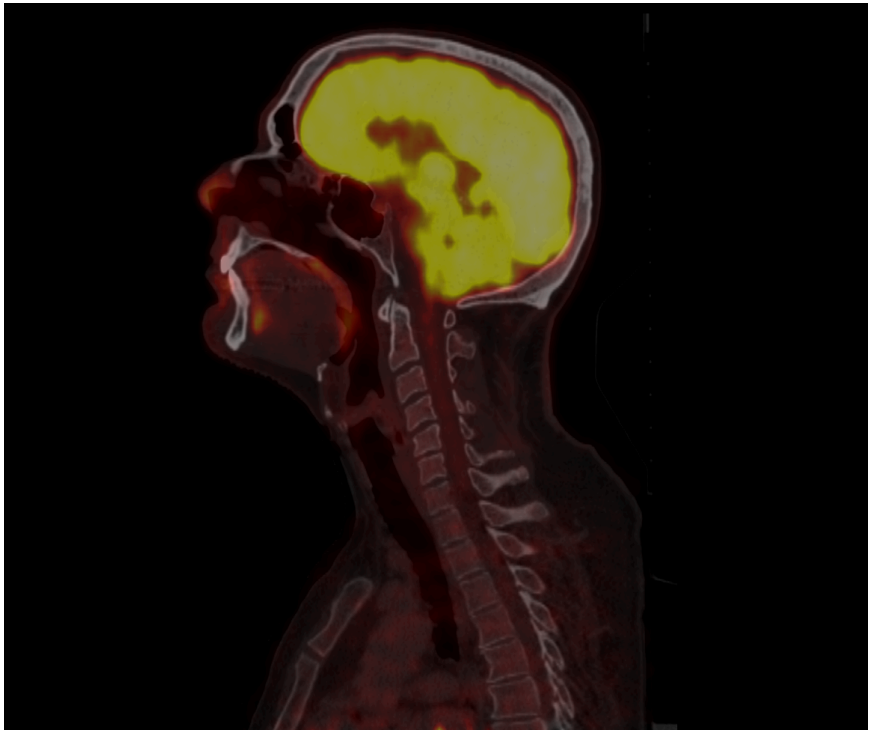
PET/CT Visualization and Analysis



Part III: PET/CT Analysis

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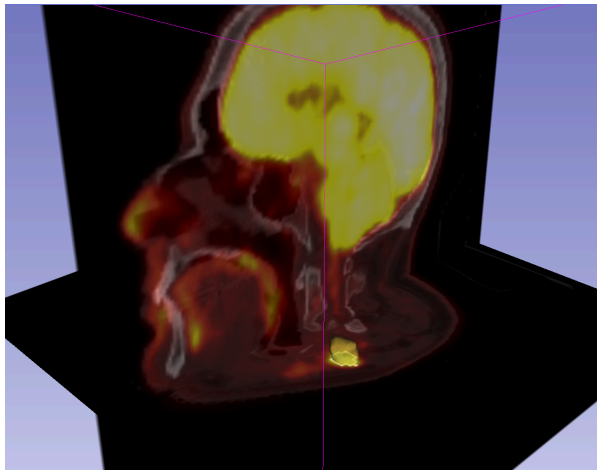
FDG-PET SUV

- Standardized Uptake Value (SUV) is a semi-quantitative measure derived from the determination of tissue activity obtained from a clinical PET study

SUV = Tissue Concentration of Radioactive Tracer x
Patient Weight / Injected Dose

- Under certain circumstances, 18-F Fluorodeoxyglucose (FDG) SUV correlates with metabolic rate of glucose and/or the number of viable tumor cells

Tutorial Case



- Pathology: poorly differentiated squamous cell carcinoma
- Treatment: radiotherapy and chemotherapy (weekly cis-platin)
- Two 18F-FDG PET and CT scans acquired within a 5-month interval.

PETCT tutorial: Clinical Case and Data

The datasets are located in

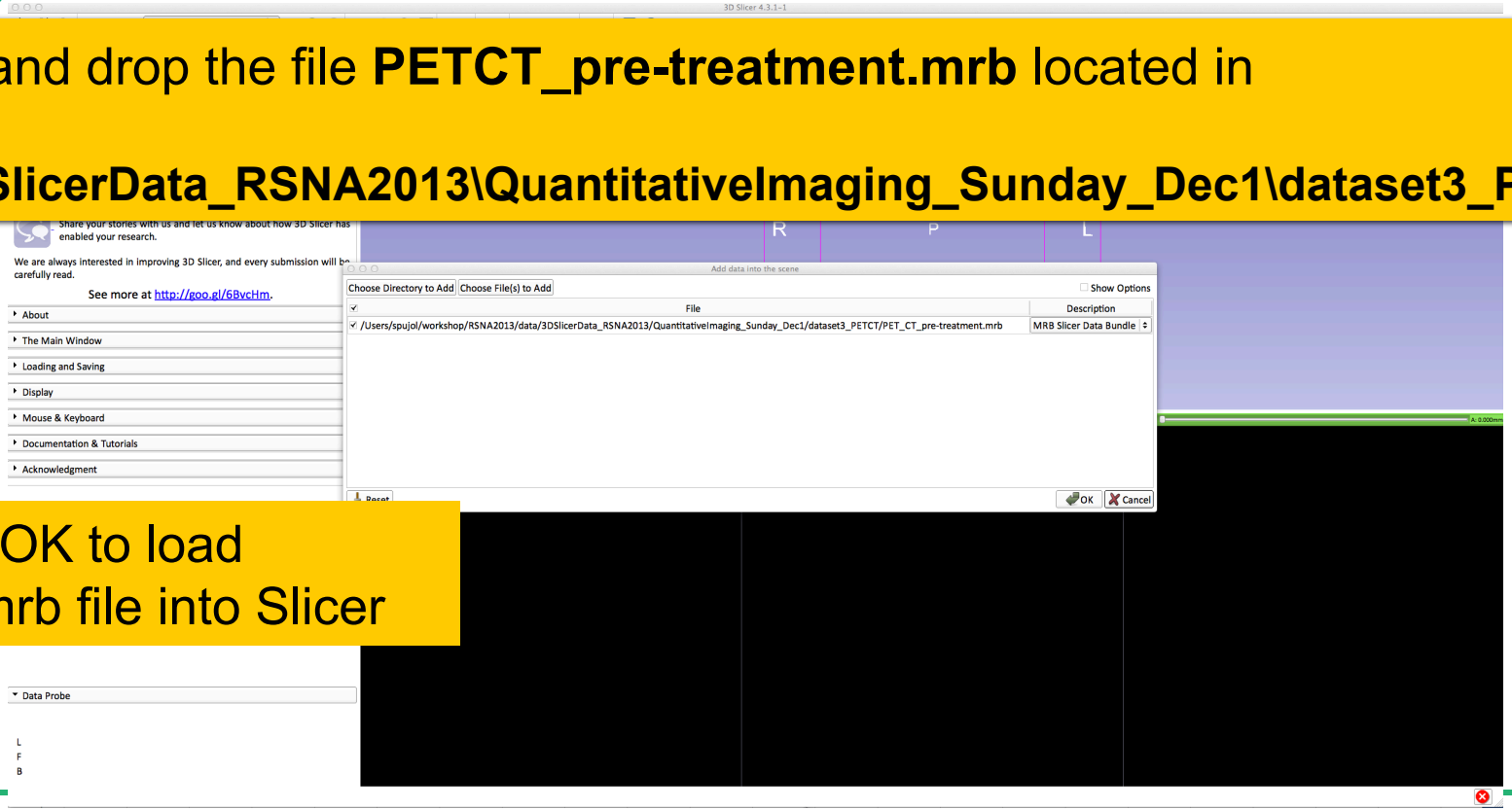
C:\3DSlicerData_RSNA2013\QuantitativeImagingSunday_Dec1\dataset3_PETCT

- **PETCT1 dataset** is located in the **pre-treatment directory** corresponds to the baseline
- **PETCT2 dataset** is located in the **post-treatment directory** corresponds to the follow-up scan.

Loading the PETCT scene

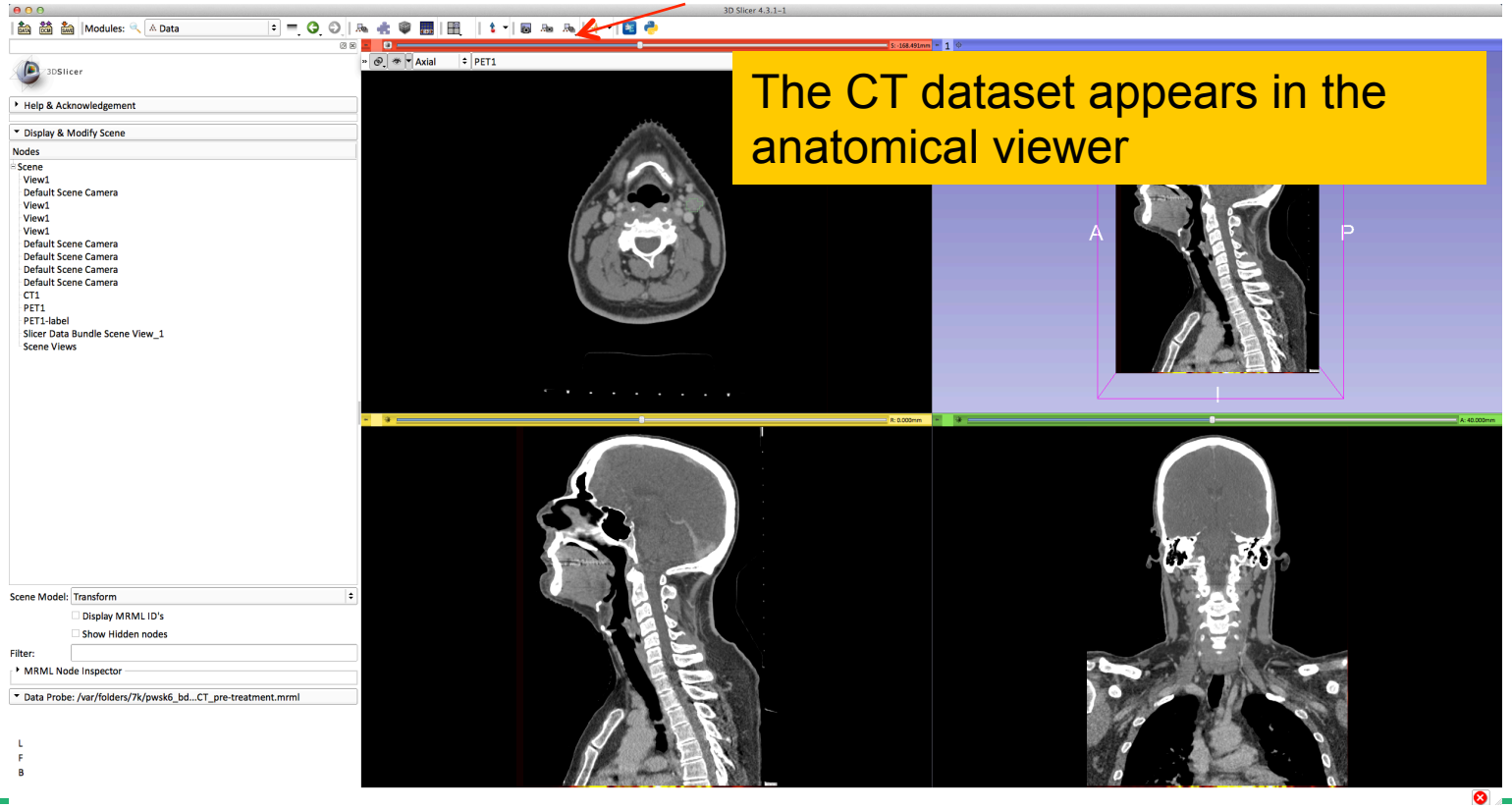
Drag and drop the file **PETCT_pre-treatment.mrb** located in

C:\3DSlicerData_RSNA2013\QuantitativeImaging_Sunday_Dec1\dataset3_PETCT

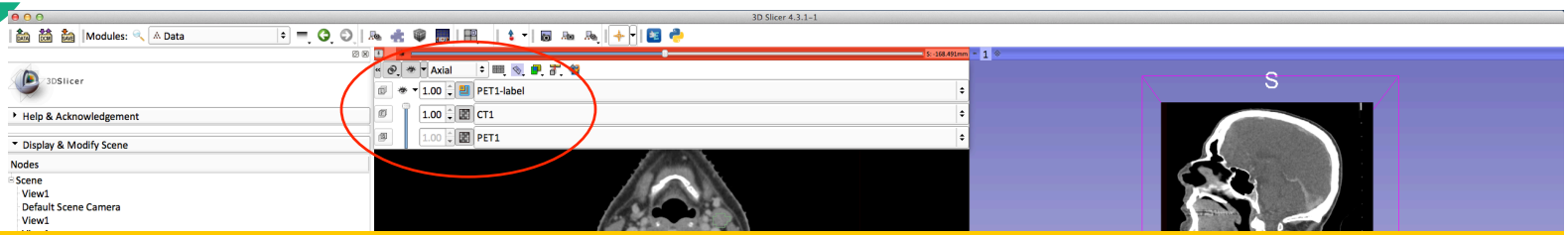


Click OK to load
the .mrb file into Slicer

Loading the PETCT scene



Loading a PETCT dataset



Left click on the pin icon in the top left corner to display the red slice viewer menu.

The **CT1** volume is displayed in the Foreground viewer

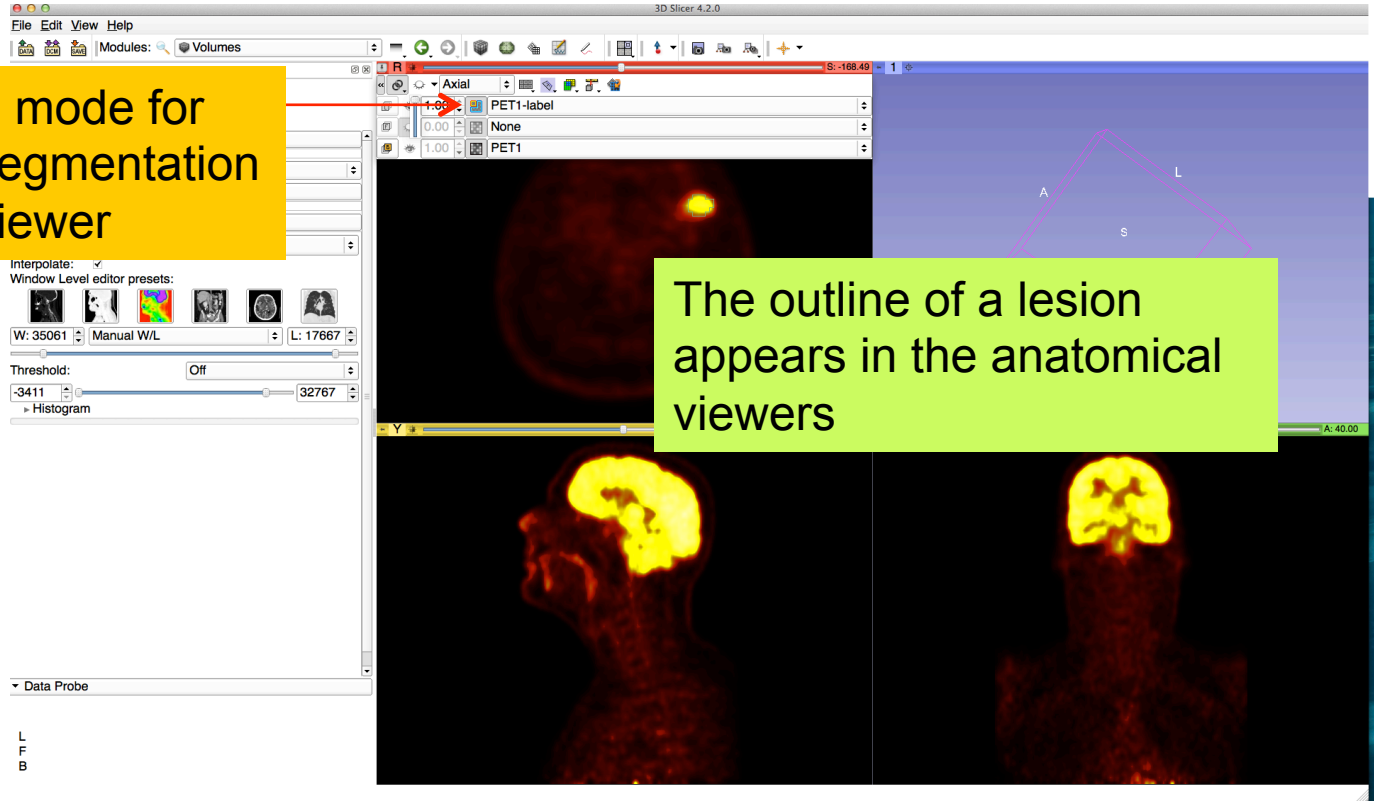
The **PET1** volume is displayed in the Background viewer

The **PET1-Label** is displayed in the Labelmap viewer

Use the slider to fade between the Bg viewer and the Fg viewer to display the PET volume overlaid on the CT volume

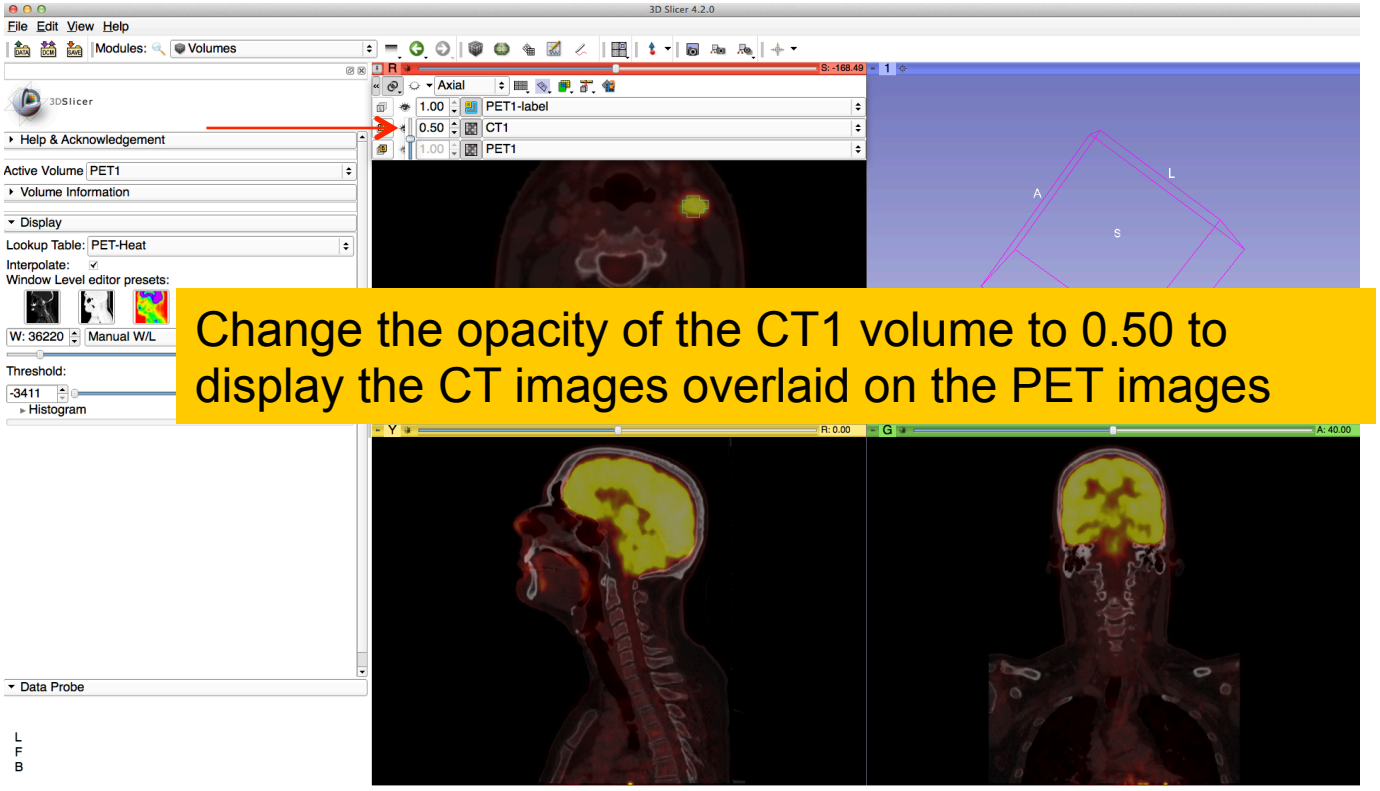
Visualization of PETCT data

Select the outline mode for the **PET1-label** segmentation in the labelmap viewer

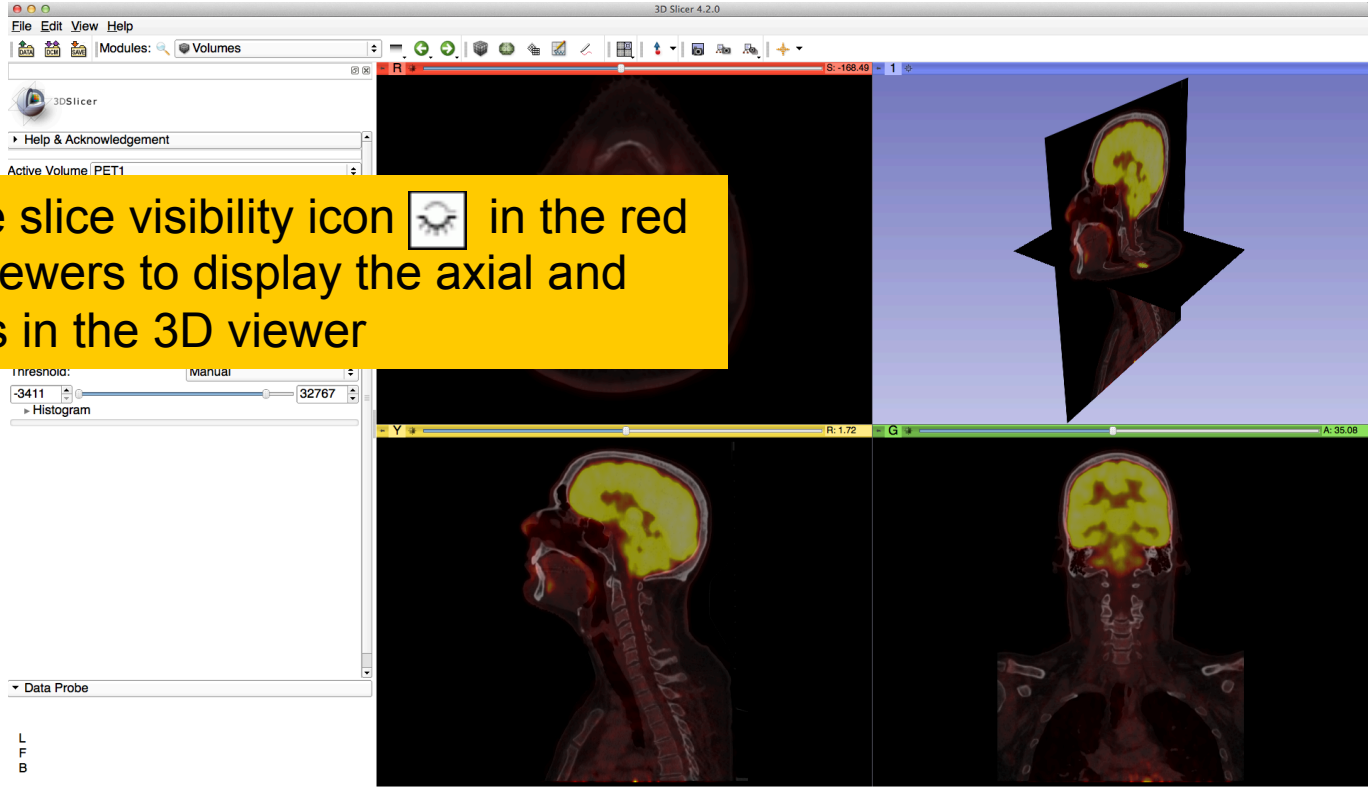


The outline of a lesion appears in the anatomical viewers

Visualization of PETCT data



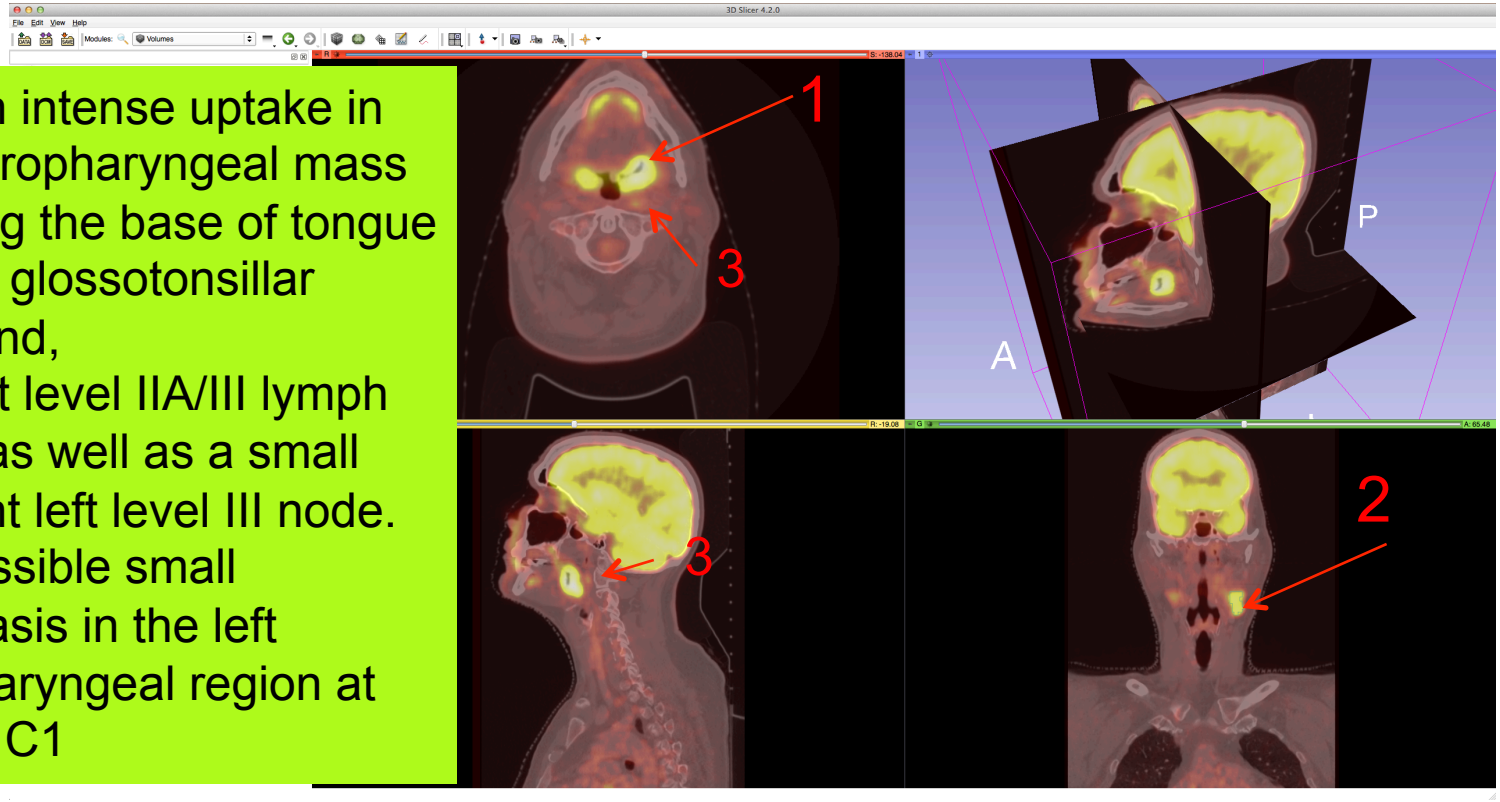
Visualization of PETCT data



Check on the slice visibility icon in the red and yellow viewers to display the axial and sagittal slices in the 3D viewer

PET uptake findings

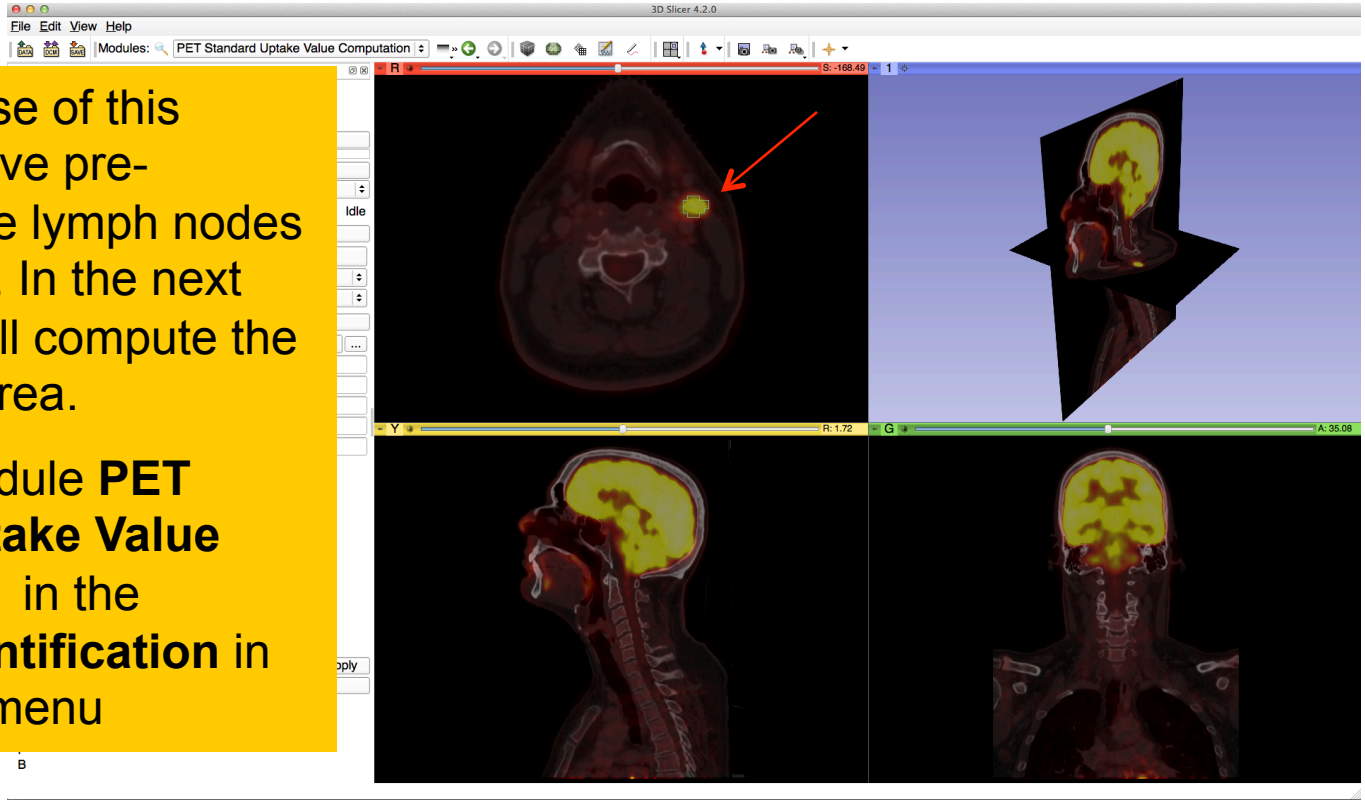
Note an intense uptake in
1) left oropharyngeal mass involving the base of tongue and left glossotonsillar fossa and,
2) in left level IIA/III lymph nodes as well as a small adjacent left level III node.
3) a possible small metastasis in the left retropharyngeal region at level of C1



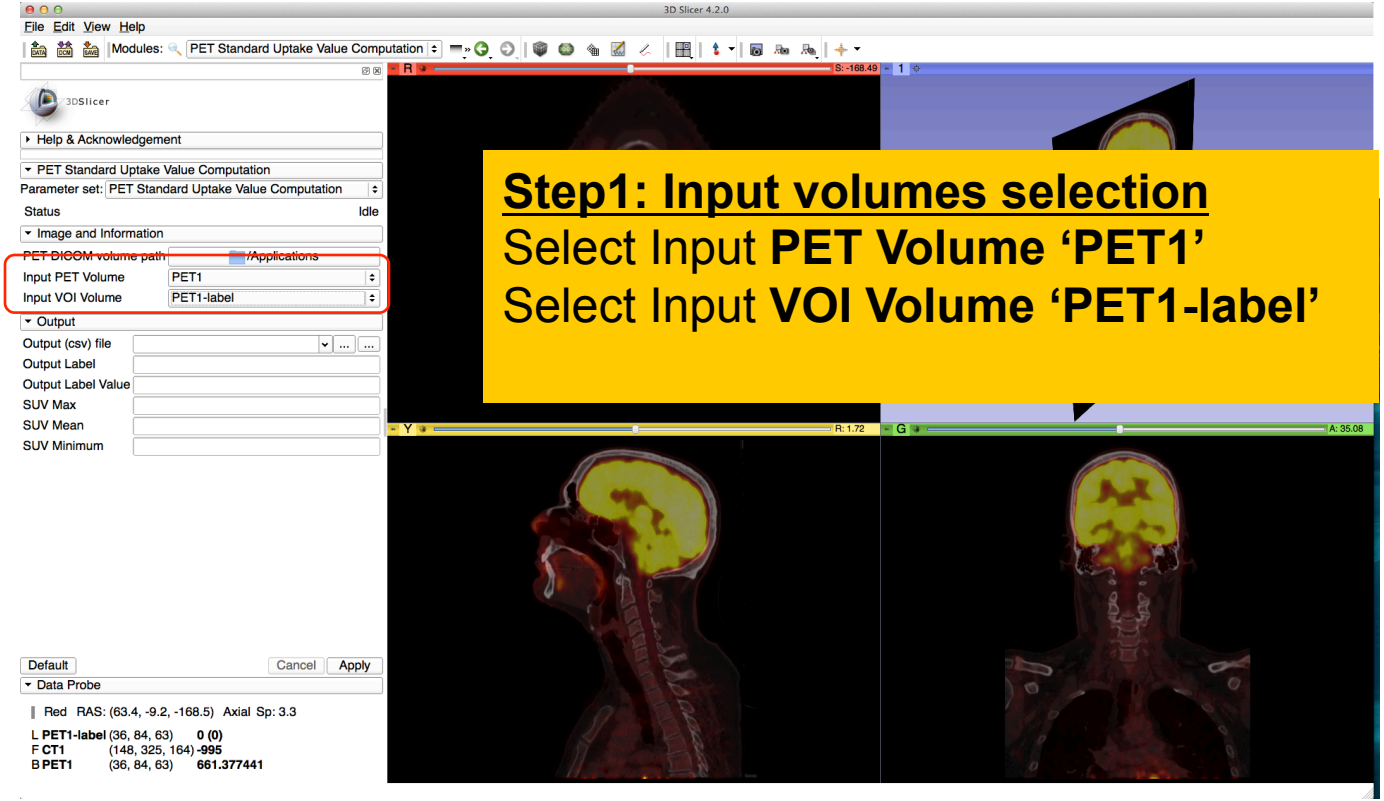
PET SUV Computation

For the purpose of this tutorial, we have pre-segmented the lymph nodes uptake region. In the next section, we will compute the SUV for this area.

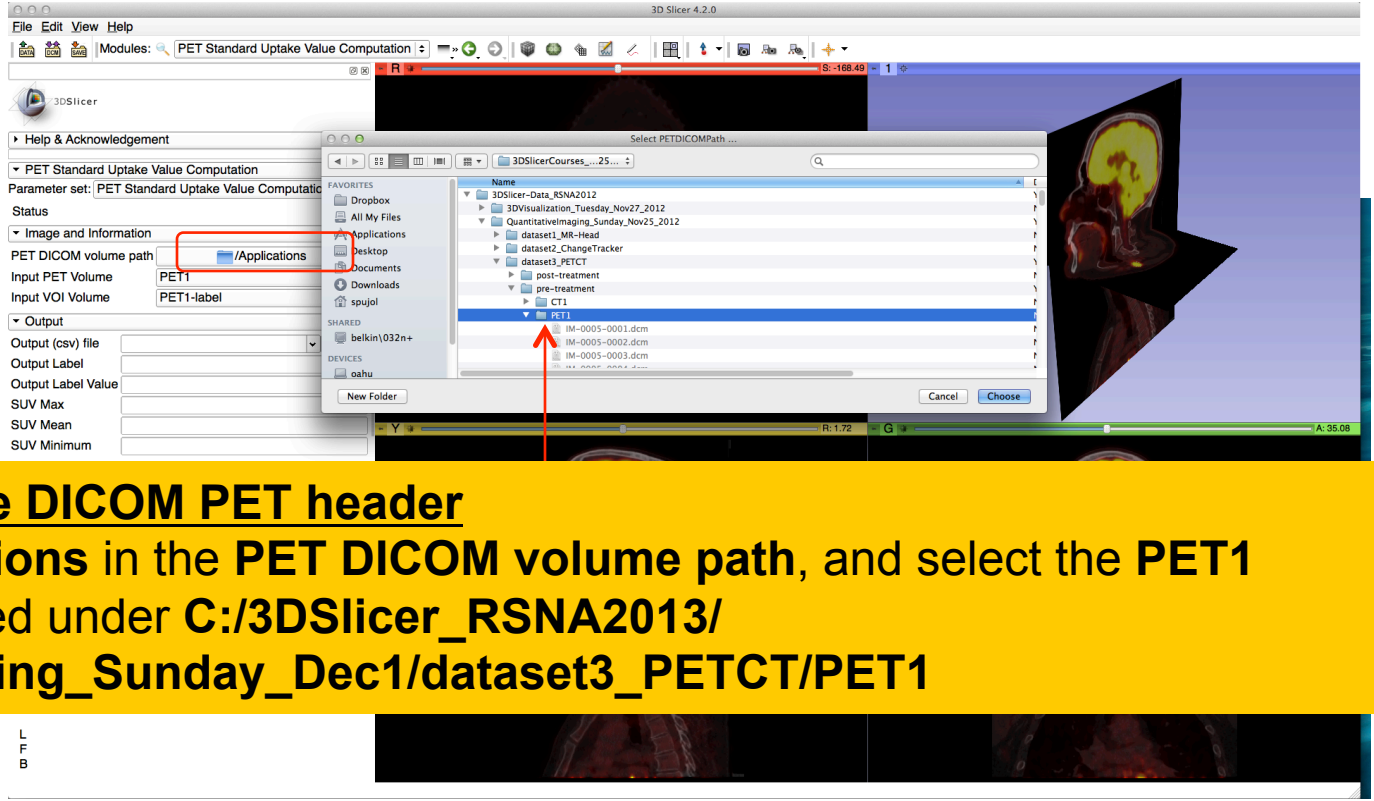
Select the module **PET Standard Uptake Value Computation** in the category **Quantification** in the modules' menu



PET SUV Computation



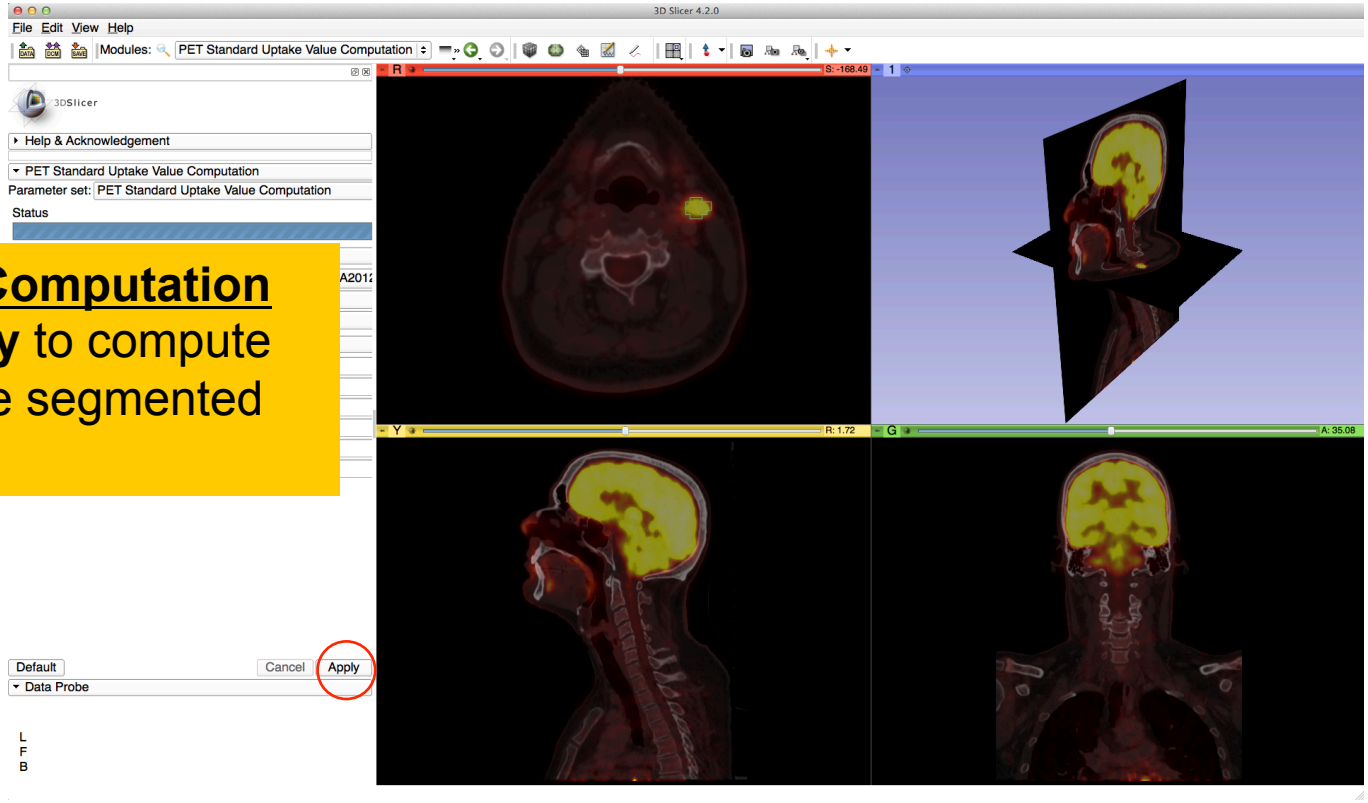
PET SUV Computation



<u>Step2: Path to the DICOM PET header</u>

Click on **/Applications** in the **PET DICOM volume path**, and select the **PET1** subdirectory located under **C:/3DSlicer_RSNA2013/QuantitativeImaging_Sunday_Dec1/dataset3_PETCT/PET1**

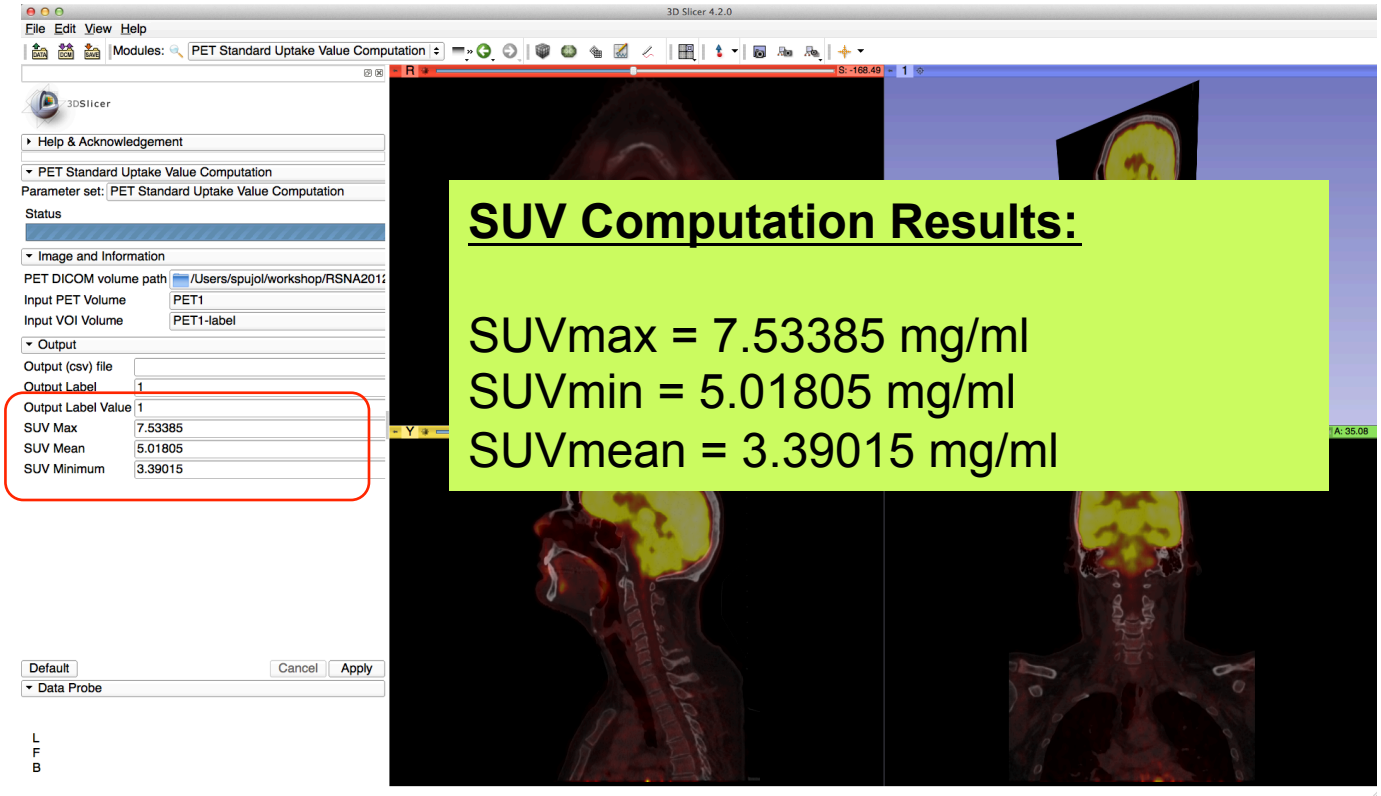
PET SUV Computation



Step3: SUV Computation

Click on **Apply** to compute the SUV in the segmented region

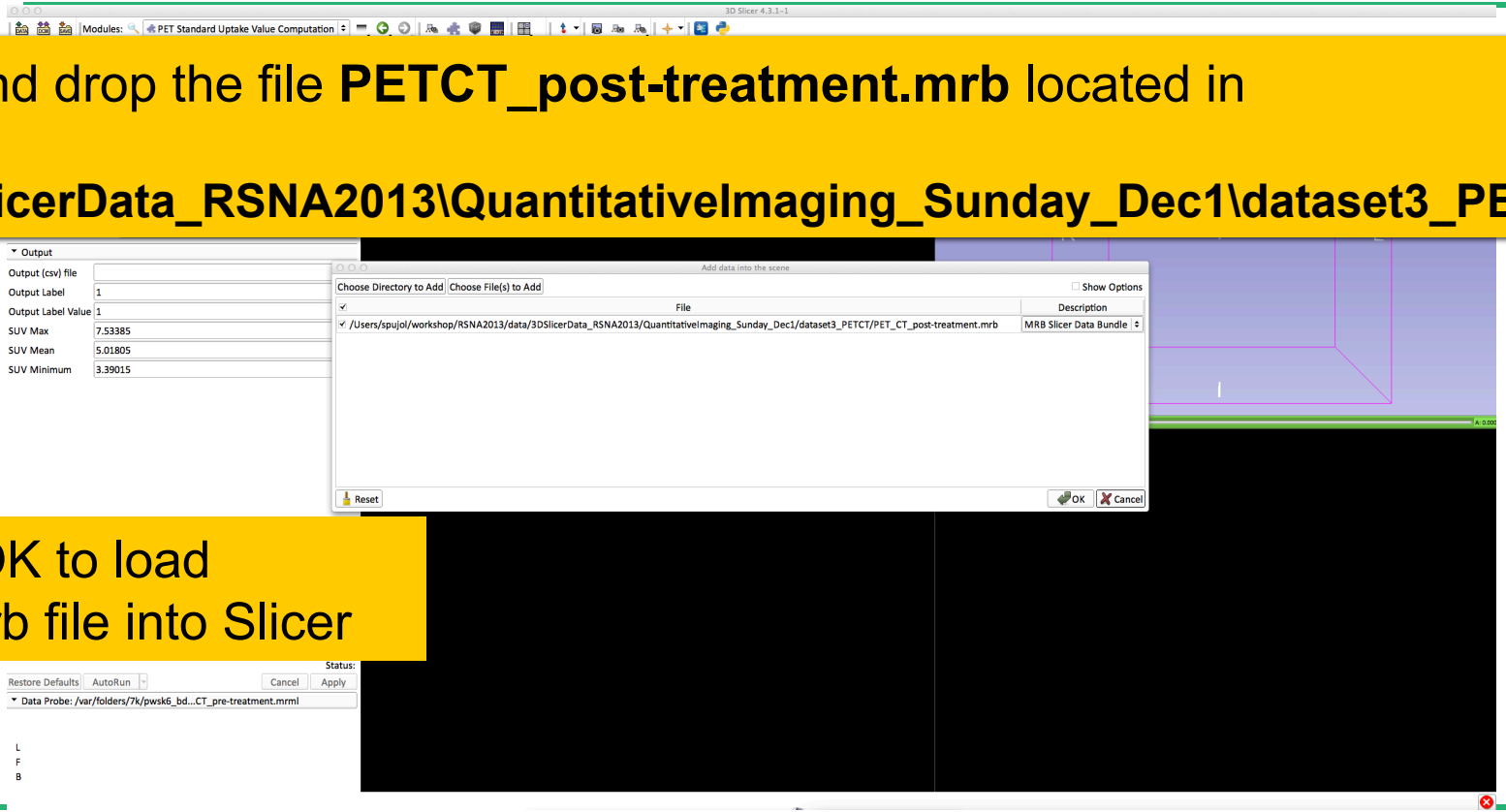
PET SUV Computation



Loading the PETCT scene

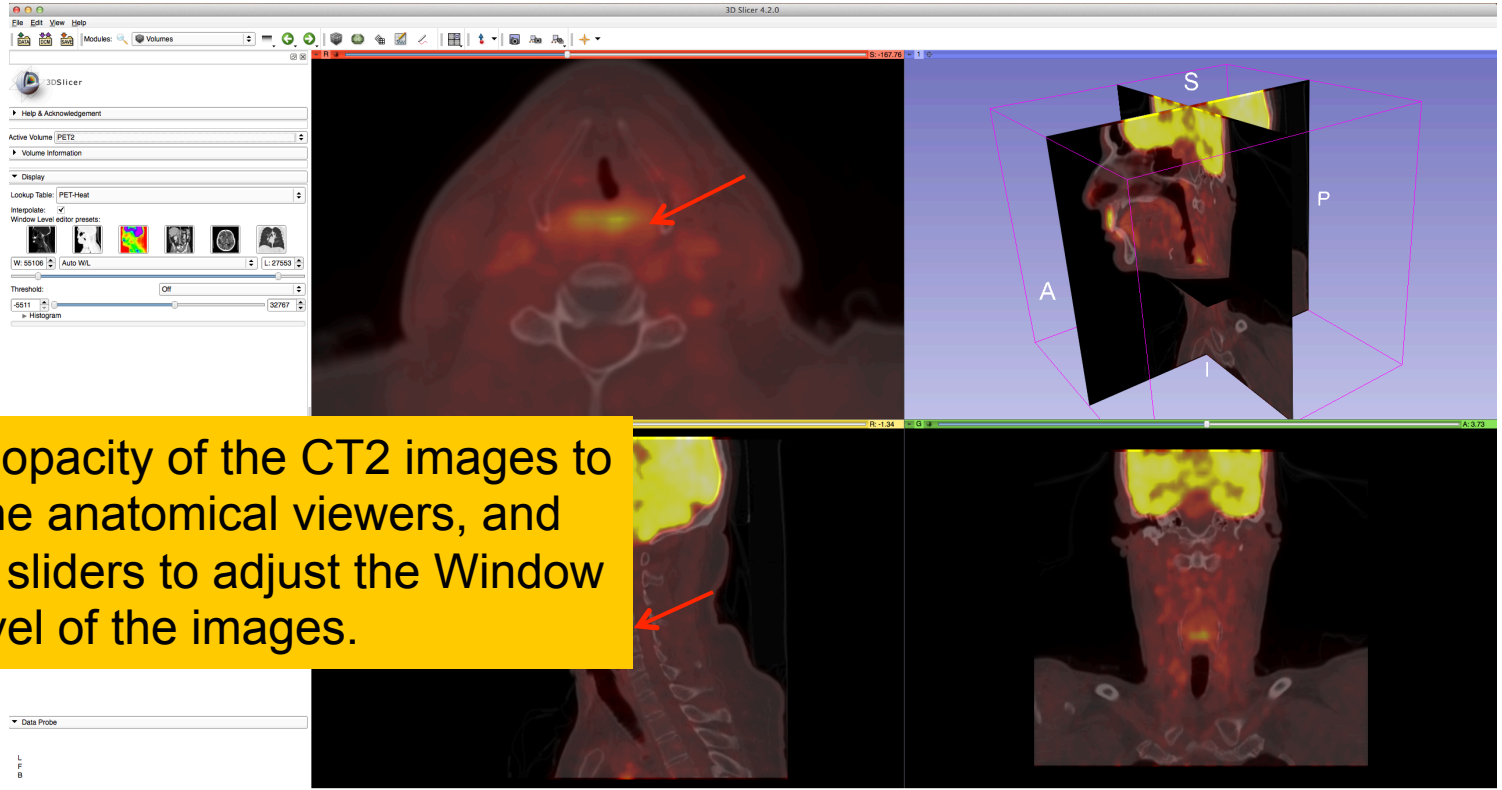
Drag and drop the file **PETCT_post-treatment.mrb** located in

C:\3DSlicerData_RSNA2013\QuantitativeImaging_Sunday_Dec1\dataset3_PETCT



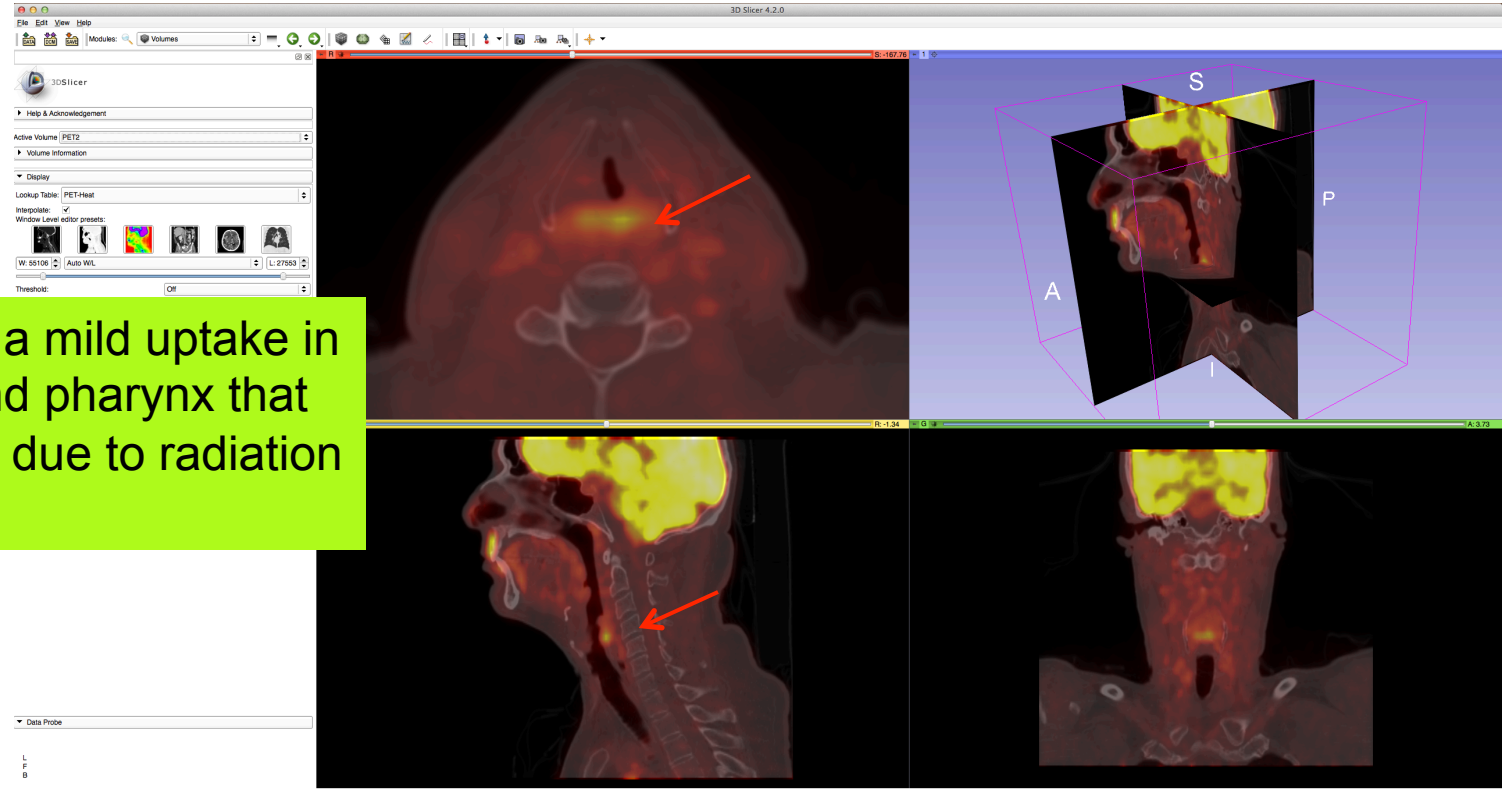
Click OK to load
the .mrb file into Slicer

PET uptake findings



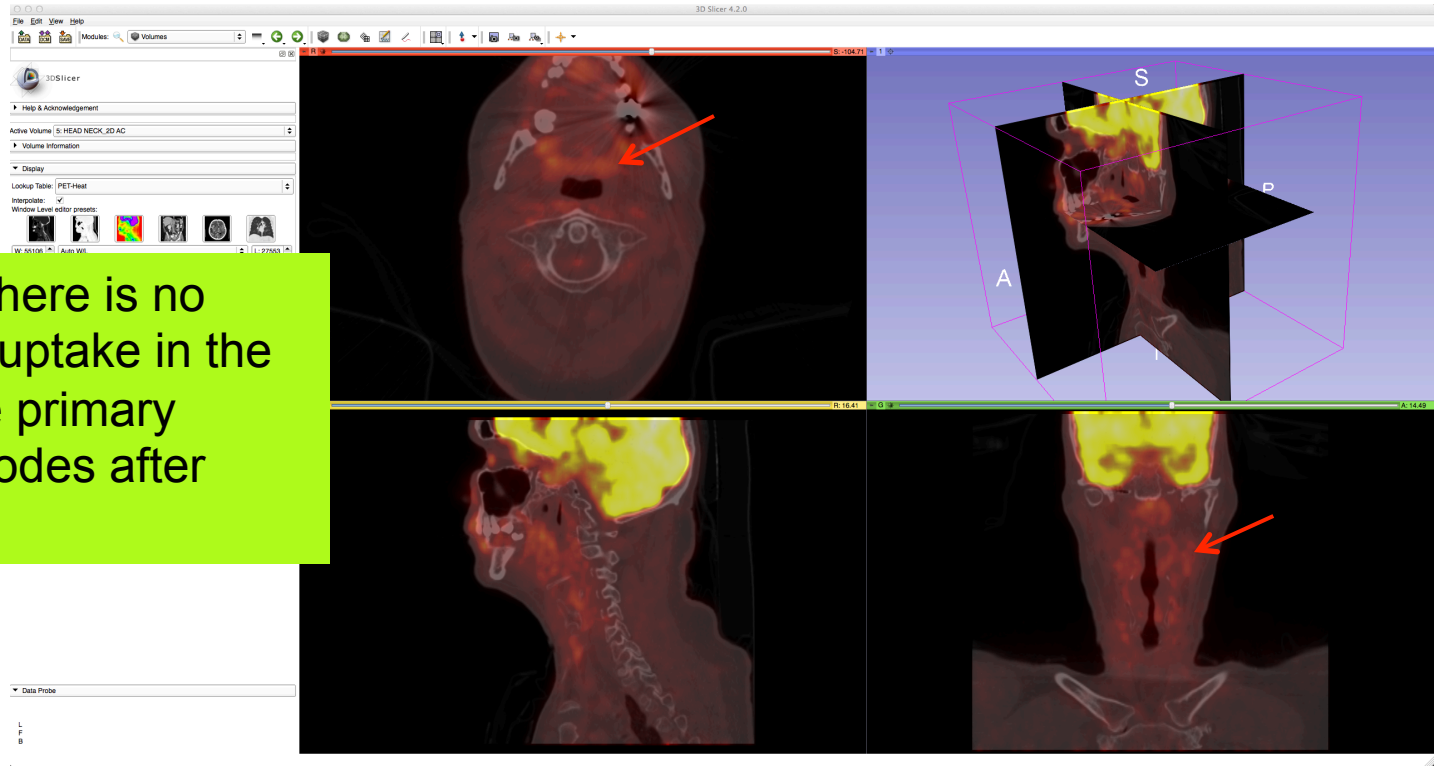
Set the opacity of the CT2 images to 0.5 in the anatomical viewers, and use the sliders to adjust the Window and Level of the images.

PET uptake findings



Observe a mild uptake in larynx and pharynx that are likely due to radiation effect.

PET uptake findings



Note that there is no remaining uptake in the area of the primary tumor or nodes after treatment

Acknowledgments

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