varian

Velocity

dr Marcin Litoborski

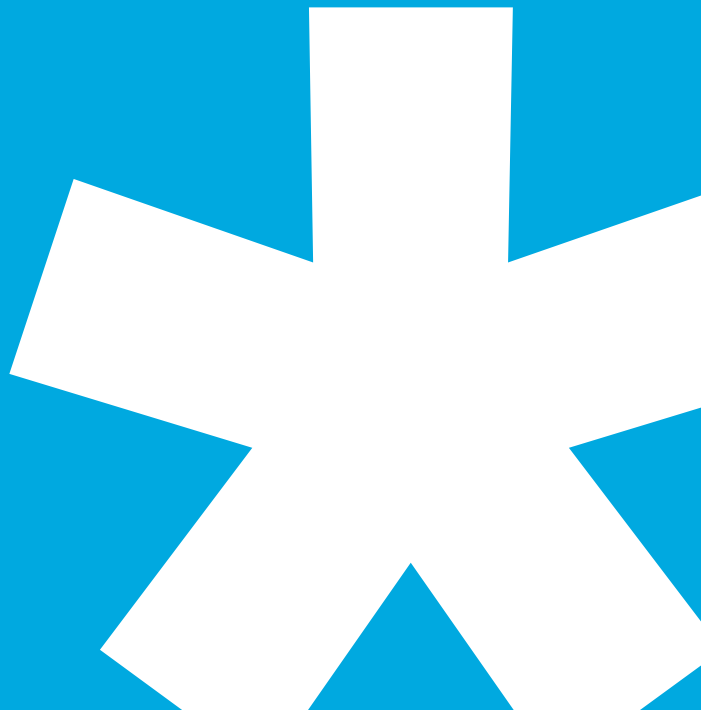
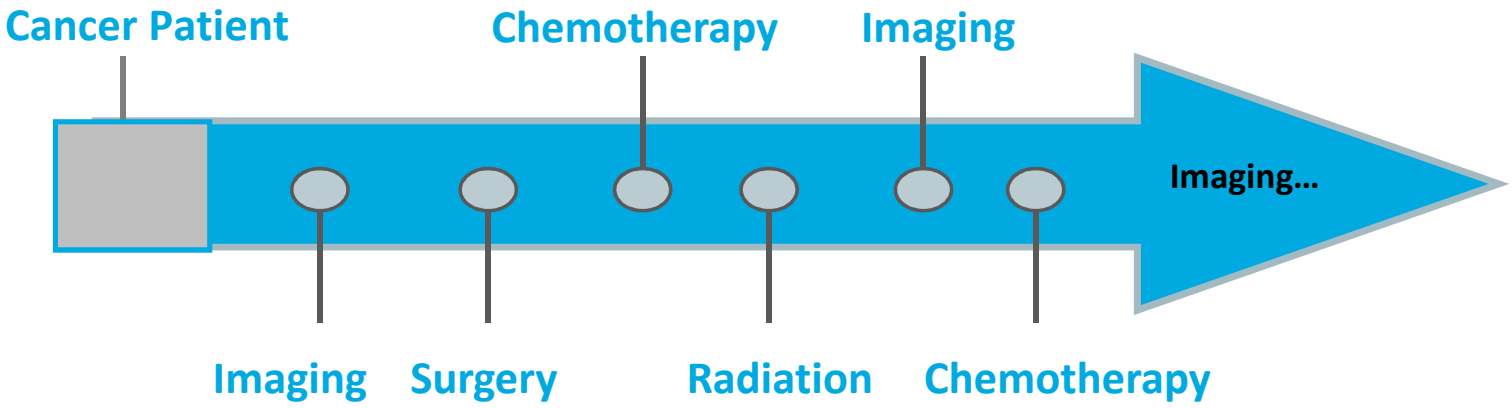
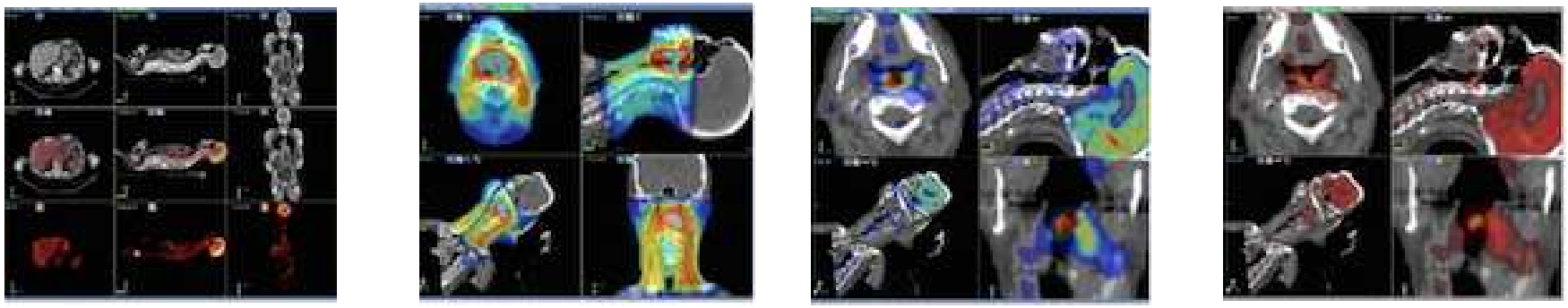


Image Guided Cancer Therapy

A Lifetime of Follow-up Imaging





varian

Velocity: Lesion Tracking & Data Visualization

Image and oncology data warehouse with registration, contouring and analytics

Deform
Deform all Imaging Modalities

Contour
Automatically Draw Anatomy

Track
Map and Model Radiation Dose

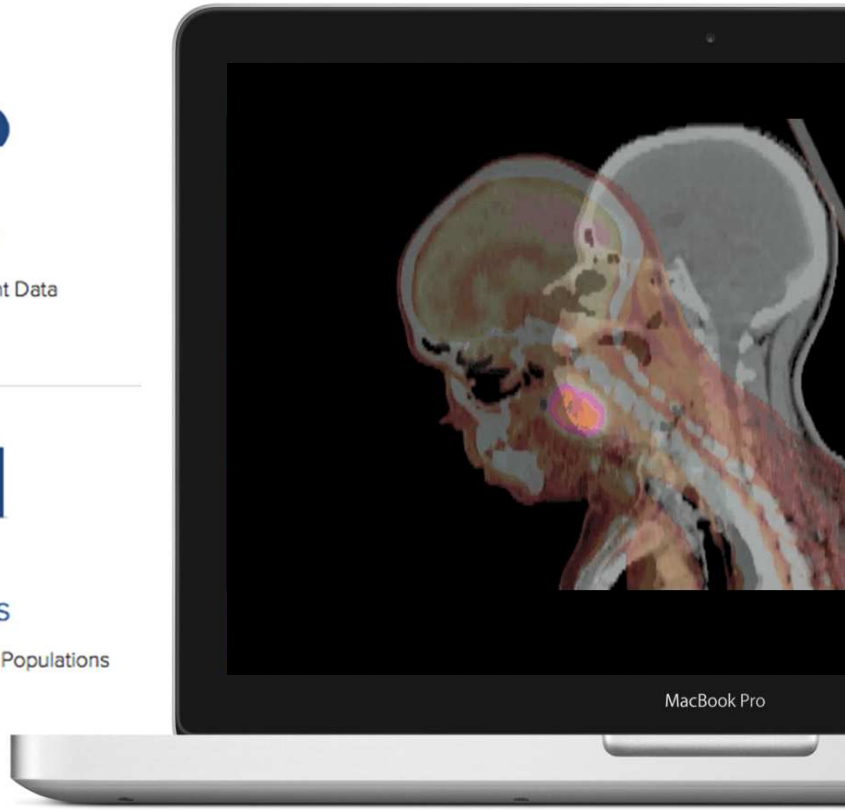
Store
Store All Patient Data

Share
Share Data in the Cloud

Review
Review Treatment Plans Quickly

Workflow
Designed for Care Teams

Assess
Assess Patients and Populations



varian

Our Mission

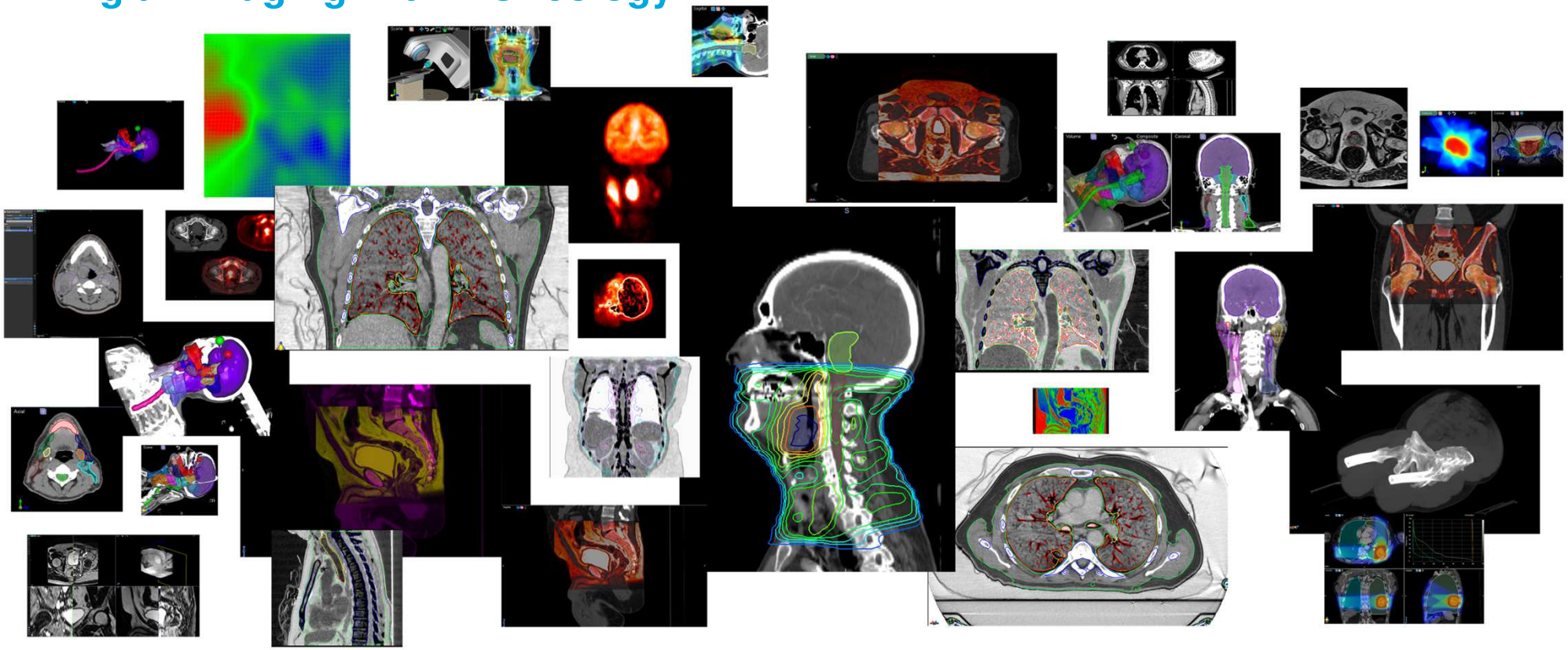
Velocity powers Oncology Care Teams by transforming unconnected data into clinical knowledge

Velocity

varian

Velocity as a Central Repository

Linking all imaging within Oncology



Our goal is to enable quantitative imaging research and treatment response assessment

varian

Deformable Image Registration

varian

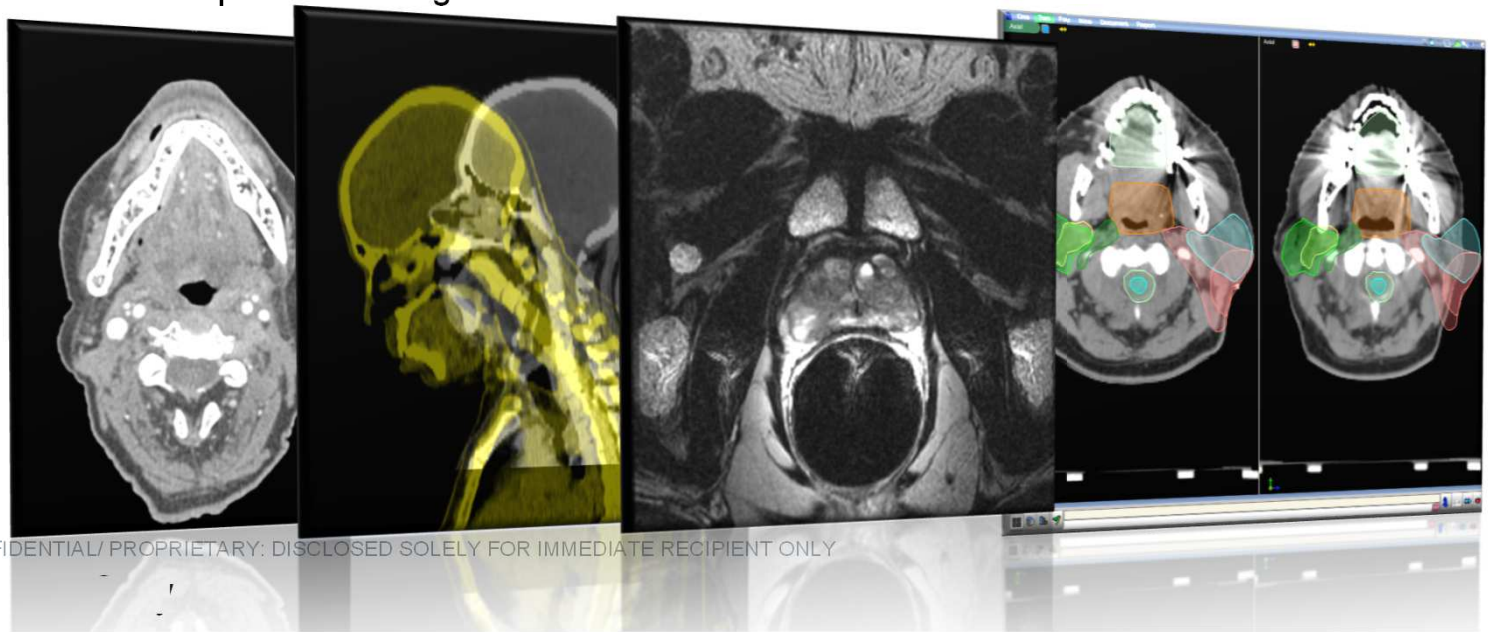
Automatically draw Anatomy

PET Wand

varian

Velocity Clinical Uses

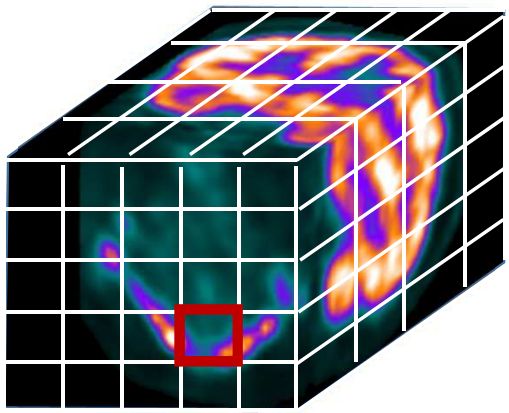
- Do you receive Diagnostic CTs acquired with Contrast?
- Do you receive PET-CT images acquired in non-treatment planning positions?
- Do you receive MRI images acquired in non-treatment planning positions?
- Do you re-simulate or re-plan your patients during the course of treatment?
- Do you treat patients who have had previous radiation therapy treatment?
- What about Adaptive Planning?

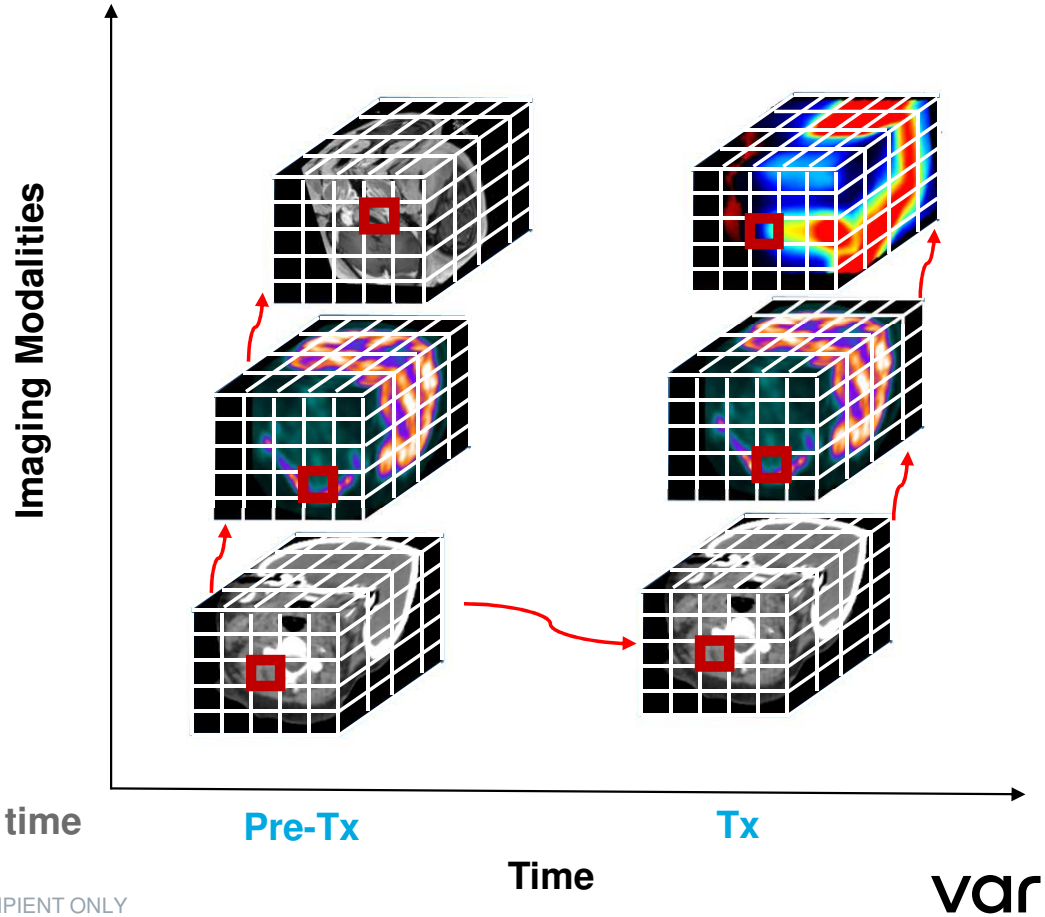


varian

Voxel Data Processing: Unstructured to Structured

Velocity Core Engine for Longitudinal Cancer Imaging





1. Images are voxels

2. Align voxels across modalities and time

varian

Evolution of Velocity Image Registration

Multi-modality Rigid	2007
Mono-modality Demons & Multi-Modality B-Spline	2008
Multi-Resolution B-Spline	2009
MR Image Filtering/Inverse DIR	2011
Structure-Guided B-Spline	2013
CBCT Image Filtering	2014

Time

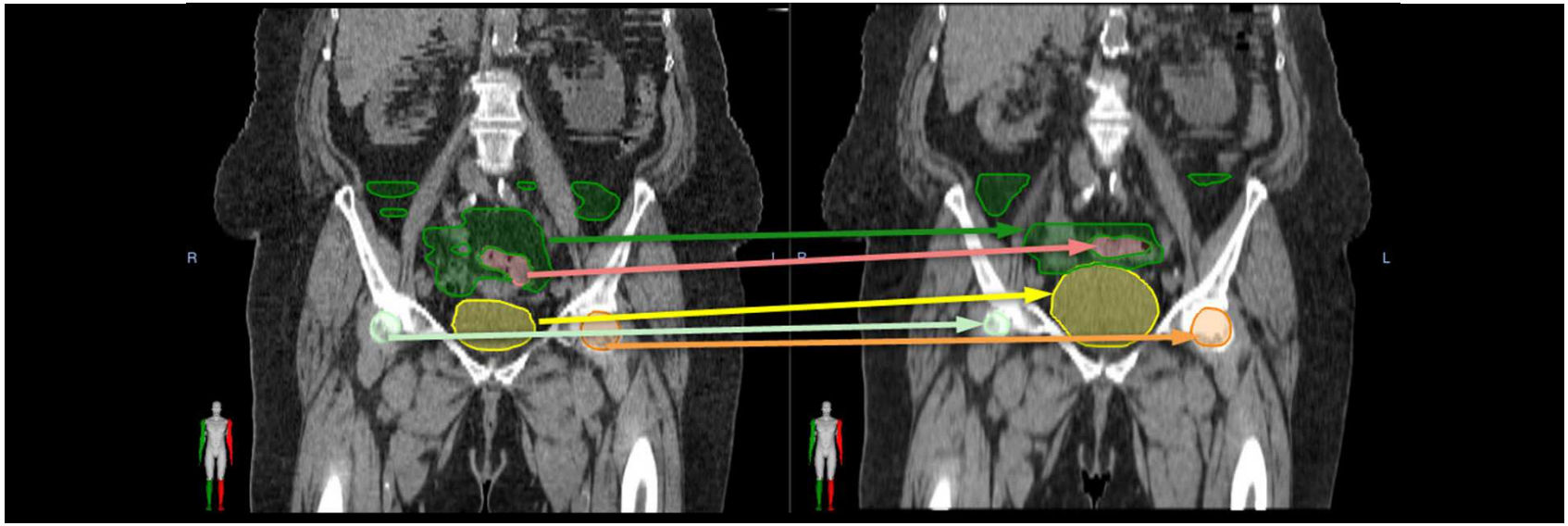
varian

Velocity: Structure-Guided DIR (SGD)

- Our hybrid deformable using anatomical structures to guide the deformable solution
- Models extreme differences in local anatomy due to a uniform expansion/contraction of tissue

Examples are:

- empty/full bladder between scans
- surgically removed tissue
- added physical objects such as immobilization devices, boluses, HDR applicators

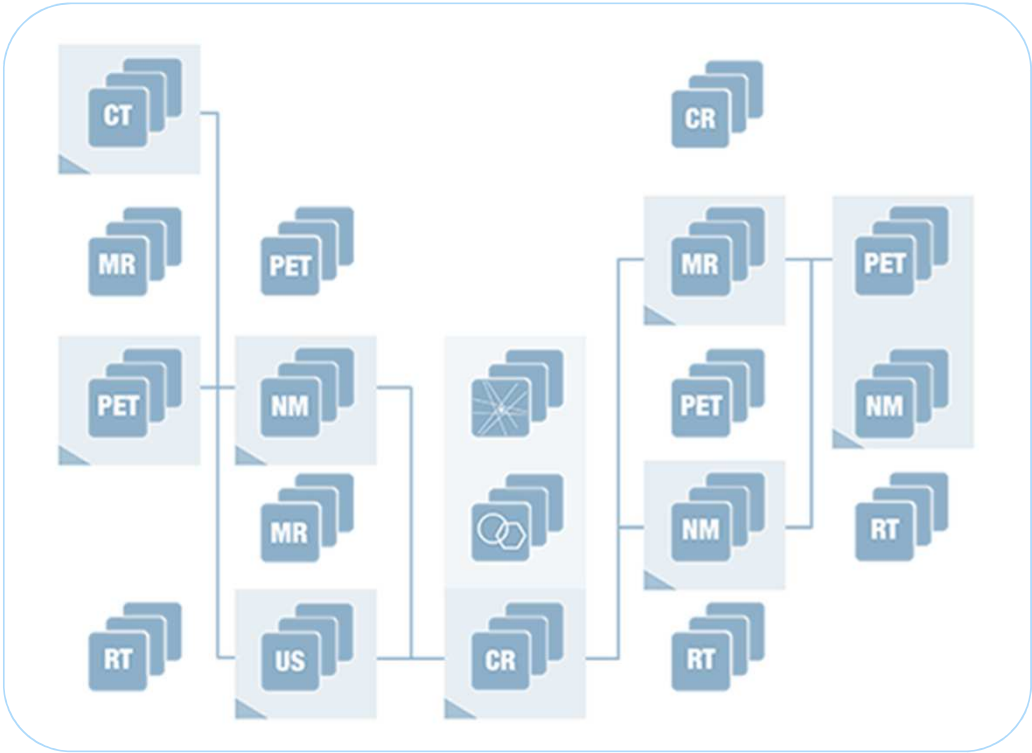


varian

Longitudinal Patient Maps

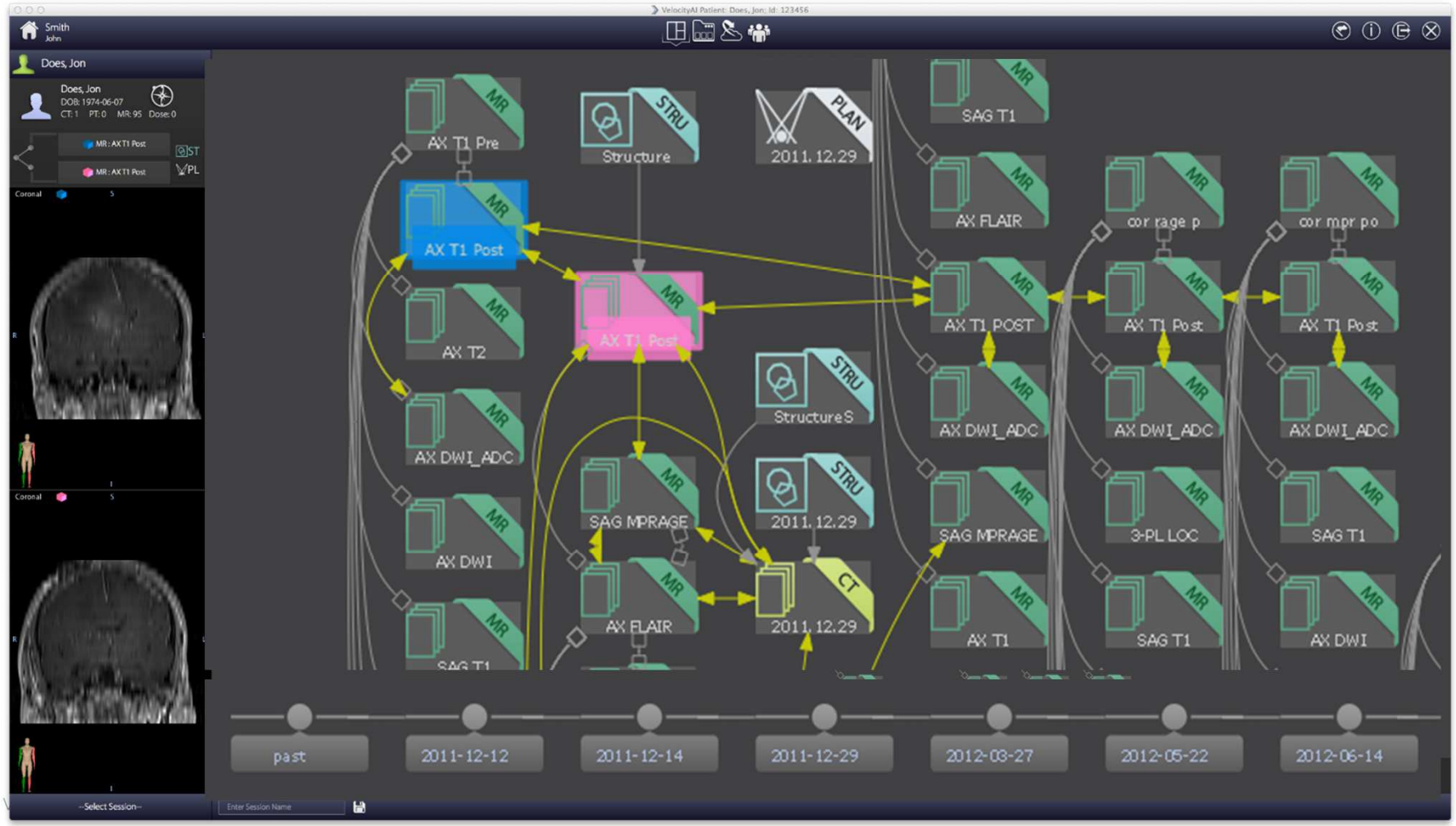
Multidisciplinary teams see the patient's imaging and treatment history

- Map unstructured imaging and treatment data across multiple time points.
- Unified data storage system for efficient care team collaboration
- Shared decision making to extend the care team beyond the hospital



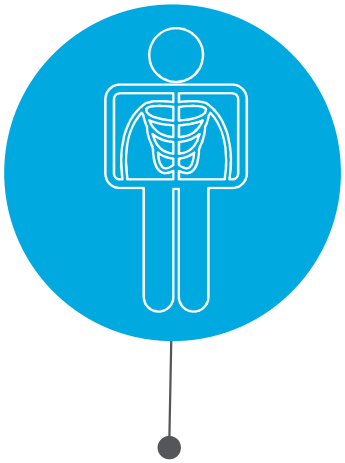
varian

Longitudinal Patient Maps



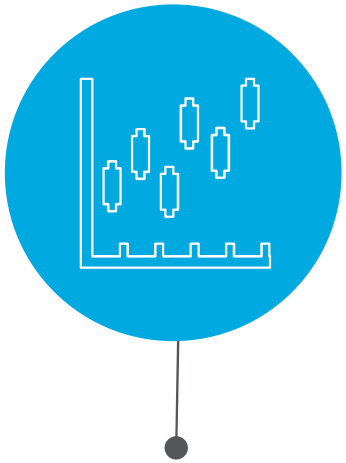
varian

VELOCITY HELPS YOU SEE THE PATIENT STORY



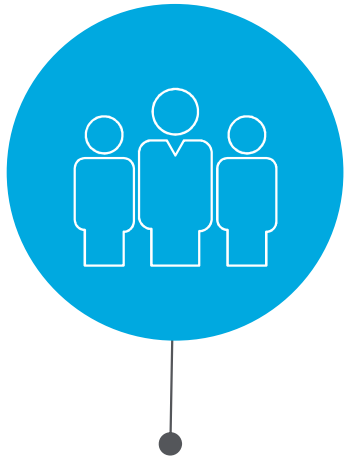
Measure

Measure every time point



Track

Track change over time



Share

Shared decision making

varian

Velocity - Roadmap

Customers performing SRS/SBRT need Velocity

- Adaptive & Multiple Tx
- Tracking change
- Deformable Image Reg
- Collaboration

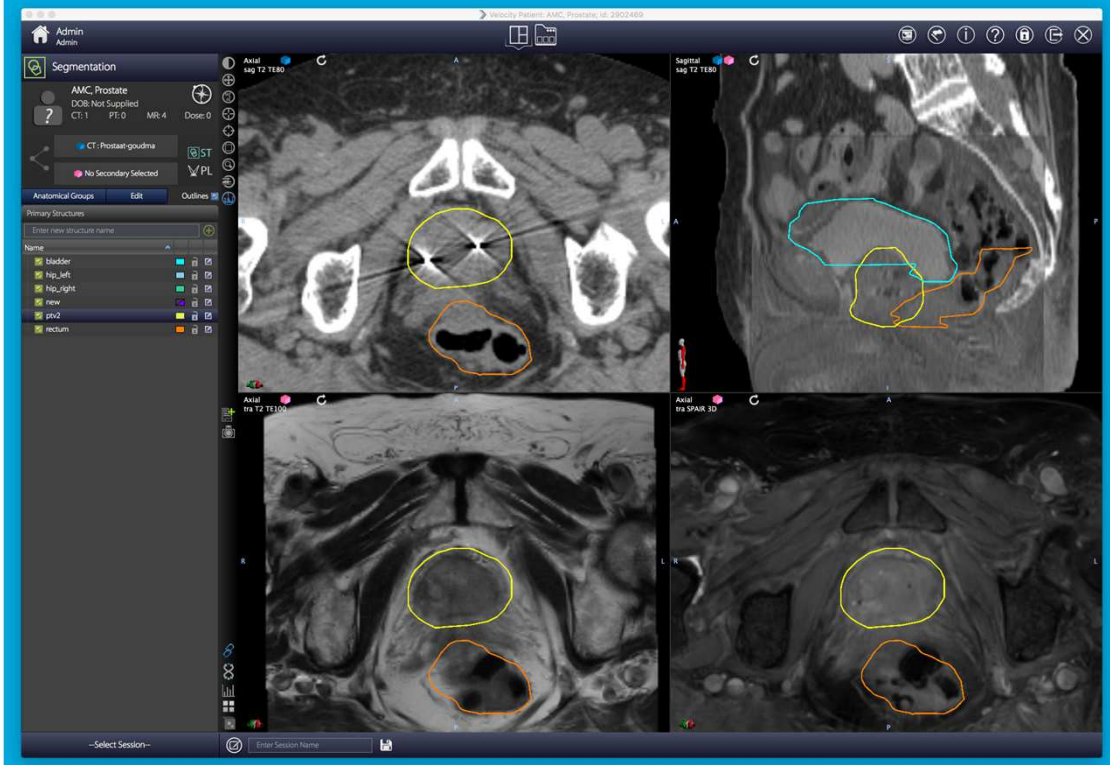
- SRS/SBRT
- Track and Verify
- M^3i – Cine/Multiview
- ARIA Sync
- Adaptive/Automation
- Microsphere
- Research Toolbox (API)

varian

M3i

Multi Modality Motion Imaging

- What it is:
  - The ability to view **multiple fused images on one screen** that are registered to a primary volume
  - Side-by-side contouring on all image series
- Competition that has this feature:
  - BrainLab
  - PACS Viewers

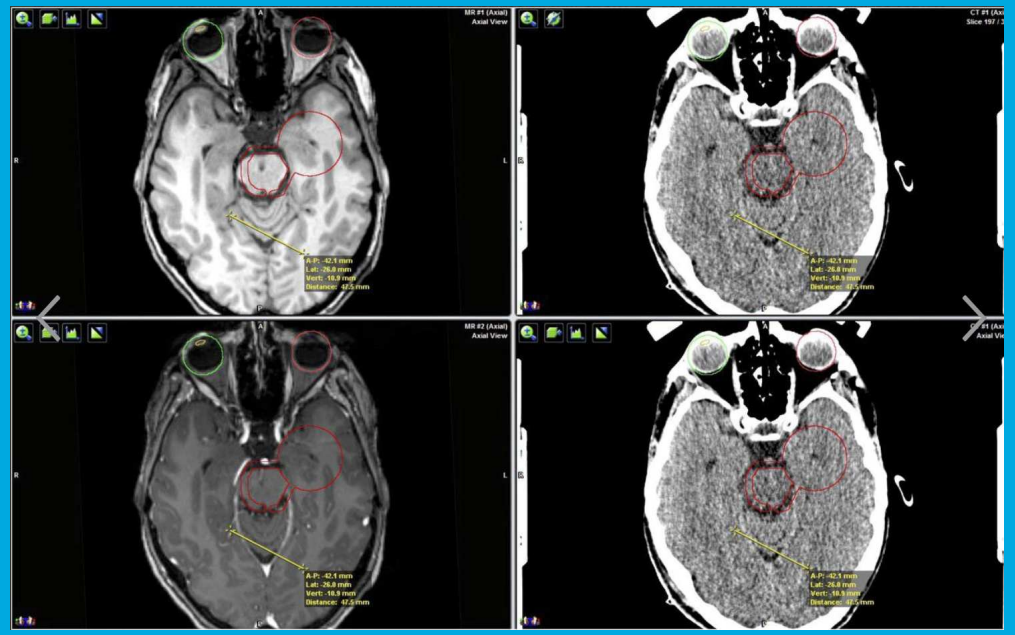


varian

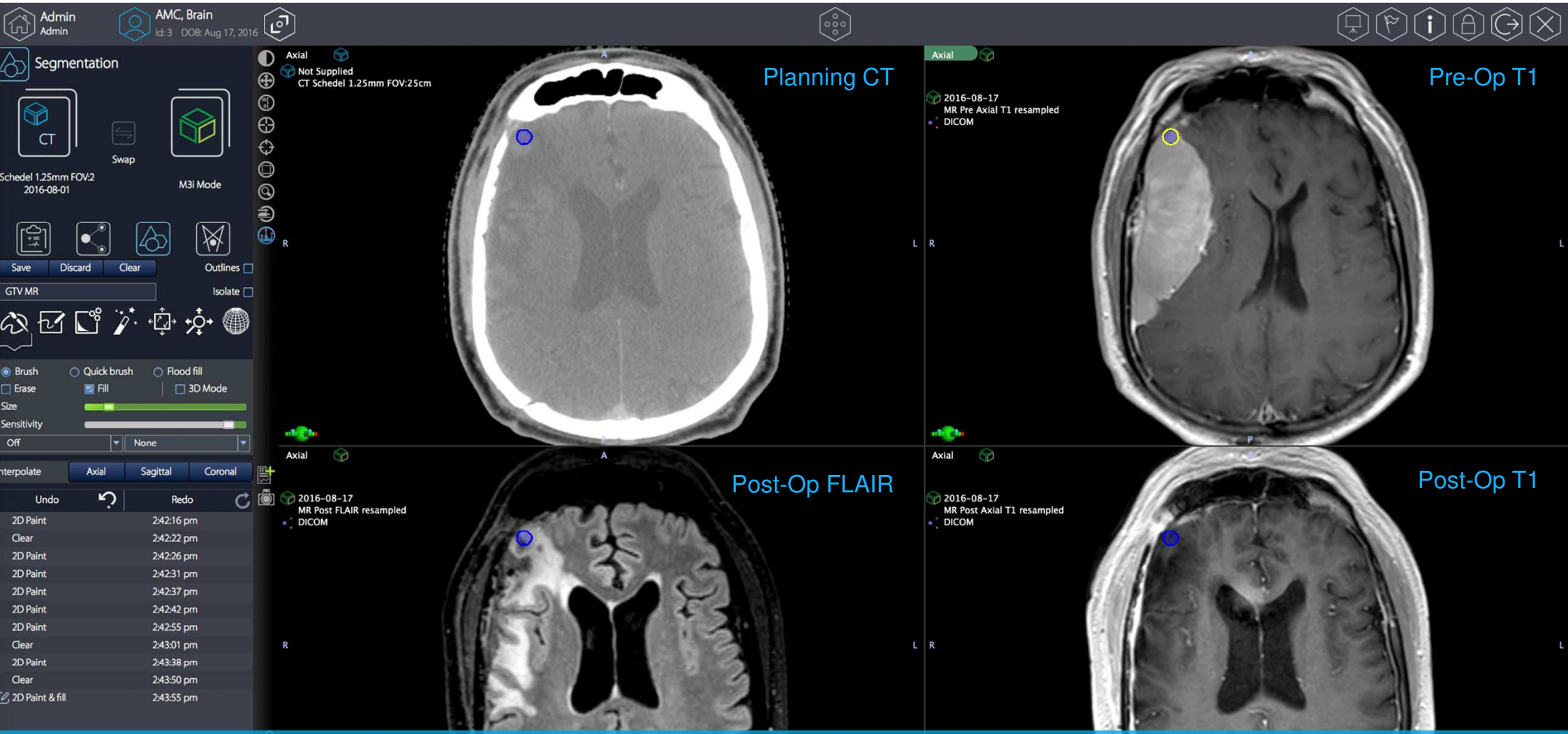
M3i

Use Case

- Need:
  - Oncologist needs to draw the GTV for a brain tumor patient receiving radiosurgery using CT and MR images from different timepoints.
- Use Case:
  - Oncologist loads the primary planning CT image and loads three secondary diagnostic MR image series:
    - Pre-Op T1 post-contrast
    - Post-Op T1 post-contrast
    - Post-Op FLAIR
  - All volume information can be utilized to contour the lesion on the primary planning CT in real time

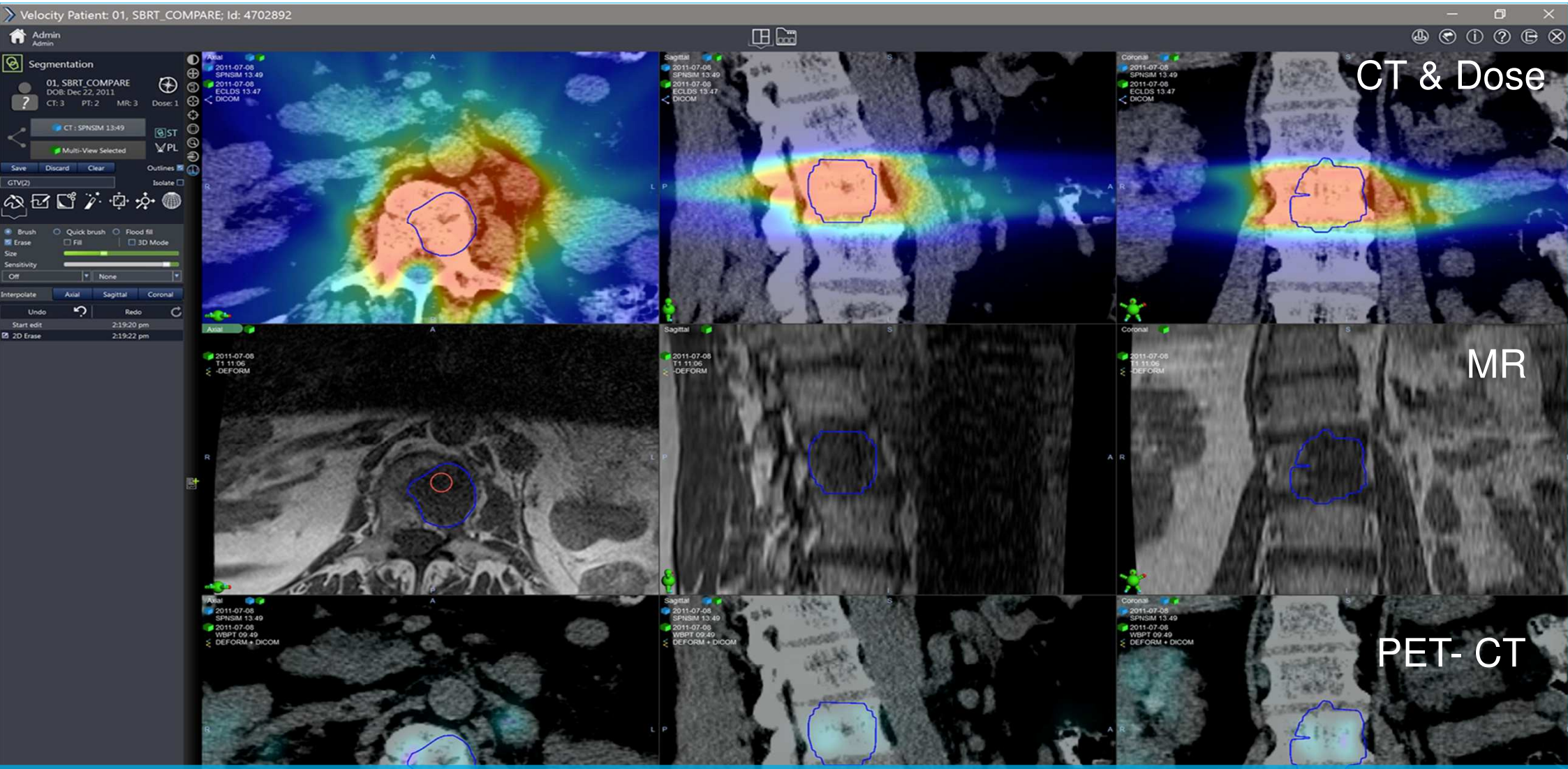


varian



"Adding multi-image viewing capability to Velocity would be great. Our scenario would have the treatment planning CT as the primary set and then secondary's might include the post-op T1 post-contrast and FLAIR image sets as well as the pre-op T1 post-contrast image set."

– Hui-Kuo Shu, MD, PhD, Emory University



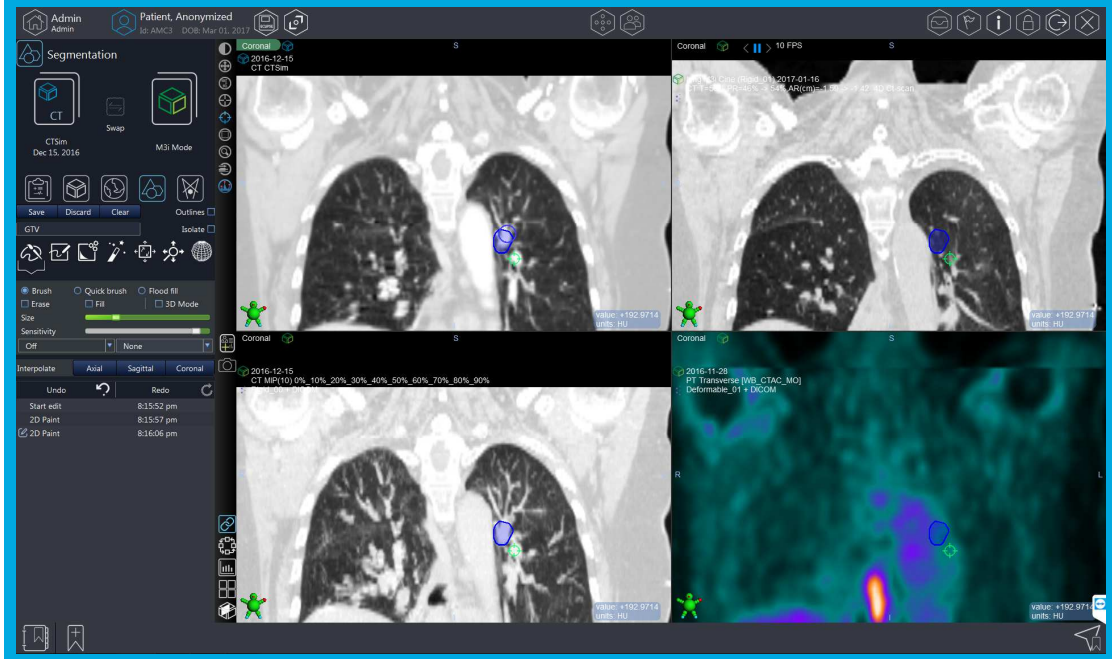
"We are able to register entire MR imaging studies for prostate, brain, and cervix to planning CT images for tumor delineation and adaptive therapy decision making."

– Zdenko van Kesteren, Ph.D., Academic Medical Centre (AMC), The Netherlands

M³i Cine

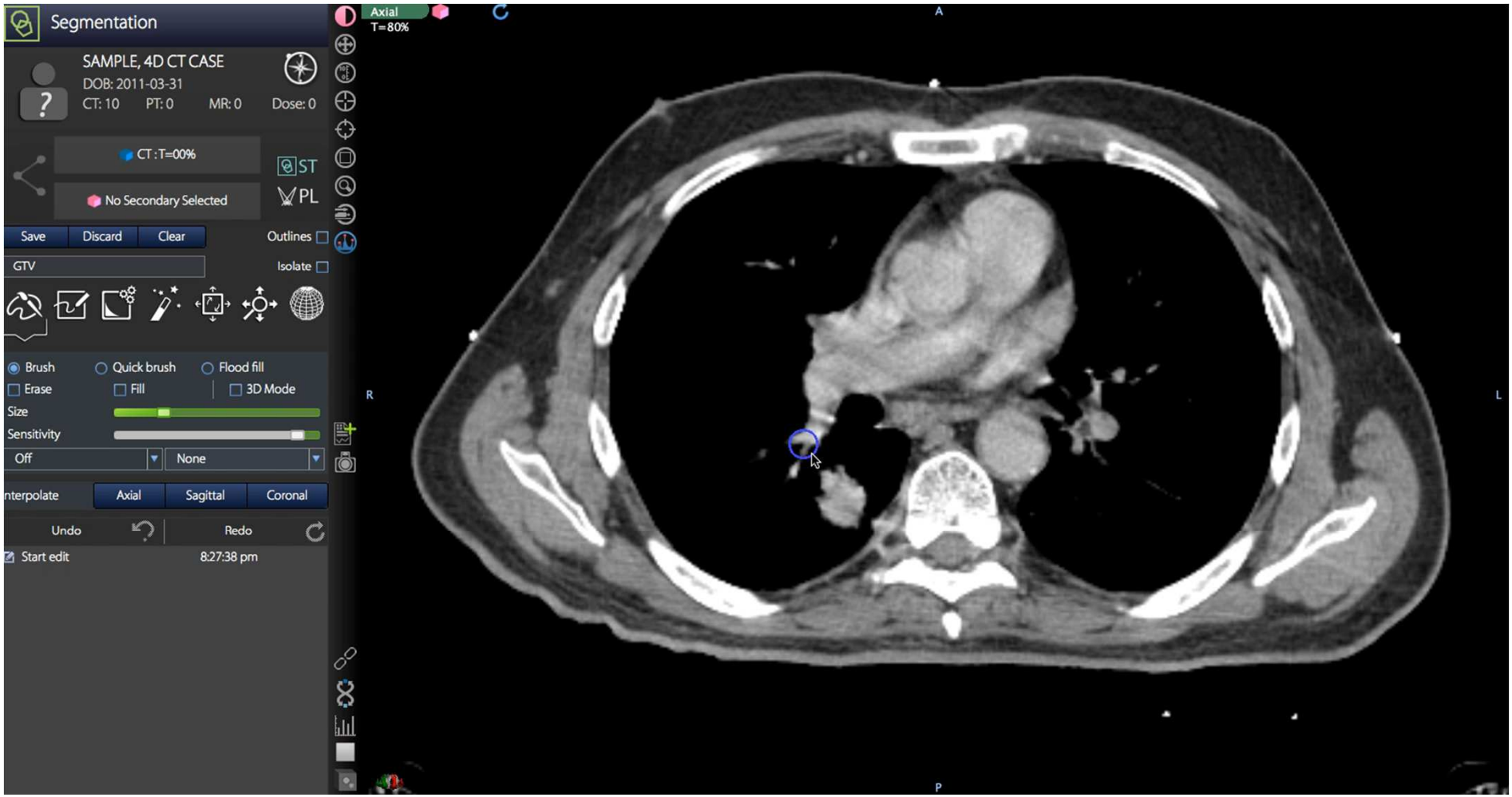
4-D Cine

- What it is:
  - A “movie” that plays through the phases of a 4DCT
  - Primarily used with lung cases to show motion during the breathing cycle
  - We can contour on the moving images to include the whole region of the ITV
- Reimbursement Code:
  - **CPT® 77293: Respiratory Motion Management Simulation**
    - ***“the radiation oncologist reviews the “cine” (movie-like) playback sequence of image sets in three planes (axial, coronal, sagittal) to verify that the sets faithfully represent the smooth and continuous tumor motion throughout the breathing cycles without unacceptable artifact”***
- Competition that has this feature:
  - MIM

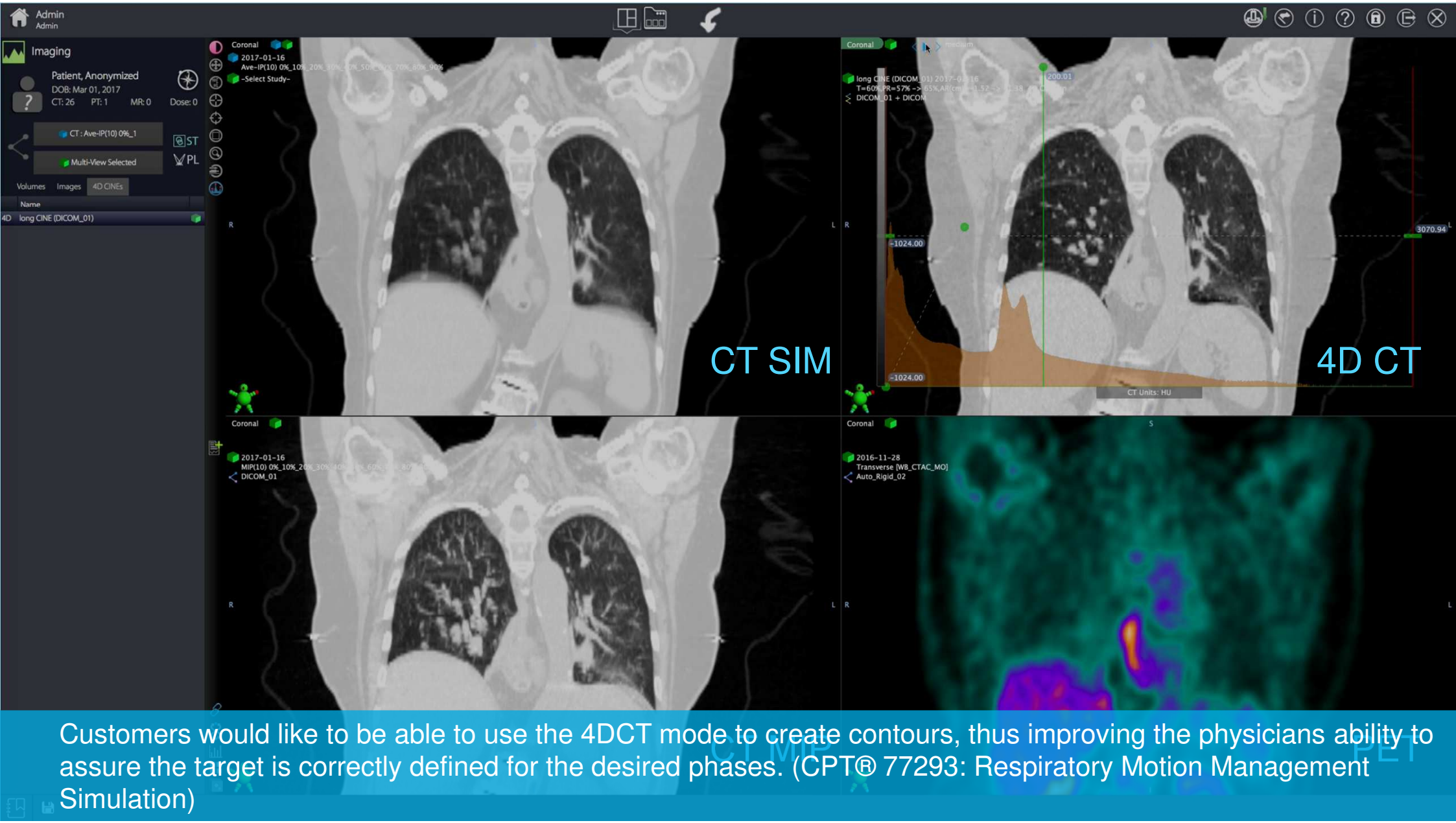


varian

M³i Cine



varian



Customers would like to be able to use the 4DCT mode to create contours, thus improving the physicians ability to assure the target is correctly defined for the desired phases. (CPT® 77293: Respiratory Motion Management Simulation)

Velocity Track & Verify

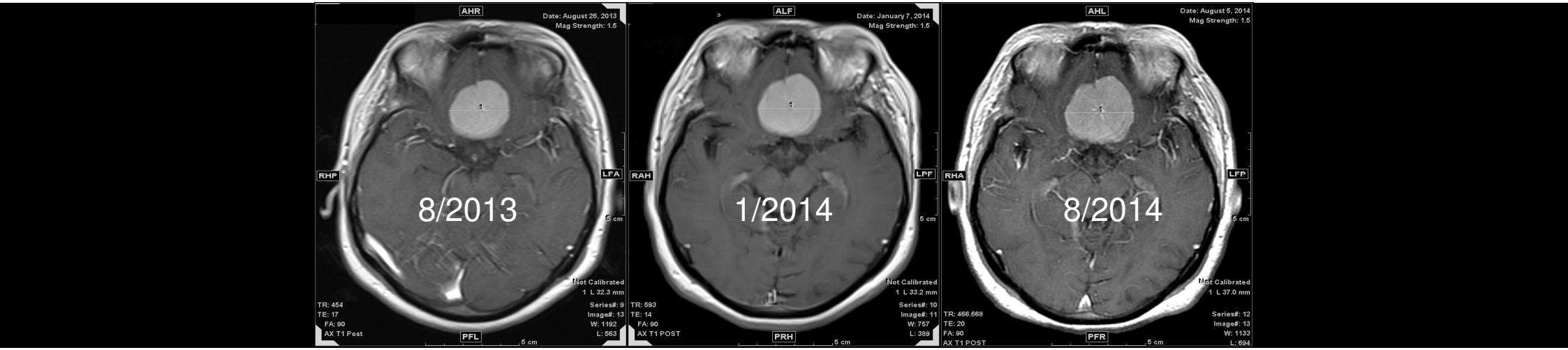
Managing metastatic disease and tracking volumetric tumor change for response assessment.

Why it matters?

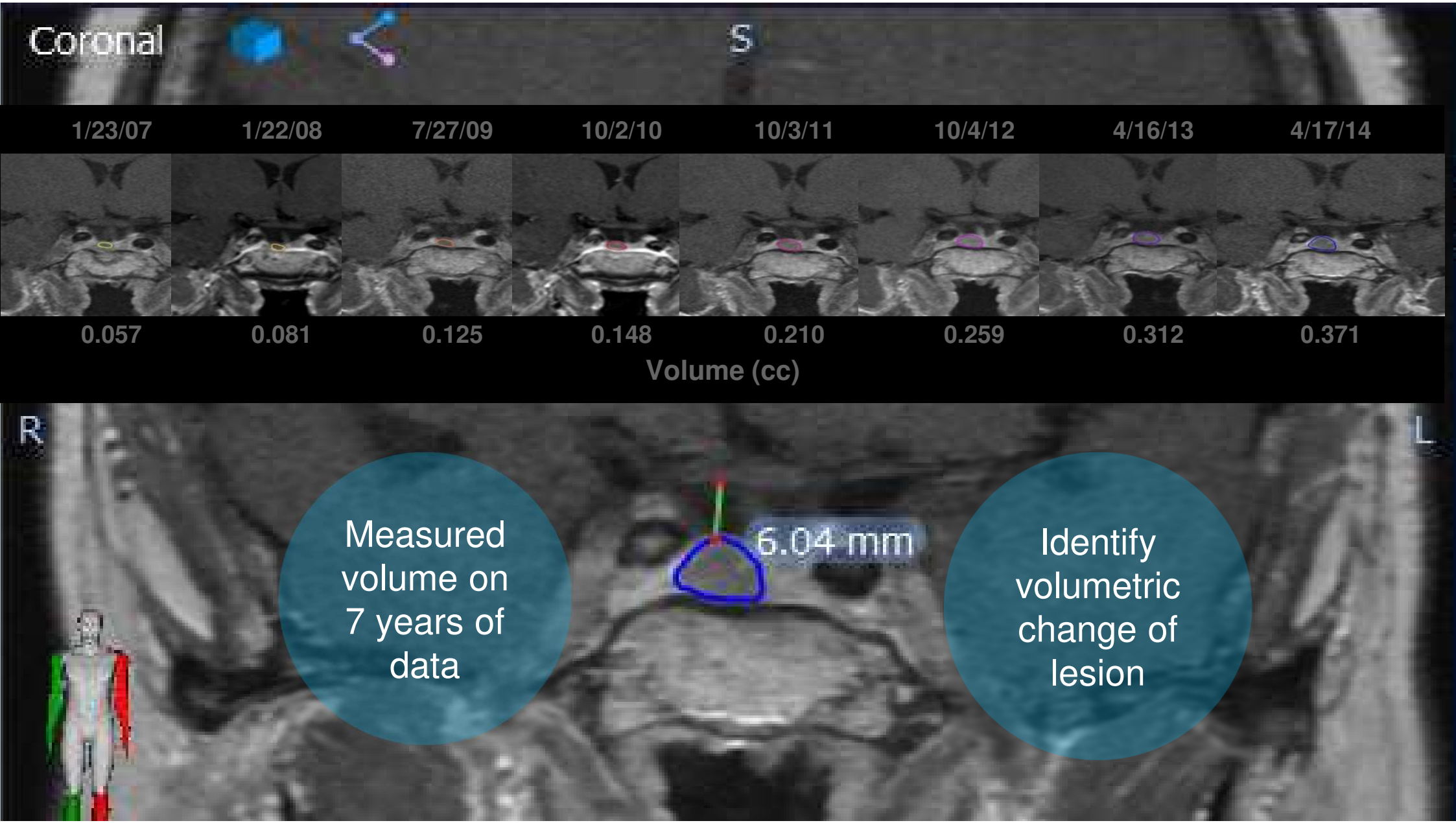
- "If you give me volume reductions between scans, that would make my life easier" – Dee Khuntia, MD.
- "Just hit tag." Five seconds of work for a lifetime of data.
- Today, the solution is using PACS and Excel. Oncologist want to track tumor growth over time.

IS PACS GOOD ENOUGH?

- Radiographically diagnosed meningioma followed serially by neurosurgeon
- *Question:* Has the lesion changed and what rate is it changing?



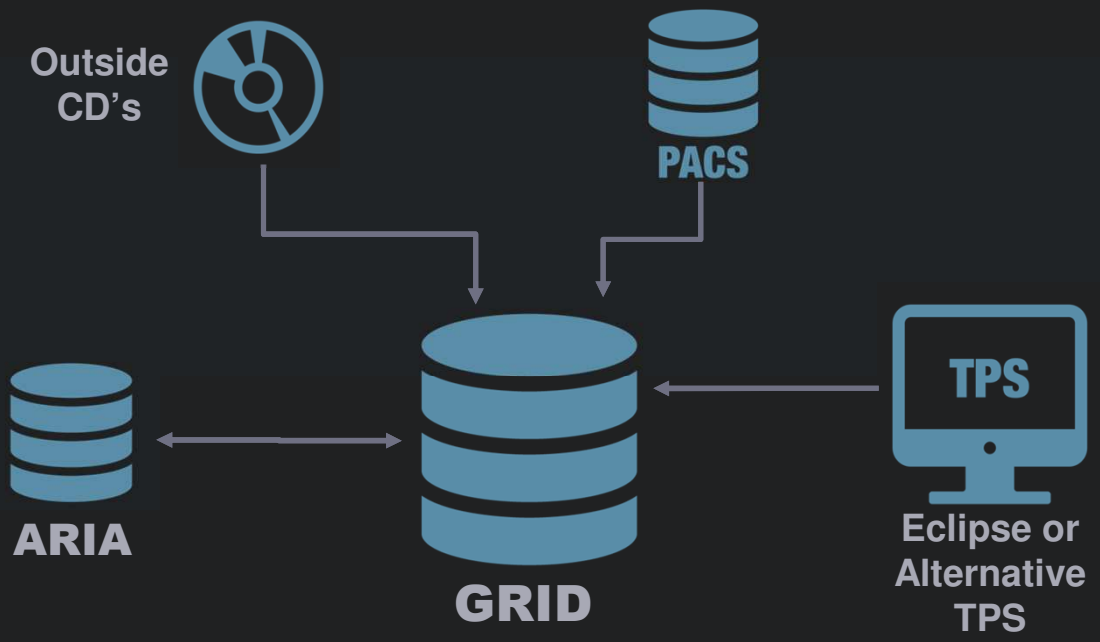
varian


Coronal
S
1/23/07
1/22/08
7/27/09
10/2/10
10/3/11
10/4/12
4/16/13
4/17/14
0.057
0.081
0.125
0.148
0.210
0.259
0.312
0.371
Volume (cc)
R
L
6.04 mm
Measured volume on 7 years of data
Identify volumetric change of lesion

ARIA/Eclipse Sync & Save

DICOM Automation

1. ARIA Sync – automatically pull data from ARIA, streaming throughout the day
2. ARIA Save– always visible one-click button to push data directly into ARIA, no import necessary
3. SmartQuery– background service to fetch scans without clinicians intervention, based on triggers



ARIA/Eclipse Sync & Save

Velocity and ARIA/Eclipse now sync, eliminating manual data transfer. Velocity adds a save button that functions identically to save within ARIA/Eclipse, saving onscreen data directly into the ARIA DB.

Why it matters?

- Varian integration of data is #1 selling point for all software solutions.
- Workflow with ARIA Sync/Save will eliminate repetitive work done in each of the systems due to automation.
- Better than the competition because we own the whole chain – from planning to delivery and online imaging.

Concept or work-in-progress – not available for sale and no guarantee of commercialization or features availability

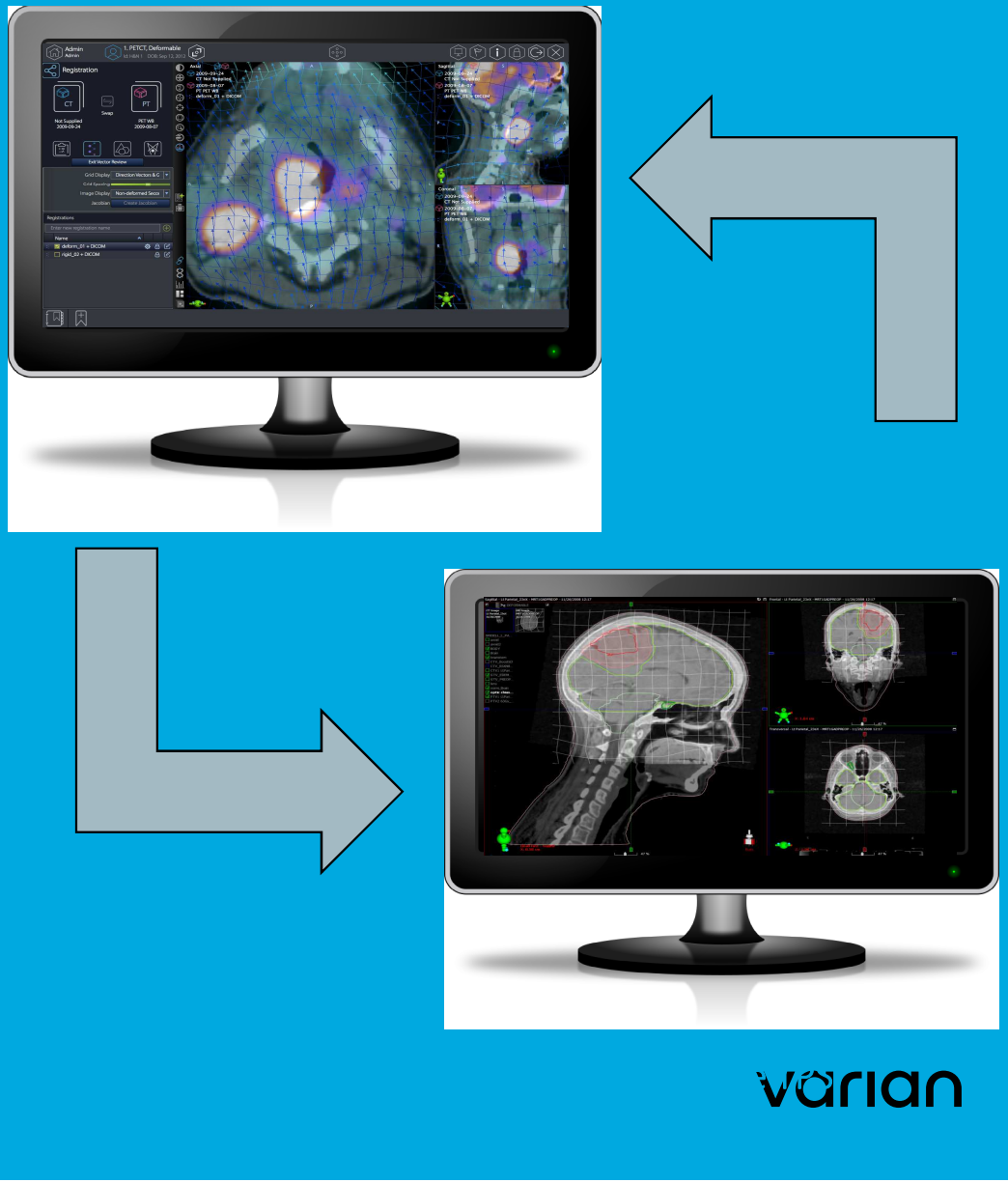
varian

DICOM Automation

varian

ARIA/Eclipse Sync & Save

- What it is:
  - Integration of data between Velocity and Eclipse/ARIA
  - Synchronizes approved plans and structures after approval
  - One click button to save Velocity work to Eclipse/ARIA
- Benefits:
  - Save time pushing/pulling data between Velocity & Eclipse/ARIA
  - Integrated ecosystem of Varian software
  - Velocity can become a “Trojan horse” to take out competitive TPS



Smart Query

Uses **machine intelligence** to automate fetching imaging **before** users even know they need it. Set up triggers and fetch, or tag patients to watch for new imaging.

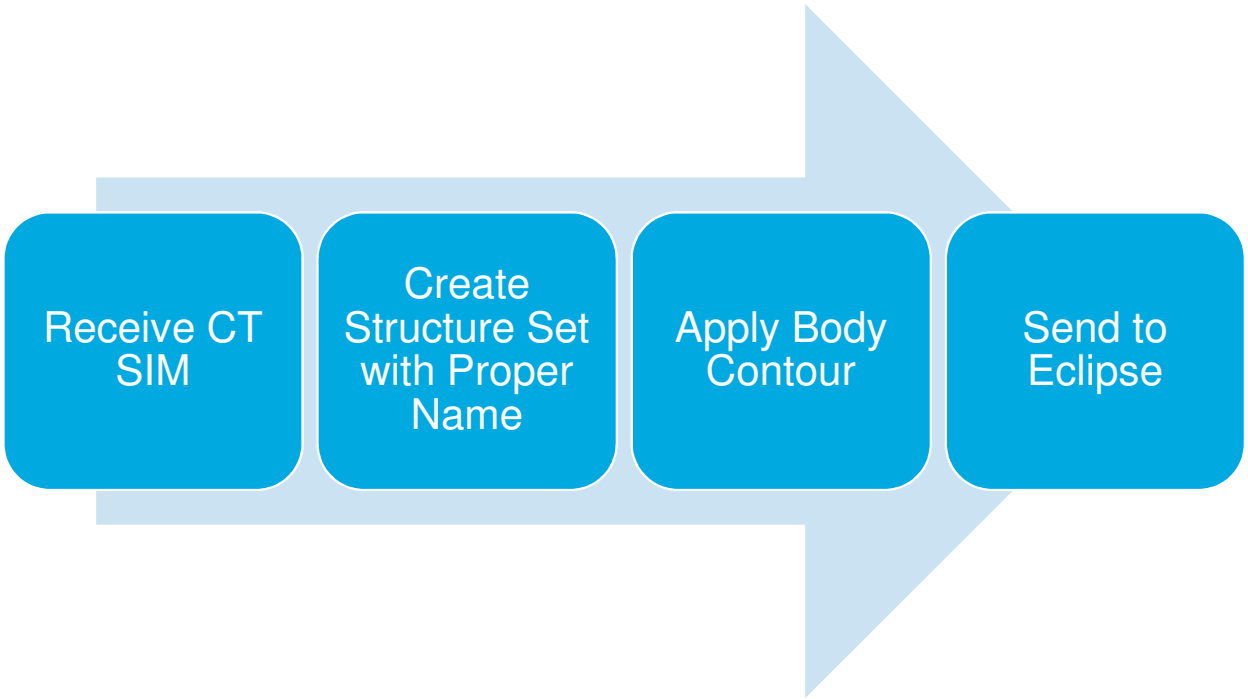
Why it matters?

- MIM has “The Assistant” workflows, but ours will be more configurable and streamlined.
- Raysearch has no DICOM automation. This is tedious manual work.

Concept or work-in-progress – not available for sale and no guarantee of commercialization or features availability

varian

Combining Behaviors- “Golden Path”



We want to enable combining workflows so simple tasks like “create structure set, create body contour, and push” can be automatically completed everytime without any user input after initial configuration

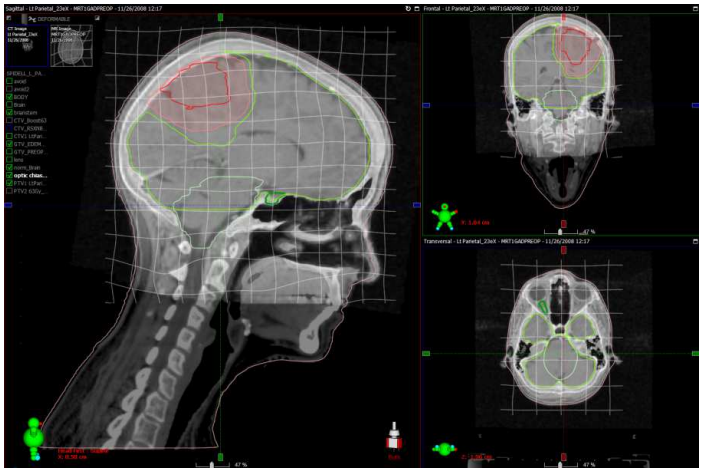
varian

Adaptive Planning Today

- Subjective Process
- Decision is made on the basis of KV portal and Cone Beam CT (CBCT) images
- Based on visual inspection
- Often based on dose calculated on CBCT

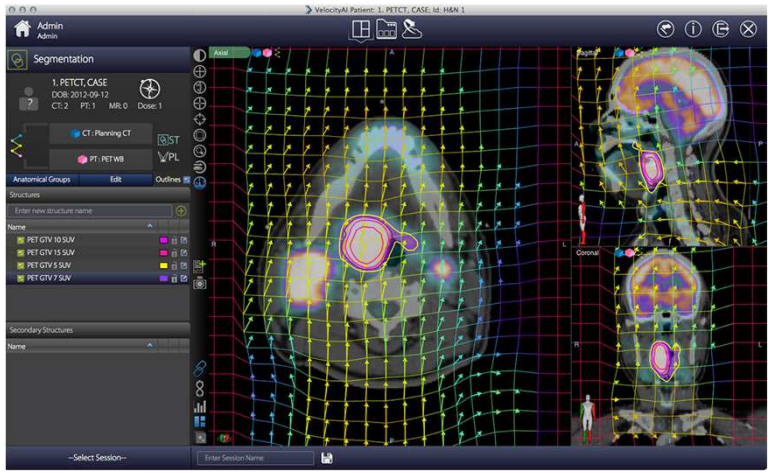
Dose Tracking Assessment

- Adaptive Therapy
  - Requires Eclipse and Velocity



Eclipse TPS

Dose Calculation



Velocity

Deformable Dose Mapping and Volume Creation

varian

Dose Tracking Assessment

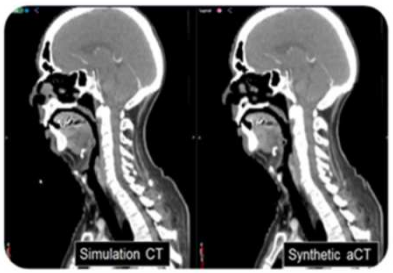
Adaptive RT Workflow

CT Simulation

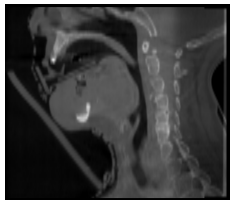
Planning

Delivery

CT Sim



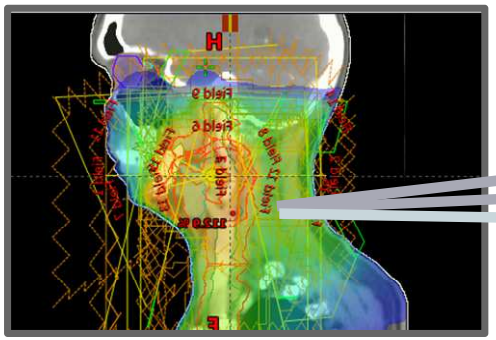
Adaptive Synthetic CT



CBCT

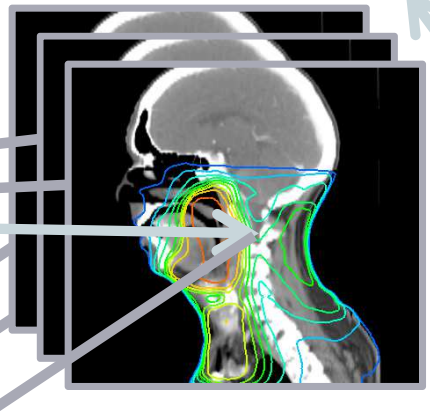
varian

Adaptive Dose Tracking Workflow



CTSim with planning dose

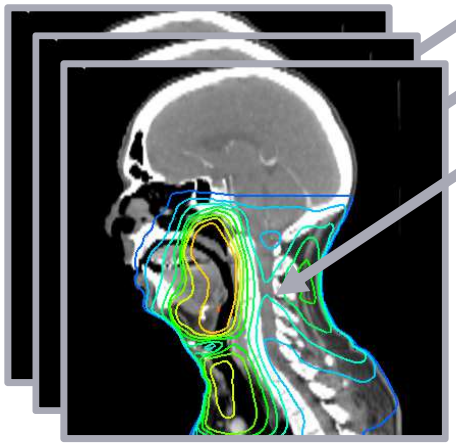
Create synthetic aCT with tx shifts



Fractions

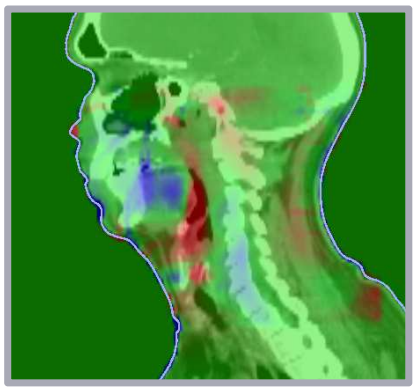
Synthetic aCT with daily dose

Deformable registration



Synthetic aCT doses deformed to CTSim

Σ



Accumulated doses on CTSim

varian

Our Adaptive Software Solution

Automated workflows for deformable dose mapping, dose calculation and dose accumulation for adaptive radiation therapy.

Velocity ARIA Sync

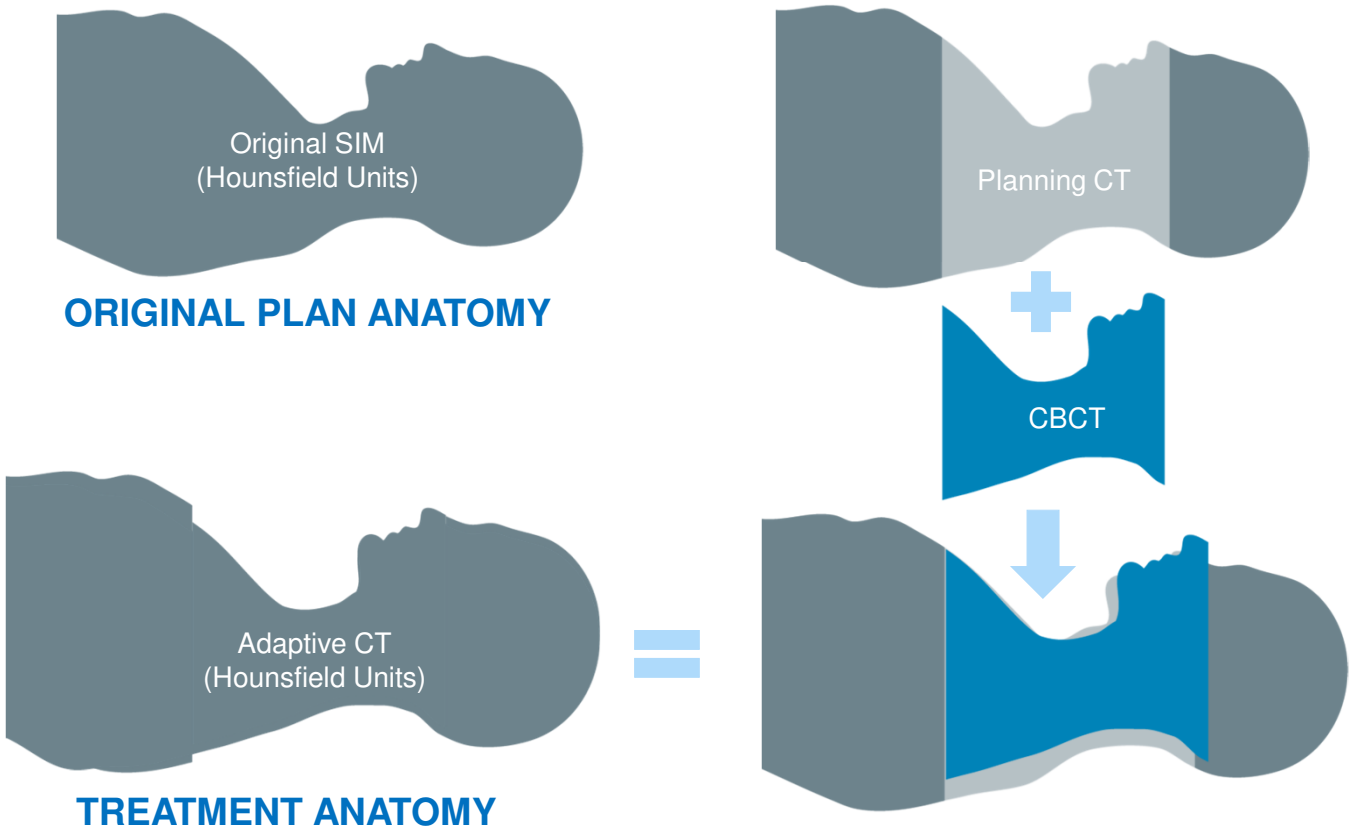
Varian Velocity Imaging Informatics

Varian Eclipse TPS

Concept or work-in-progress – not available for sale and no guarantee of commercialization or features availability

varian

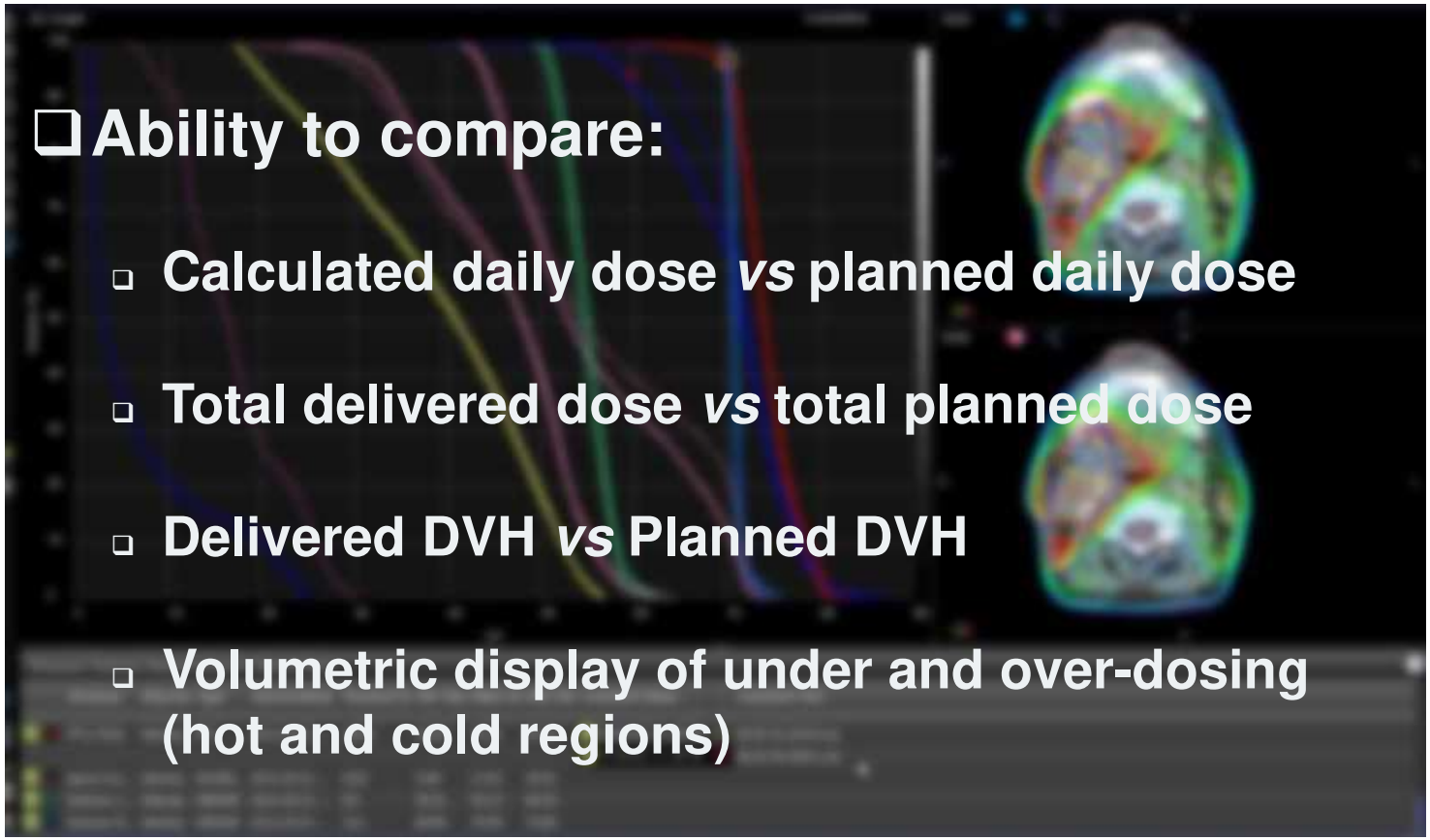
Create “Synthetic” or “Adaptive” CT



Using the Deformable Reg the HU from the Planning CT in the area of overlap are deformed to the CBCT anatomy and used to create the new volume

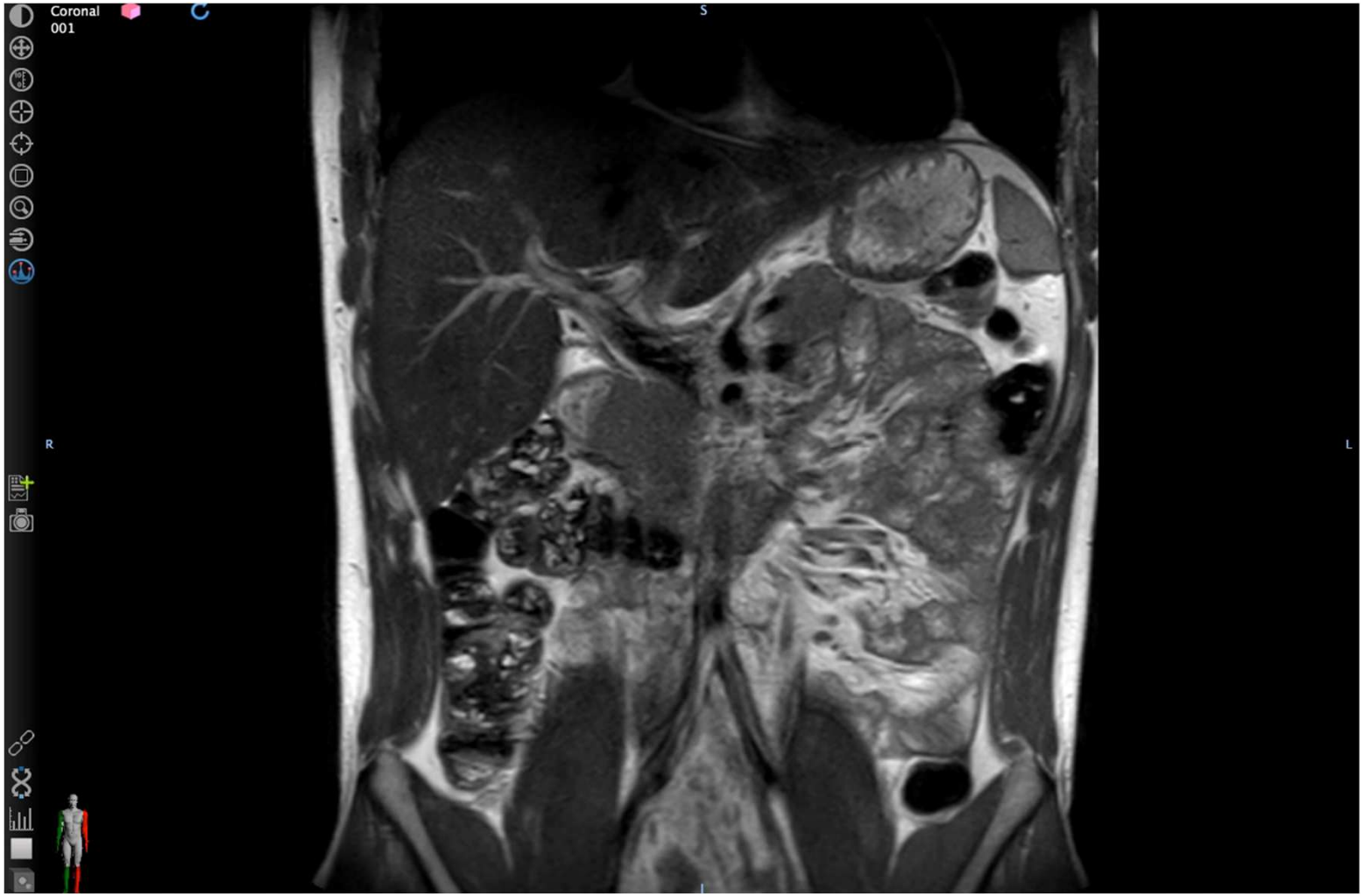
varian

Benefits of Varian Offline Dose Review



varian

M³i Cine



varian


varian