

1st AFIIM course of MRI: MSK and Neuroradiology
May 28th, 2015

New Trends in Neuroradiology Imaging

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Diagnostic Imaging

Sheba Medical Center

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Imaging Technique- MRI

- T₁, T₂, T₂ FLAIR, +contrast media
- DWI
- DTI
- MRS
- PWI
- fMRI
- TRAM

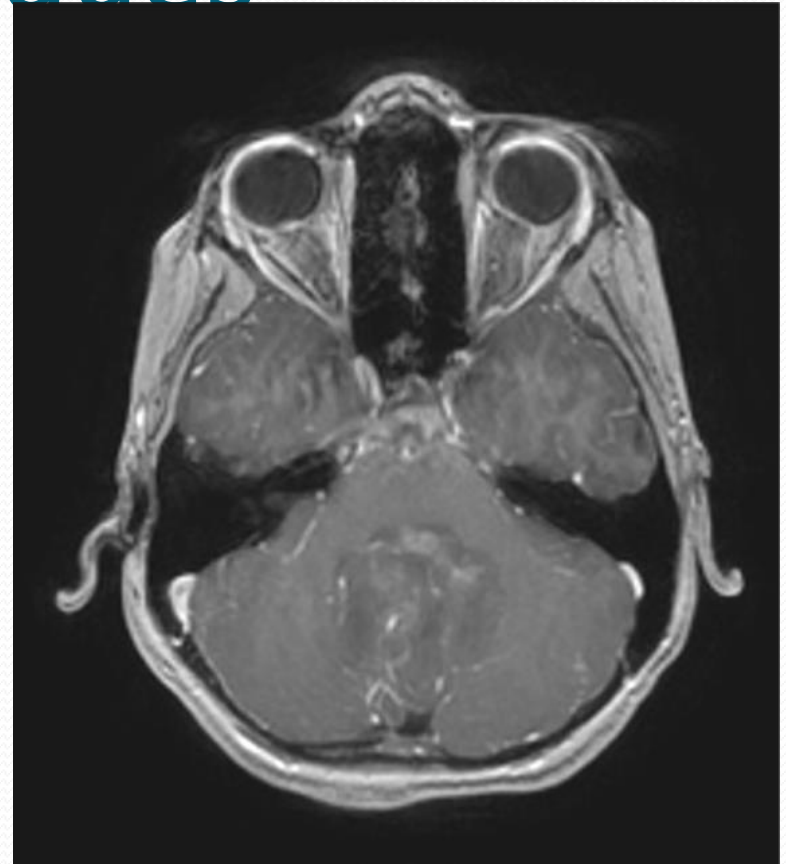
Advanced Techniques

- DWI
 1. **Restriction**
(cellularity)
 2. Blood
 3. Post op ischemia
- DTI
- MRS
- PWI
- fMRI



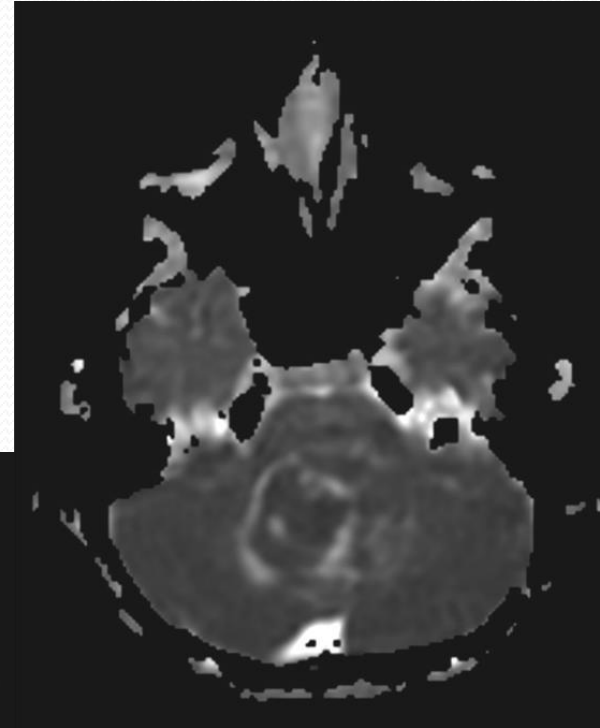
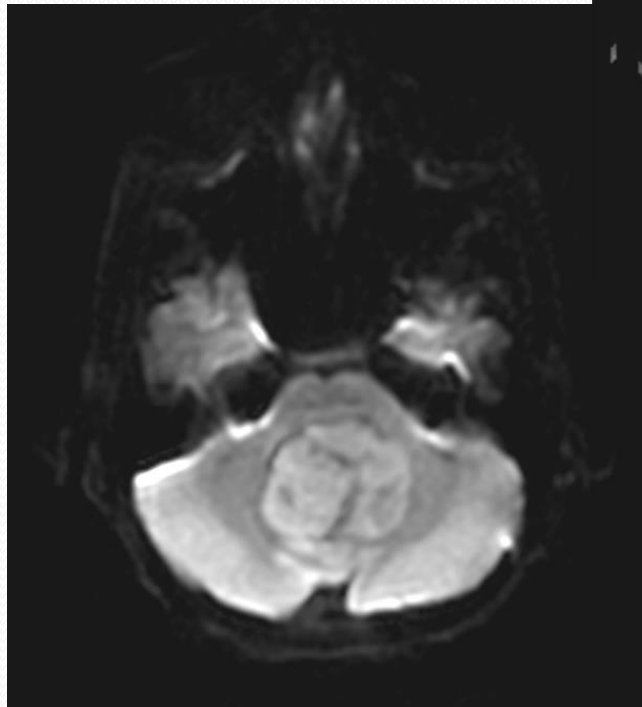
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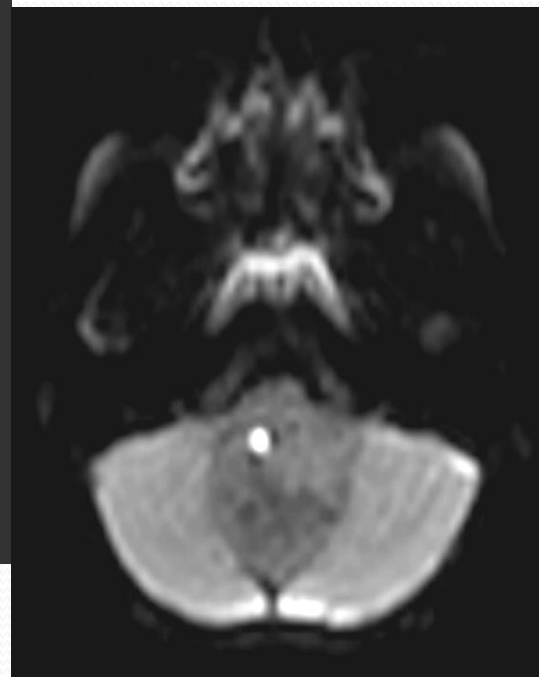
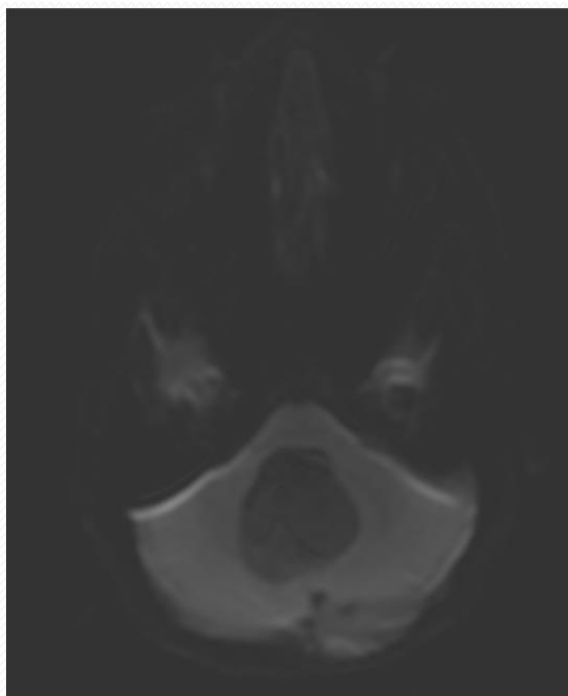
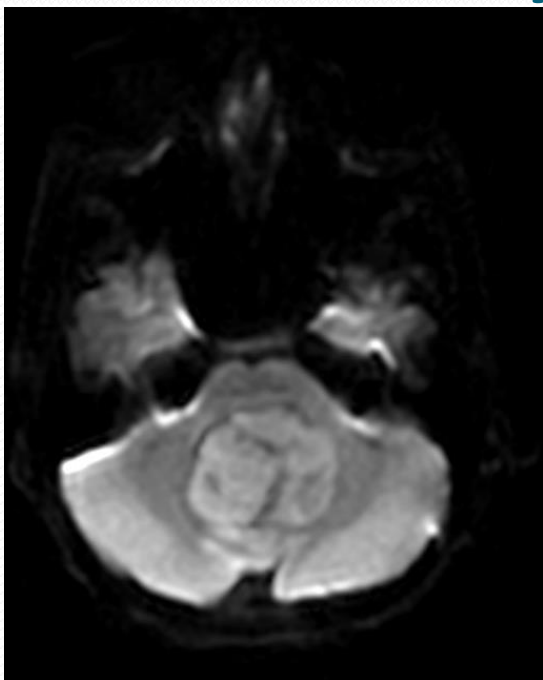


Advanced Techniques

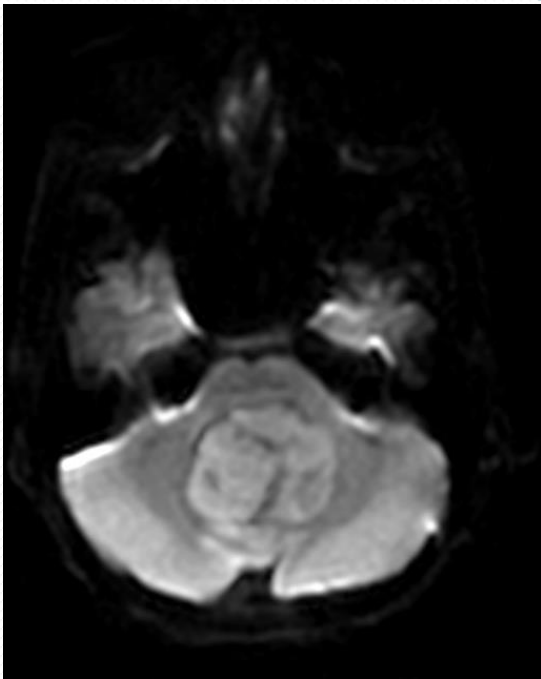
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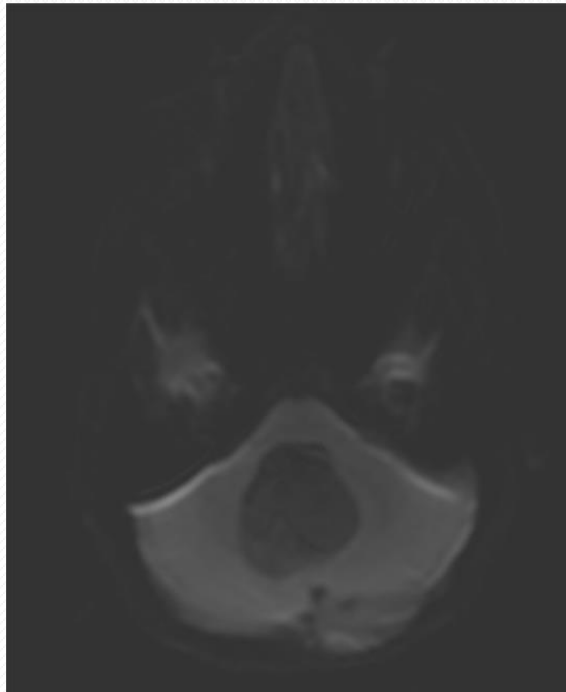
PNET/JPA/EPEN



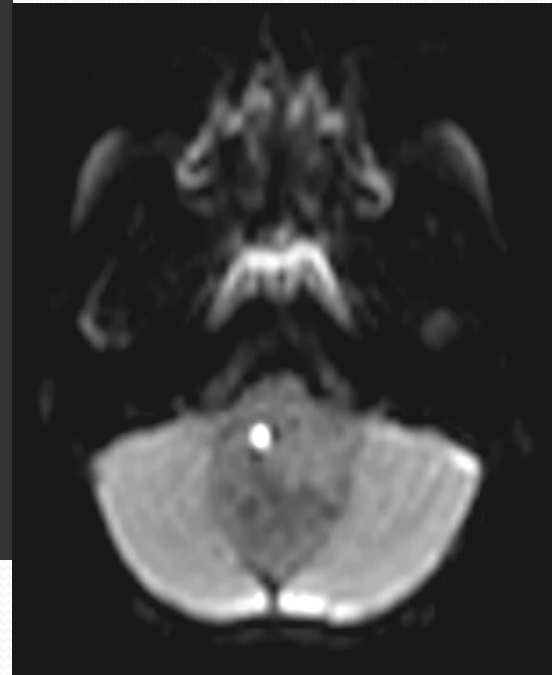
PNET/JPA/EPEN



Medulloblastoma

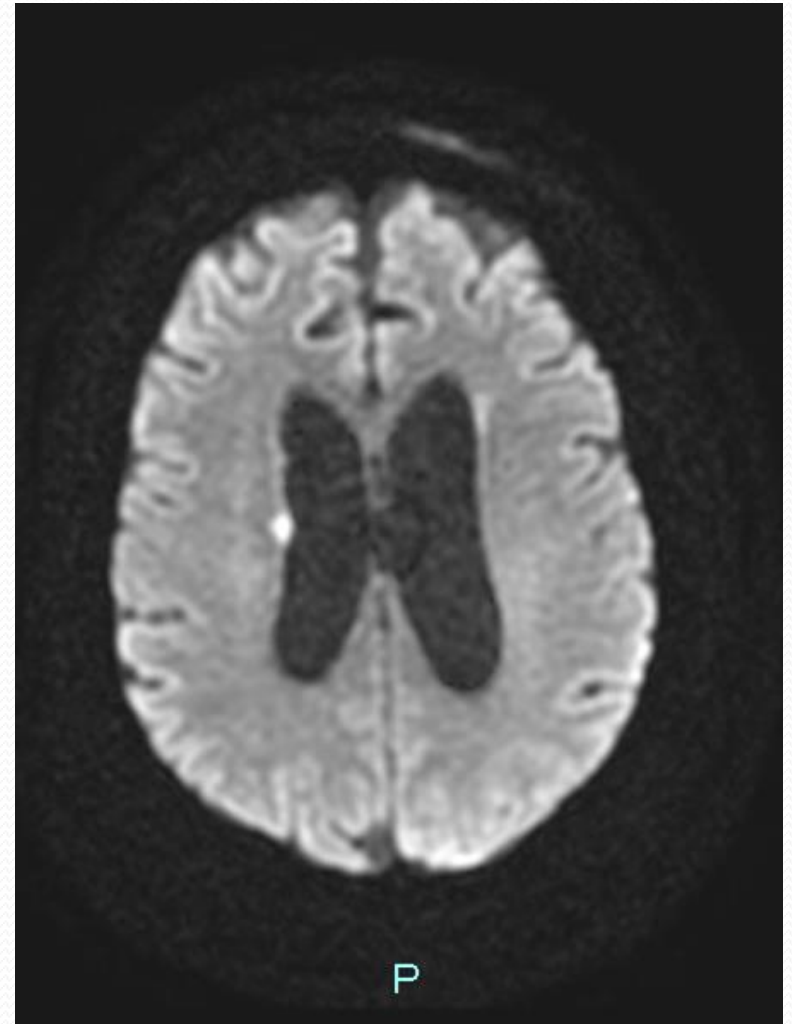
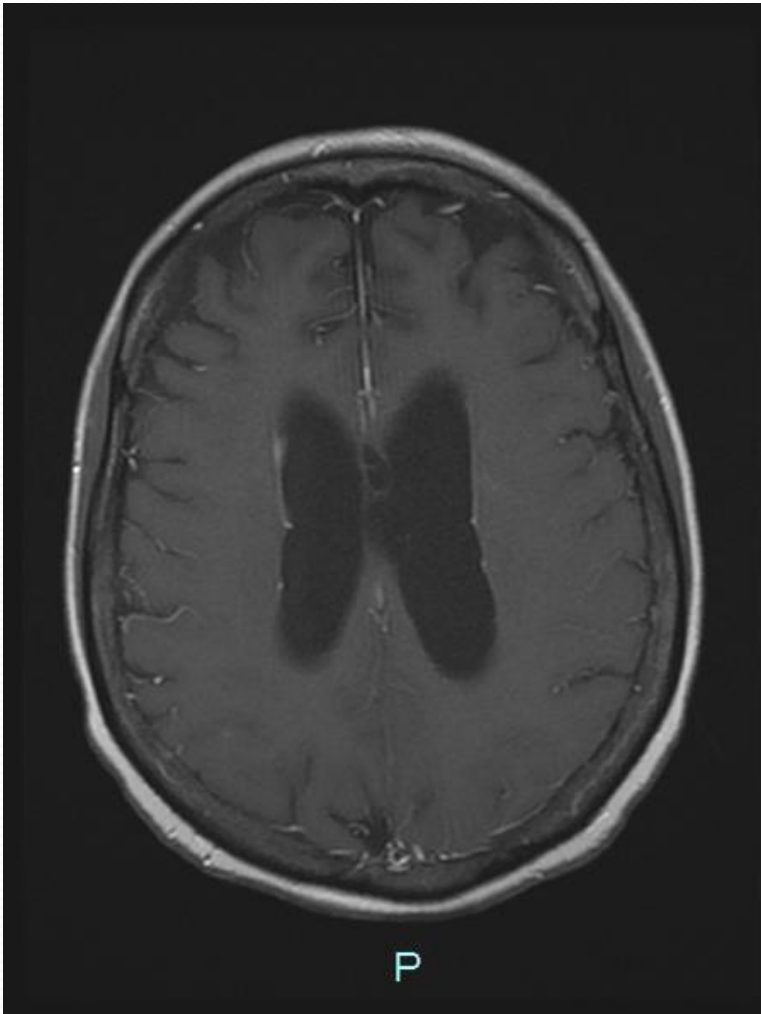


Pilocytic astrocytoma

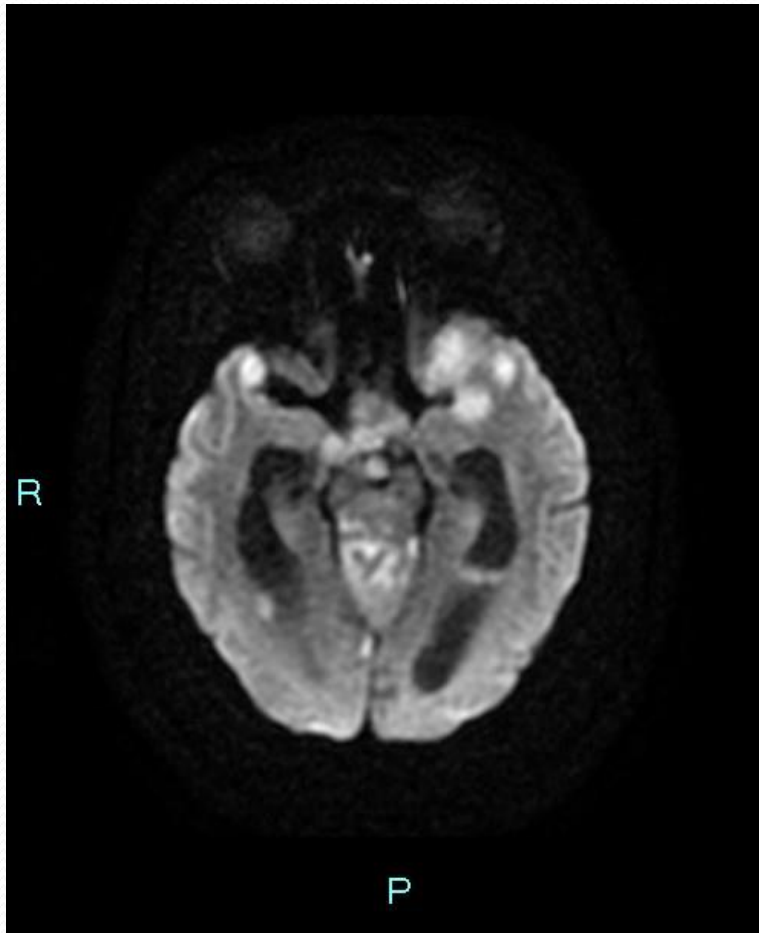


Ependymoma

Metastases



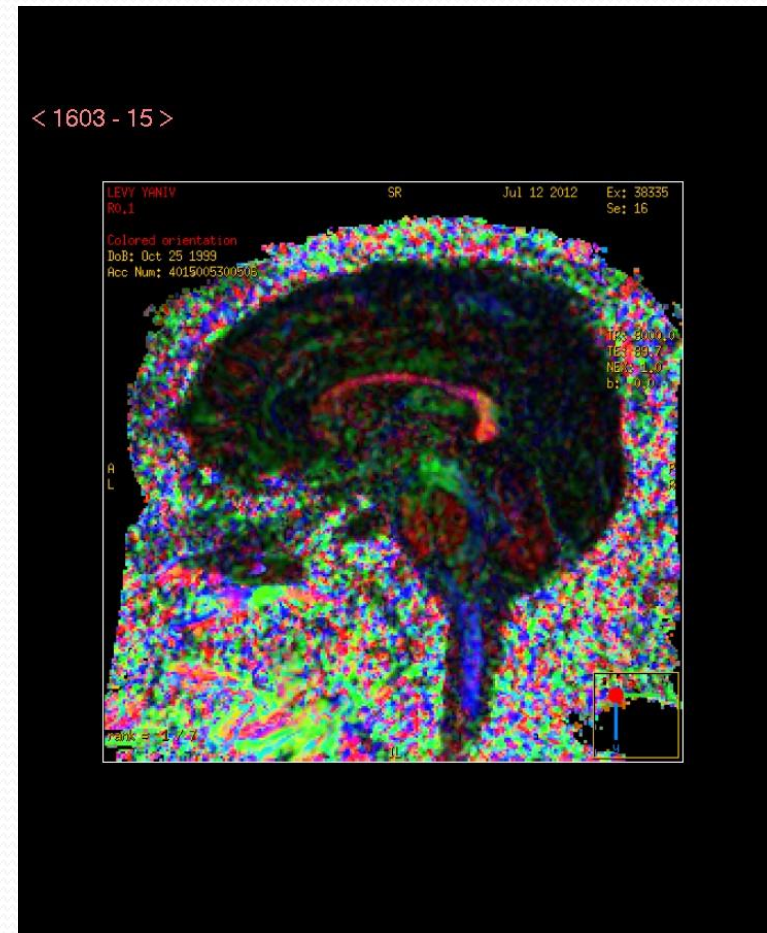
Lepto-meningeal Spread



- DWI is very sensitive for the detection of brain mets in PNET
- Ependymal and leptomeningeal!

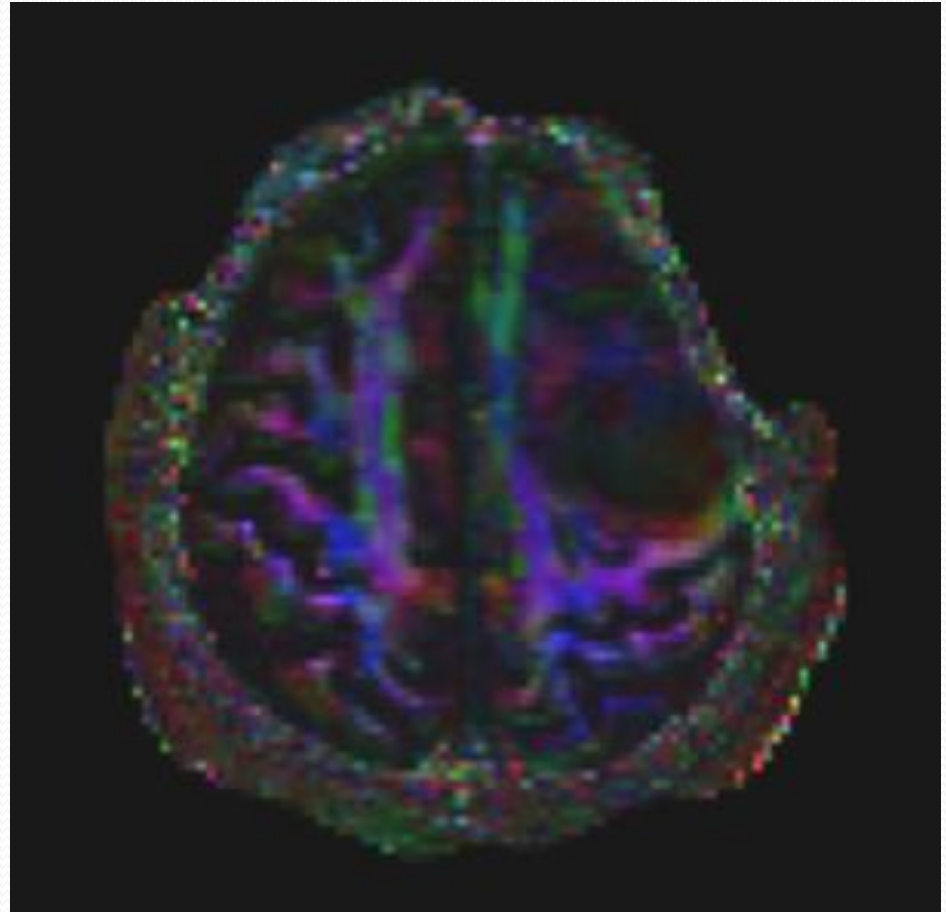
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- DWI
- DTI
 1. FA
 2. Tractography
- MRS
- PWI
- fMRI



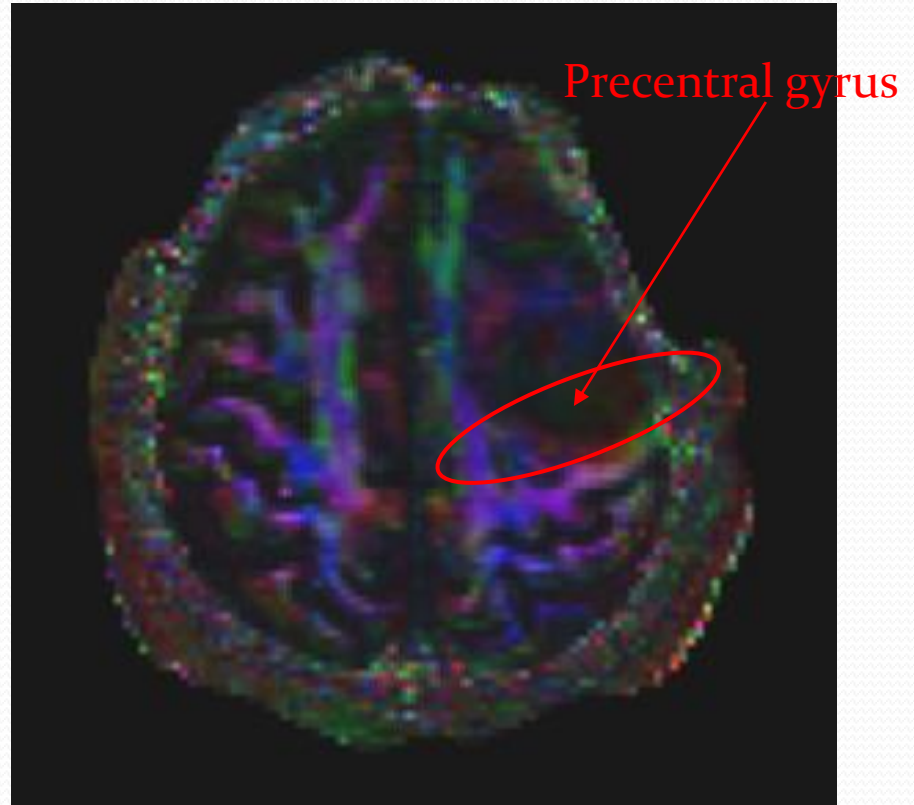
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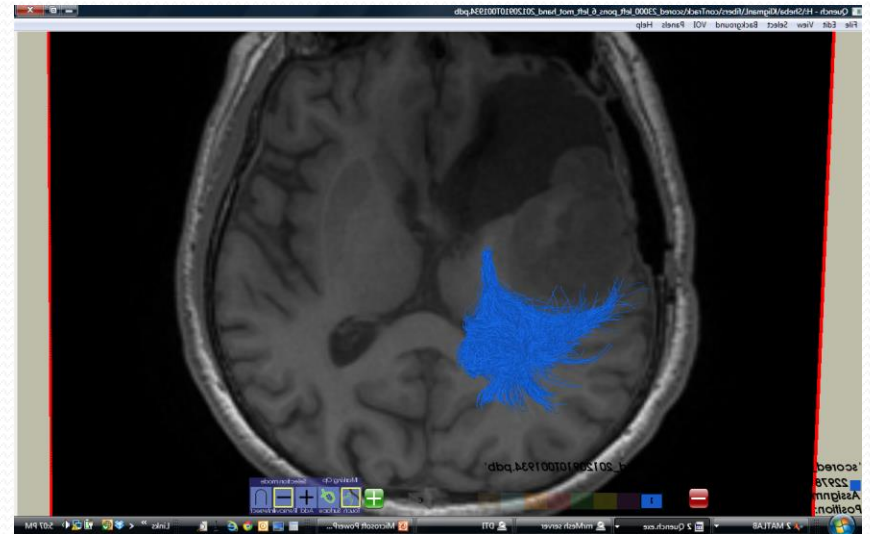
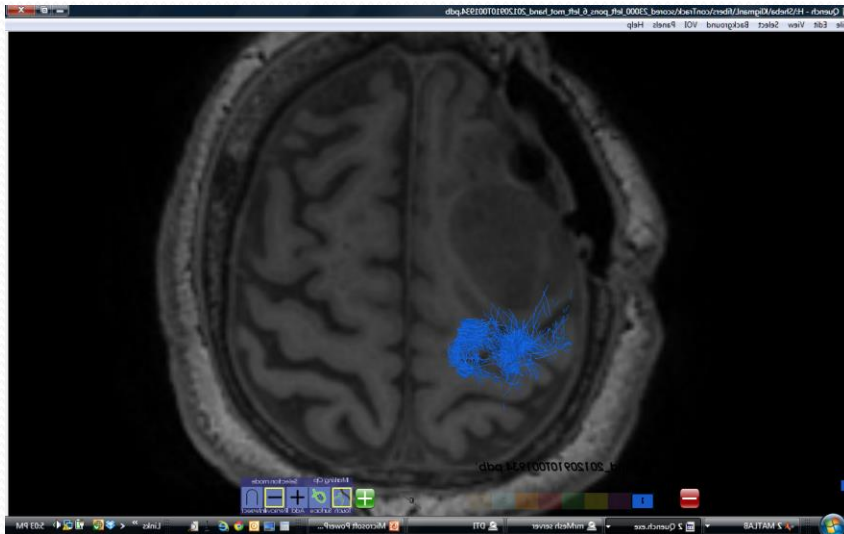


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Tractography

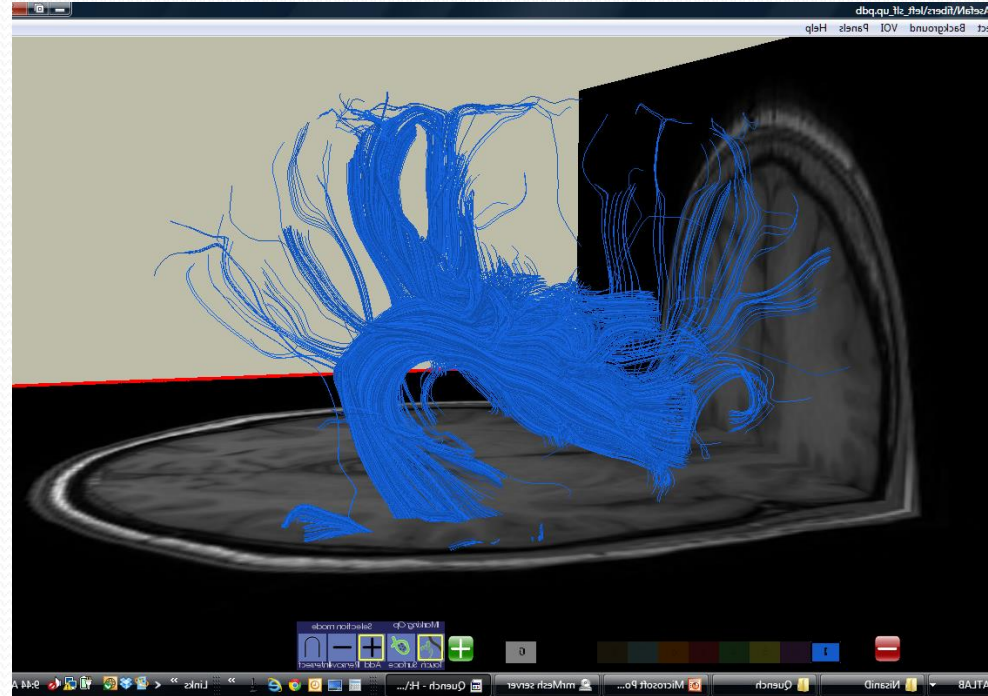


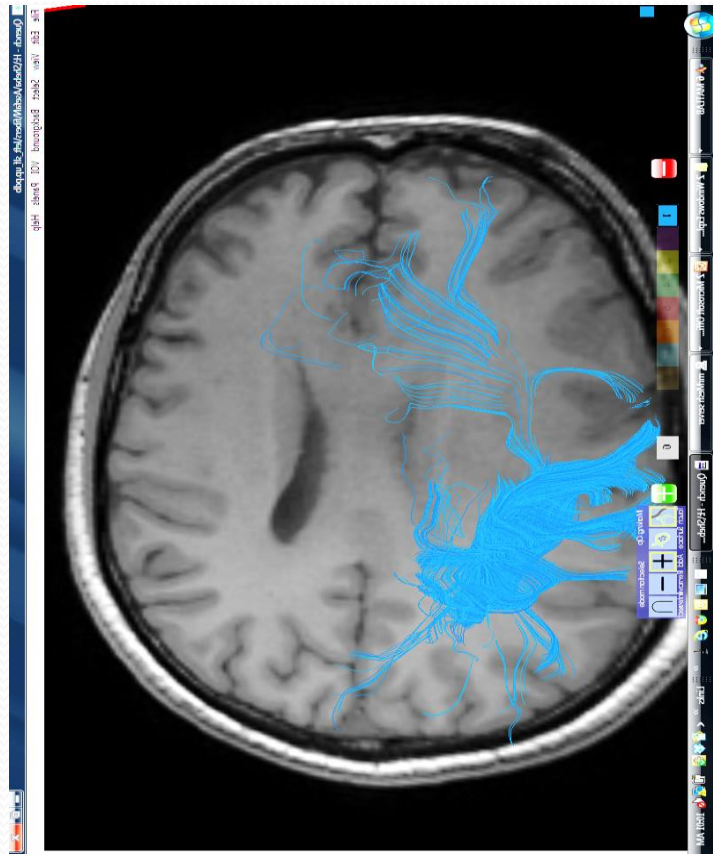
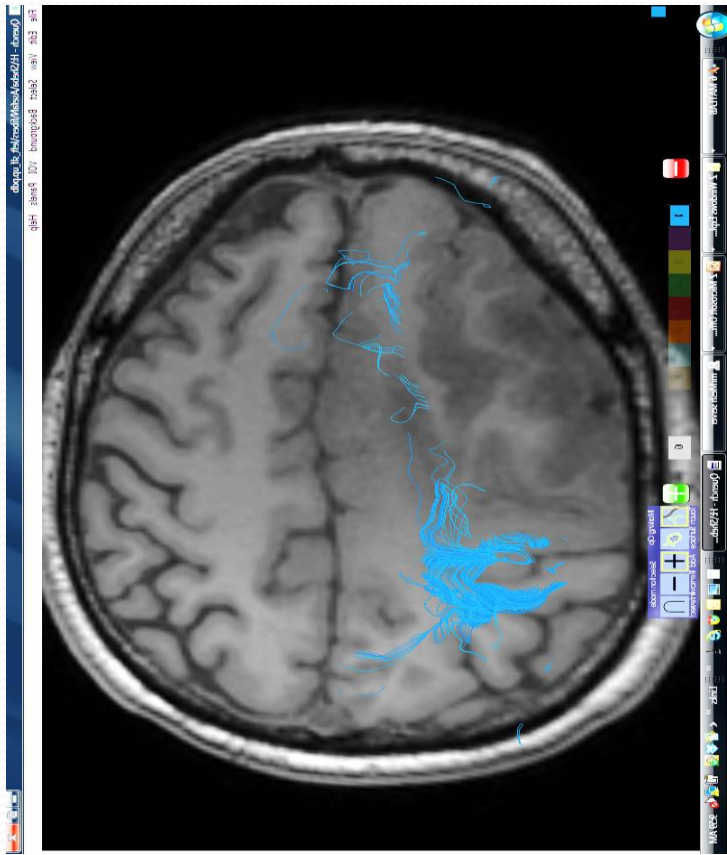
Tract *dislocated* by the lesion
ex: Left Motor Fibers pushed
backward

Courtesy Dr Meyer

Advanced Techniques

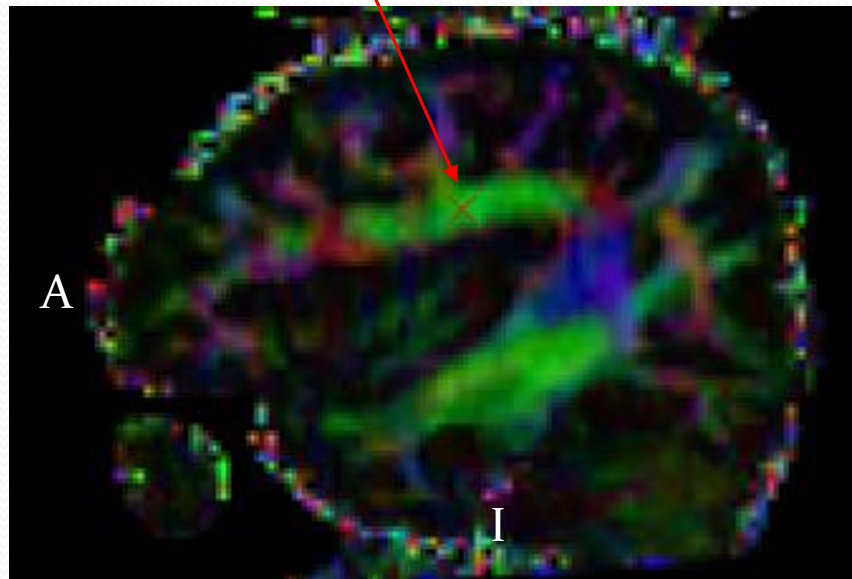
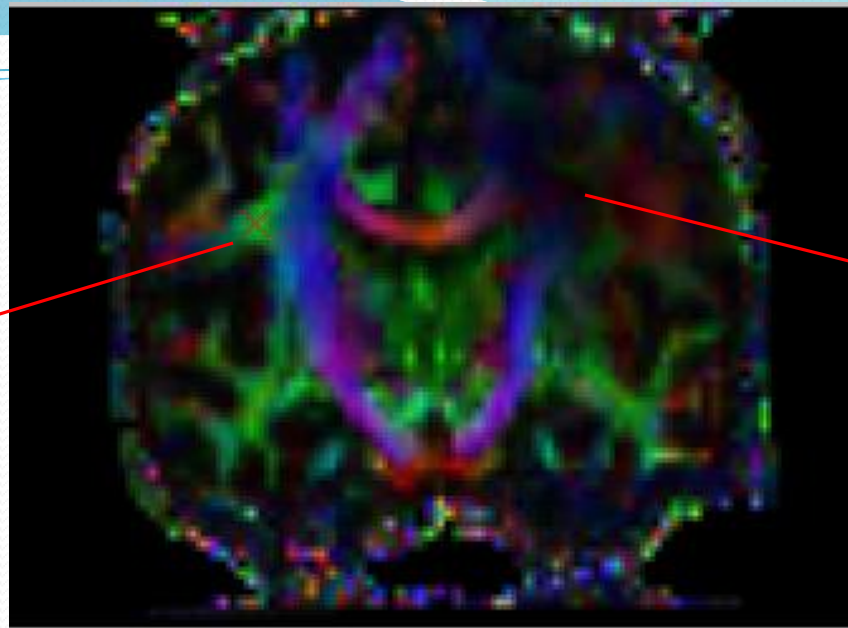
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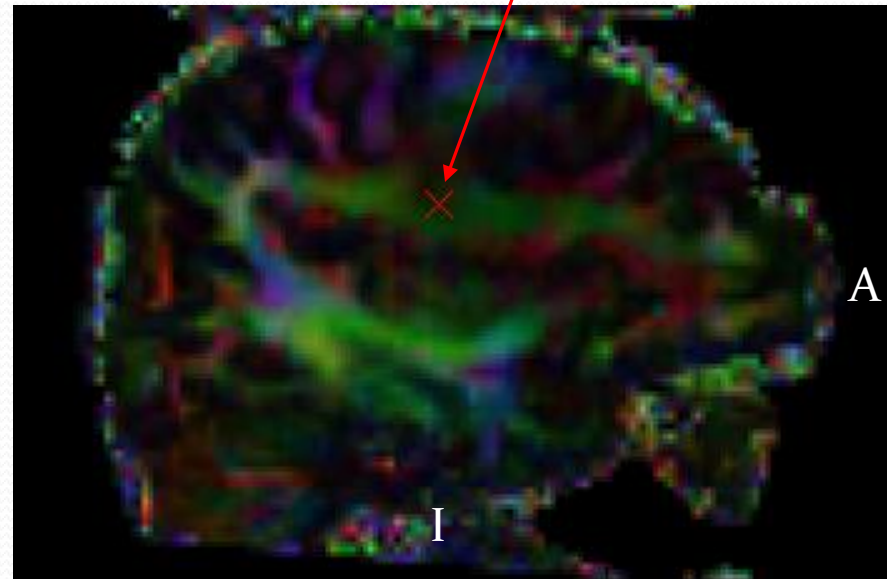


Normal Side
(Right)

Infiltrated Side
(Left)



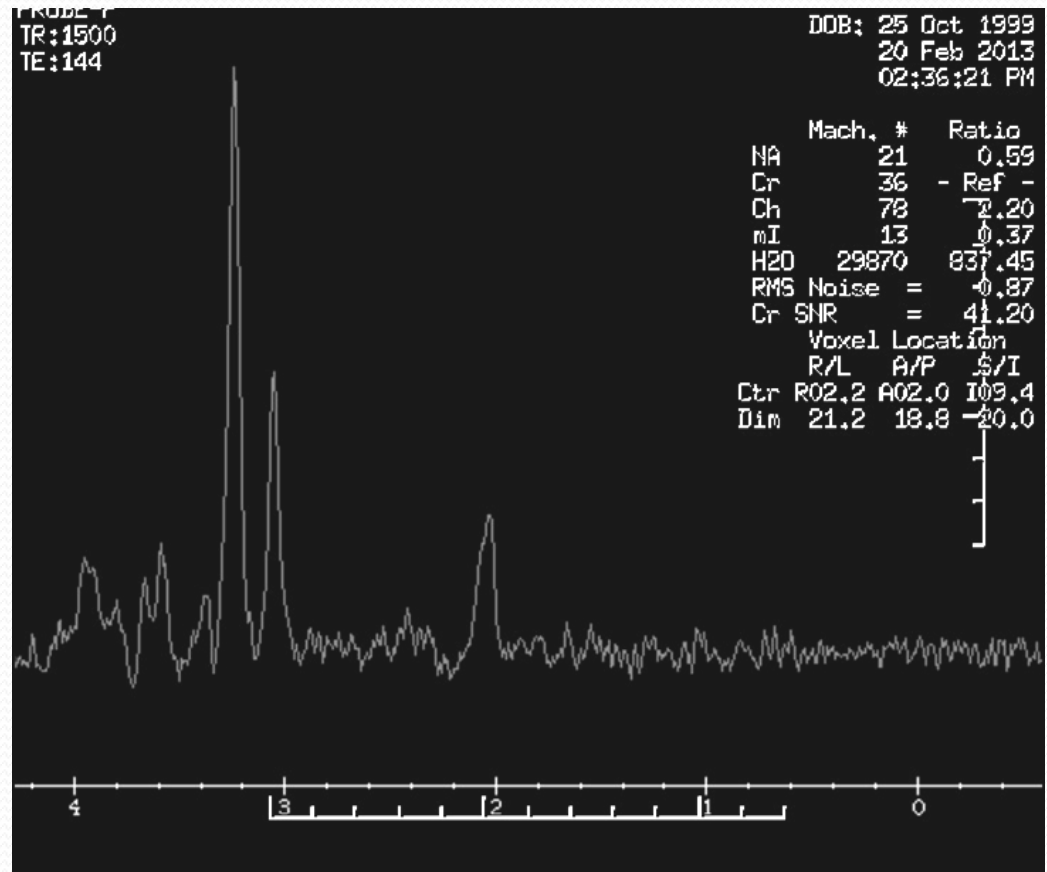
Normal arcuate



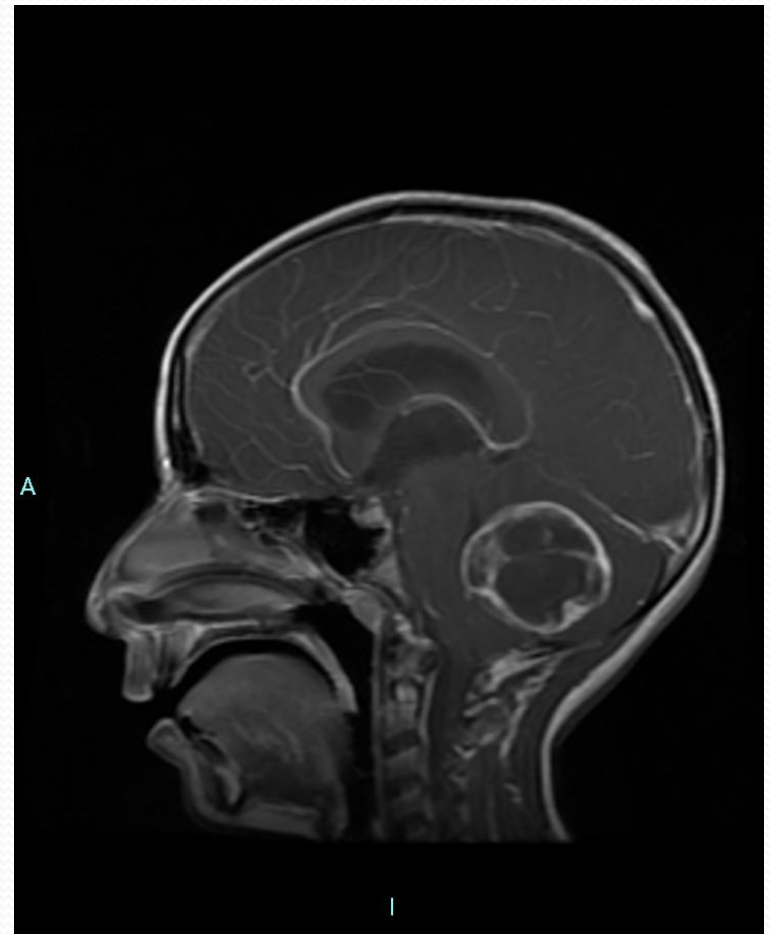
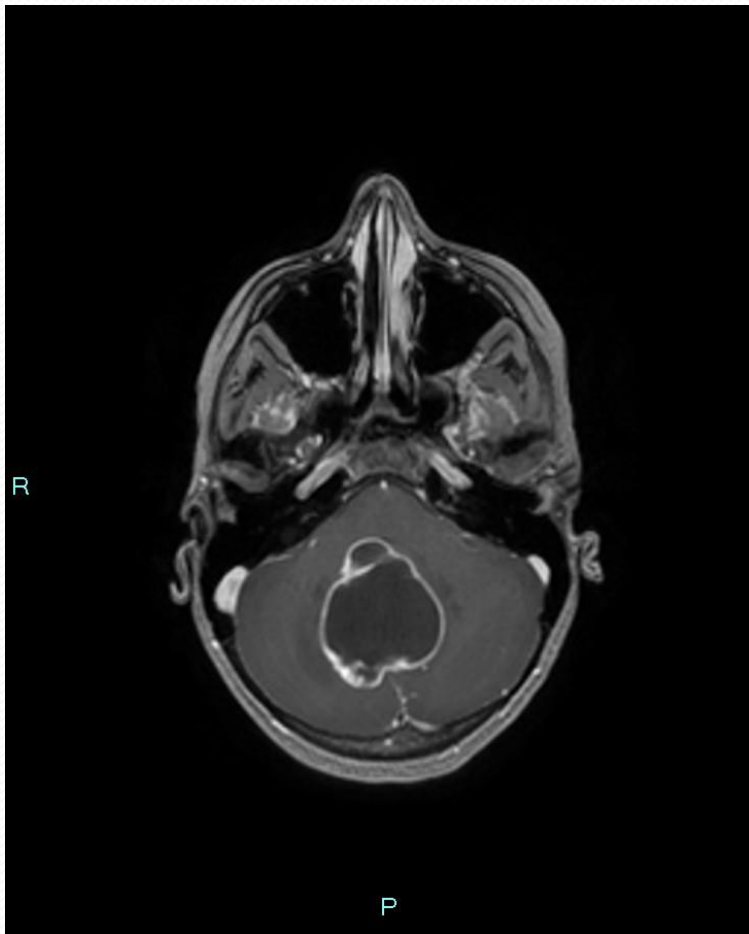
Infiltrated arcuate

Advanced Techniques

- DWI
- DTI
- MRS
 1. NAA
 2. Choline
 3. Lactate
 4. Lipids
 5. mI
- PWI
- fMRI

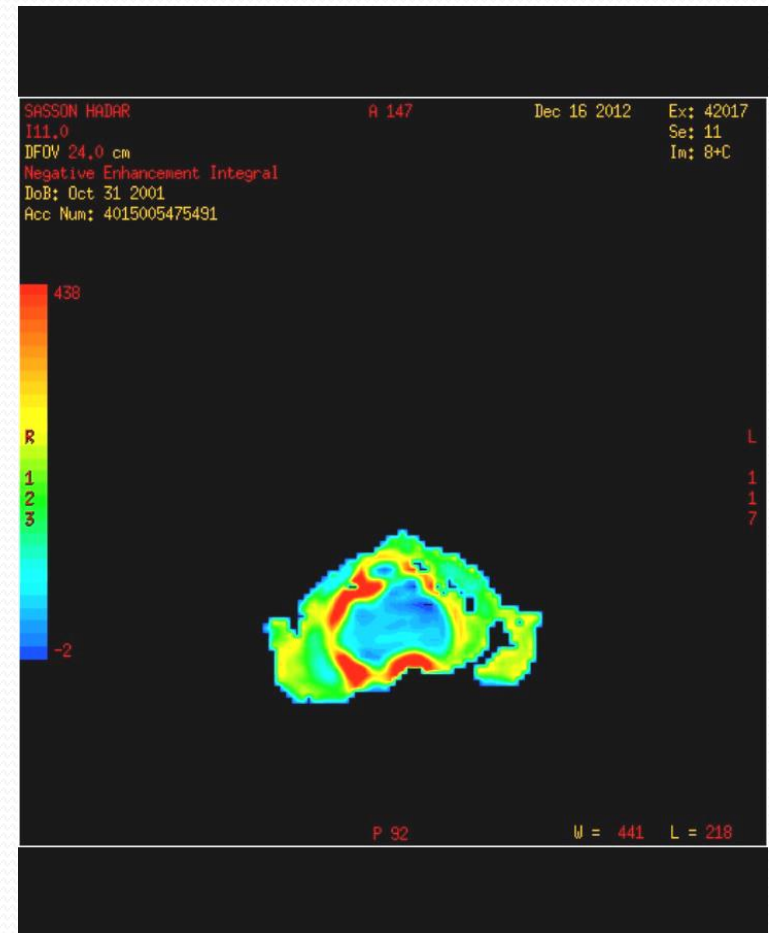


JPA- PWI



Advanced Techniques

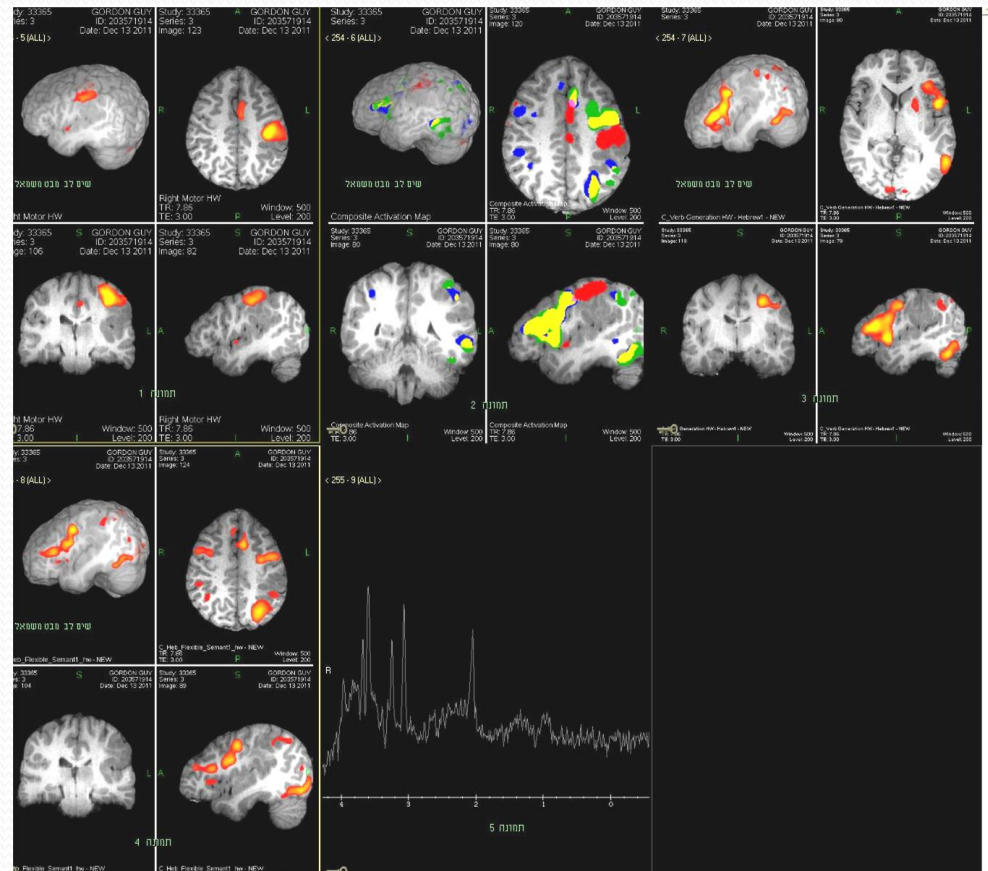
- DWI
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- **PWI**
- fMRI



Advanced Techniques

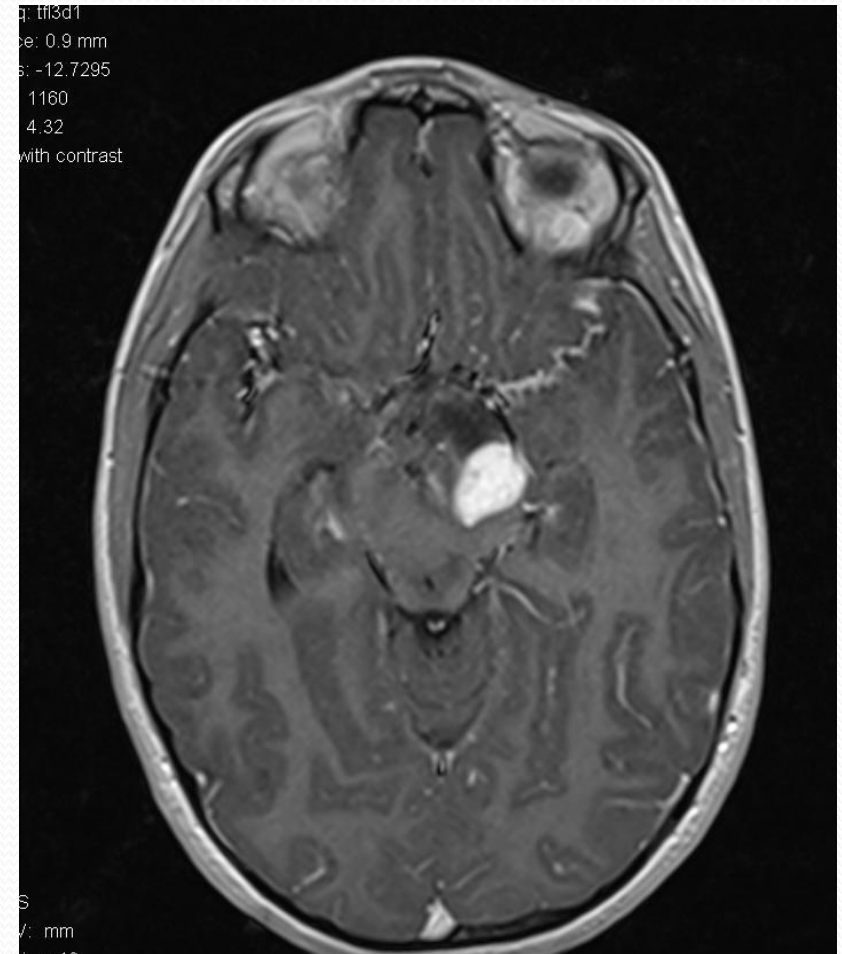
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- PWI
- **fMRI**

1. Preoperative planning
2. Neurological deficit



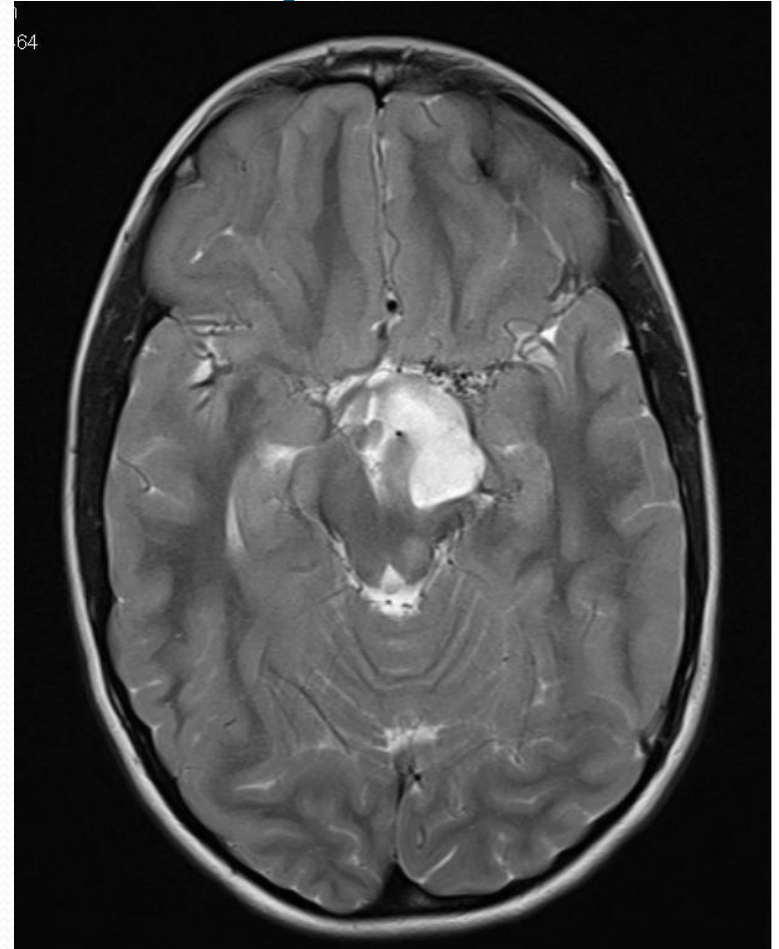
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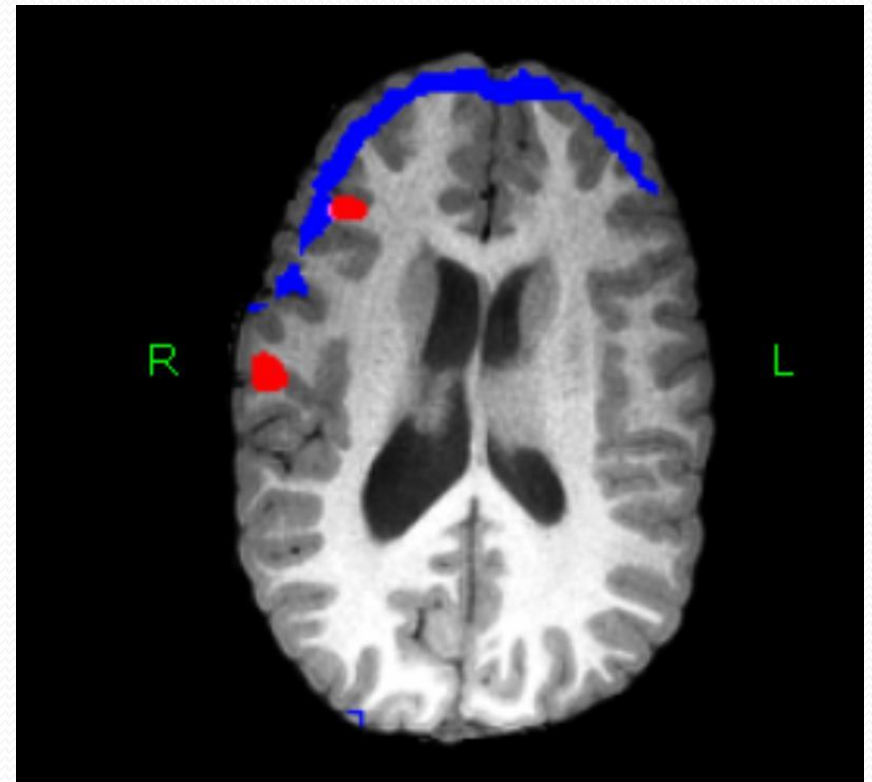
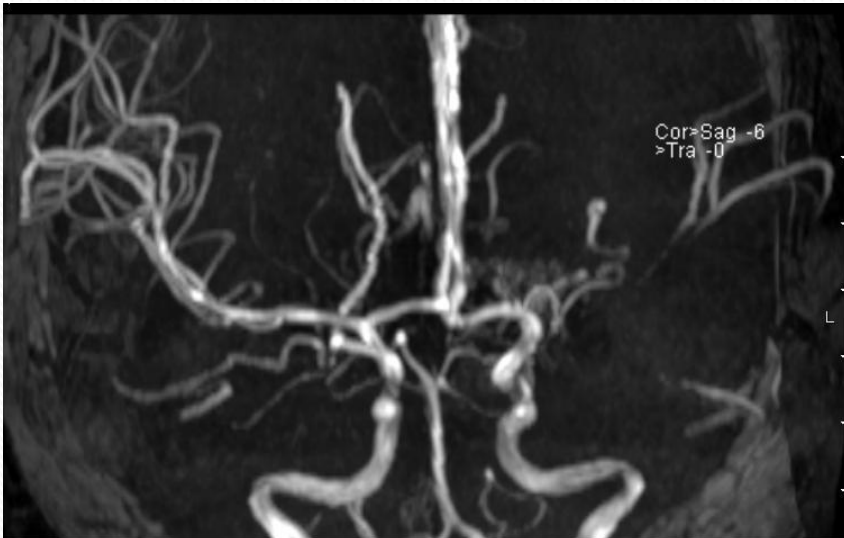
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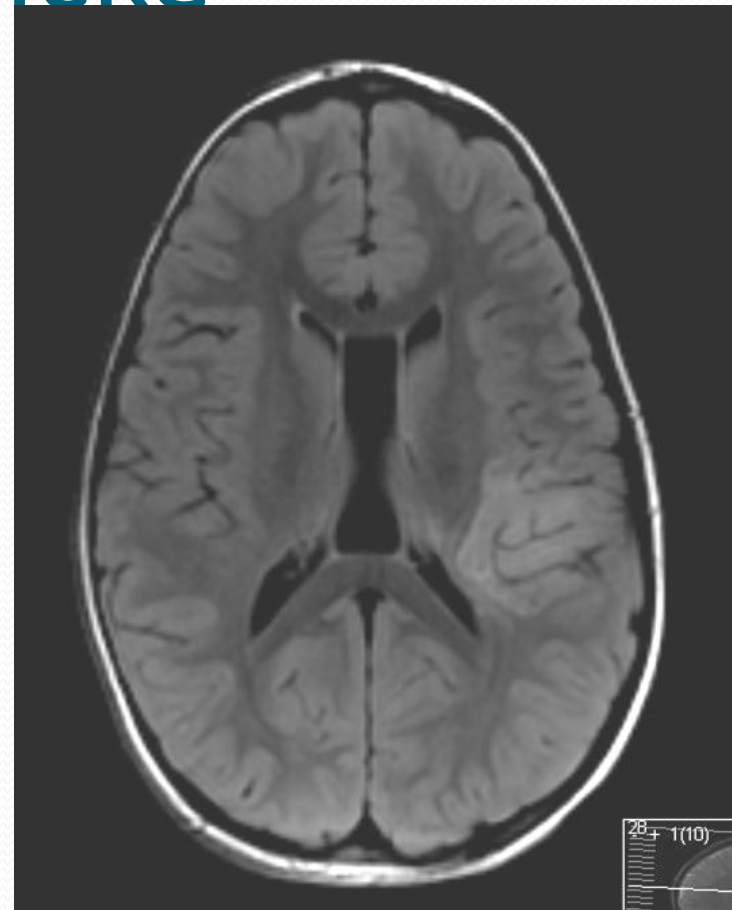
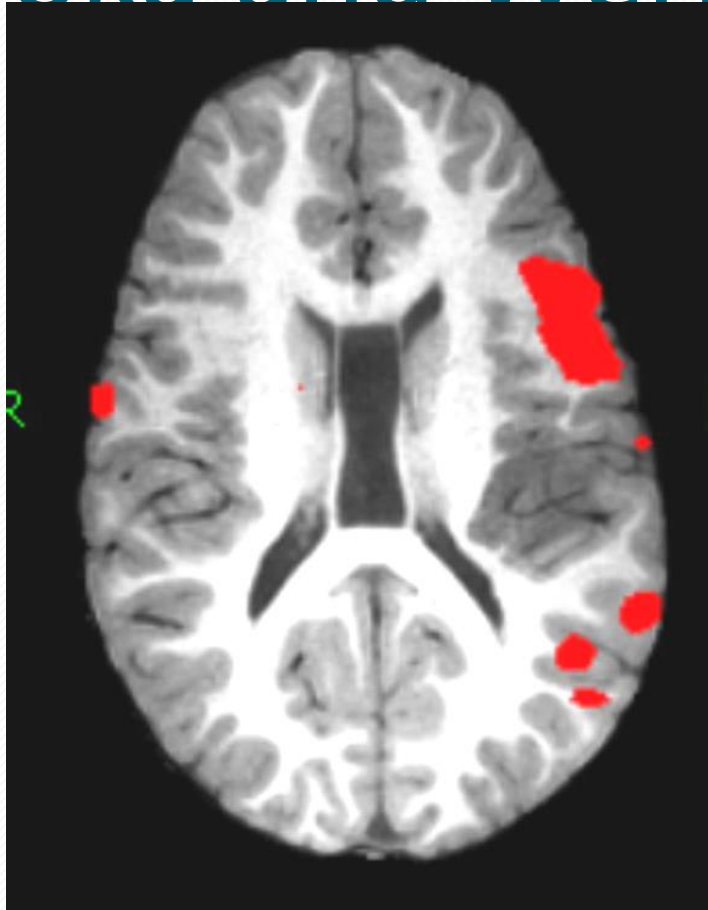


BOLD= Blood Oxygen Level Dependent)

NF1 and Moya Moya



Broka and Wernicke

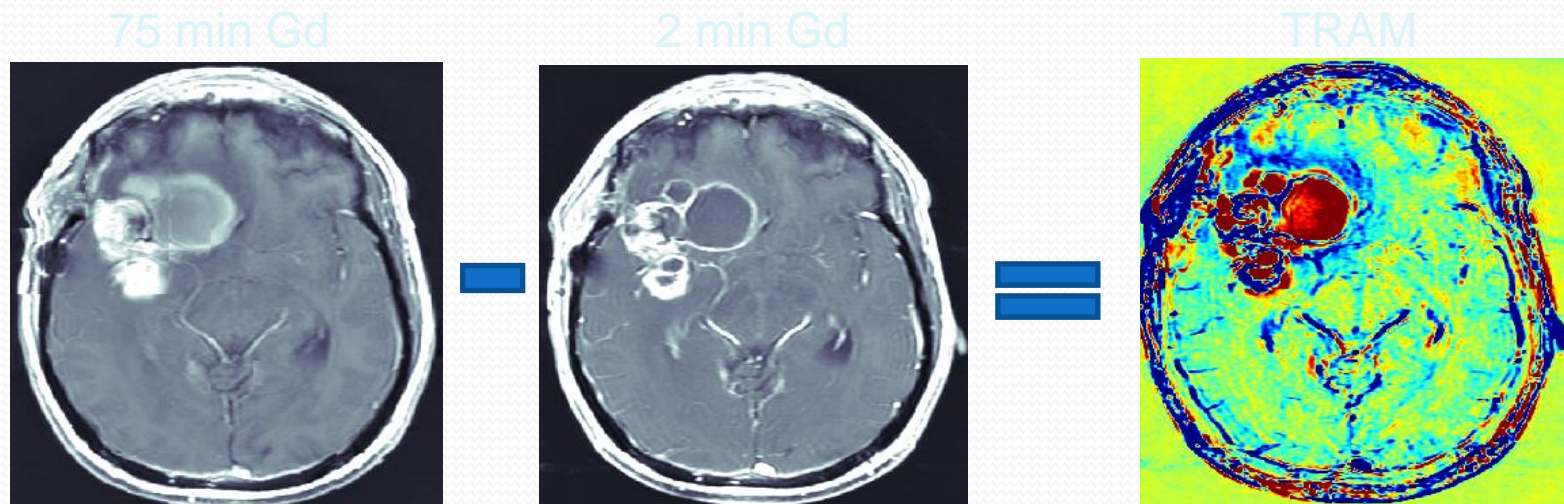


Delayed Contrast Extravasation MRI:

Treatment Response Assessment Maps (TRAMs)

Method

1. Acquire 2 series of T1-MRI 2 & 75 min post contrast injection
2. Perform rigid/elastic registration and intensity variation corrections
3. Subtract the early (2 min) images from the late (75 min) images



Blue = efficient Gd clearance at 75 min

Red = Gd accumulation at 75 min

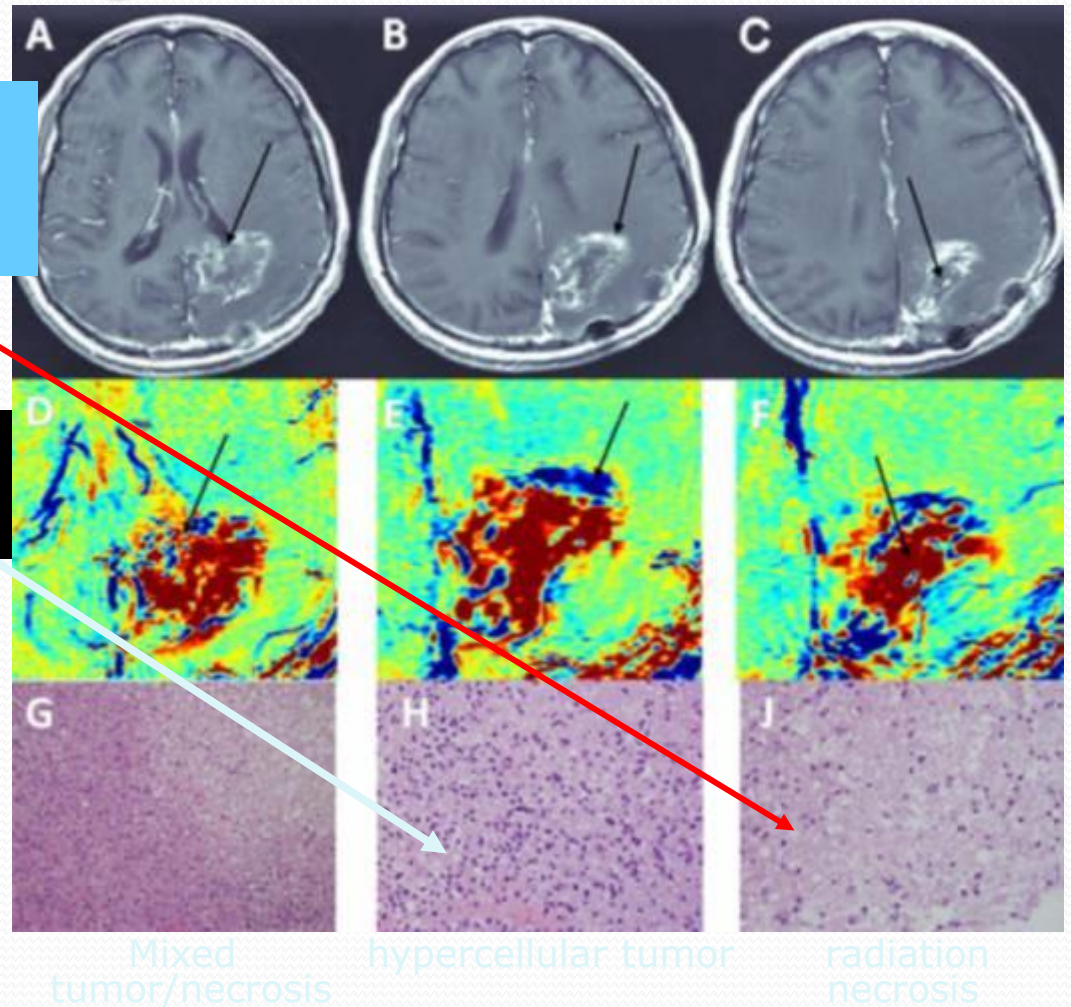
Delayed Contrast Extravasation MRI: Histological Validation

206 patients recruited from 5 major hospitals in Israel, 54 of those underwent surgery

Red = non-tumoral tissues:

Blue = morphologically active tumor:

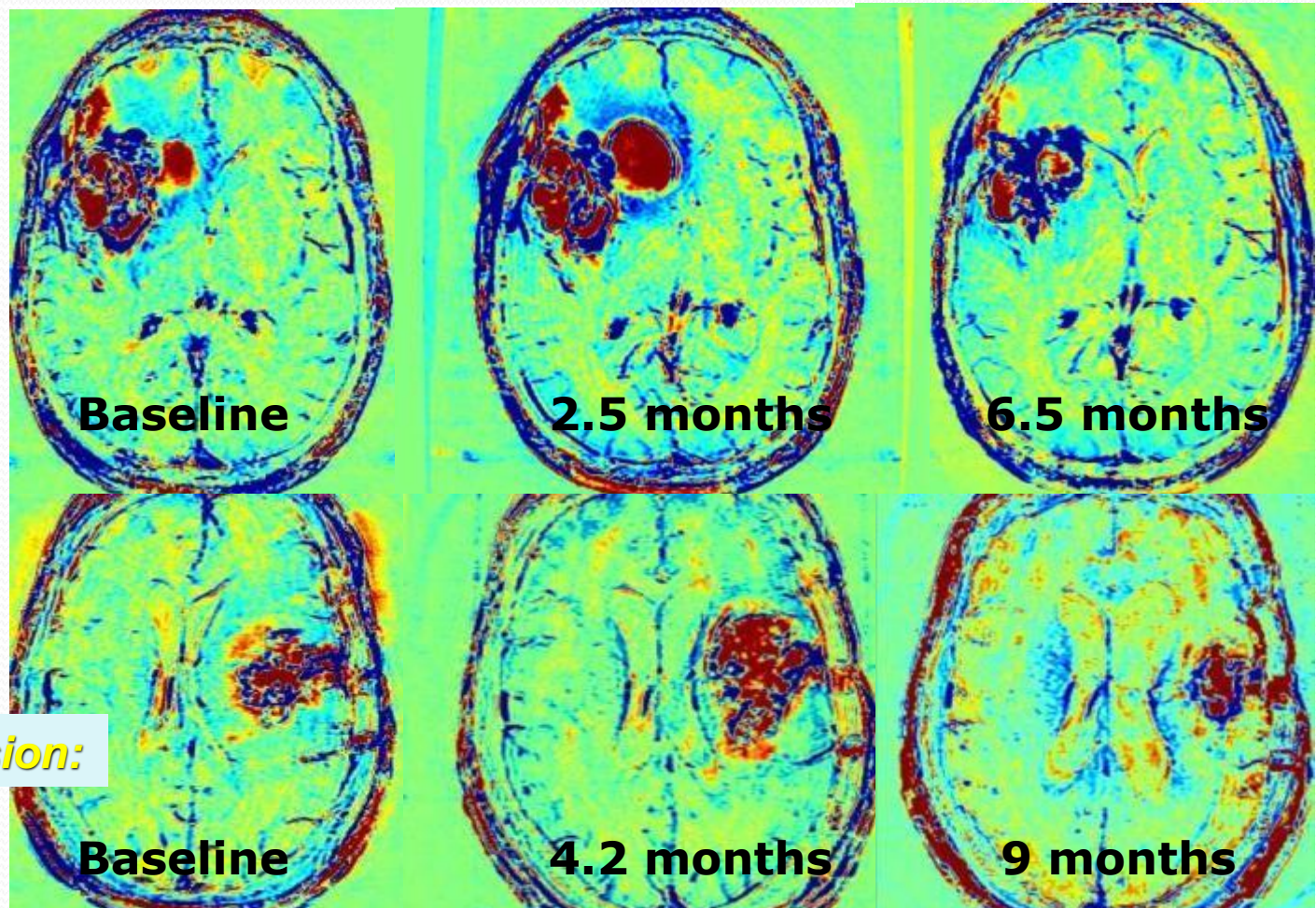
95% PPV, 99% sensitivity



206 patients, 588 TRAMs, 291 decisions:
87: continue treatment; 204: change treatment

Decision:
Change -
surgery

Progression:
confirmed
histologically:
70% tumor



Decision:
Continue
adjuvant
**Temozolomi
d**

Pseudoproggression:

Progression = increase in blue volume

Pseudoproggression = increase in red volume >> increase in blue volume

Conclusion

- MRI is a “diagnostic tool”
- We can do a good old fashioned T₁, T₂, FLAIR, DWI w/wo contrast
- Or we can use it for better understanding the brain lesions and help the Neurosurgeons and Oncologists to treat the patients









