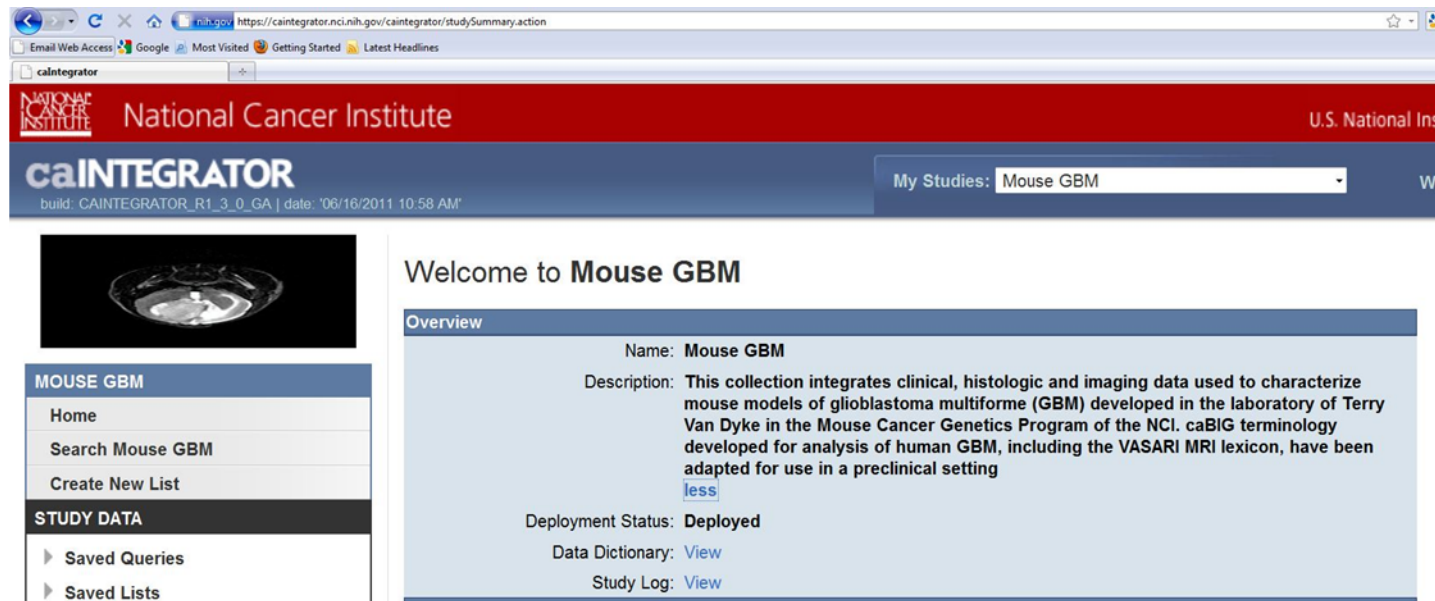
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caBIG[®] tools support *Mouse GBM*

caIntegrator: Demo

Data from
Mouse GBM
stored in
caIntegrator



The screenshot displays the caIntegrator web application interface. At the top, the National Cancer Institute logo and name are visible, along with the text "U.S. National Ins". Below this, the "caINTEGRATOR" logo is shown, with a build number "build: CAINTEGRATOR_R1_3_0_GA" and a date "date: '06/16/2011 10:58 AM'". A search bar labeled "My Studies:" contains the text "Mouse GBM".

On the left side, there is a navigation menu with the following items:

- MOUSE GBM
 - Home
 - Search Mouse GBM
 - Create New List
- STUDY DATA
 - ▶ Saved Queries
 - ▶ Saved Lists

The main content area is titled "Welcome to Mouse GBM" and contains an "Overview" section. The "Overview" section displays the following information:

- Name: **Mouse GBM**
- Description: This collection integrates clinical, histologic and imaging data used to characterize mouse models of glioblastoma multiforme (GBM) developed in the laboratory of Terry Van Dyke in the Mouse Cancer Genetics Program of the NCI. caBIG terminology developed for analysis of human GBM, including the VASARI MRI lexicon, have been adapted for use in a preclinical setting [less](#)
- Deployment Status: **Deployed**
- Data Dictionary: [View](#)
- Study Log: [View](#)

caBIG[®] tools support *Mouse GBM*

caIntegrator: Demo

Search *Mouse GBM* for mouse patients with defined biological or clinical features

The screenshot displays the caIntegrator web interface. At the top, the National Cancer Institute logo and name are visible, along with the text 'U.S. National Institutes of Health | www.cancer.gov'. The main header shows 'caINTEGRATOR' and 'My Studies: Mouse GBM'. Below this, the 'Search Mouse GBM' section is active, showing tabs for 'Criteria', 'Results Type', 'Sorting', 'Query Results', and 'Save query as...'. The 'Criteria' tab is selected, and the 'Define Query Criteria for: Unsaved Query' section is visible. It includes a dropdown menu for 'Mouse Patient Annotations' with an 'Add' button. Below this, there are fields for 'Mouse Patient Annotations', 'Genotype cell line', 'equals', and 'TR'. A radio button selection for 'or' and 'and' is present. A 'Run Query' button is at the bottom right of the criteria section. A yellow callout box on the left contains the text 'Search *Mouse GBM* for mouse patients with defined biological or clinical features' and has a red bracket pointing to the 'Mouse Patient Annotations' dropdown menu.

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caINTEGRATOR build: CAINTEGRATOR_R1_3_0_GA | date: '06/16/2011 10:58 AM'

My Studies: **Mouse GBM** Welcome, jansens | [Logout](#)

Search Mouse GBM

Criteria Results Type Sorting **Query Results** Save query as...

Query Results for: Unsaved Query Res

36 items found, displaying 1 to 20. [First/Prev] 1, 2 [Next/Last]

Select Image <small>All None</small>	Select Subject <small>All None</small>	Subject ID	DEATH DATE	Injectiondate	Path-MVP	IHC-p53	GBM cause of death	IHC-EGFR	cellline
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_5	09/30/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_3	10/25/2010	08/24/2010	N	1	Y	1	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_6	10/25/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC2_11311090	02/25/2011	01/13/2011	N	1	Y	2	187436tu1
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_18	09/23/2010	08/24/2010	Y	1	Y	0	187436tu2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_10	09/30/2010	08/24/2010	N	1	Y	0	187436tu1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_7	10/01/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_8	10/25/2010	08/24/2010	N	1	Y	2	185332
		TVD_GBML_IC2_11311001	02/08/2011	01/14/2011	Y	1	Y	0	187436tu2

Export To CSV Save Subject List Forward To NBIA

MOUSE GBM

- Home
- Search Mouse GBM
- Create New List

STUDY DATA

- ▶ Saved Queries
- ▶ Saved Lists

caINTEGRATOR MENU

- Support
- Tutorials
- User Guide

Results lists all mouse patients satisfying search criteria

caBIG[®] tools support *Mouse GBM*

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caINTEGRATOR build: CAINTEGRATOR_R1_3_0_GA | date: '06/16/2011 10:58 AM'

My Studies: **Mouse GBM** Welcome, jansens | [Logout](#)

Search Mouse GBM

Criteria Results Type Sorting **Query Results** Save query as...

Query Results for: Unsaved Query Res

36 items found, displaying 1 to 20. [First/Prev] 1, 2 [Next/Last]

Select Image All None	Select Subject All None	Subject ID	DEATH DATE	Injectiondate	Path-MVP	IHC-p53	GBM cause of death	IHC-EGFR	cellline
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_5	09/30/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_3	10/25/2010	08/24/2010	N	1	Y	1	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_6	10/25/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC2_11311090	02/25/2011	01/13/2011	N	1	Y	2	187436tu1
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_18	09/23/2010	08/24/2010	Y	1	Y	0	187436tu2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_10	09/30/2010	08/24/2010	N	1	Y	0	187436tu1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_7	10/01/2010	08/24/2010	N	1	Y	2	185332
	<input checked="" type="checkbox"/>	TVD_GBML_IC1_070610_8	10/25/2010	08/24/2010	N	1	Y	2	185332
		TVD_GBML_IC2_11311001	02/08/2011	01/14/2011	Y	1	Y	0	187436tu2

[Export To CSV](#) [Save Subject List](#) [Forward To NBIA](#)

GenePattern Analysis
Integrative Genomics Viewer
Heat Map Viewer

STUDY MANAGEMENT
Manage Studies
Create New Study

caINTEGRATOR MENU
Support
Tutorials
User Guide

Results lists all biological and clinical features compiled for each mouse patient

caBIG[®] tools support *Mouse GBM*

caIntegrator: Demo

More
biological/clinical
features compiled
for each mouse
patient

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My Studies: Mouse GBM Welcome, jansensa | Logout

Search Mouse GBM

Criteria Results Type Sorting Query Results Save query as...

Query Results for: Unsaved Query Results per Page: 20 Apply

	IHC-GFR	cellline	Histology Cell line	numbercells	Type of Model	IHC-PTEN	Strain	IHC-CD31	Path-Margins	Genotype cell line	% Necrosis	Birthdate	LAST FOLLOWUP DATE
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Infiltrative	TR	15	07/06/2010	09/30/2010
1		185332		25000	Syngeneic transplant	0	C57BL/6J	2	Infiltrative	TR	15	07/06/2010	10/25/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/25/2010
2		187436tu1		25000	Syngeneic transplant	2	C57BL/6J	0	Not infiltrative	TR	15	09/28/2010	02/25/2011
0		187436tu2		25000	Syngeneic transplant	1	C57BL/6J	0	Not infiltrative	TR	15	07/06/2010	09/23/2010
0		187436tu1		25000	Syngeneic transplant	2	C57BL/6J	0	Not infiltrative	TR	15	07/06/2010	09/30/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/01/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/25/2010
0		187436tu2		25000	Syngeneic transplant	1	C57BL/6J	0	Not infiltrative	TR	15	09/28/2010	02/08/2011

Export To CSV Save Subject List Forward To NBIA Retrieve DICOM Images

caBIG[®] tools support *Mouse GBM*

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My Studies: Mouse GBM Welcome, jansensa | Logout

Search Mouse GBM

Criteria Results Type Sorting Query Results Save query as...

Query Results for: Unsaved Query Results per Page: 20 Apply

	IHC-EGFR	cellline	Histology Cell line	numbercells	Type of Model	IHC-PTEN	Strain	IHC-CD31	Path-Margins	Genotype cell line	% Necrosis	Birthdate	LAST FOLLOW-UP DATE
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Infiltrative	TR	15	07/06/2010	09/30/2010
1		185332		25000	Syngeneic transplant	0	C57BL/6J	2	Infiltrative	TR	15	07/06/2010	10/25/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/25/2010
2		187436tu1		25000	Syngeneic transplant	2	C57BL/6J	0	Not infiltrative	TR	15	09/28/2010	02/25/2011
0		187436tu2		25000	Syngeneic transplant	1	C57BL/6J	0	Not infiltrative	TR	15	07/06/2010	09/23/2010
0		187436tu1		25000	Syngeneic transplant	2	C57BL/6J	0	Not infiltrative	TR	15	07/06/2010	09/30/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/01/2010
2		185332		50000	Syngeneic transplant	0	C57BL/6J	2	Not infiltrative	TR	15	07/06/2010	10/25/2010
0		187436tu1		25000	Syngeneic transplant	2	C57BL/6J	0	Not infiltrative	TR	15	09/28/2010	02/25/2011

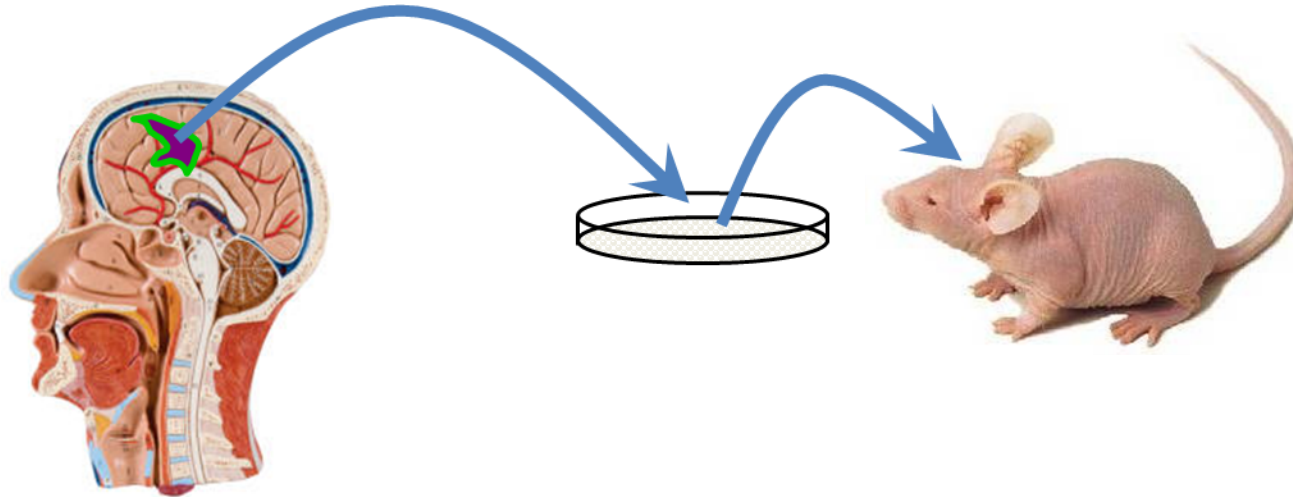
Forward patient list to NBIA to download DICOM images

Forward To NBIA Retrieve DICOM Images

Outline

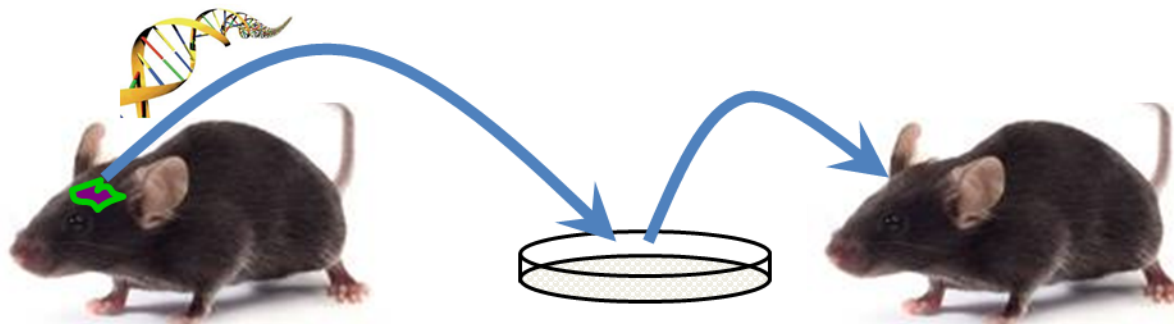
- The *Mouse GBM* project
- How do caBIG[®] tools support *Mouse GBM*?
 - Standardize MRI features (VASARI)
 - Archive and organize DICOM data (NBIA)
 - Integrate imaging and biology (caIntegrator)
- Summary and remaining challenges

Mouse models of GBM



**Established cell
lines xenograft**

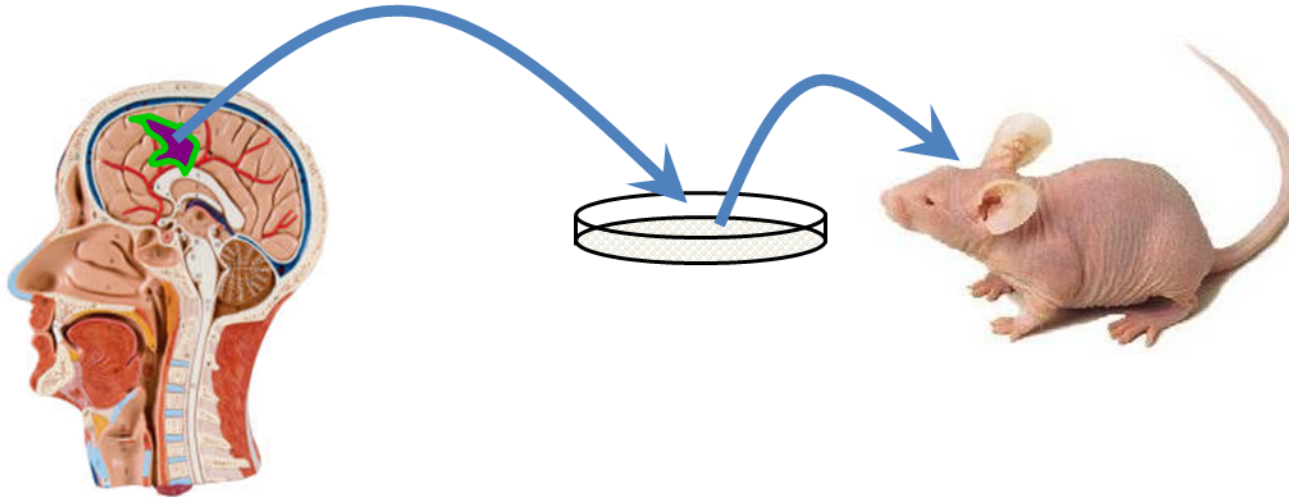
**Patient derived
xenograft**



**Genetically
engineered
mouse (GEM)**

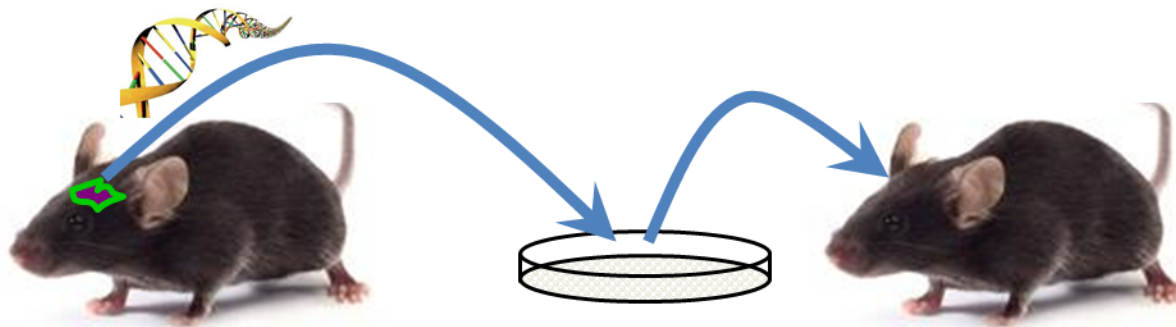
**Syngeneic
allograft**

Mouse models of GBM



**Established cell
lines xenograft**

**Patient derived
xenograft**



**Genetically
engineered
mouse (GEM)**

**Syngeneic
allograft**

caBIG[®] tools for preclinical research

Remaining challenges

- Standardized features for mouse vs. human comparison
- NBIA: Non-DICOM images
- caIntegrator: Archiving vs. integrating

Preclinical research for caBIG[®] tools

- Data stream is similar to humans!
 - Multimodality imaging
 - Chemotherapy (novel), radiation therapy
 - Histology, molecular and genetic analysis
- Large numbers with standardized data
- Full access to tissue
- Tumors at different stages

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