



MASSACHUSETTS  
GENERAL HOSPITAL

RADIATION ONCOLOGY



*National  
Alliance for  
Medical Image  
Computing*

DBP: Head and Neck Cancer

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NA-MIC AHM January 12, 2012

# Head & neck cancer: Statistics

- Between 4-6% of all new cancer cases
- About 60,000 new cases per year
- 60% present with advanced disease
- 5 year survival: 57%
- Multimodal treatment

# Head & neck cancer sites

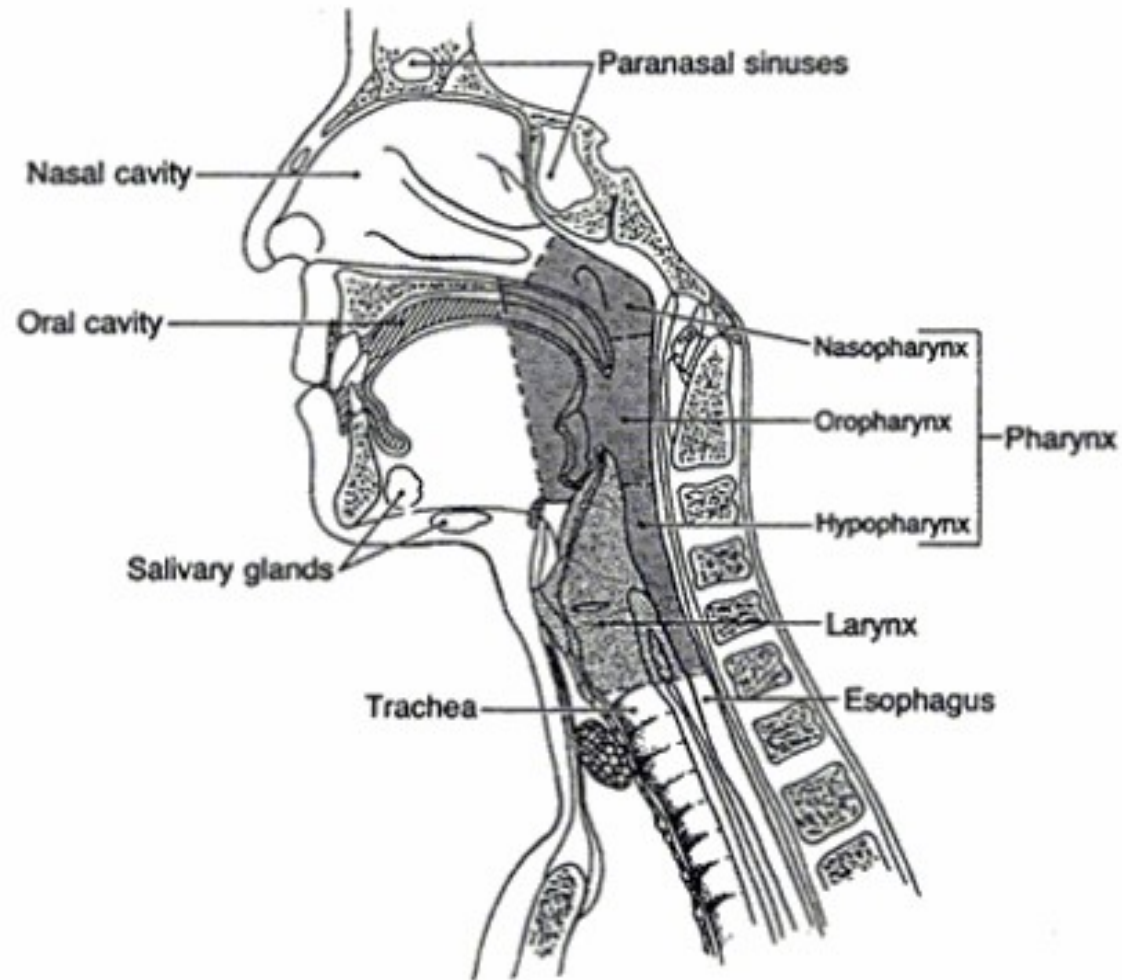
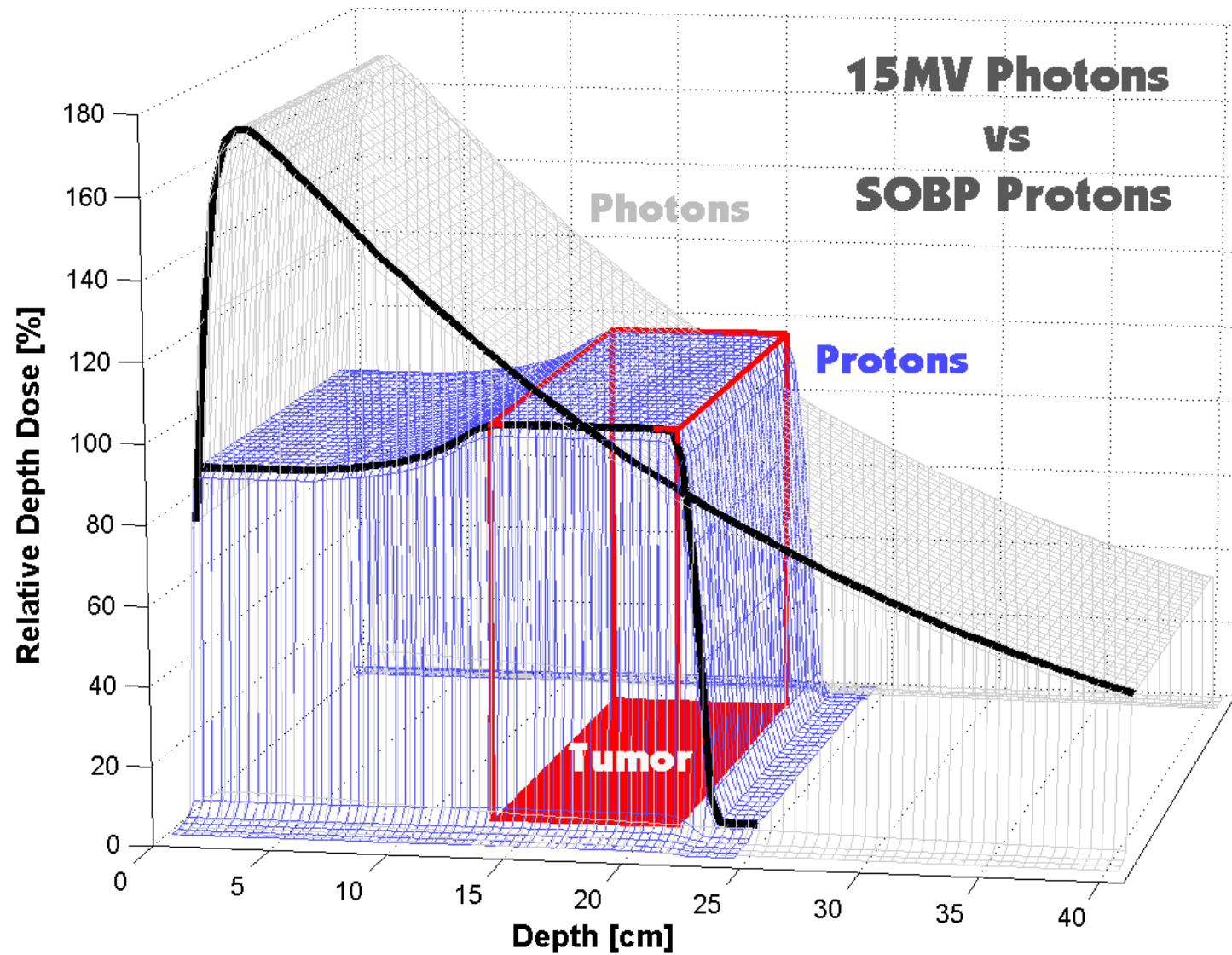
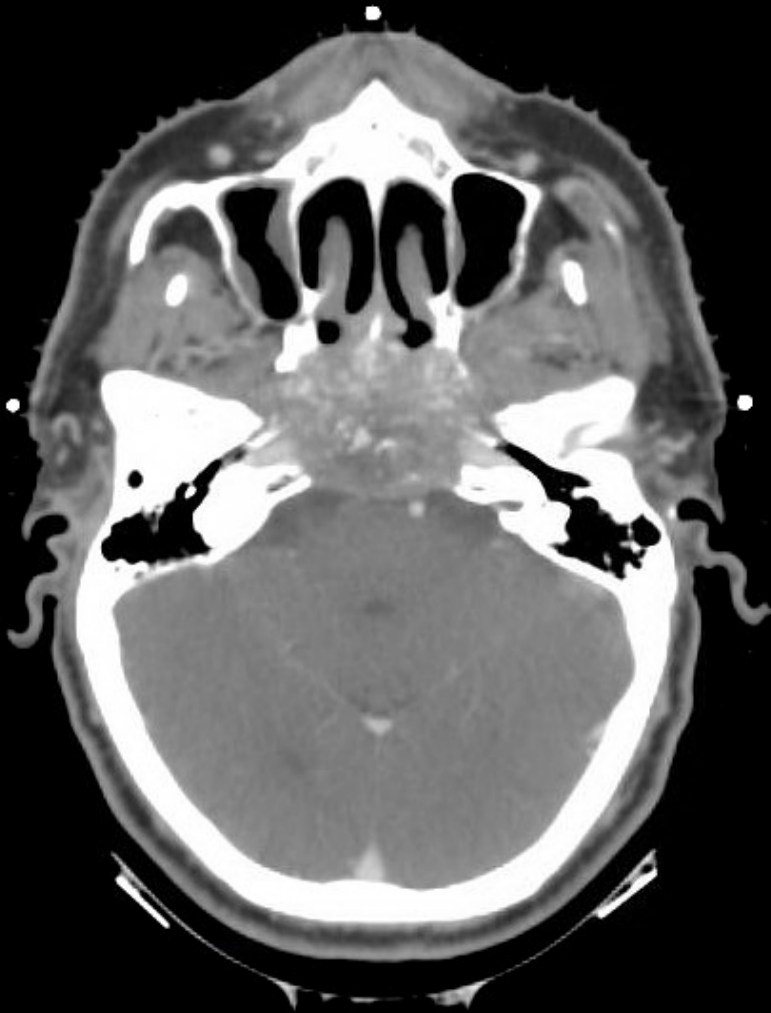


Image credit: American Cancer Society ([www.cancer.org](http://www.cancer.org))

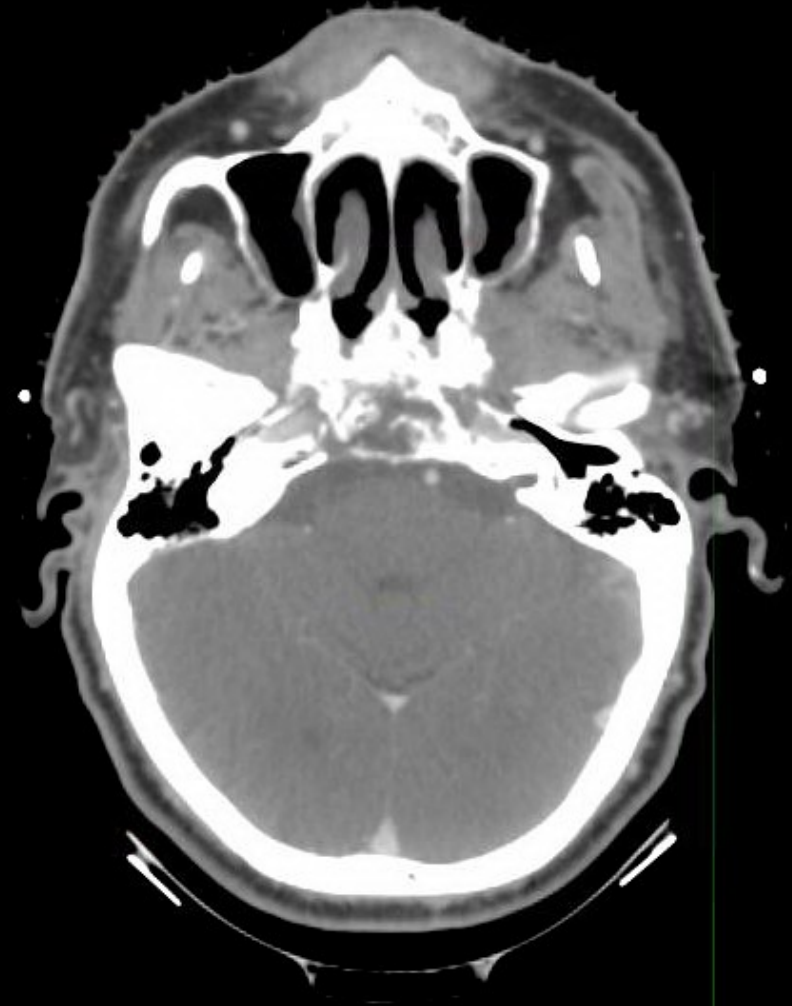
# Proton therapy



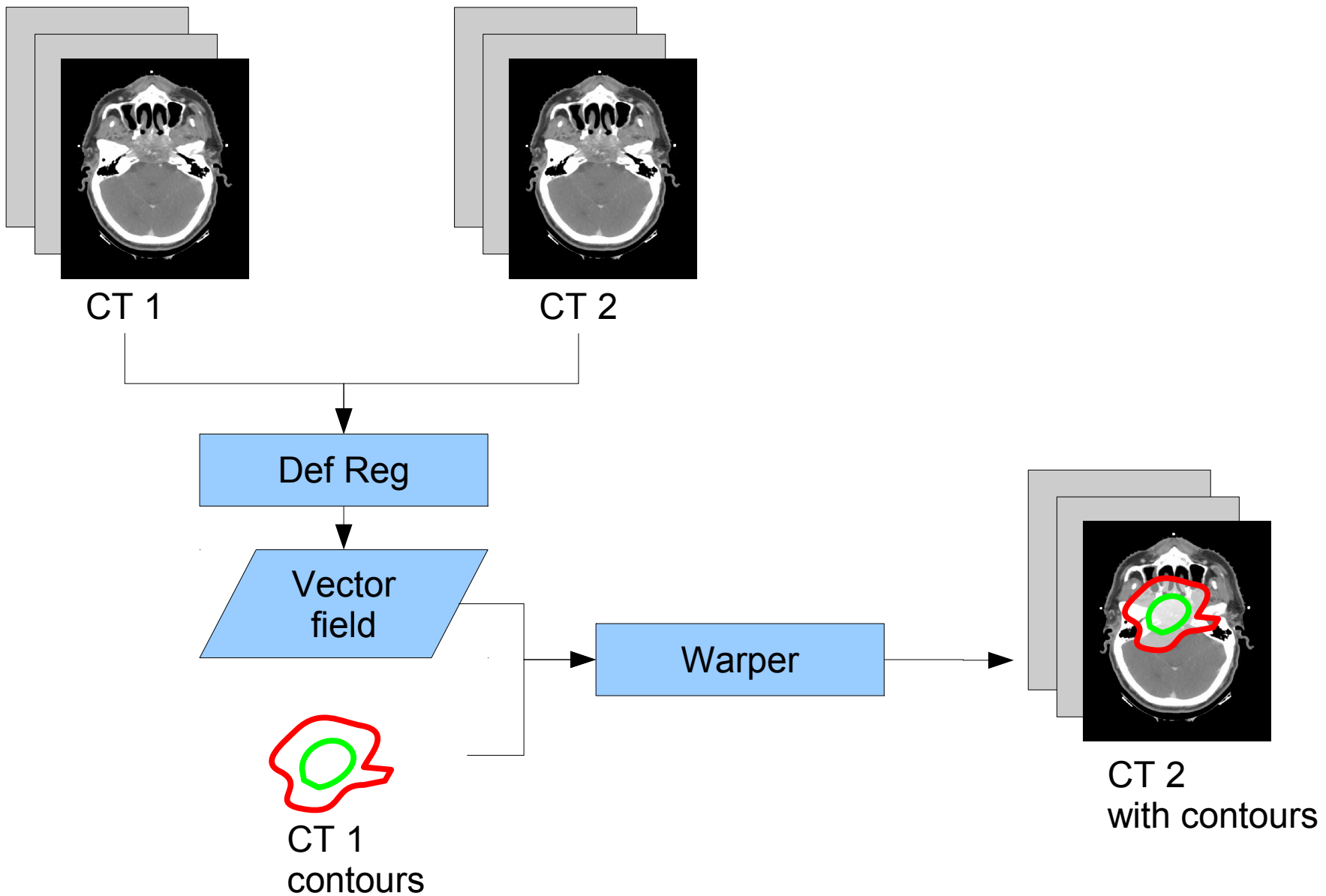
# Anatomic change



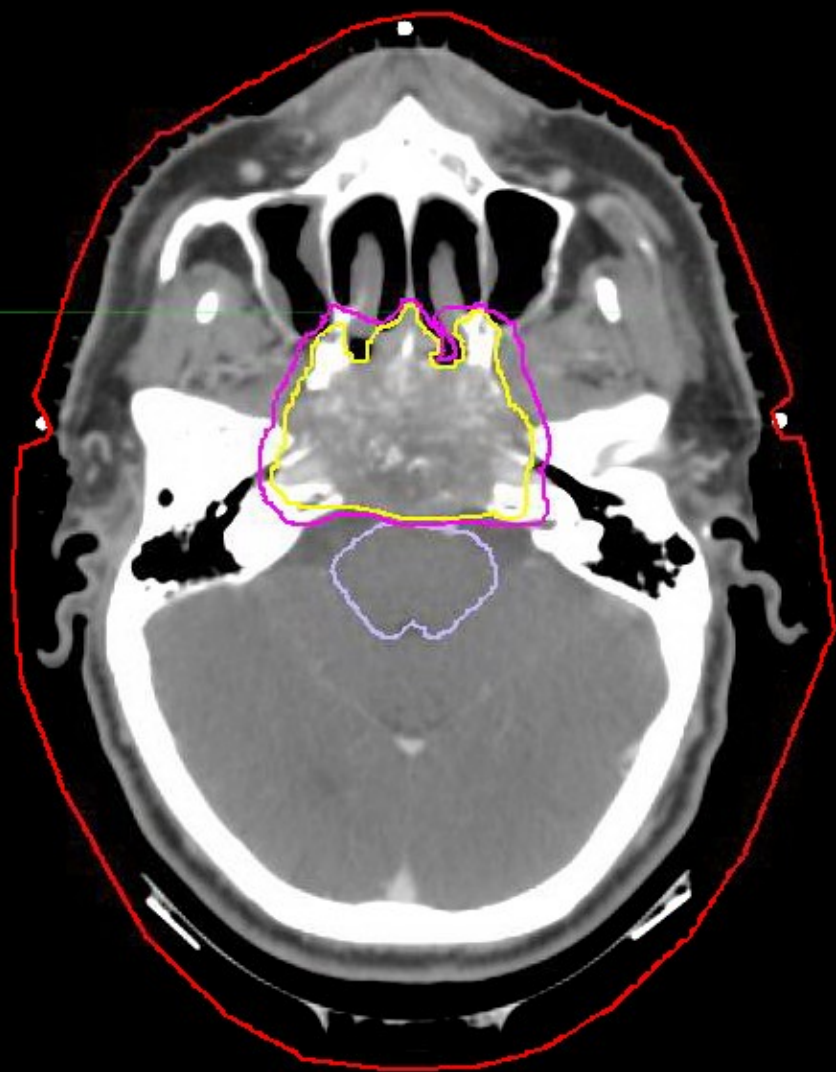
L R



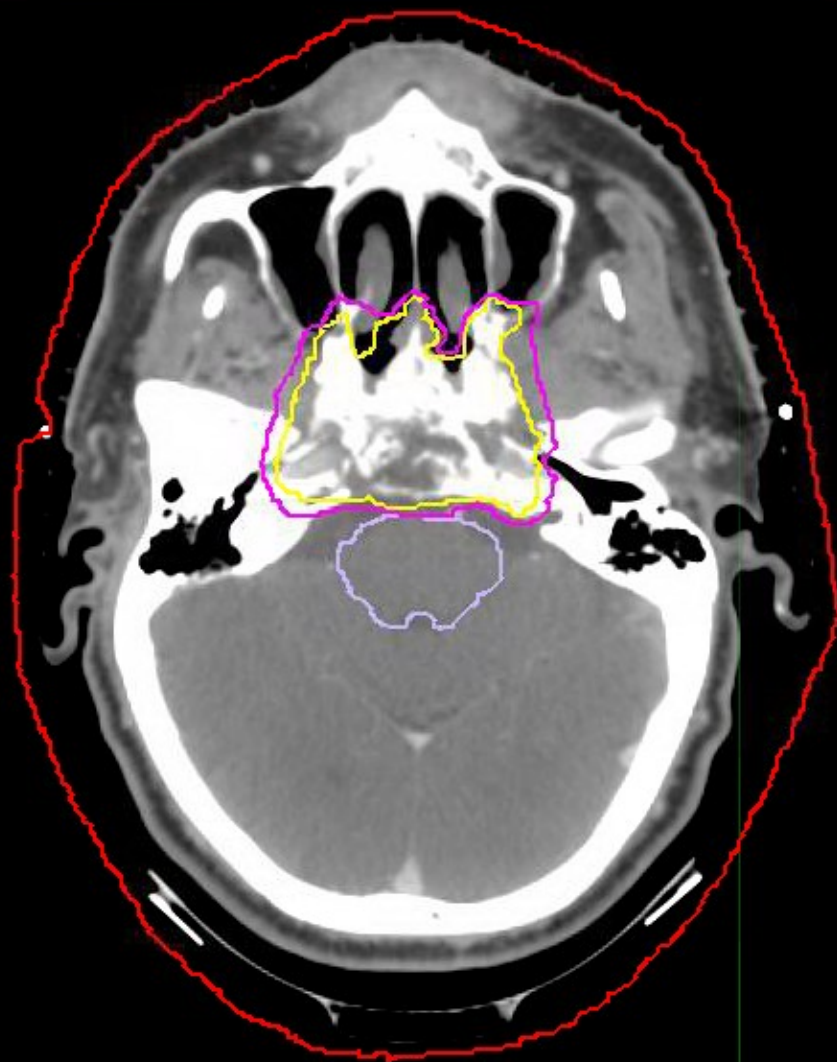
# Recontouring



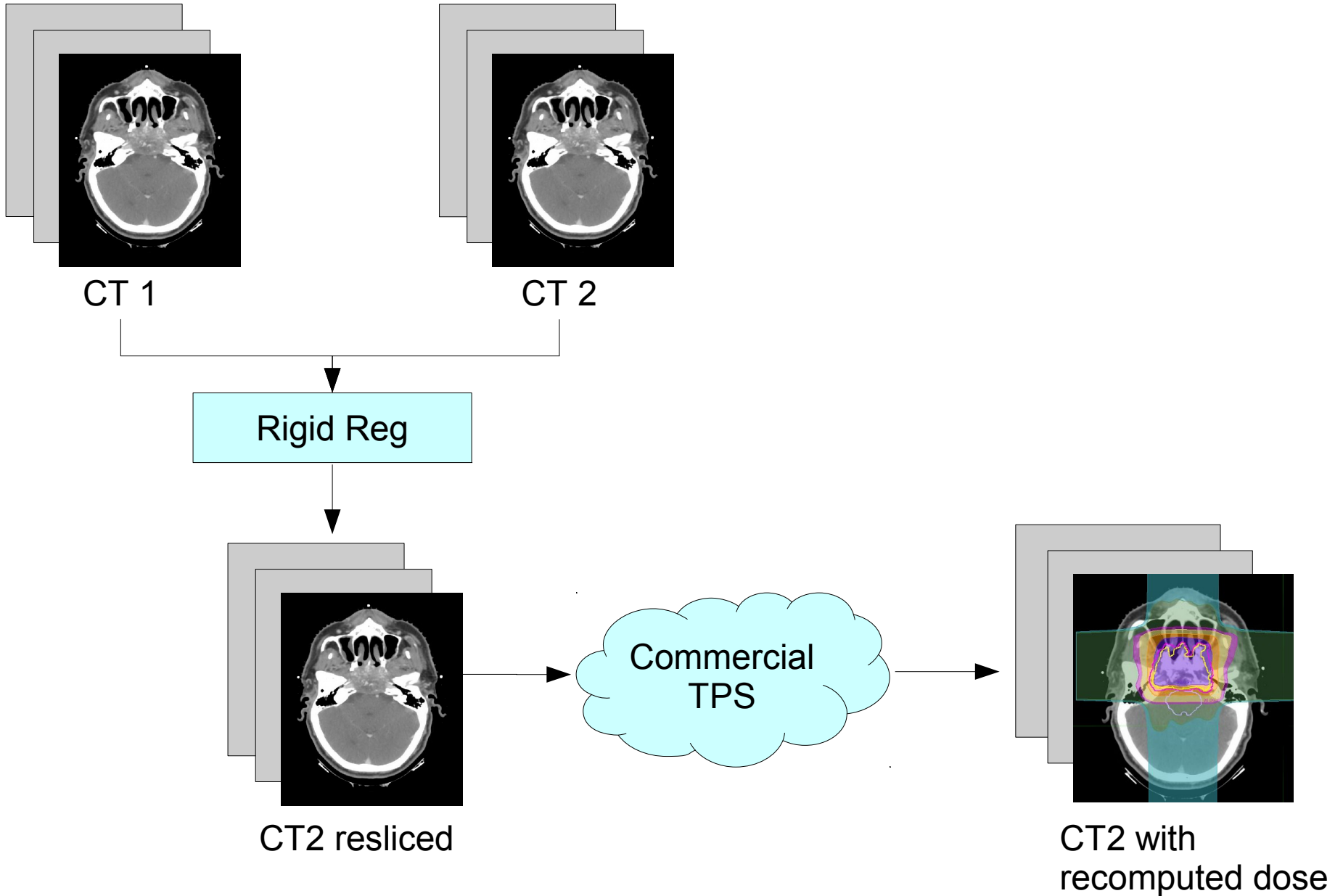
# Recontouring



L R

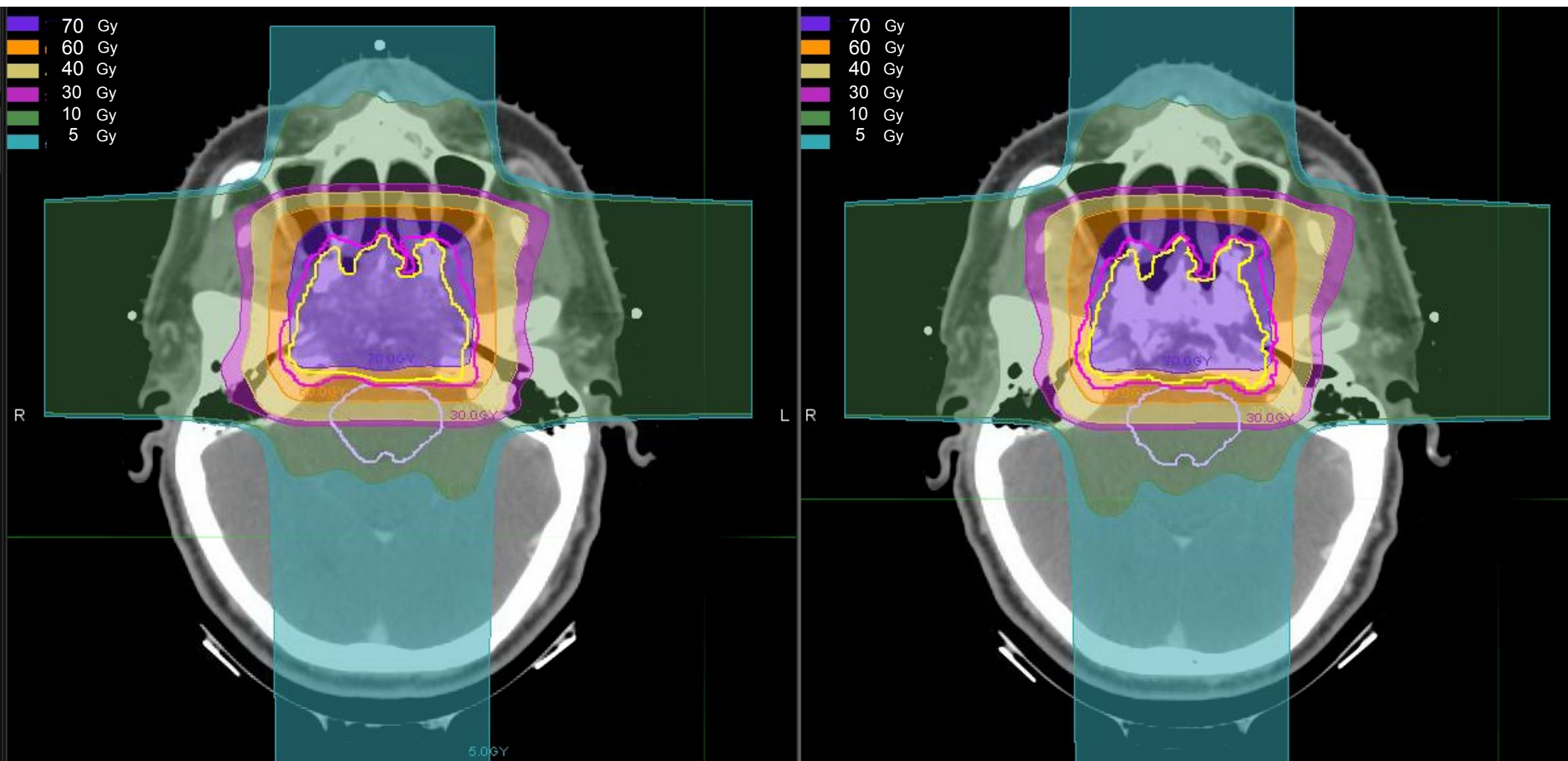


# Beam placement

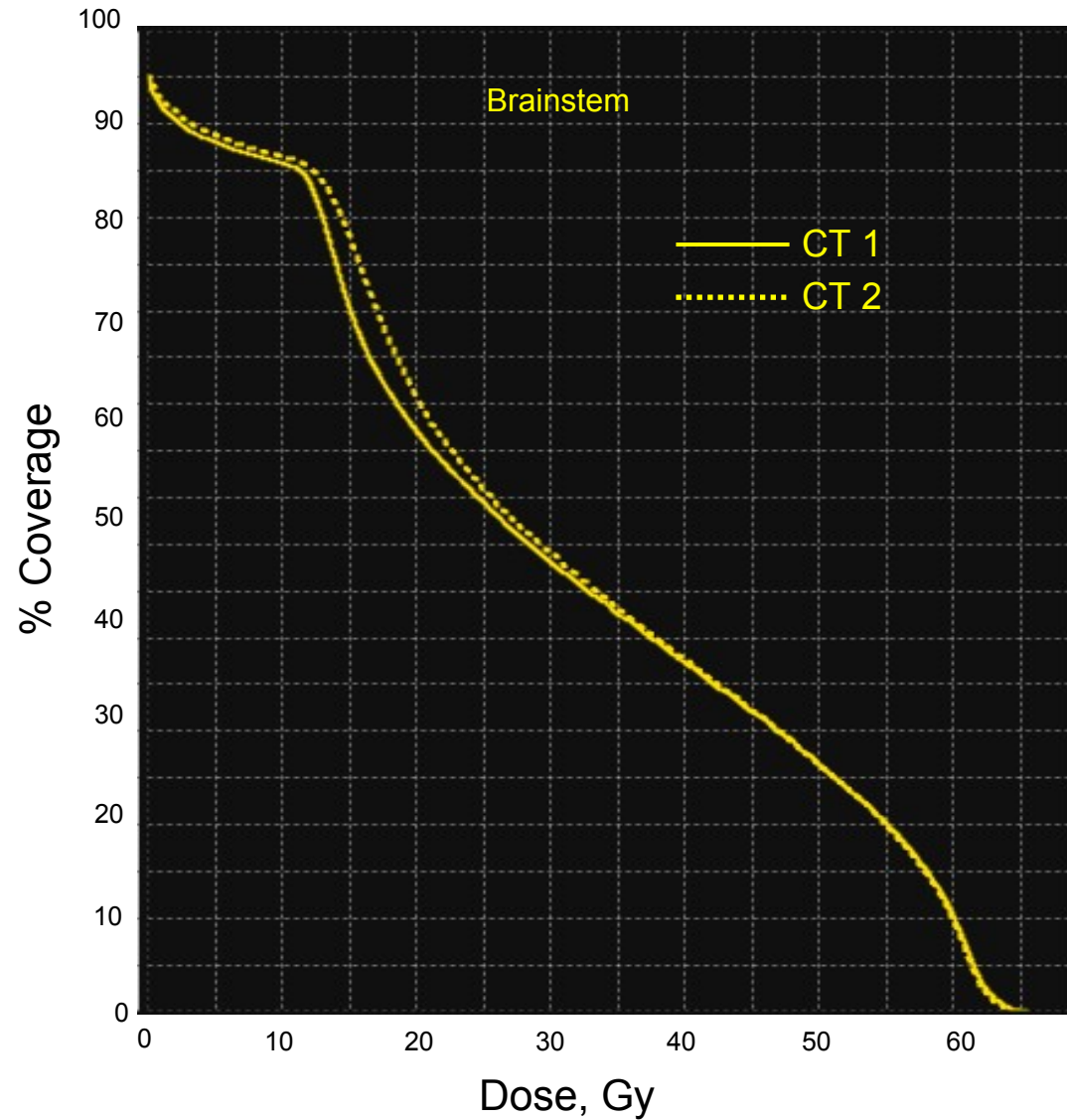




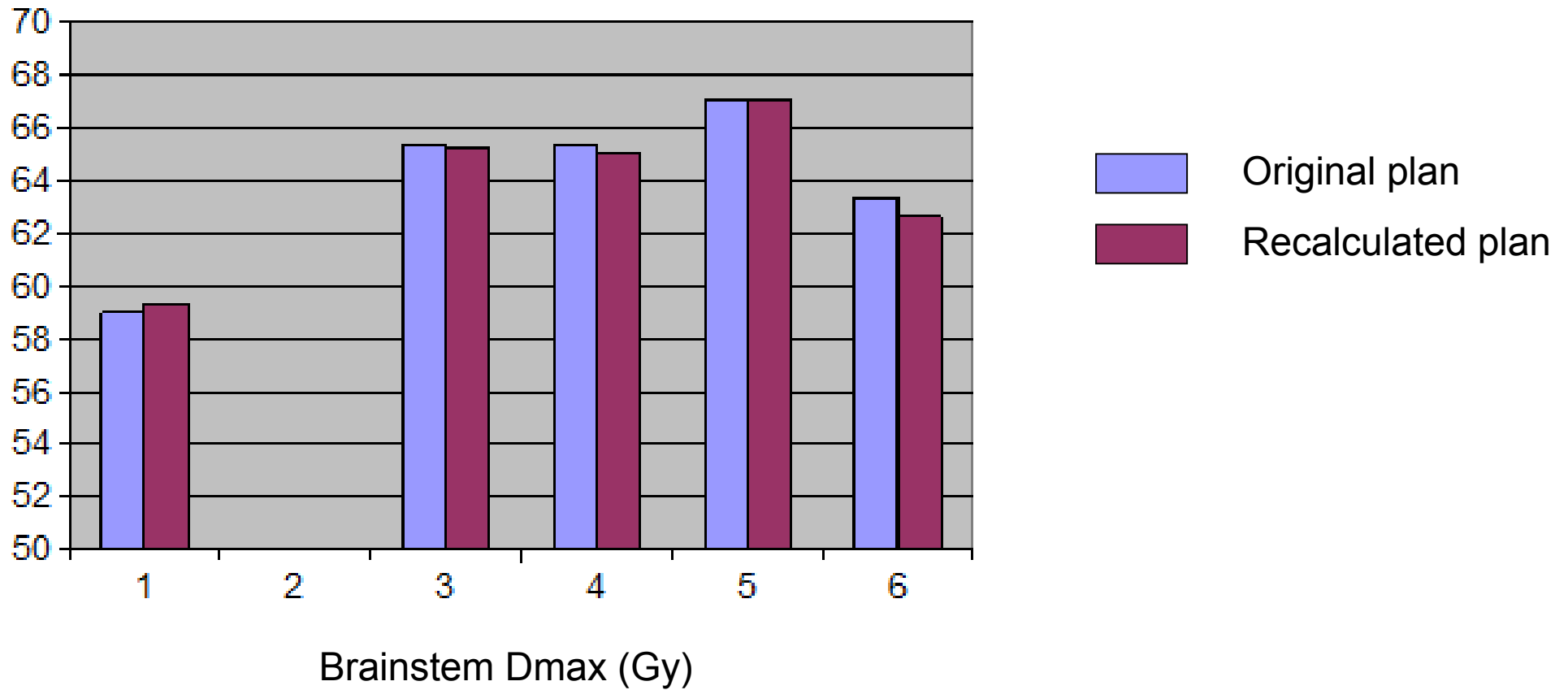
# Dose recalculation



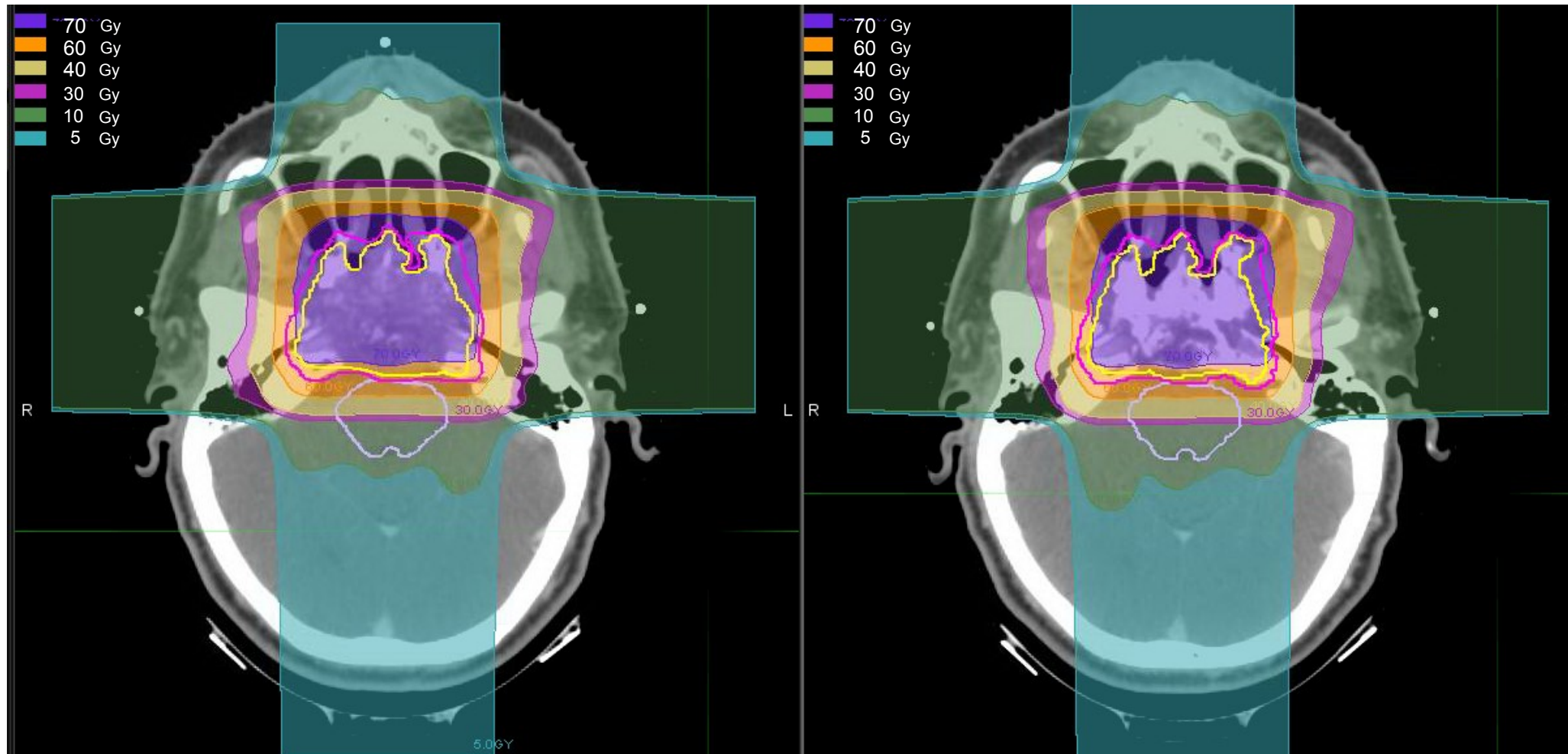
# Dose recalculation



# Dose recalculation



# Dose recalculation



# Moving forward

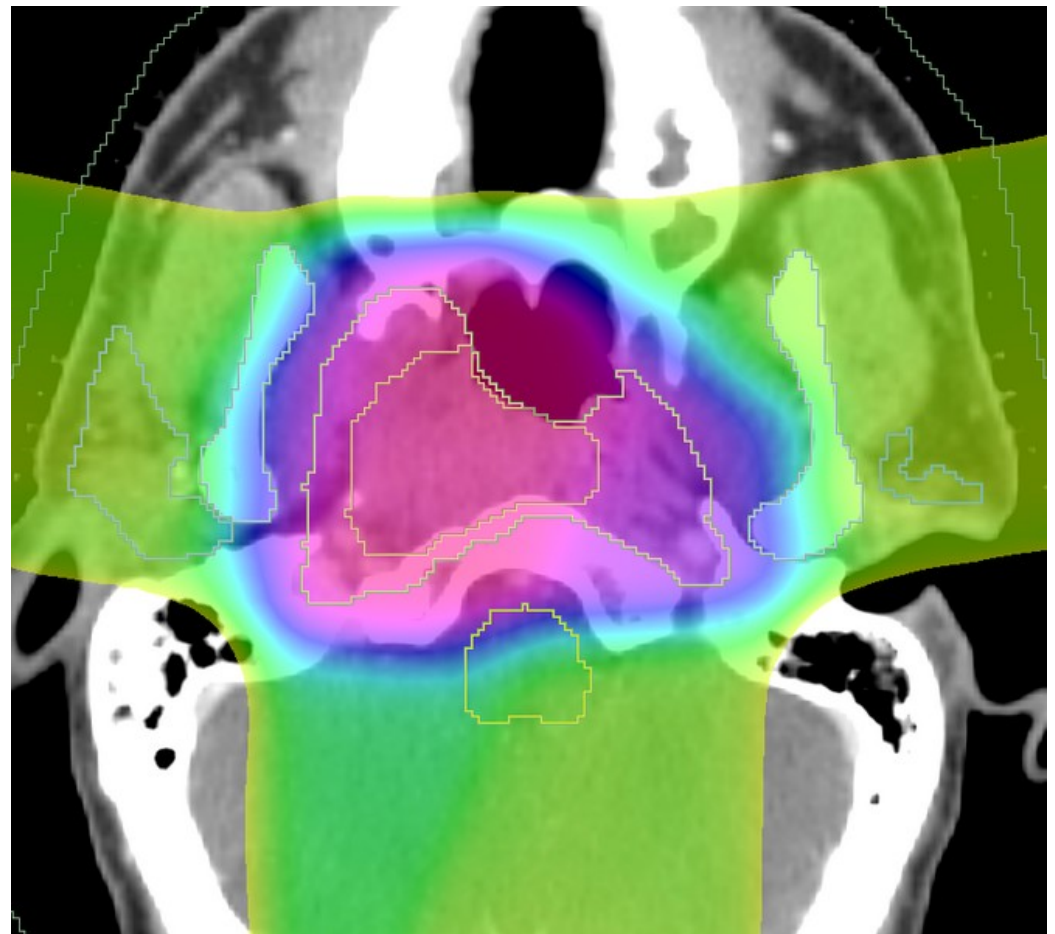
- Automatic segmentation
  - Atlas-based segmentation (head and neck)
  - Intra-subject segmentation (head and neck)
  - Interactive segmentation
- Automatic registration
  - Hybrid image/pointset methods (prostate)
  - Sliding organs (thorax)

# Engineering plan

- Support for adaptive radiotherapy in NA-MIC
- Four goals
  - DICOM-RT interchange
  - Structure and dose warping
  - Interactive deformable registration
  - Plan review

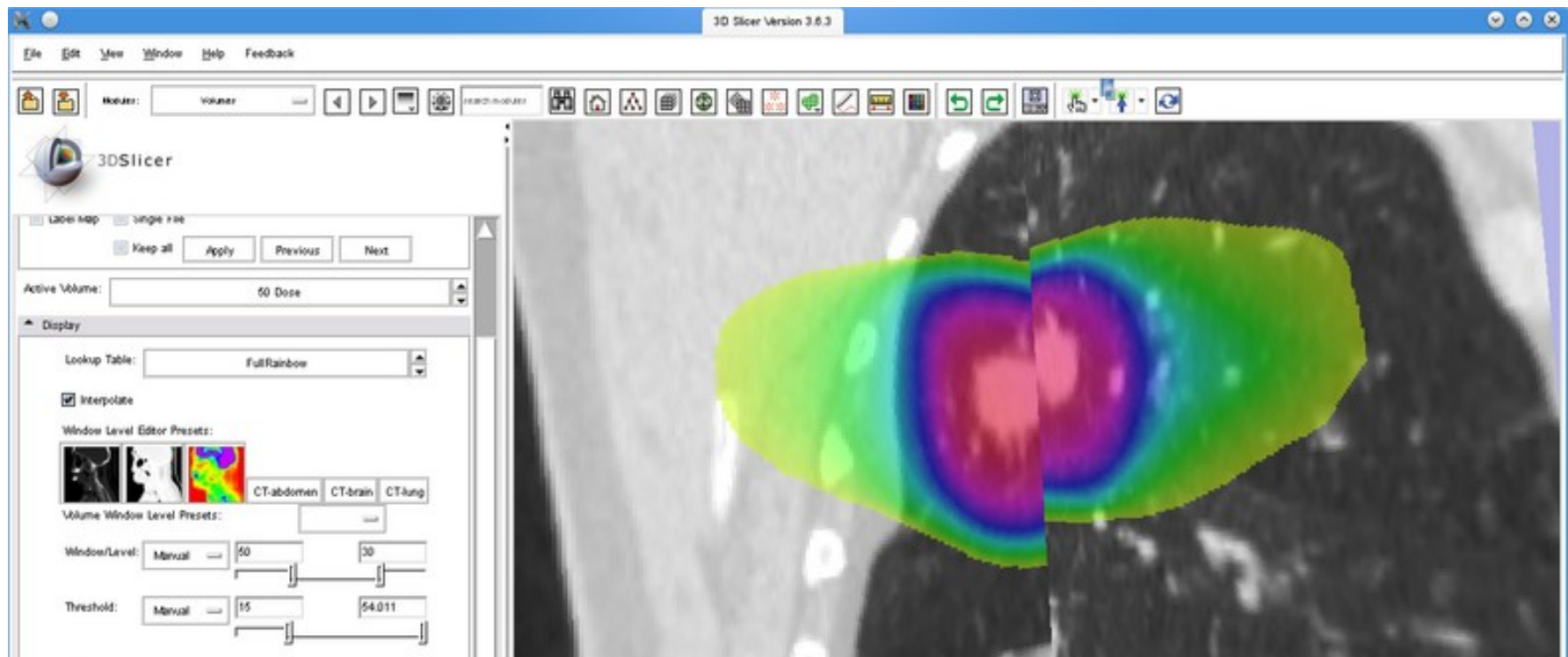
# DICOM-RT interchange

- Current Status
  - Two CLP modules
  - NA-MIC tutorial
- Outstanding Issues
  - Points of interest
  - RT Plan support
  - Nested structures
  - Structure names
  - others...



# Structure set and dose warping

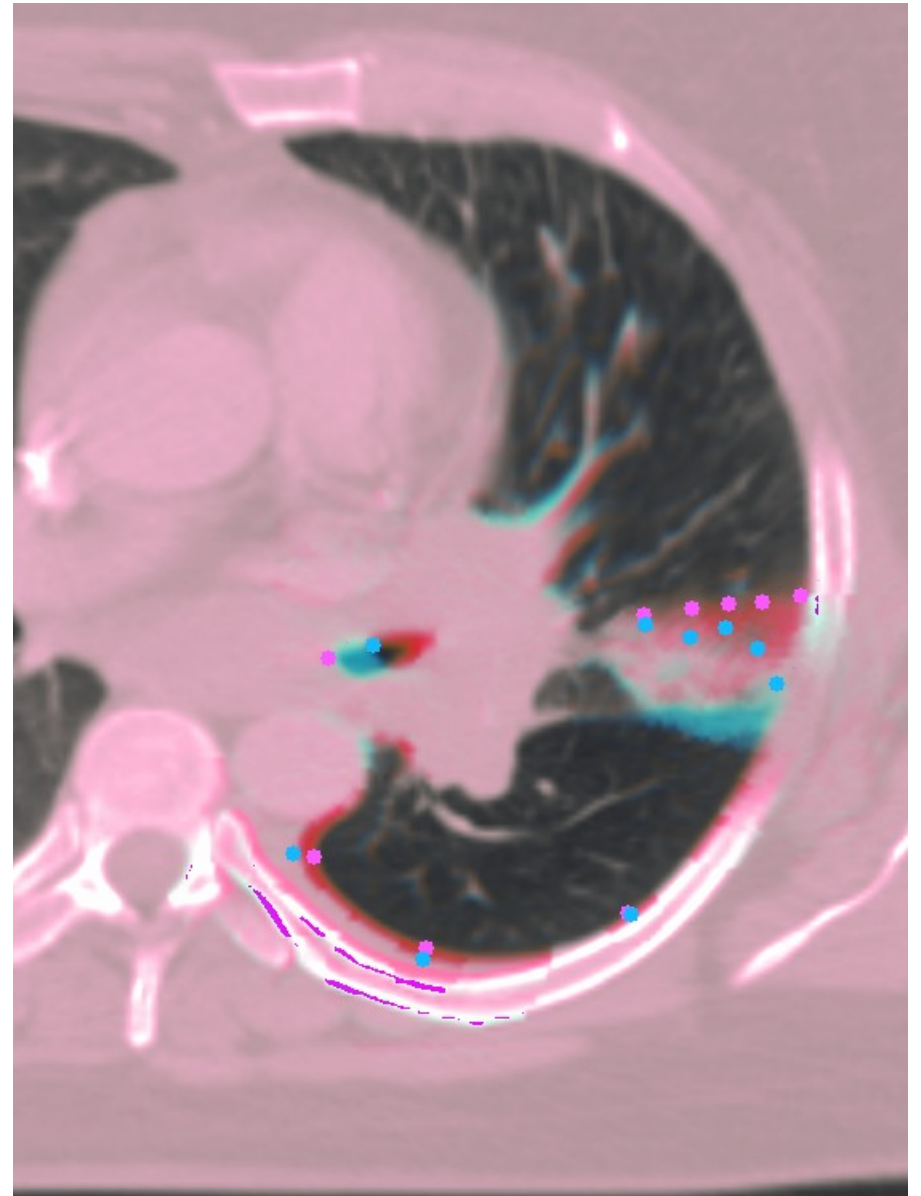
- Current status
  - Command line module
  - NA-MIC tutorial
  - B-spline or Vector field
  - Compatible with DICOM-RT import/export





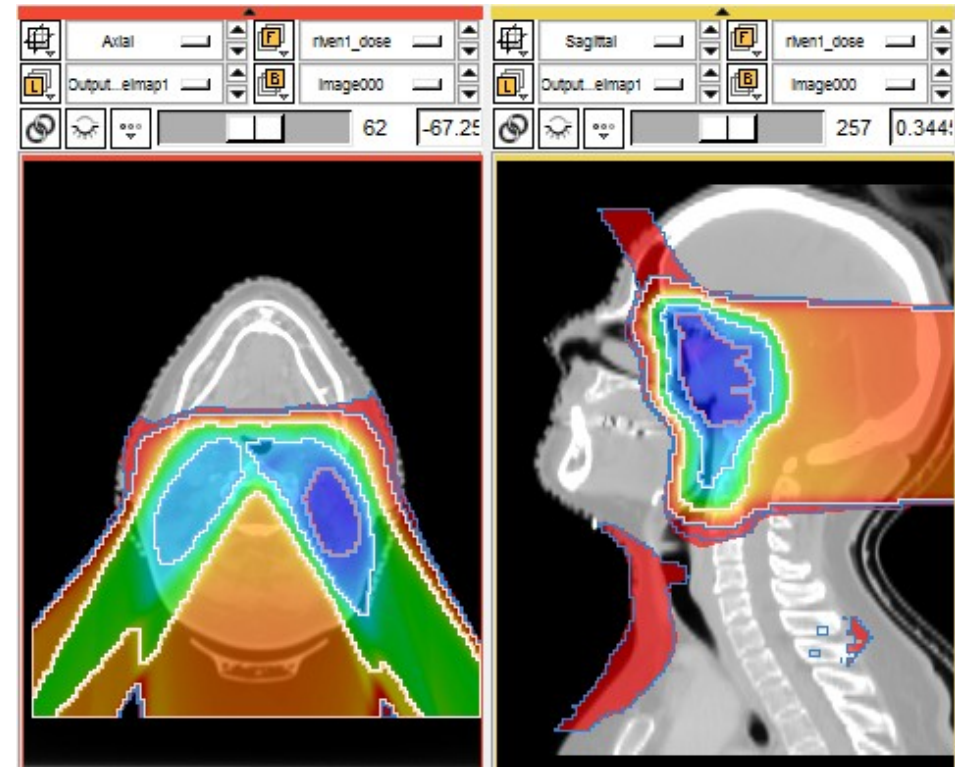
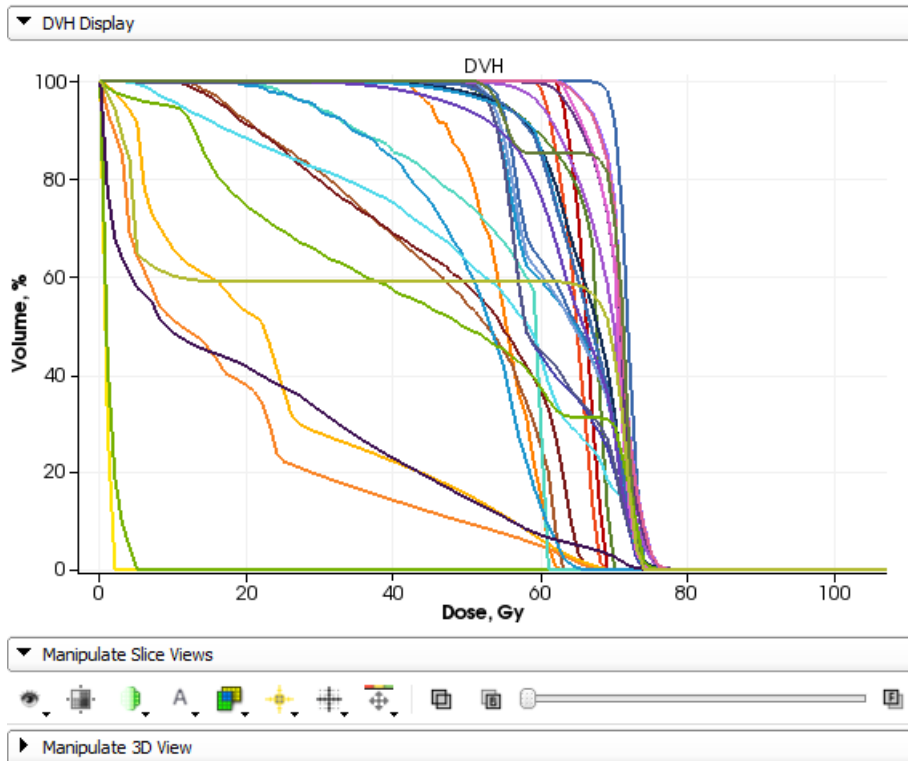
# Interactive deformable registration

- Current status
  - Command line module
  - NA-MIC tutorial
  - Three RBF types
  - Regularization
  - Vector field export



# Plan review

- Current status (WIP)
  - Dose volume histogram module (Pinter)
  - Dose comparison/isodose module (Shusharina)



An aerial, black and white photograph of a city, likely Cambridge, Massachusetts. In the foreground, a large, light-colored classical building with a prominent portico of four columns is visible. The city is densely packed with buildings, and a wide river flows through the middle ground. In the background, a large, domed building sits atop a hill. The overall scene is captured from a high angle, looking down on the city.

Thank you from the DBP team

MGH: Nadya Shusharina, James Shackelford,  
Annie Chan, George TY Chen, Greg Sharp

MIT: Amelia Arbisser, Ramesh Sridharan,  
Christian Wachinger, Polina Golland

GT/BU: Ivan Kolesov, Allen Tannenbaum

Isomics: Steve Pieper