

# ACADEMIC SOFTWARE IN CANCER RESEARCH: USER'S PERSPECTIVE

VARIAN  
ONCOLOGY  
SYSTEMS

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Imaging Informatics

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VARIAN  
medical systems

“PROPRIETARY – Varian Medical Systems”

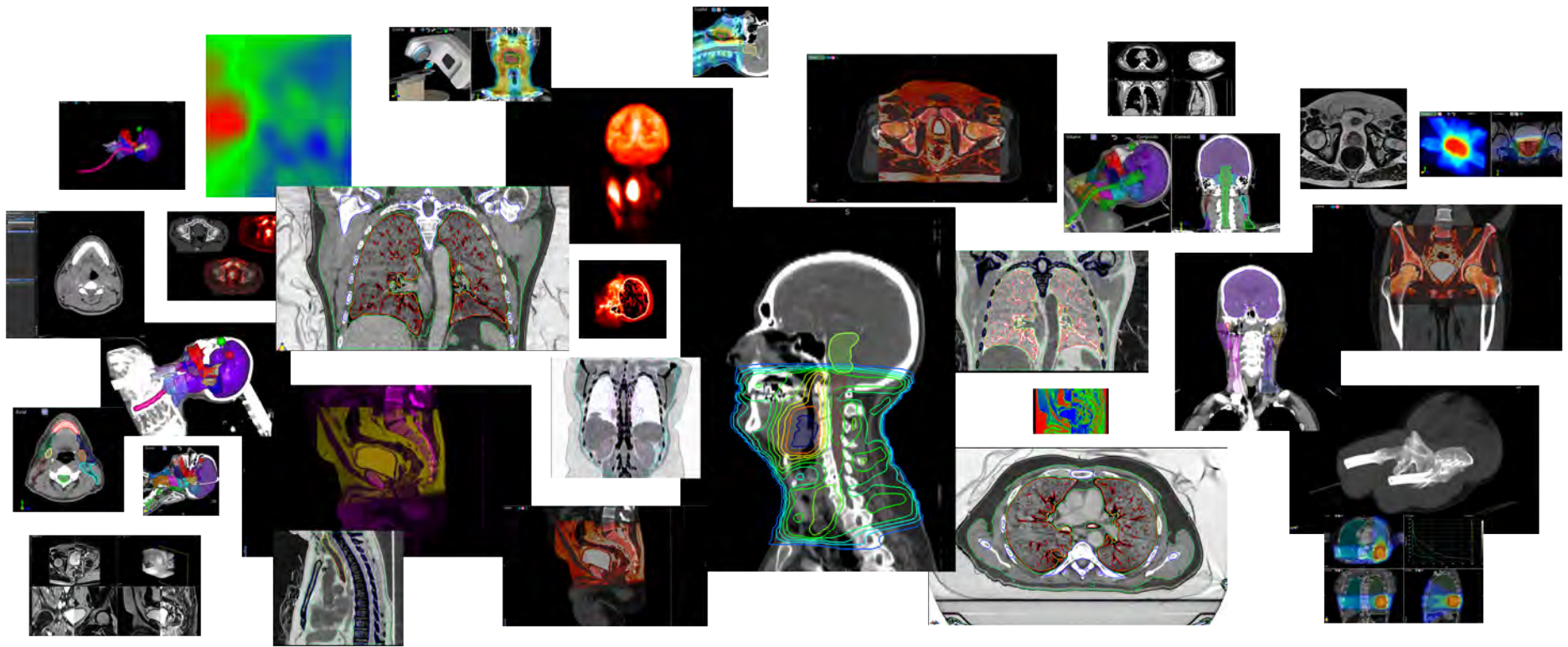
Devices presented may not be available in all markets.

### **Intended Use Summary**

Velocity is a stand-alone software product that provides the physician a means for comparison of medical imaging data from multiple DICOM conformant imaging modality sources. It allows the display, annotating, volume rendering, registration and fusing of medical images as an aid during use by diagnostic radiology, oncology, radiation therapy planning and other medical specialties. Velocity is not intended for mammography diagnosis.

### **Safety**

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Treatment sessions may vary in complexity and time. Radiation treatment is not appropriate for all cancers.



# Think BIG

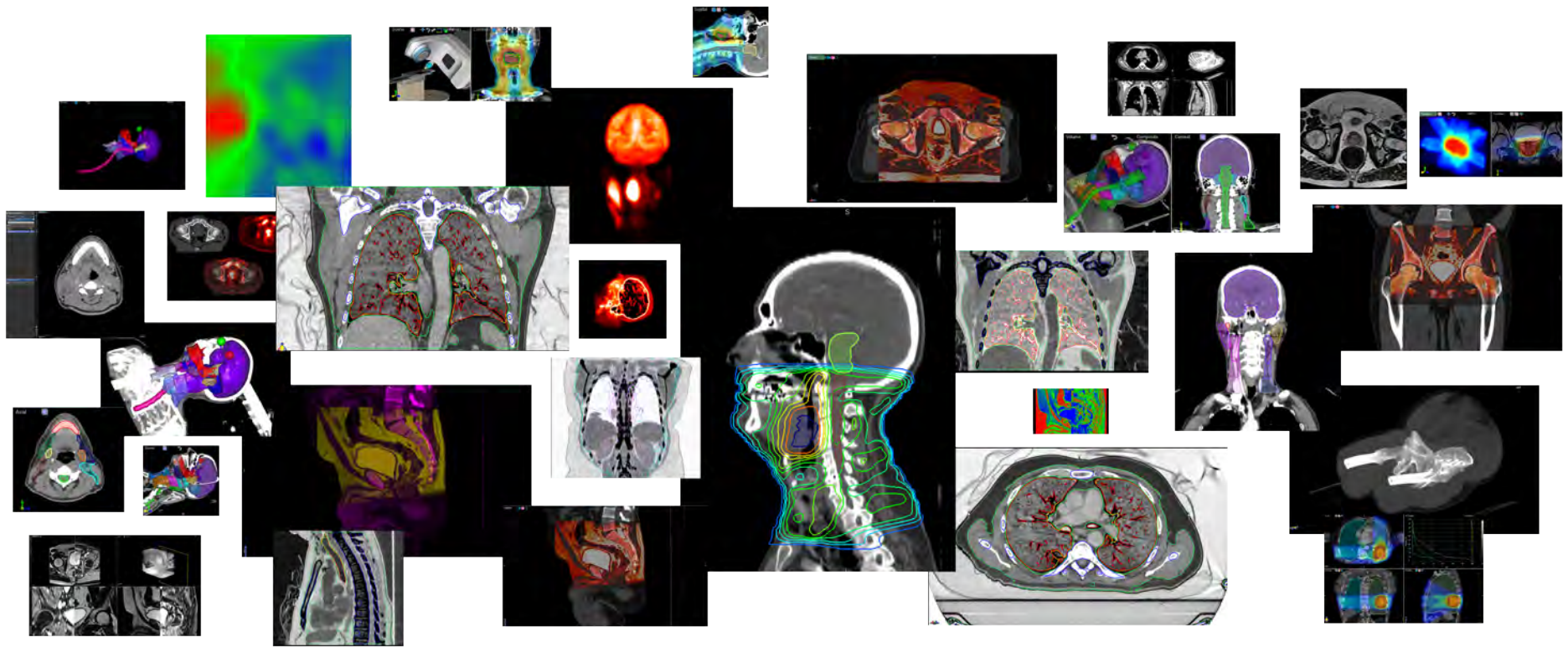
# From "Towards Precision Medicine" To "A Cancer Moonshot"

**SPRING 2016 SYMPOSIUM & WORKSHOP**

**March 13-15, 2016, Napa CA**

We come together to change the world one megabyte at a time, and we can only do it together with our private partners from the corporate community.

## CI4CC Thinks BIG



# Start small

## Two Problems We Encountered

Helping clinical  
care teams treat  
patients

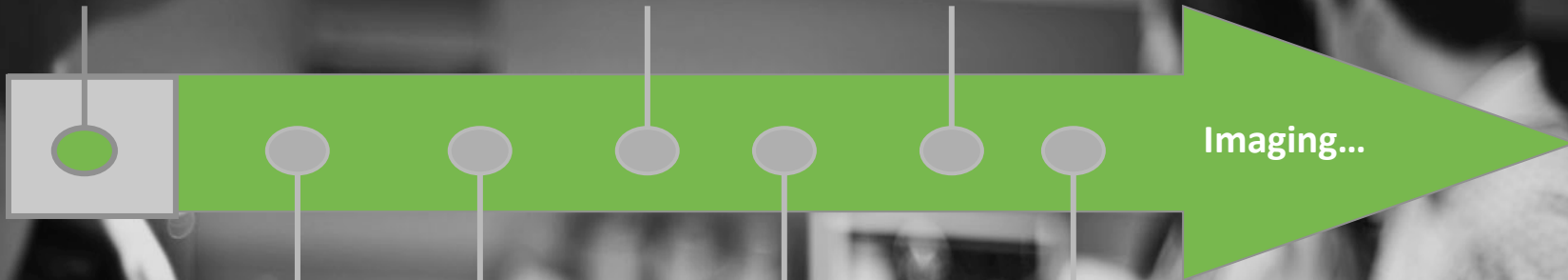
Helping care  
teams conduct  
clinical research

Two problems may require two different solutions!

Cancer Patient

Chemotherapy

Imaging

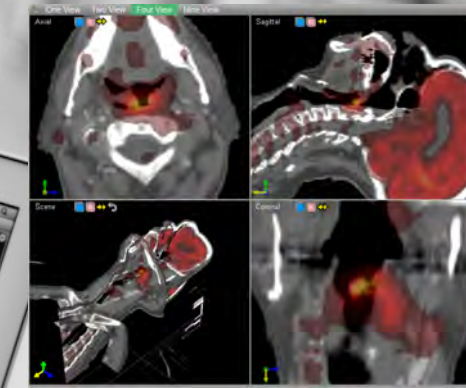
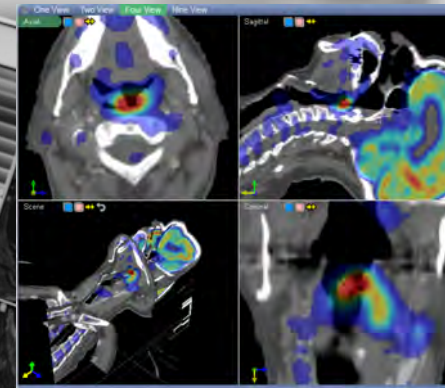
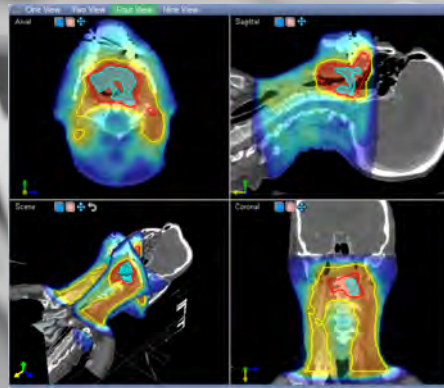
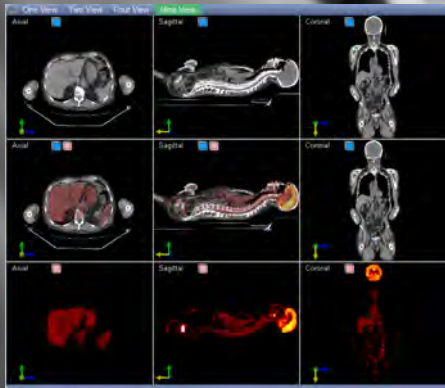


Imaging

Surgery

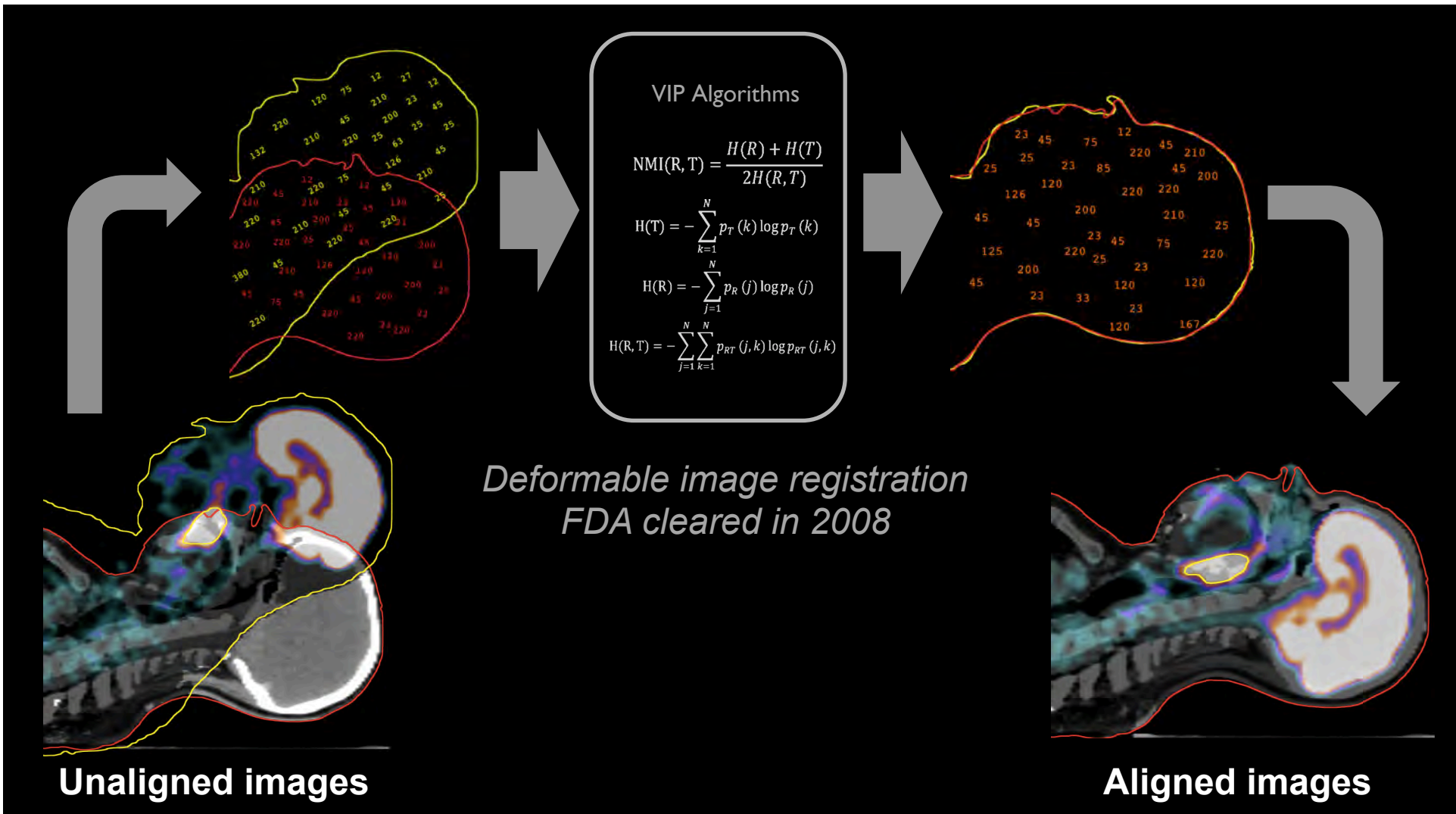
Radiation

Chemotherapy



# Image-Guided Cancer Therapy

Lifetime of follow-up imaging



Our Vision: Images are data not pictures!



# Academic Industry Partnership: Velocity

Clinical analytics and tools for longitudinal response assessment features.

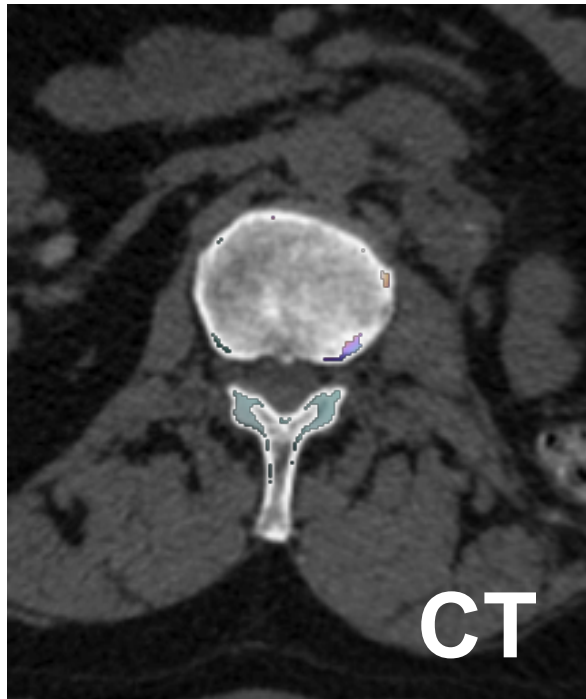
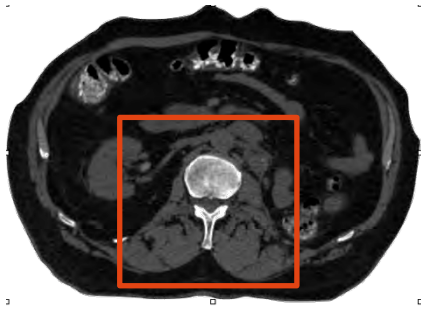
## Expanded capabilities

- Deformable voxel tracking,
- Segmentation, annotation and markup
- RECIST/WHO and other analytics
- Plug-in architecture for automated research engines
- Integration with commercial components

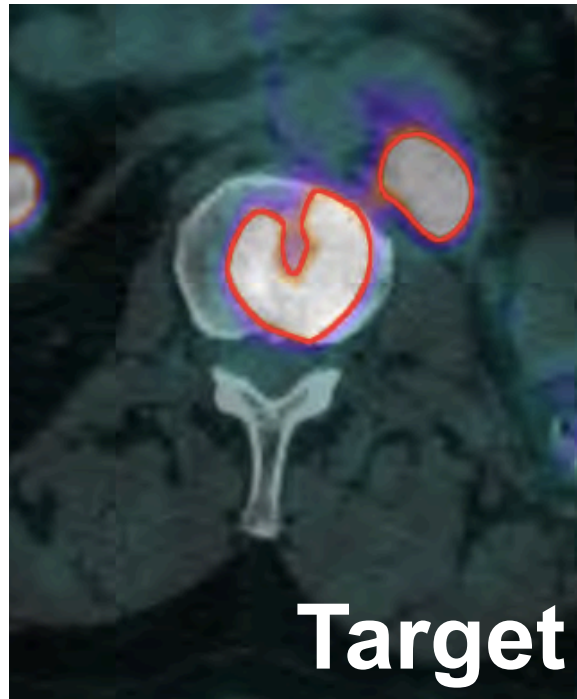


EMORY | WINSHIP  
CANCER  
INSTITUTE

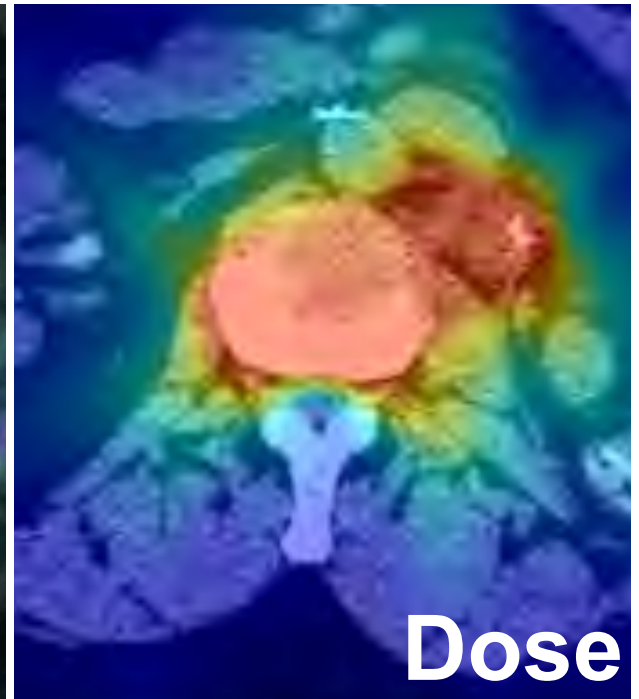




CT

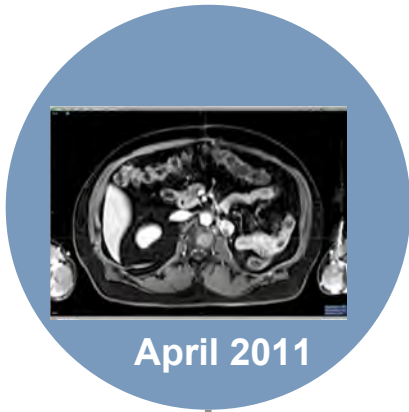


Target

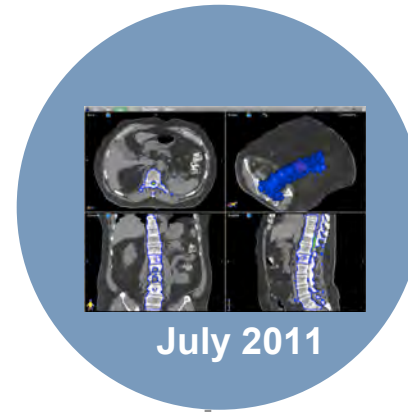


Dose

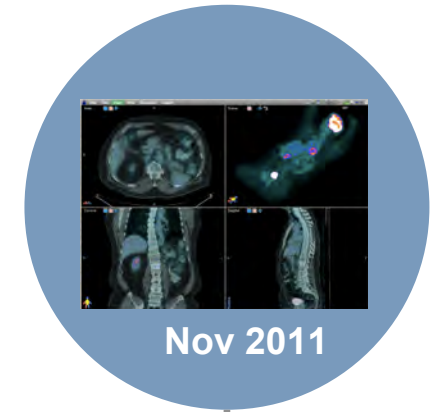
# Spine Radiosurgery Case



Pre-Treatment Imaging

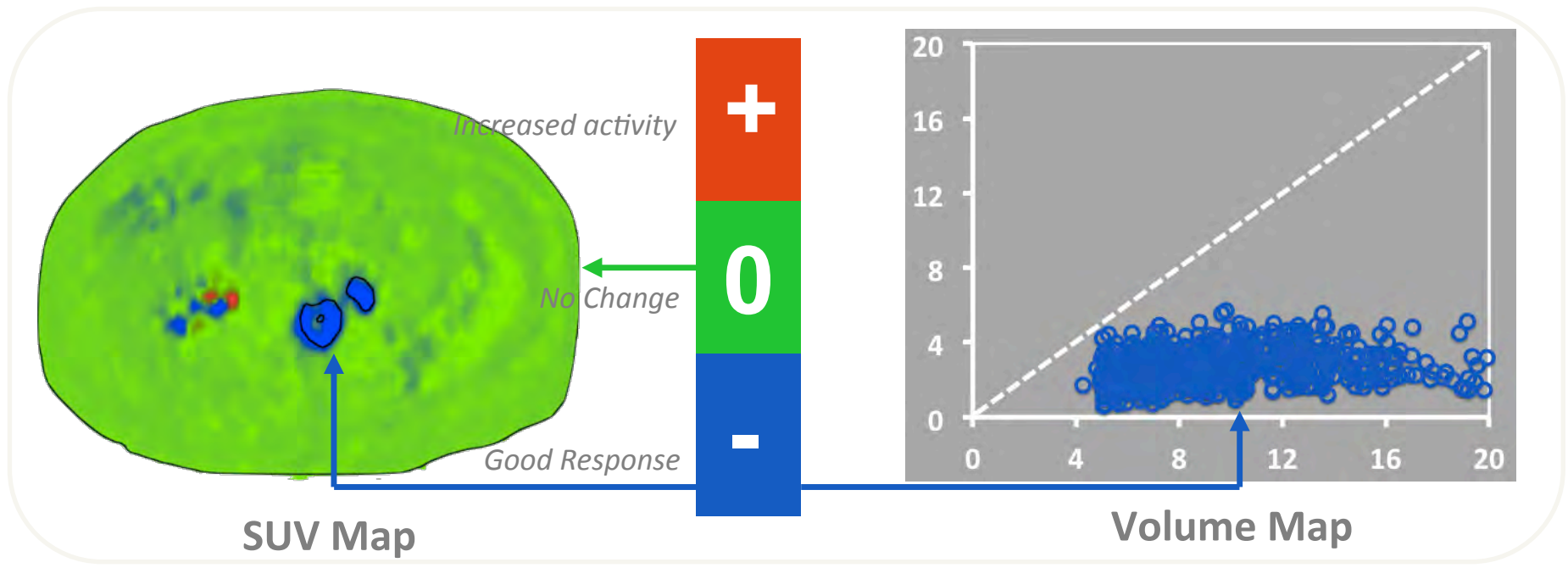
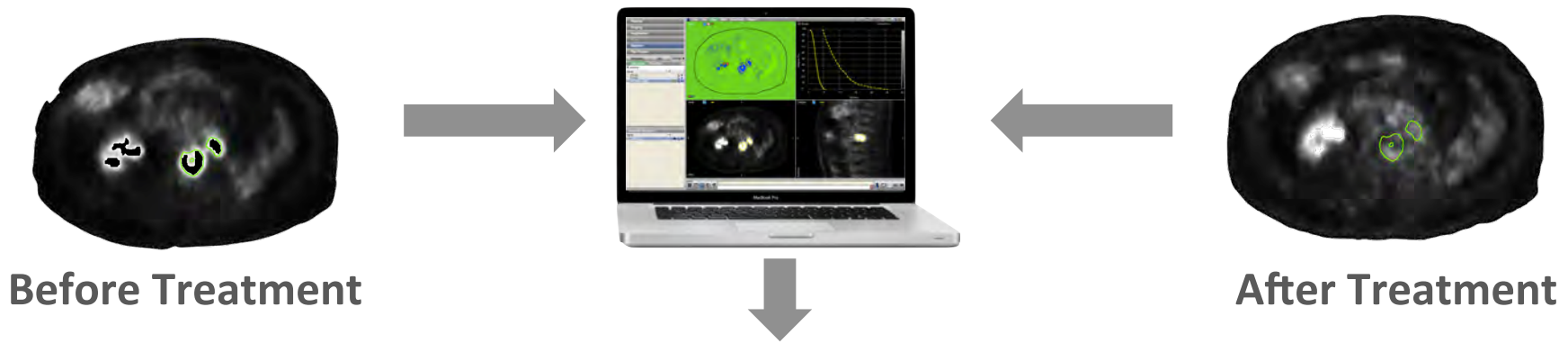


Treatment



Post-Treatment Imaging

**Bring data together**  
**Did the therapy work?**



# Quantitative Image Analytics

## Two Problems We Encountered

Helping clinical  
care teams treat  
patients

Helping care  
teams conduct  
clinical research

Two problems may require two different solutions!

Search Prior Knowledge

Enable clinicians to use previous patients' experiences in the health care system to guide future care.

Care Team Collaboration

Facilitate a coordinated cancer care workforce & mechanisms for easily sharing information

Cancer Research

Improve the evidence base for quality cancer care by utilizing all of the data captured during real-world clinical encounters

## Delivering High-Quality Cancer Care: Charting a New Course for System in Crisis



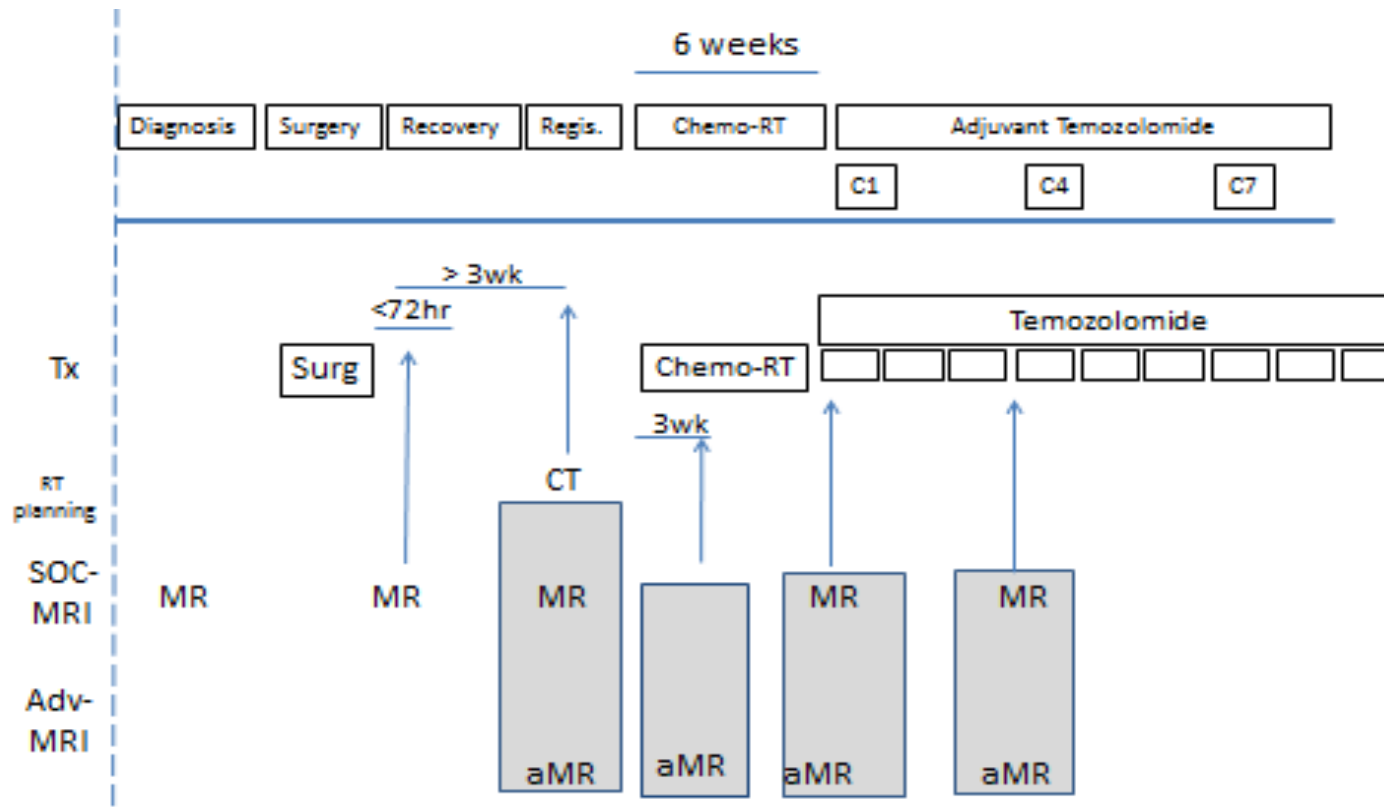
# Clinical trials incorporating advanced imaging

## NRG ONCOLOGY

### NRG-BN001

ClinicalTrials.gov NCT02179086.

**RANDOMIZED PHASE II TRIAL OF HYPOFRACTIONATED DOSE-ESCALATED PHOTON IMRT OR PROTON BEAM THERAPY VERSUS CONVENTIONAL PHOTON IRRADIATION WITH CONCOMITANT AND ADJUVANT TEMOZOLOMIDE IN PATIENTS WITH NEWLY DIAGNOSED GLIOBLASTOMA**



# Research Software



**MeVisLab**

Rapid prototyping



Repository of image processing algorithms



Visualize images



Repository of visualization algorithms

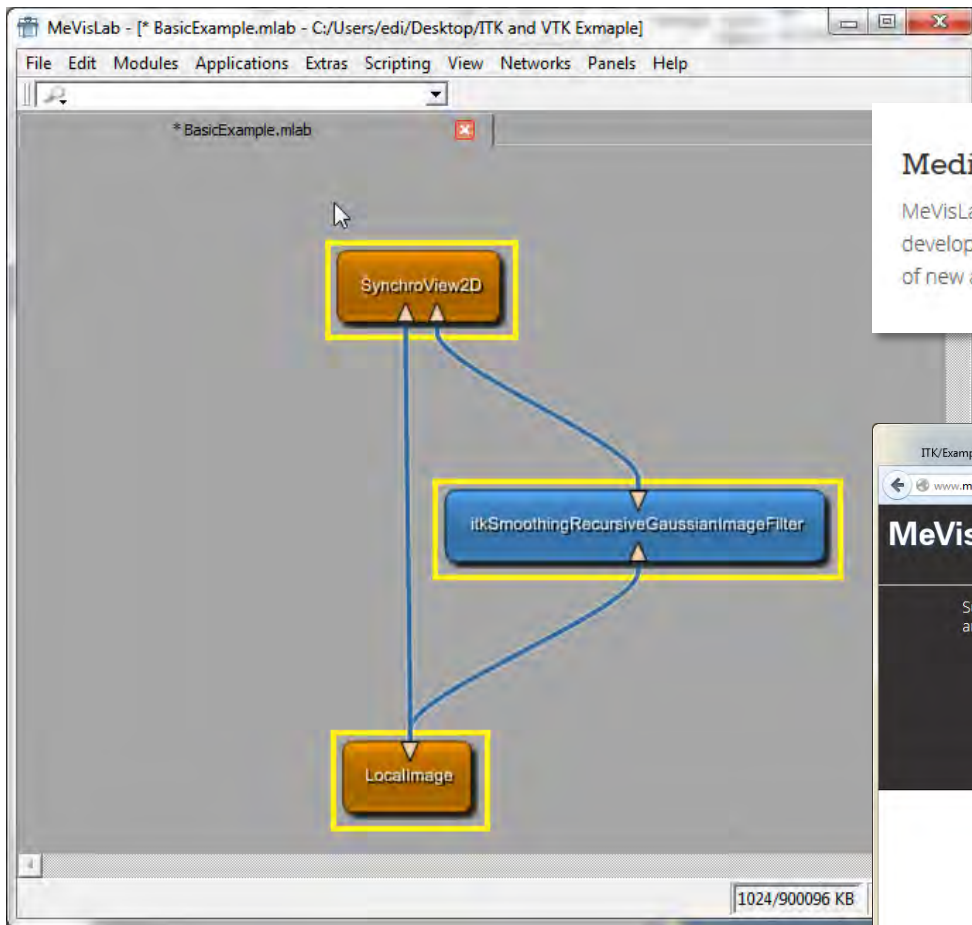


Visualize meshes



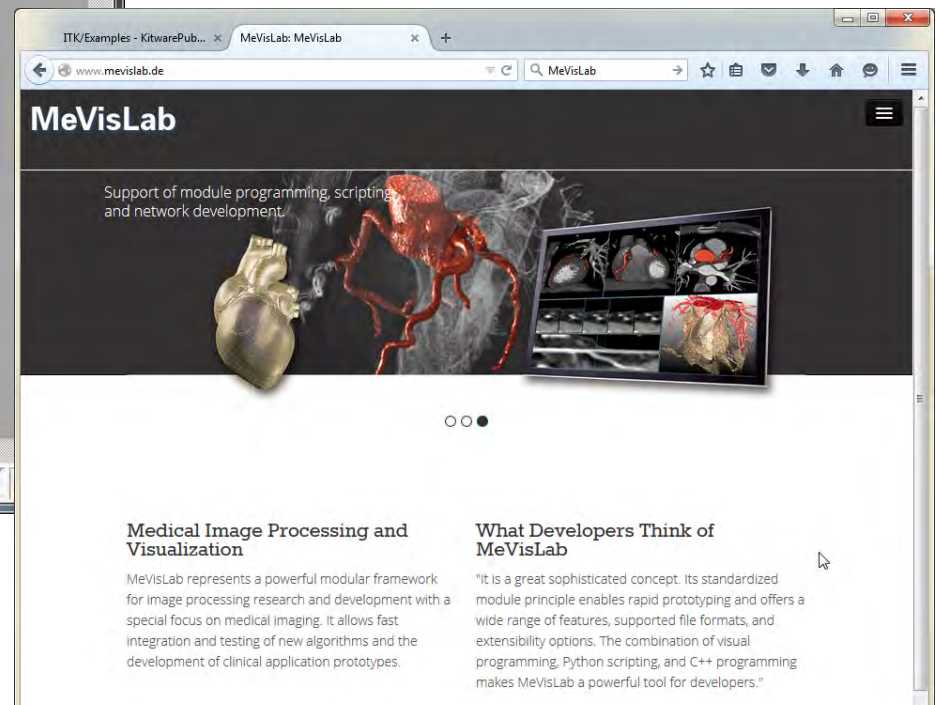
Multi-platform build system





## Medical Image Processing and Visualization

MeVisLab represents a powerful modular framework for image processing research and development with a special focus on medical imaging. It allows fast integration and testing of new algorithms and the development of clinical application prototypes.



**Medical Image Processing and Visualization**

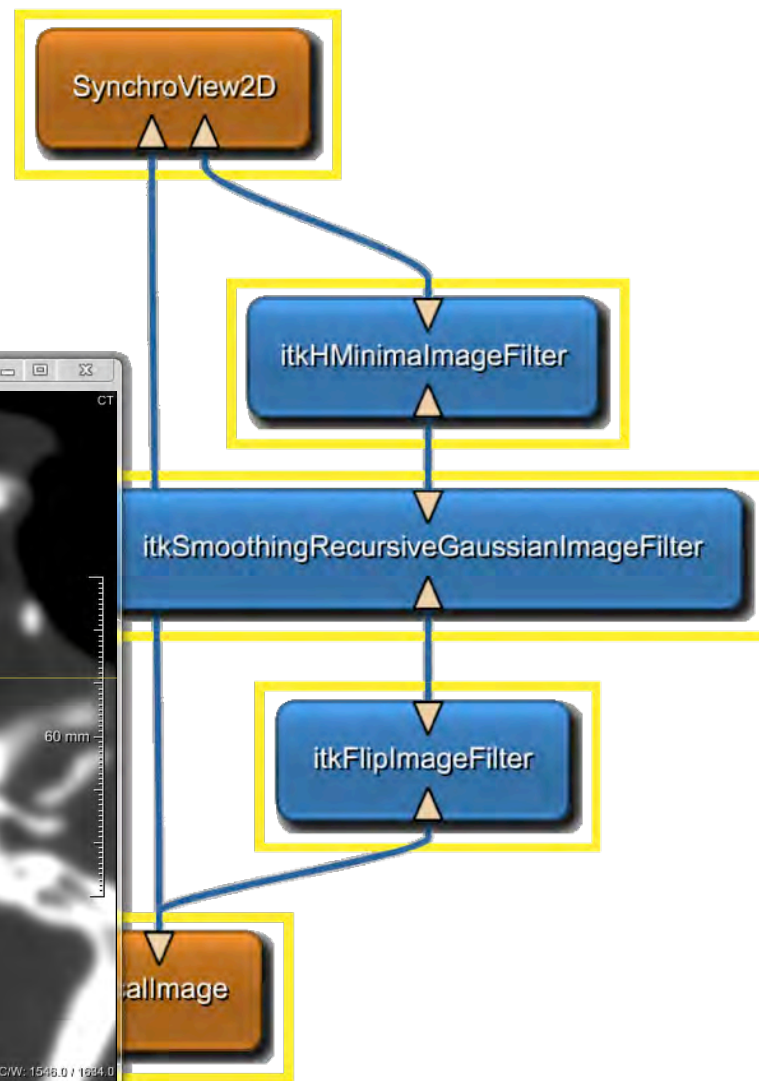
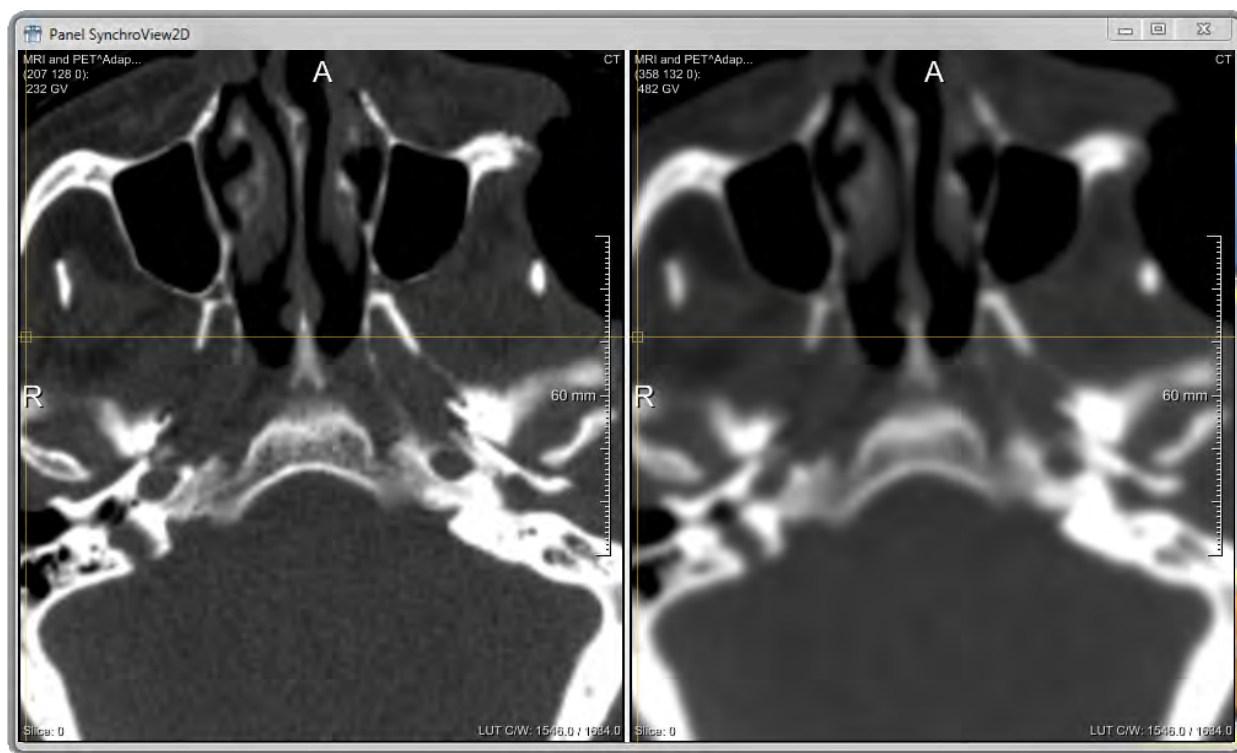
MeVisLab represents a powerful modular framework for image processing research and development with a special focus on medical imaging. It allows fast integration and testing of new algorithms and the development of clinical application prototypes.

**What Developers Think of MeVisLab**

"It is a great sophisticated concept. Its standardized module principle enables rapid prototyping and offers a wide range of features, supported file formats, and extensibility options. The combination of visual programming, Python scripting, and C++ programming makes MeVisLab a powerful tool for developers."

# Prototyping

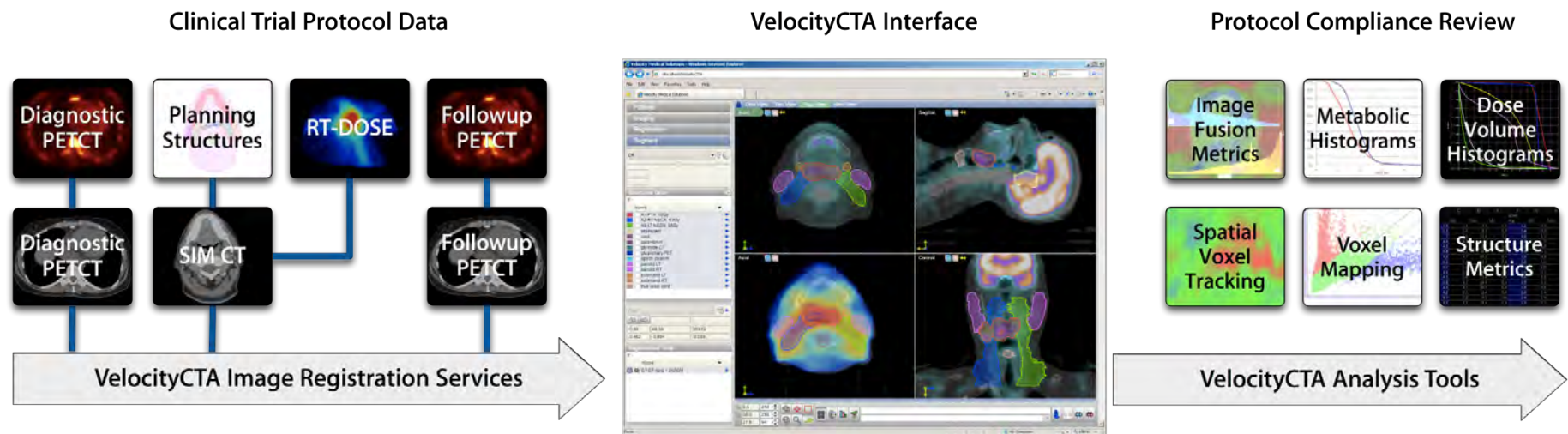
# Example of simple pipeline to smooth a CBCT dataset



# Velocity Clinical Trial Analysis (CTA) Tools



- Velocity Clinical Trial Analysis (VelocityCTA) was developed and deployed for integration with NCI informatics services to provide visualization/annotation/markup of multi-modality imaging and DICOM RT objects in image-guided radiation therapy clinical trials.
- Developed as part of ARRA High Tech Grant



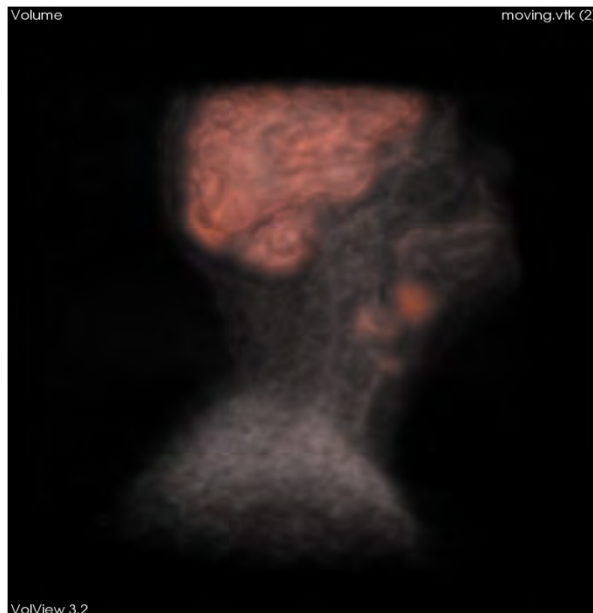
# Voxel clustering for quantifying PET-based treatment response assessment

Eduard Schreibmann, Anthony F. Waller, Ian Crocker, Walter Curran, and Tim Fox<sup>a)</sup>  
*Department of Radiation Oncology and Winship Cancer Institute of Emory University, Atlanta, Georgia 30306*

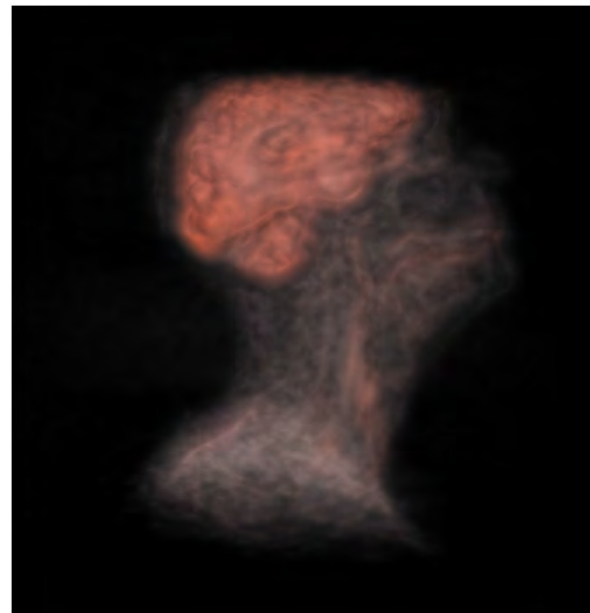
(Received 3 March 2011; revised 24 September 2012; accepted for publication 15 October 2012;  
published 12 December 2012)



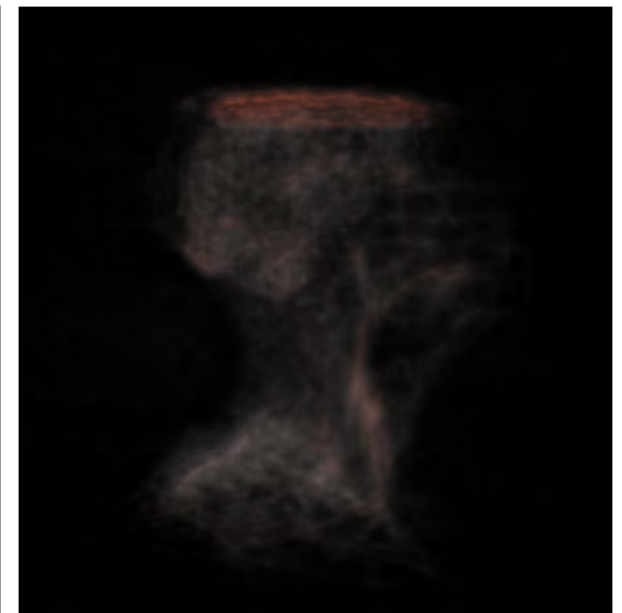
**Results:** The algorithm was retrospectively applied to PET/CT and radiotherapy (RT) oncology data from an NCI-sponsored clinical trial (81 clinical cases from RTOG 0522 Trial) for combined drug and radiation therapy in head and neck carcinomas. This clinical trial dataset presented a realistic environment for implementing and validating our algorithm to correlate local response as observed in serial PET with delivered dose. The technique was instrumental in detecting geographical and



Pre-Treatment Scan



Post-Treatment Scan



Difference

# Uniting Cancer Research

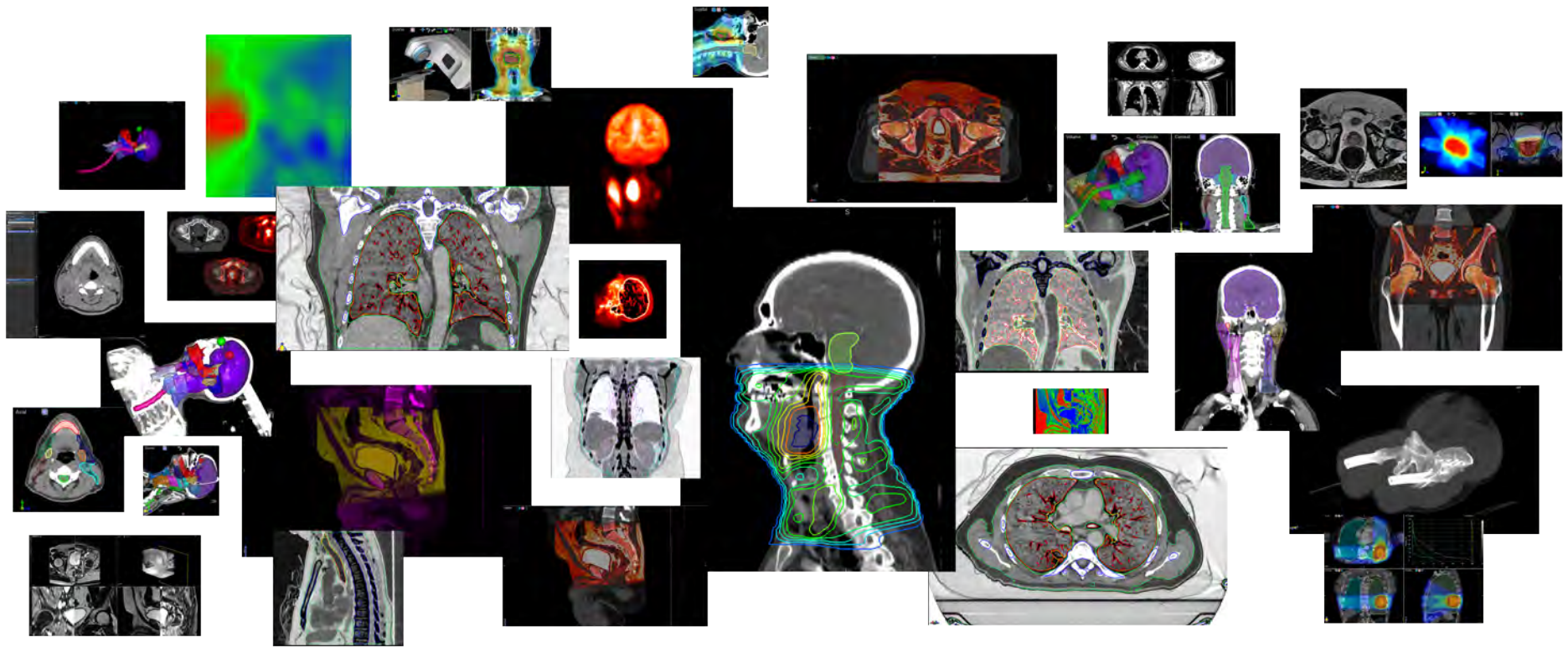
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## VARIAN DEVELOPER WORKSHOP for Researchers

**Learn how to leverage non-clinical Varian Research Tools in your projects during our 2-day hands-on workshop for customer developers.**

Topics will include:

- TrueBeam® System DeveloperMode
- Eclipse™ Treatment Planning System APIs
- Monte Carlo solutions
- Use of open-source tools for the RT community, and more



Academic Industry Partnership (AIP)  
is important for both patient care and research