

prism[®]
Clinical Imaging

Welcome to ASNR 2020
and the Prism Virtual Booth!

Overview

- ▶ Prism facilitates the integration of multi-parameter, multi-modality advanced imaging into the clinical workflow
- ▶ The examples in this presentation are all created with our clinical products
- ▶ Software is compatible with all 1.5T/3T/7T clinical scanners, PACS, and surgical nav.
- ▶ Research extensions supported with DICOM and non-DICOM import/export in processing and visualization

Contents

- ▶ [Tumor/Epilepsy](#)
- ▶ [Traumatic Brain Injury](#)
- ▶ [Alzheimer's Disease](#)
- ▶ [Functional Neurosurgery](#)

- ▶ [Task fMRI](#)
- ▶ [DTI/Tractography](#)
- ▶ [Physiology](#)
- ▶ [Spinal Imaging](#)

Use Cases

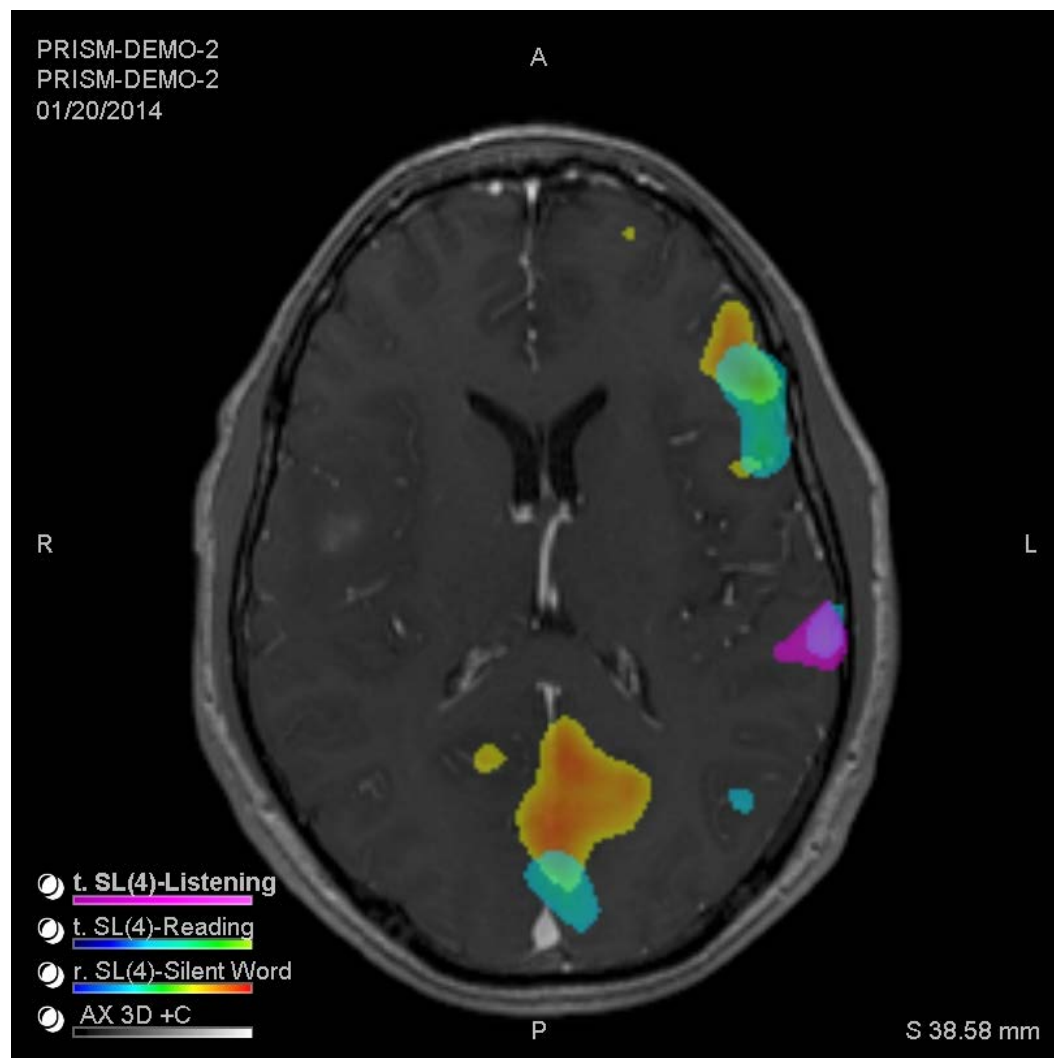
Prism's Solution

*Click on any heading for more information
Return here with the 'Contents' button*

Task fMRI

- ▶ Reliable identification of eloquent cortex
- ▶ Prism provides language, motor, sensory, cognitive and breath–hold NVU paradigms
 - Multiple natural languages
 - Easy/hard and pediatric versions
- ▶ Extensive paradigm library
 - Customizable and extensible
 - Export to PACS, surgical navigation, etc.

- ▶ Correlation, T or p mapping
- ▶ Optional masking and smoothing
- ▶ Overlay with opacity/outlining
- ▶ Flexible export to all popular PACS and OR systems



Rich paradigm library can be locally enhanced

Task fMRI Reporting

Report automatically collated from Prism Acquire and Prism Process...

Training Assessment:

Trainer's Name: cneller
Patient's Self Assessment:
Observer's Assessment:
Comments:

Processed - Semantic Decision

Training & testing results

Scanning Assessment:

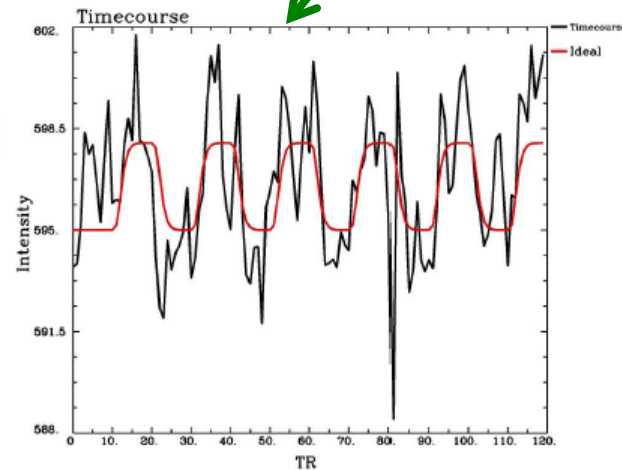
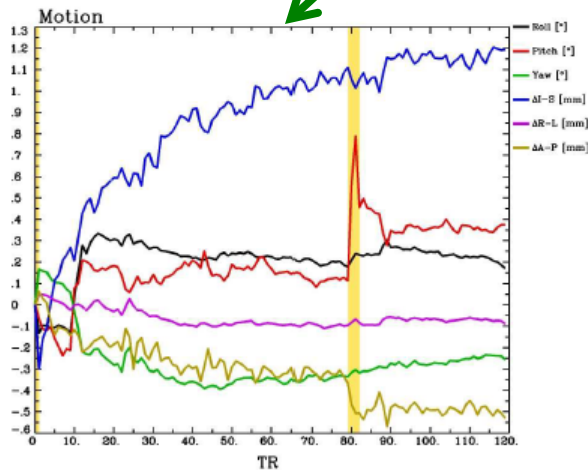
Operators' Name: GV
Patient's Self Assessment:
Observer's Assessment:
Image Quality Assessment:
Comments:

Motion impact analysis

Censored Volumes: 6 TRs (5.0%)
Waveform Cluster Size: 4073.0 ul
Maximum RMSE in Motion Correction: 25.57
Motion correlation to ideal waveform:

Activation versus Design

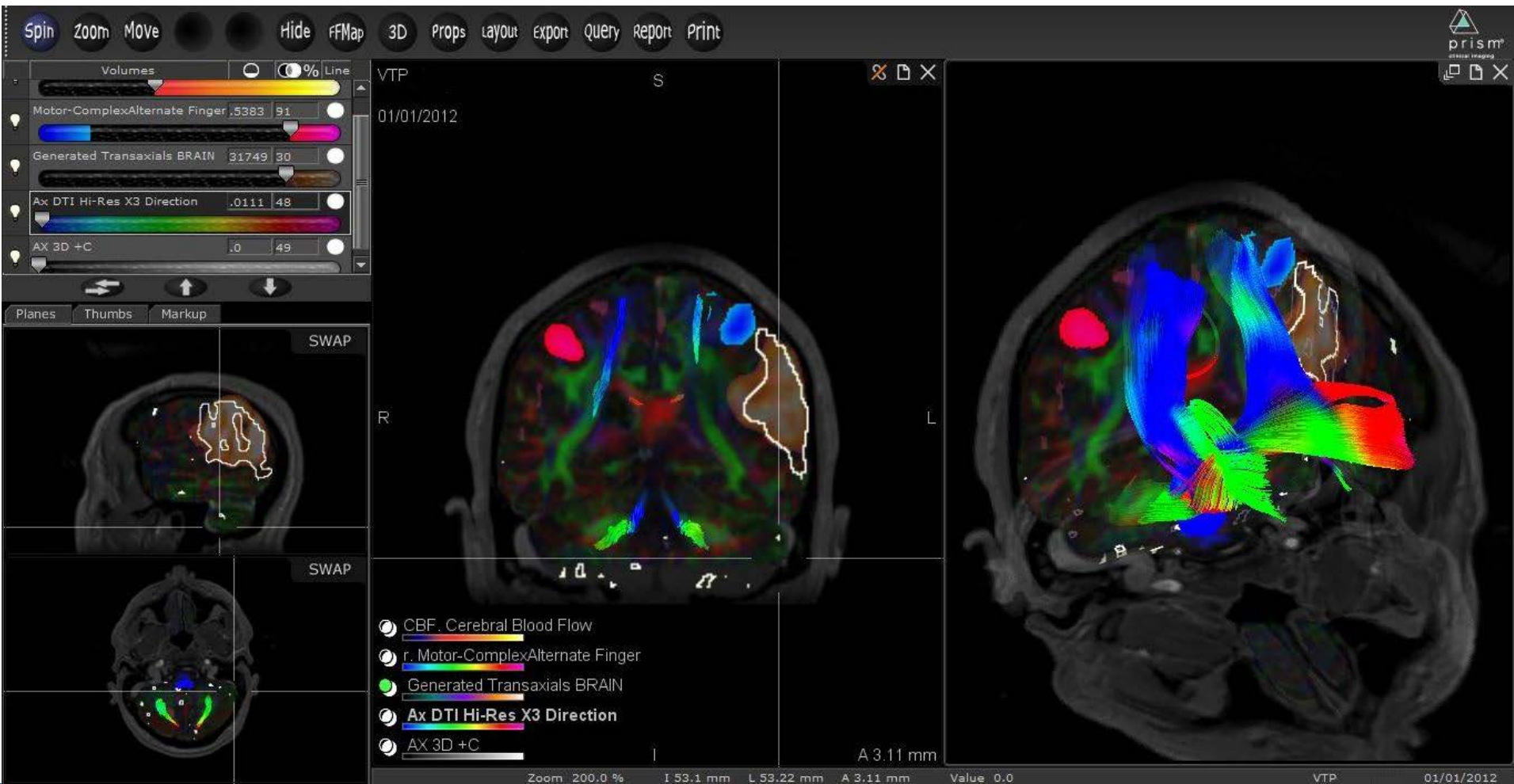
All motion parameters show little or no correlation with task.



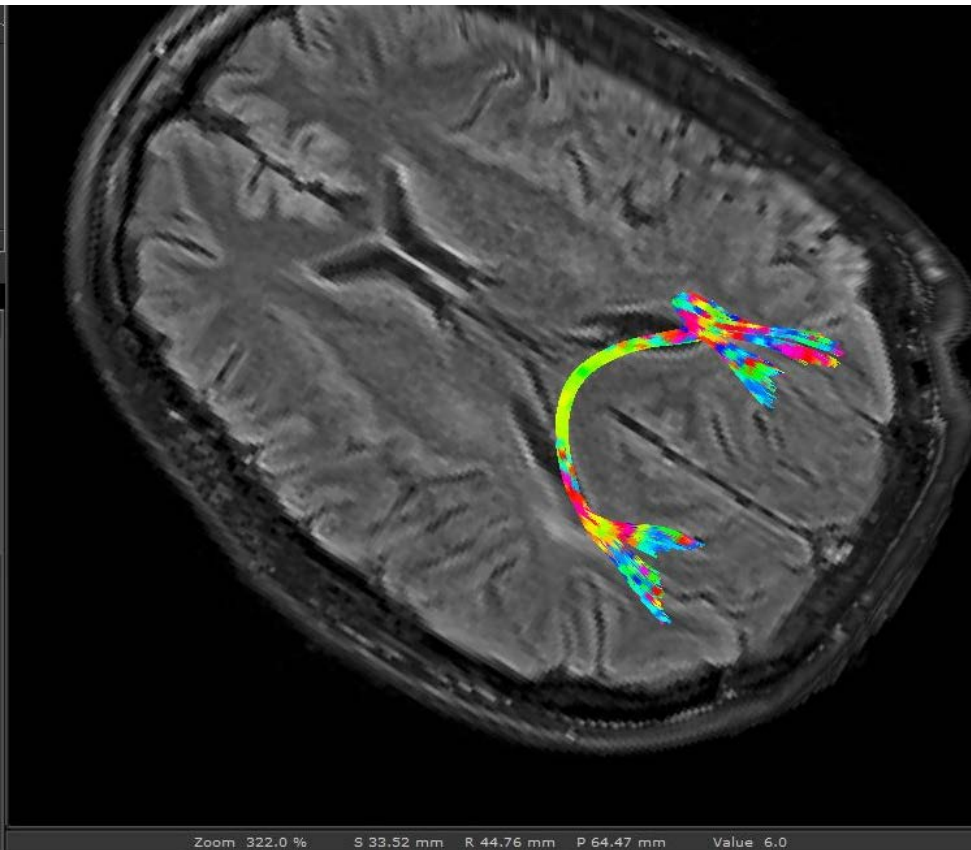
DTI/Tractography

- ▶ Tissue characterization with quantitative MD, FA, radial and axial diffusivity
- ▶ White matter visualization: color-coded DTI
- ▶ Tractography with filtering and quantitation
- ▶ Export to PACS, surgical navigation, etc.

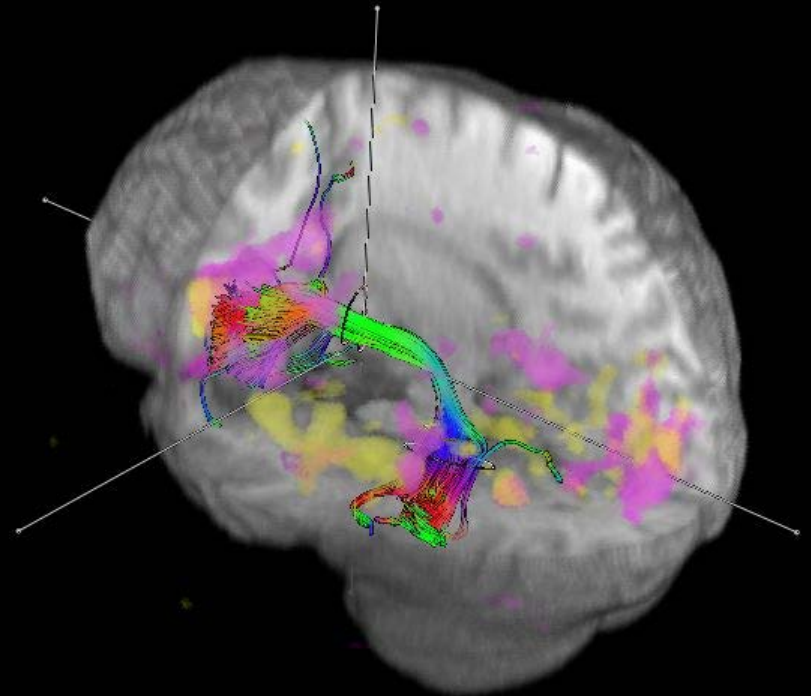
DTI / Tractography



White matter proximity to tumor margin

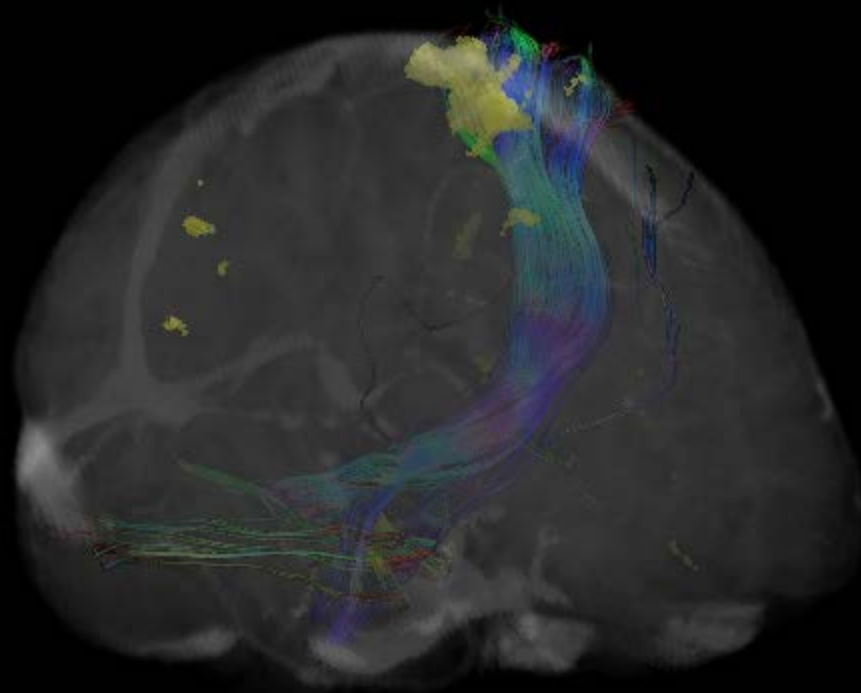


Tracks colored by parametric data (FA)



fMRI/DTI Language system mapping

33



Volumetric rendering including fMRI and tractography

Pre-Treatment Brain Mapping

- ▶ 86,970 new brain tumors annually in US¹
- ▶ \$100,000 est. initial treatment costs²
- ▶ Surgical intervention commonly required
- ▶ 3 million people with epilepsy in the US³
- ▶ Surgical intervention used in about 1% of patients with poorly controlled seizures.

Tumor

Epilepsy

1 – Central Brain Tumor Registry of the United States; <http://www.cbtrus.org/factsheet/factsheet.html>

2 – National Brain Tumor Society; <https://braintumor.org/brain-tumor-information/brain-tumor-facts/>

3 – US CDC; <https://www.cdc.gov/epilepsy/data/index.html>

Pre-treatment Brain Mapping

Imaging Window

Levels Zoom Move xHairs Nudge Hide 3D Props Layout Export Query Report Print

prism clinical imaging

Volumes

- FMRI(RHYMING-FAST) .4 100
- FMRI(SILENT-WORD) .4 100
- DTI HighRes Scan x3 Direc... .0 100
- AX 3D SPGR DO NOT OBLI... .0 100
- B AX FLAIR DO NOT OBLIQ... .0 100

Morphometrics, S07
2008007
09/05/2008

A

R

L

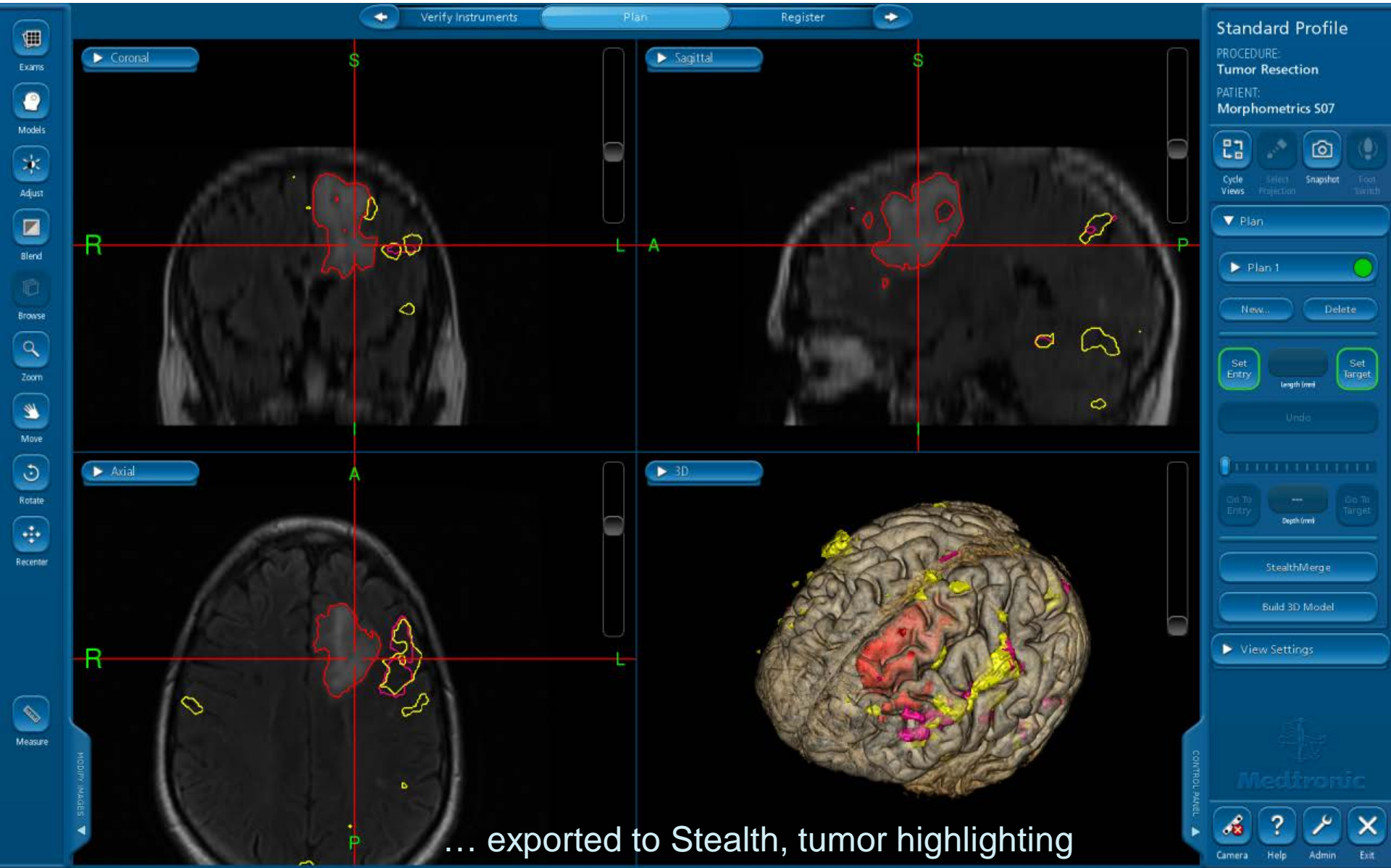
- r. FMRI(RHYMING-FAST)
- r. FMRI(SILENT-WORD)
- DTI HighRes Scan x3 Direction
- AX 3D SPGR DO NOT OBLIQUE
- B AX FLAIR DO NOT OBLIQUE!!

P

S 6.42 mm

Zoom 100.0 % S 6.42 mm L 6.45 mm A 15.52 mm Value -0.037 Morphometrics, S07 09/05/2008

Multi-parameter studies including fMRI and DTI ...



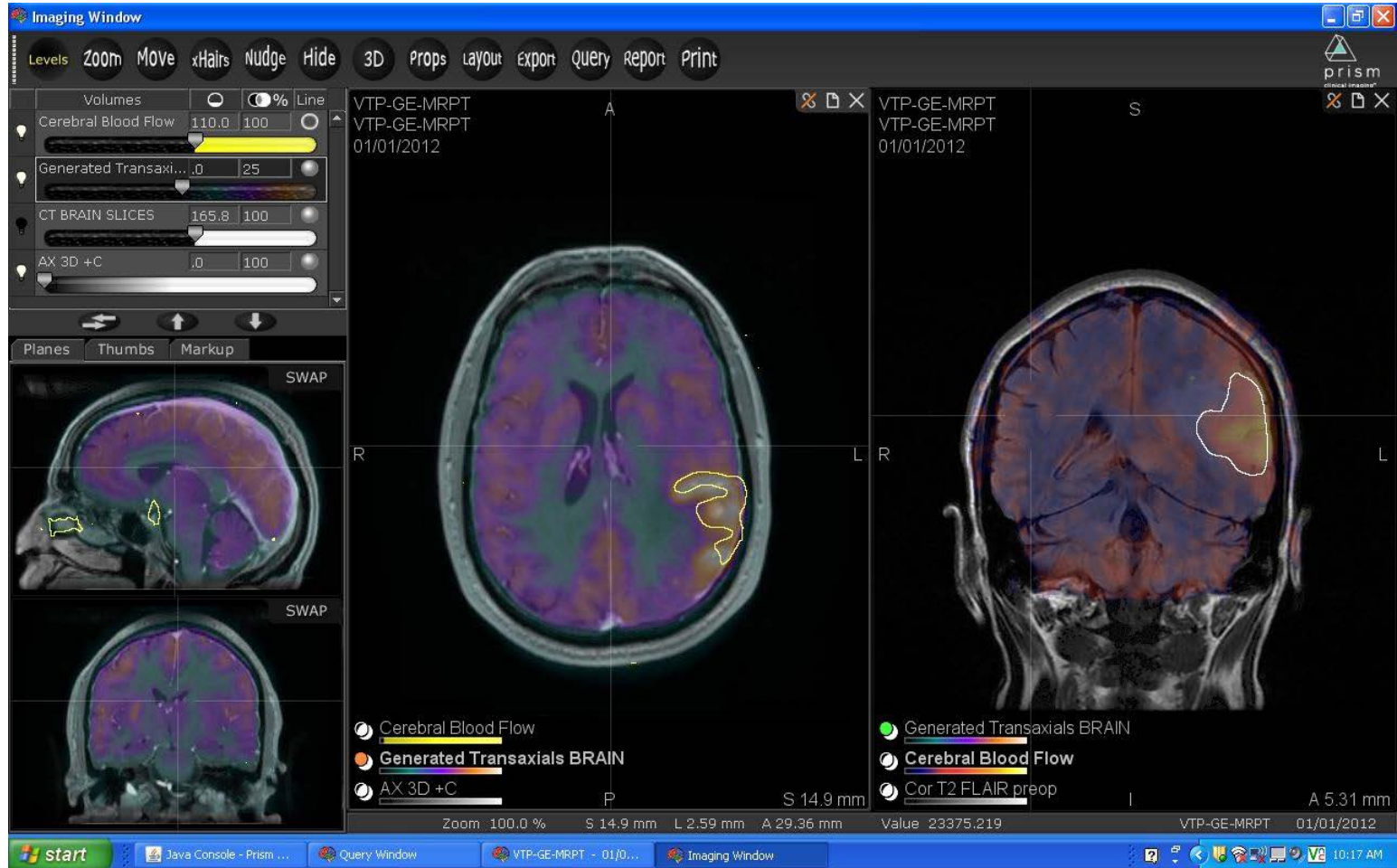
... exported to Stealth, tumor highlighting

[Contents](#)



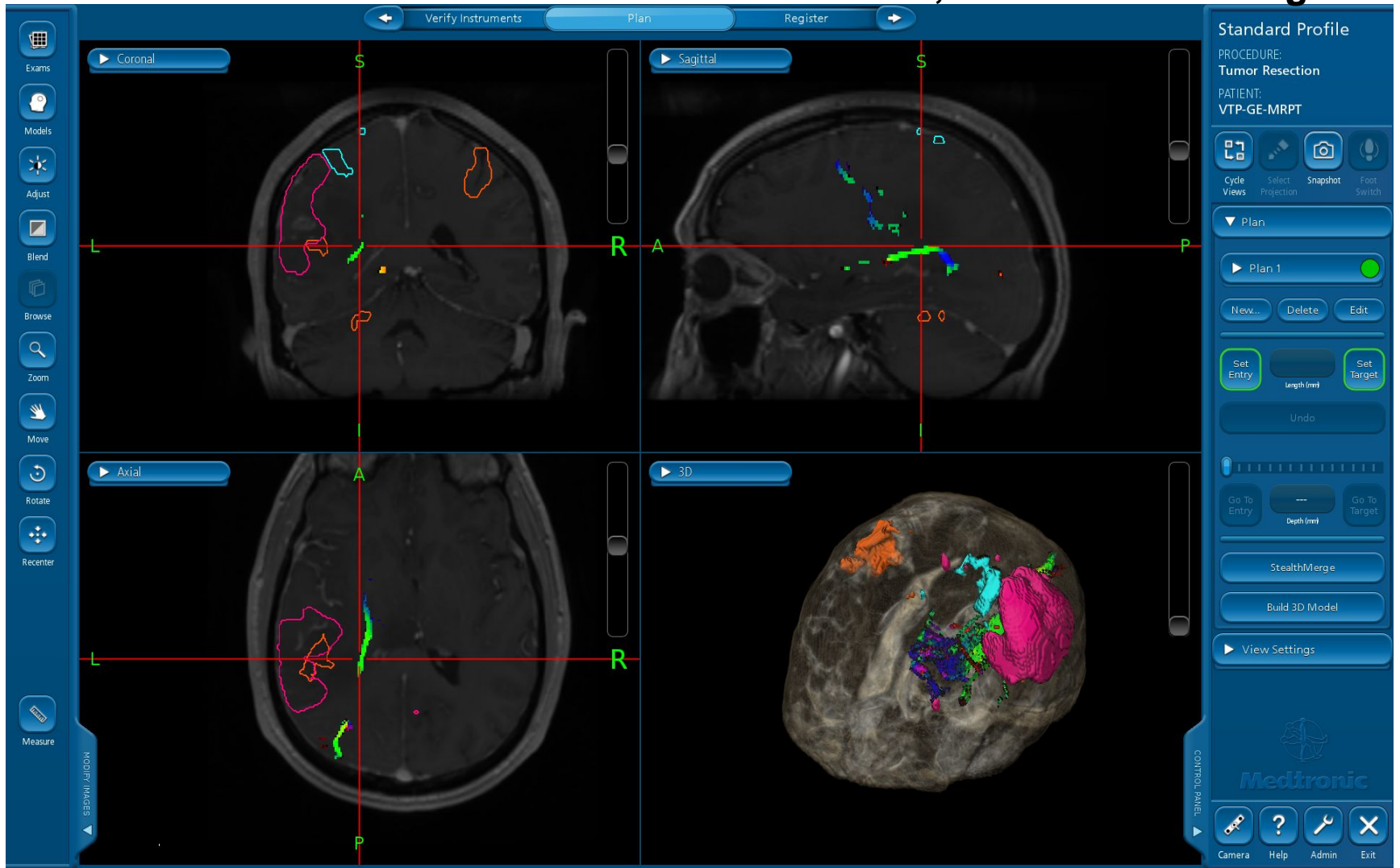
Physiology

Hyperperfusion in ASL (outline) / hypermetabolism in PET, with MR anatomy...



... in tumor treatment planning

Metabolism: PET, MR Perfusion Integration



... exported to Medtronic Stealth Synergy



Metabolism: PET quantitation

PET quantitation of hypometabolism in epilepsy...

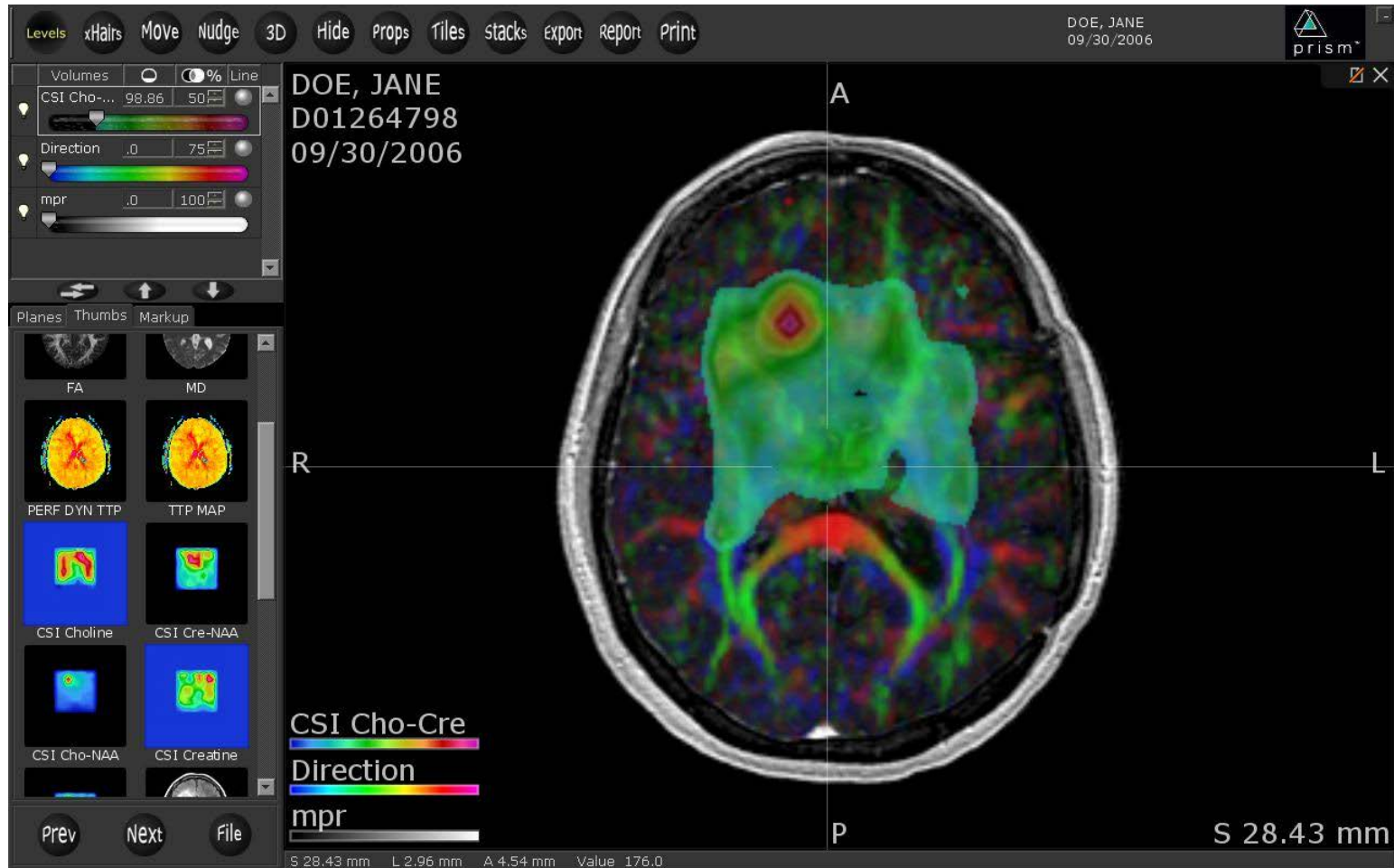


... with MRI anatomical localization



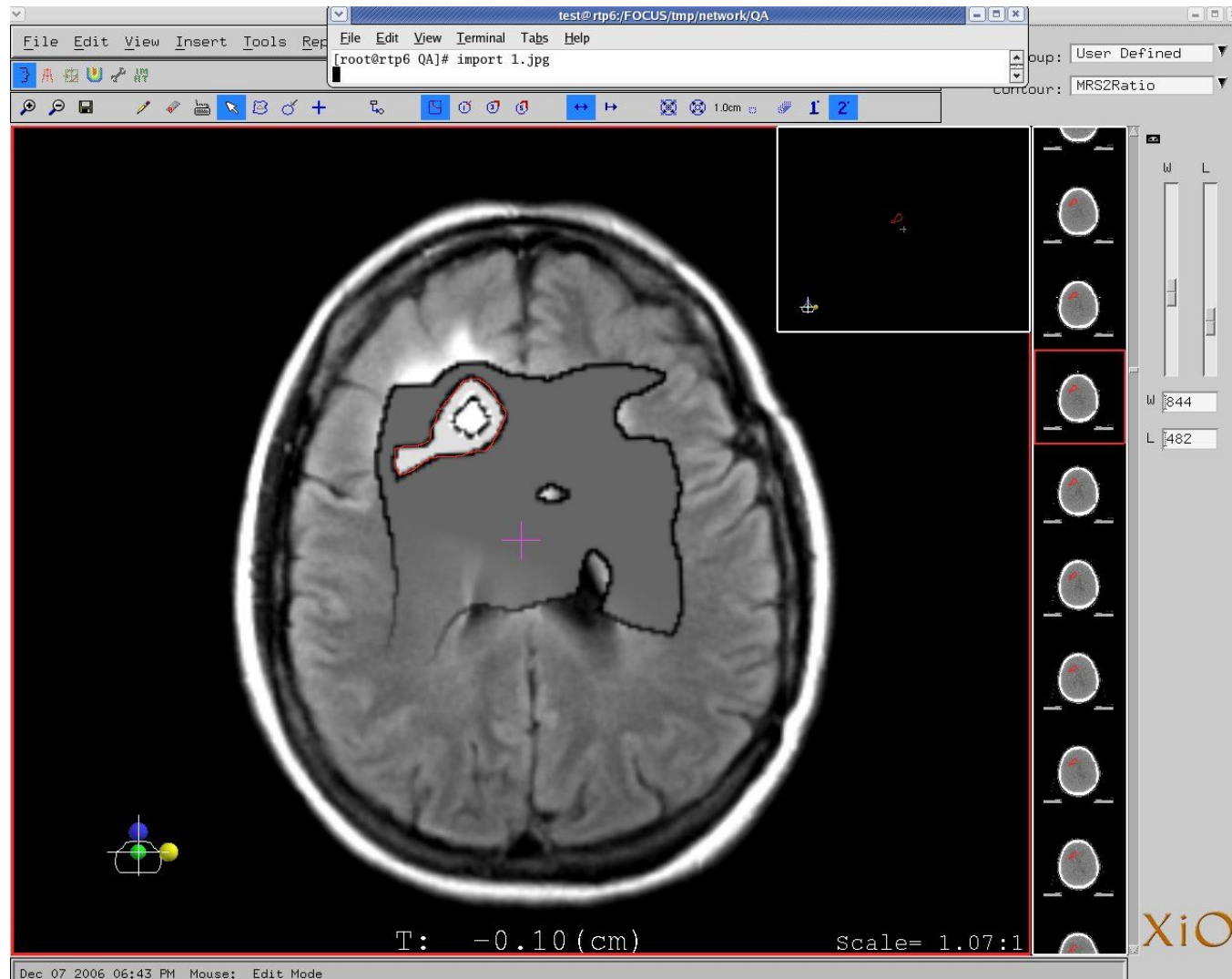
Metabolism: MR Spectroscopy in Prism

MR Spectroscopy of tumor metabolism overlaid on DTI delineating white matter



2D or 3D CSI, quantitative ratios ...

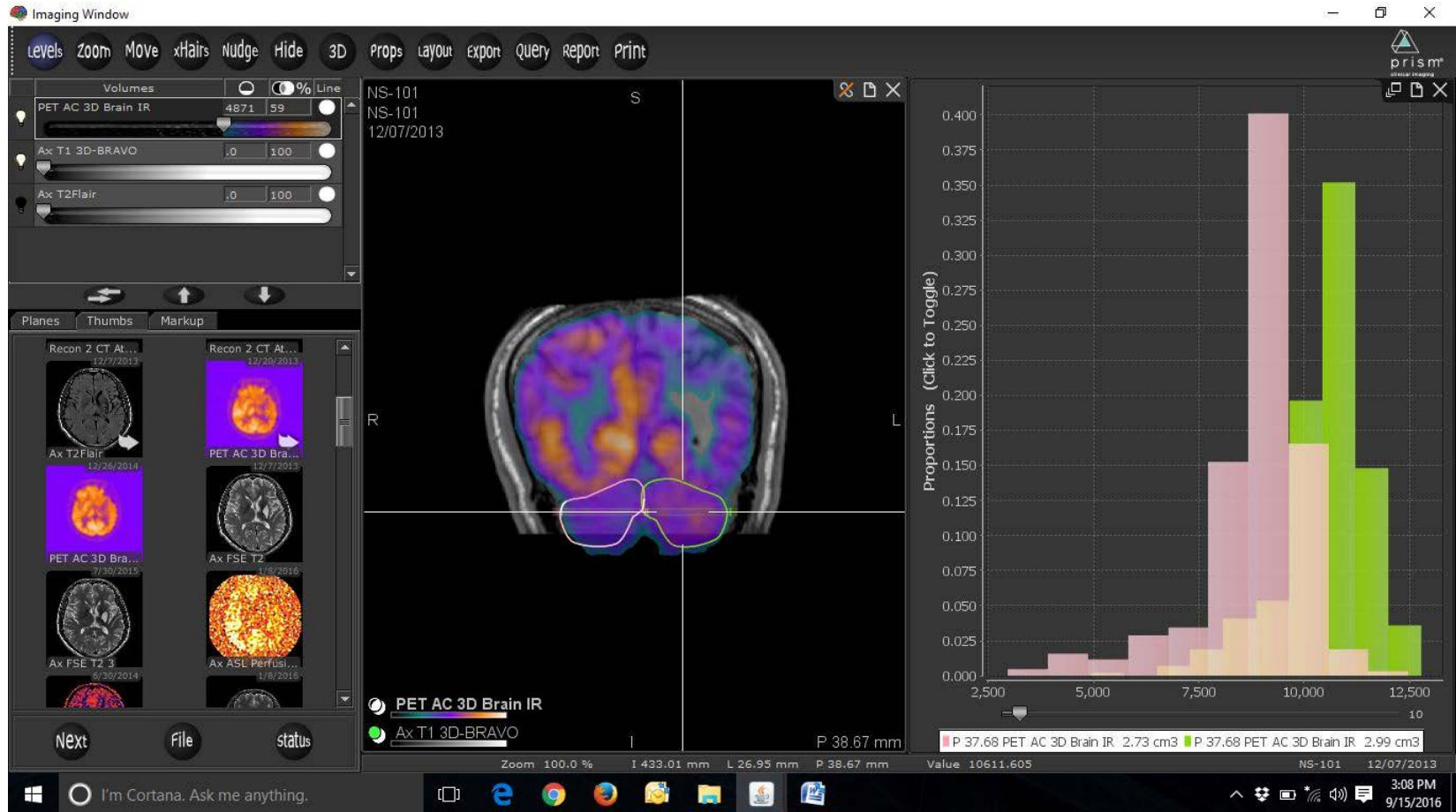
Metabolism: MR Spectroscopy in Prism



... can be exported for RT planning

Metabolism: Crossed Cerebellar Diaschisis Analysis

PET quantitation of cerebellar change with MR anatomy guidance...



... characterizing indirect impact of stroke

[Contents](#)



Alzheimer's Disease

- ▶ 5.8 million people with Alzheimer's Disease in the US¹ (60–80% of dementia)
- ▶ 15–20% of people >65 have Mild Cognitive Impairment (MCI)¹
- ▶ 4–8 year average survival after diagnosis
- ▶ Sixth leading cause of death in the US
- ▶ \$305B in US dementia care in 2020 (est.)
 - 67% from Medicare/Medicaid

1 – Alzheimer's Assoc.: <https://www.alz.org/alzheimers-dementia/facts-figures>

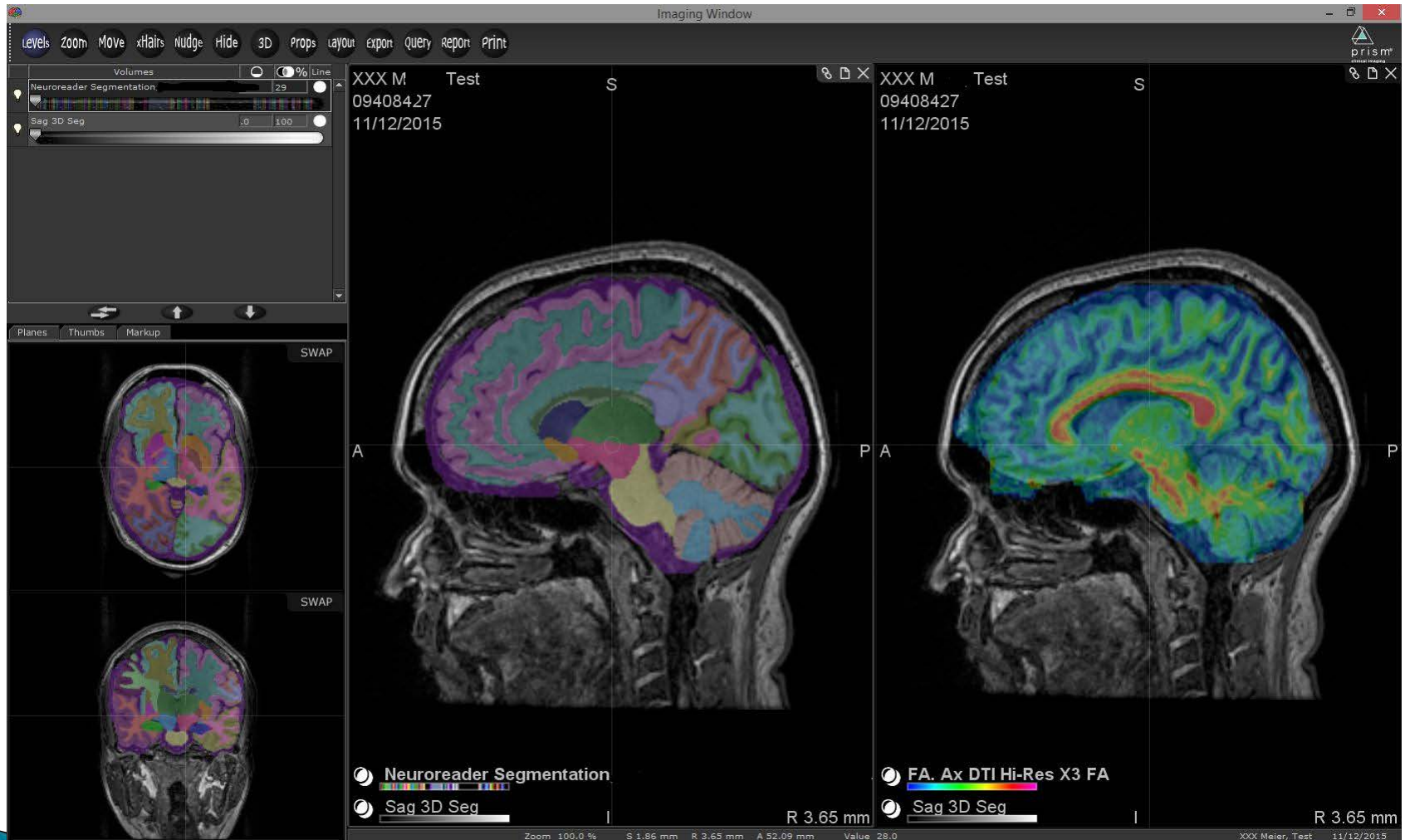
2 – AD Facts and Figures: https://www.alz.org/media/Documents/alzheimers-facts-and-figures_1.pdf

Imaging Biomarkers in Alzheimer's Disease

- ▶ PET imaging: FDG, amyloid (FDA cleared), tau
- ▶ MRI Morphometrics (brain atrophy)
 - FDA cleared services (NeuroQuant[®], Neuroreader[™])
- ▶ Functional Connectivity (rs-fMRI)
- ▶ Diffusion MRI and tractography
- ▶ MR Perfusion (regional hypoperfusion)

Neurodegenerative Assessment

Automated brain segmentation and volumetric analysis ...



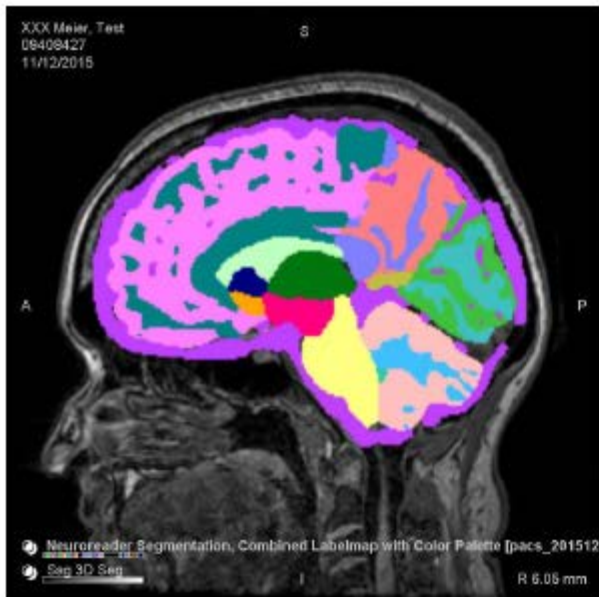
... for MCI and Alzheimer's profiling



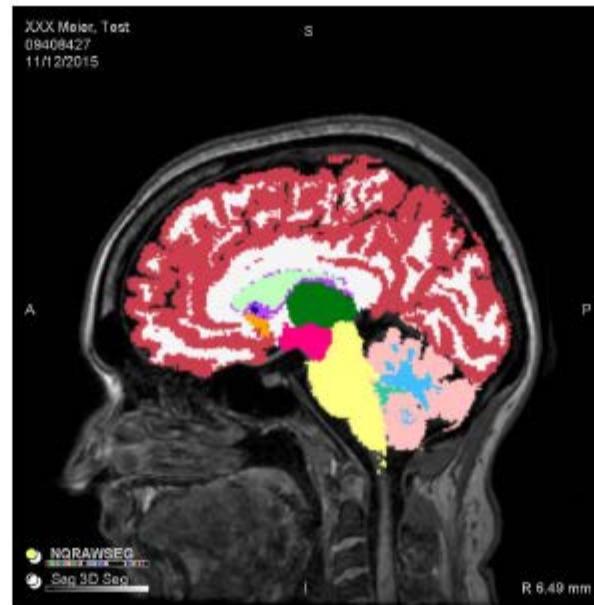
Neurodegenerative Assessment

Segmentation results registered and reported in Prism ...

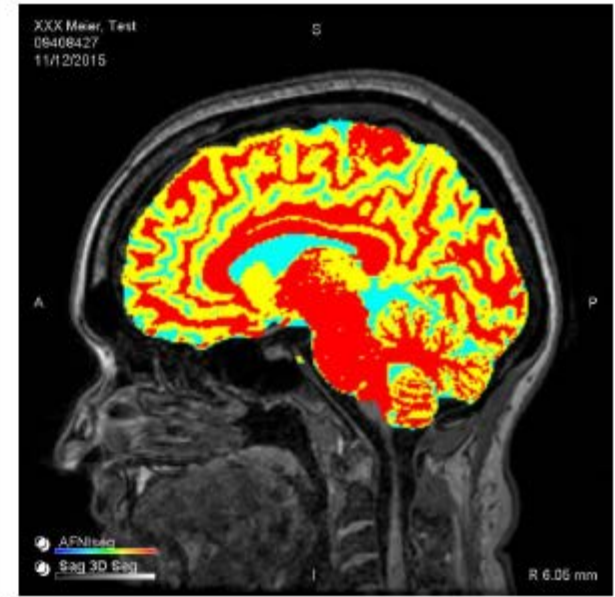
Neuroreader



NeuroQuant



AFNI



... from multiple third-party services

[Contents](#)



Traumatic Brain Injury

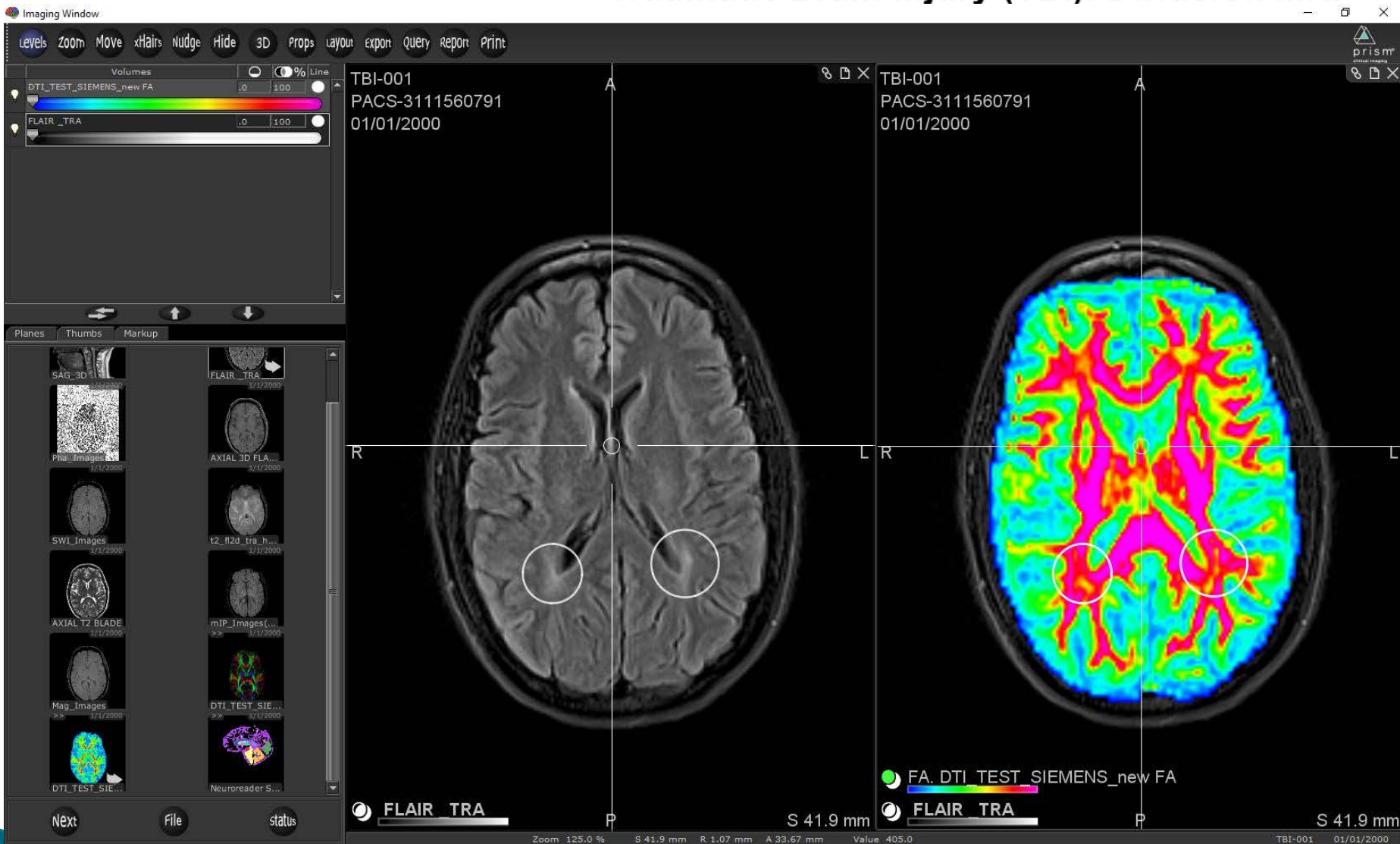
- ▶ 1.7 million TBI annually in US est.¹
- ▶ 52,000 deaths annually in US¹
- ▶ 2 to 4-fold increased risk of dementia after moderate-severe TBI
- ▶ Chronic Traumatic Encephalopathy (CTE): poor concentration and memory, irritability, depression; tendency to suicide
- ▶ US Military World-Wide Incidence²
 - 2015: >25,000; 2000-2015: >344,000

1 - US CDC: http://www.cdc.gov/traumaticbraininjury/pdf/BlueBook_factsheet-a.pdf

2 - DVBIC "DoD Numbers for TBI": http://dvbic.dcoe.mil/files/DoD-TBI-Worldwide-Totals_2015_Q1-Q4_March-30-2016_v1.0_2016-04-14.pdf

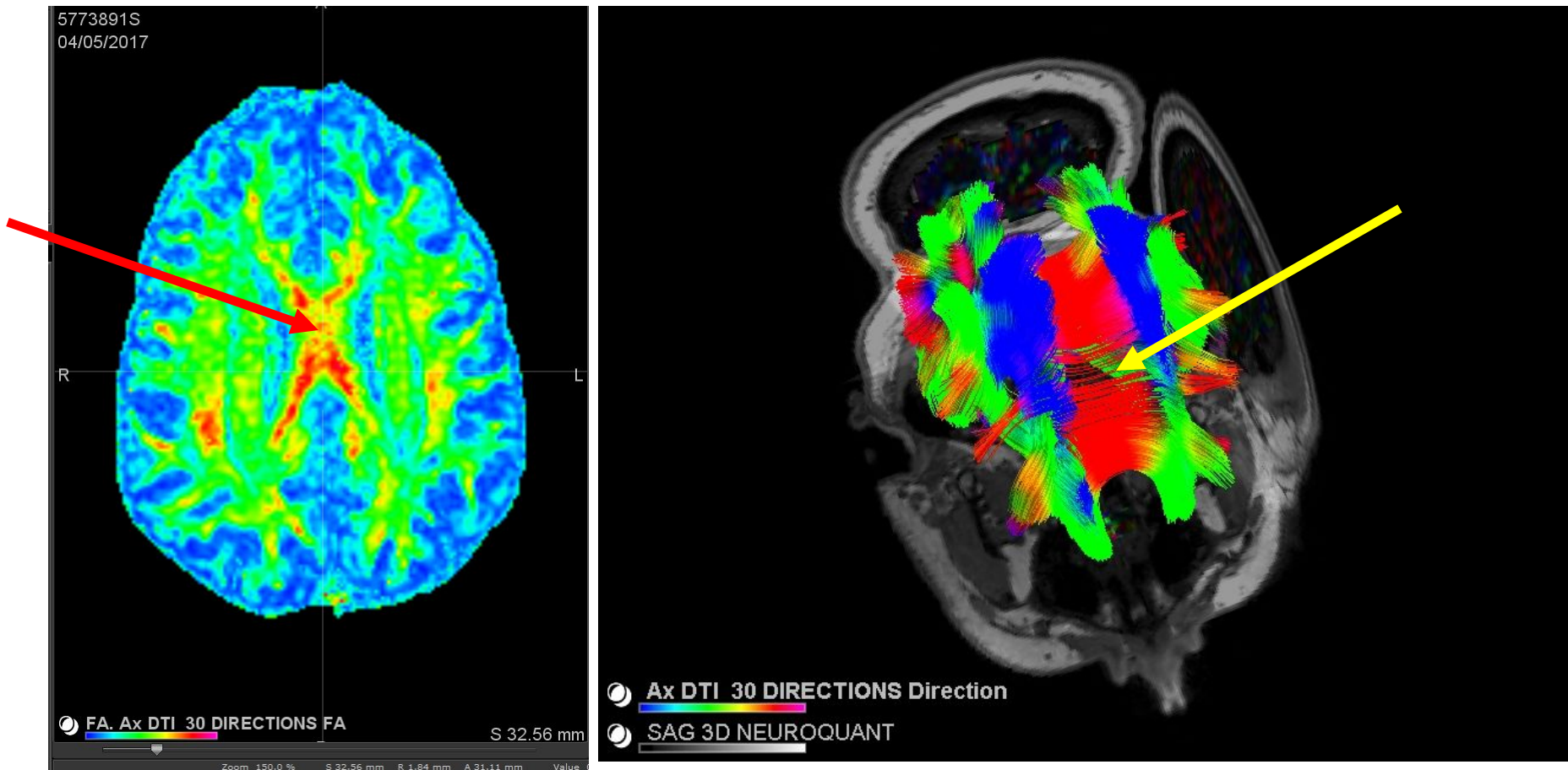
- ▶ Concussion is a risk factor in a variety of popular contact sports including football, soccer, hockey, rugby and the like.
- ▶ Concussions raise the need to assess damage, monitor progression and evaluate cumulative effects of multiple occurrences over time.

Traumatic Brain Injury (TBI): Diffusion MRI



FLAIR hyperintensity with reduced FA

Traumatic Brain Injury (TBI): Diffusion MRI



Damage to white matter of a veteran's brain visible through Diffusion Tensor Imaging (DTI) of FA and tractography in Prism

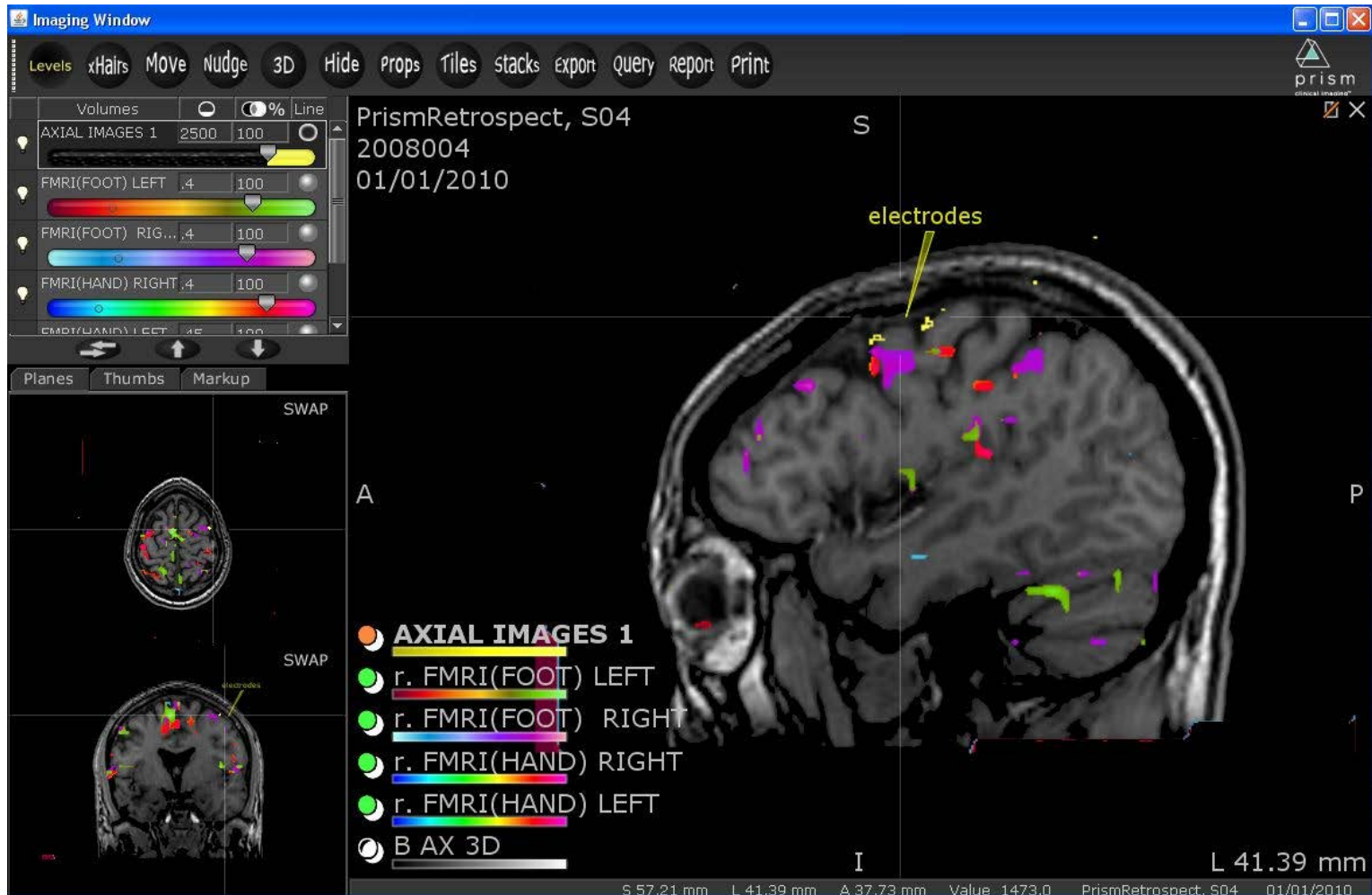
[Contents](#)



Functional Neurosurgery

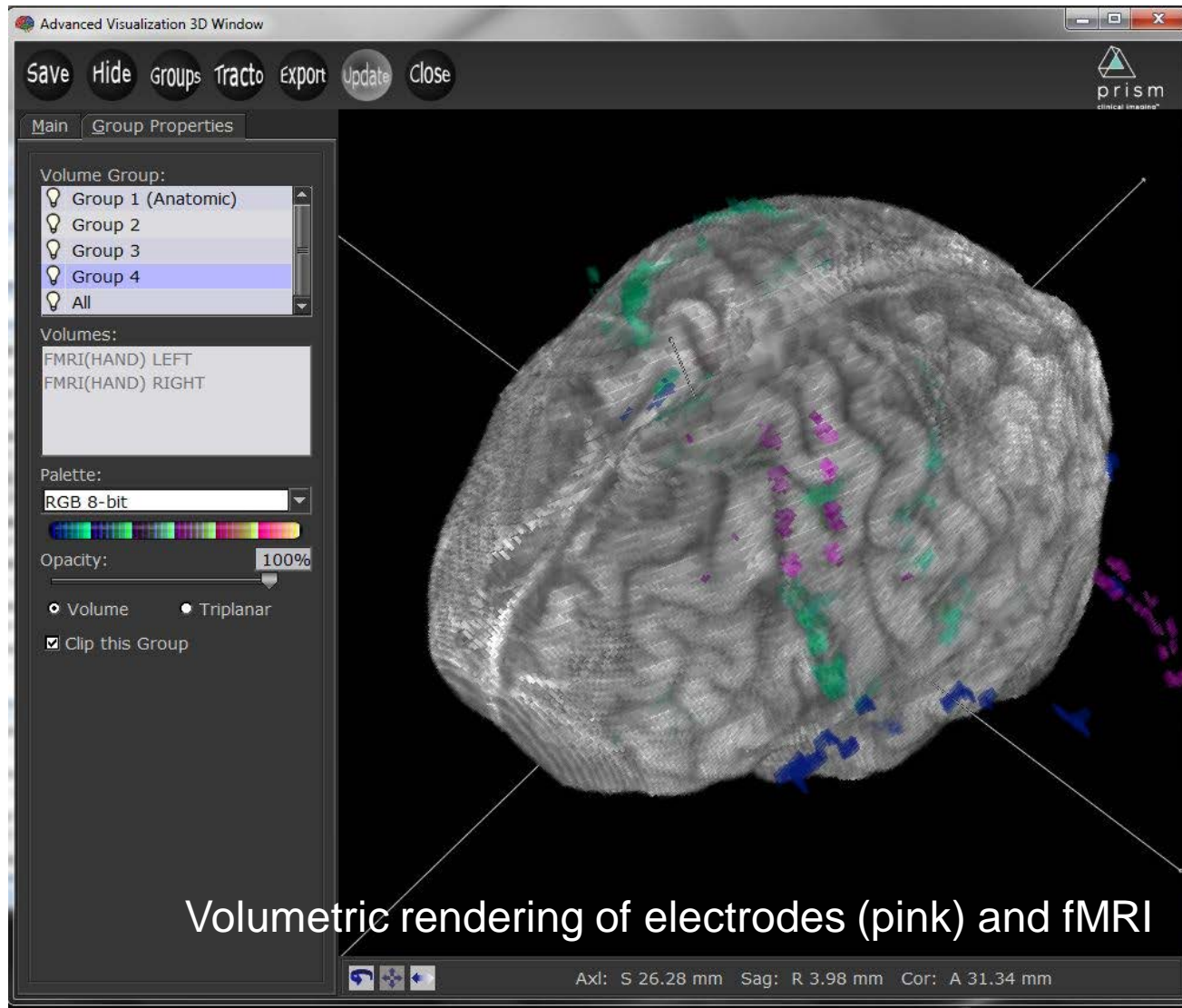
- ▶ Uses: Movement disorders, Epilepsy, Pain Management, and Neuropsychiatric conditions
- ▶ Cortical Stimulation
 - fMRI to identify functional targets
 - MRI-CT registration to evaluate placement
- ▶ Deep Brain Stimulation
 - Use of fMRI, DTI, etc. refine placement

Cortical electrode placement



Pre-surgical fMRI combined with post-surgical CT confirms cortical electrode array placement in Prism

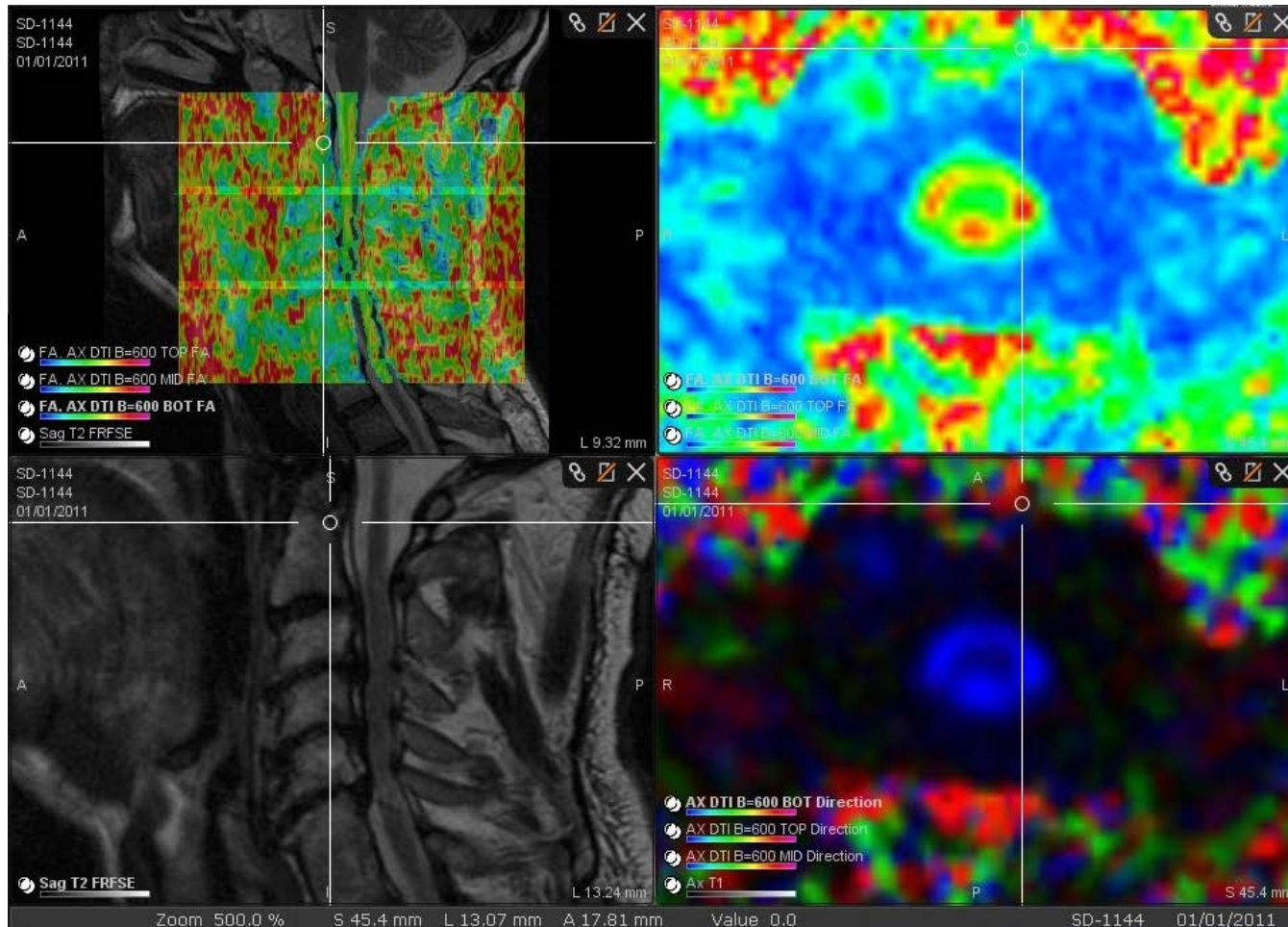
Cortical electrode placement



[Contents](#)

Spinal Imaging

SCI and myelopathy: white matter DTI and diffusion parameters...



... for pre-operative functional assessment

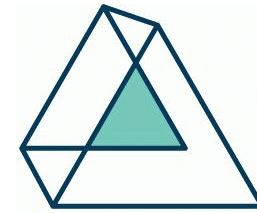
[Contents](#)



www.prismclinical.com

262-754-3840 fax 262-754-3839

contact: advisors@prismclinical.com



prism[®]
Clinical Imaging

890 Elm Grove Rd. Suite 209
Elm Grove, WI 53122 USA

For sale in the United States

Thank you for your attention.

[Contents](#)