



Surgical Planning Laboratory
Brigham and Women's Hospital
Boston, Massachusetts USA

a teaching affiliate of
Harvard Medical School

3D VISUALIZATION OF DICOM IMAGES FOR RADIOLOGICAL APPLICATIONS

Sonia Pujol, PhD, Harvard Medical School
Surgical Planning Laboratory, Brigham and Women's Hospital

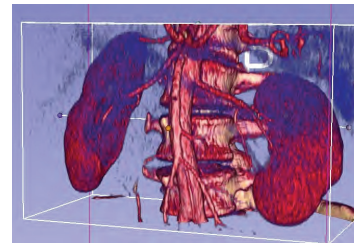
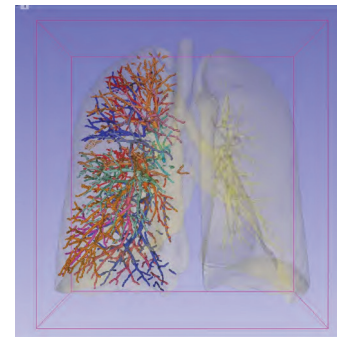
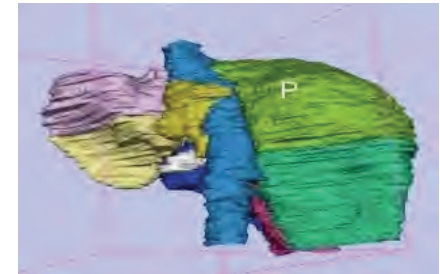
Kitt Shaffer, MD, PhD, Boston University
Vice-Chairman for Education, Boston University School of Medicine

Ron Kikinis, MD, Harvard Medical School
Surgical Planning Laboratory, Brigham and Women's Hospital



3D Visualization of DICOM images for Radiological applications

Following this tutorial, you will be able to **load and visualize DICOM volumes** with 3D Slicer, and to **interact in 3D with structural images and models of the anatomy.**

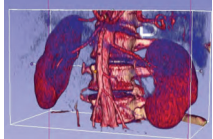




Overview

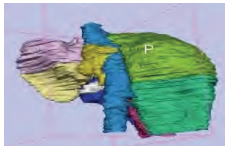


Part I: Introduction to the 3DSlicer software



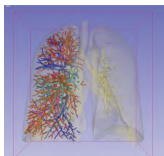
Part II: 3D Data Loading and visualization of DICOM images

- Volume Rendering of thoraco-abdominal CT data
- Surface Rendering of MR head data



Part III: 3D interactive exploration of the anatomy

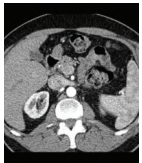
- Exploration of the Segments of the liver
- Exploration of the Segments of the lung





Tutorial Datasets

The tutorial data include 4 datasets:



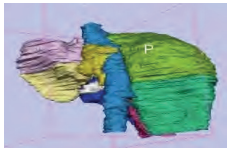
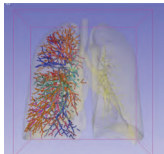
3D Visualization DICOM images part 1:

- dataset1_Thorax_Abdomen
- dataset2_Head



3D Visualization DICOM images part 2

- dataset3_Liver
- dataset4_Chest

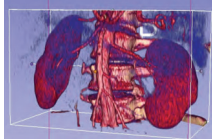




Overview

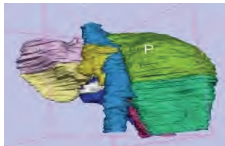


Part I: Introduction to the 3DSlicer software



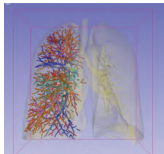
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- Surface Rendering of MR head data



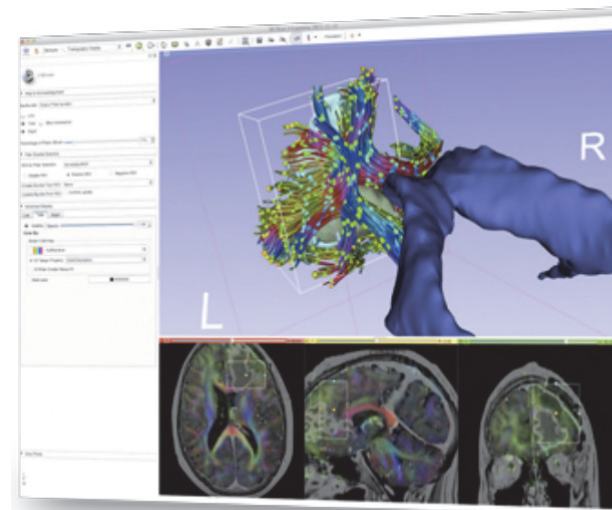
Part III: 3D interactive exploration of the anatomy

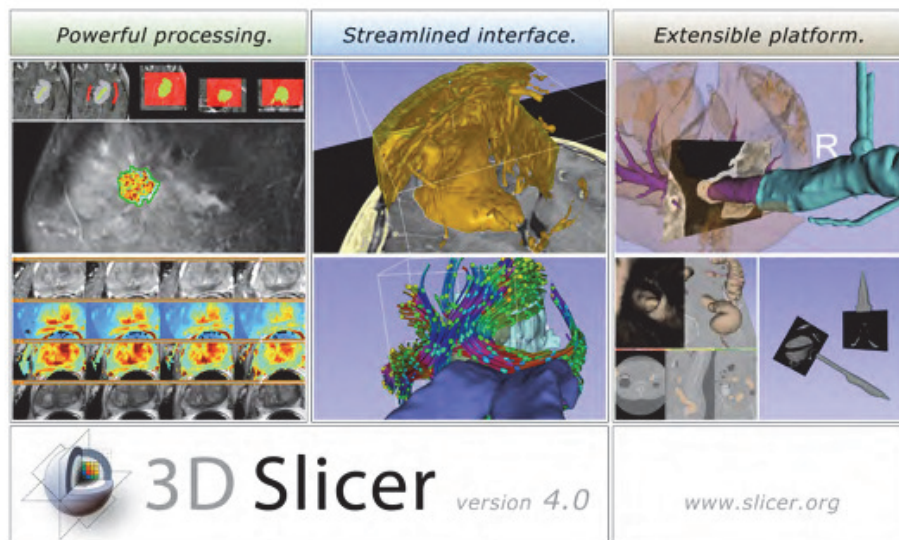
- Exploration of the Segments of the liver
- Exploration of the Segments of the lung





Introduction to the 3DSlicer software



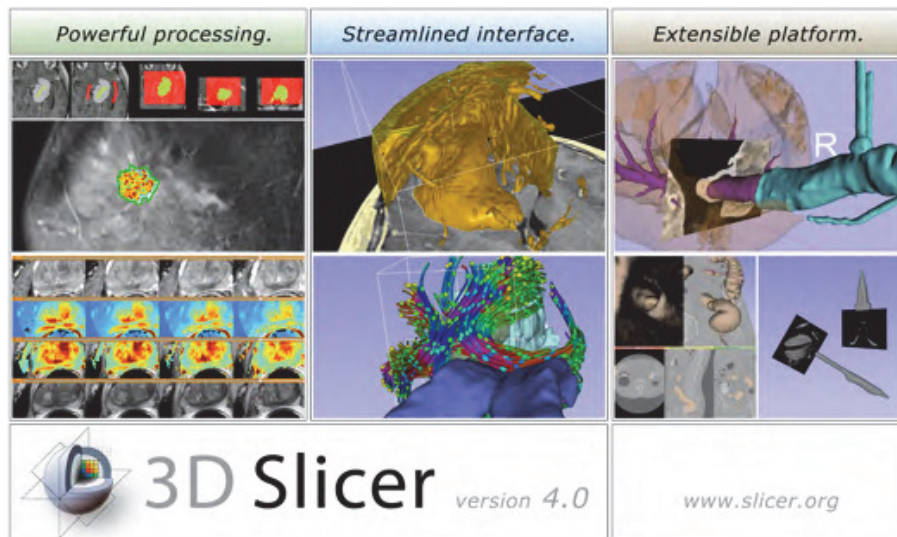


3D Slicer is a freely available **open-source** platform for segmentation, registration and 3D visualization of medical imaging data.

3D Slicer is a **multi-institutional effort** supported by the **National Institute of Health**.



3DSlicer



- 3DSlicer version 4.3 is a **multi-platform software** running on Windows, Linux, and Mac OSX
- Slicer is distributed under a **BSD license** with no restriction on use
- Slicer is a tool for research, and is **not FDA** approved

Disclaimer

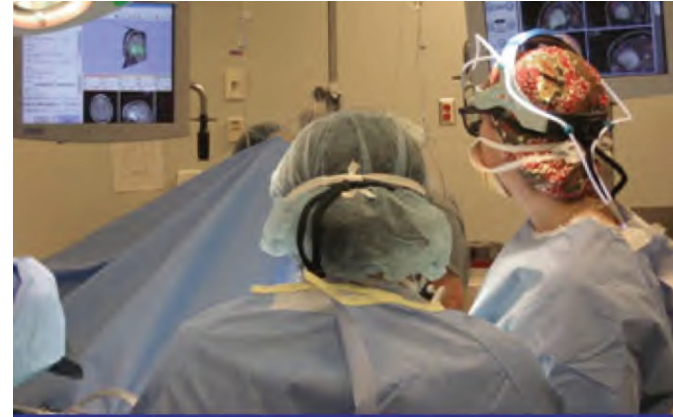
It is the responsibility of the user of 3DSlicer to comply with both the terms of the license and with the applicable laws, regulations and rules.



An interdisciplinary platform



An **open-source environment** for software developers



An **end-user application** for clinical investigators and scientists

A software platform that is both **easy to use** for clinical researchers and **easy to extend** for programmers



3DSlicer History

- 1997: Slicer started as a research project between the Surgical Planning Lab (Harvard) and the CSAIL (MIT)

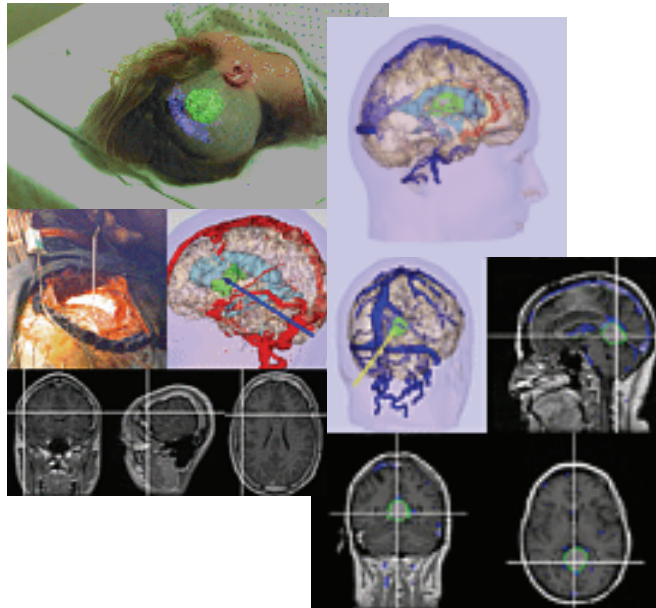
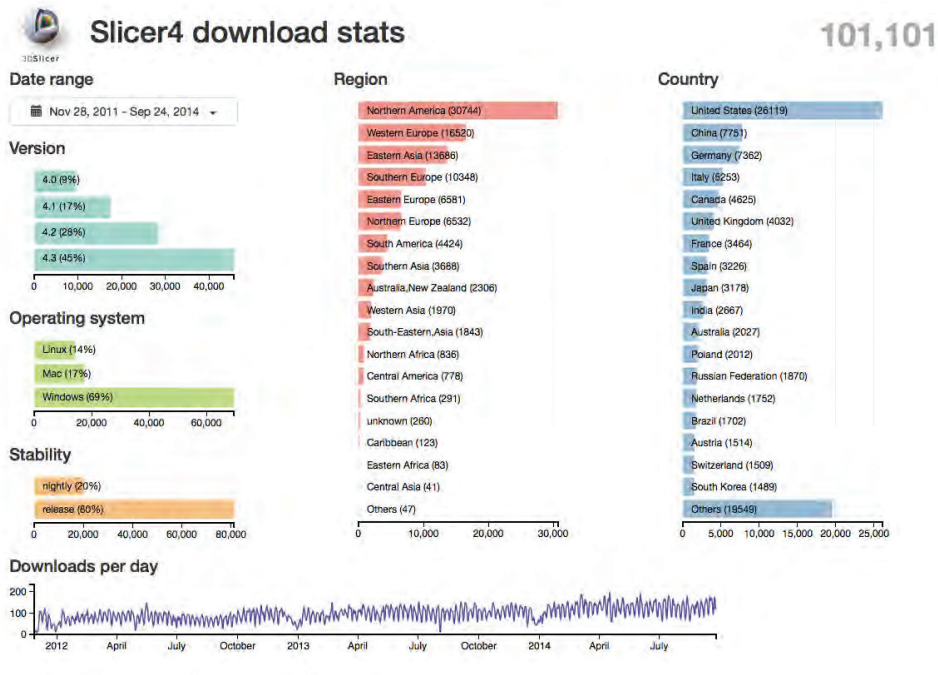


Image Courtesy of the CSAIL, MIT



3DSlicer History



- 1997: Slicer started as a research project between the Surgical Planning Lab (Harvard) and the CSAIL (MIT)
- 2014: Multi-institution effort to share the latest advances in image analysis with the clinical and scientific community



A multi-institution: NA-MIC, NAC, NCIGT



National Alliance for Medical Image Computing
A National Center for Biomedical Computing
Funded under the NIH Roadmap Initiative

Google Custom Search **Search**

NA-MIC Wiki

General

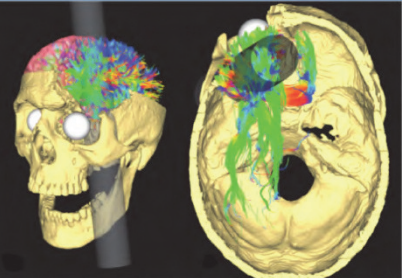
- Overview
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Center Components

- Algorithms
- Engineering
- Driving Biological Projects
- Collaboration Grants

Resources

- Publication DB
- Image Gallery
- Downloads
- Service
- Training
- Dissemination
- Events
- Links



Modeling the path of the tamping iron through the Gage skull and its effects on white matter structure. Read more.

1 of 24 Photos

The National Alliance for Medical Image Computing (NA-MIC) is a multi-institutional, interdisciplinary team of computer scientists, software engineers, and medical investigators who develop computational tools for the analysis and visualization of medical image data. The purpose of the Center is to provide the infrastructure and environment for the development of computational algorithms and open-source technologies, and then oversee the training and dissemination of these tools to the medical research community.

Supported by the National Institutes of Health

Information about collaborating with NA-MIC



Neuroimage Analysis Center
"understanding the human brain through imaging"

Google Custom Search **GO**

About the NAC

- Overview
- Organization
- Research Cores
- Collaborators

Resources

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- Web Archive



FMRI-DTI Modeling via Landmark Distance Atlases for Prediction and Detection of Fiber Tracts

Leave-one-out prediction of tract location according to the landmark distance atlas (LDA). Each subject's fMRI activation peaks and anatomical landmarks, plus the leave-one-out LDA from the other subjects, were used to predict the location of the AC, left CST, and right CST. The true structures for each subject are shown in dark blue, and the 80% confidence interval for the predicted trajectory is shown in transparent cyan. These results provide an alternative visualization of the data in the learned landmark distance model and they demonstrate reasonable model generalization to novel subjects.

Featured Image Archive

The Neuroimage Analysis Center (NAC) develops image processing and analysis techniques for basic and clinical neurosciences. The NAC research approach emphasizes both specific core technologies and collaborative application projects. The activities of the NAC are centered at the Harvard Medical School and the Surgical Planning Laboratory at the Brigham and Women's Hospital, with collaborators throughout the United States and the rest of the world.

Research center supported by the National Center for Research Resources (NCRR) and the Institute of Biomedical Imaging and Bioengineering (NIIB).



National Center for Image-Guided Therapy

NCIGT Wiki

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Advanced Multimodality Image Guided Operating (AMIGO) Suite

The Advanced Multimodality Image Guided Operating (AMIGO) Suite is an innovative surgical and interventional environment that is the clinical translational test bed of the National Center for Image-Guided Therapy (NCIGT) at the Brigham and Women's Hospital (BWH) and Harvard Medical School. The AMIGO is an integrated, 5,700 square foot area divided into three sterile procedure rooms in which a multidisciplinary team will treat patients with the benefit of intra-operative imaging using multiple modalities. More...

Featured Image Archive

The National Center for Image Guided Therapy (NCIGT) is a Biomedical Technology Resource Center supported by the NCRR and NIIB institutes

PI: Ron Kikinis, M.D.

PIs: Ferenc Jolesz, M.D.,
Clare Tempany, M.D.



Slicer: Behind the scenes

CDash - Slicer4

WARNING: This CDash instance is running the bleeding edge svn trunk CDash code, and is updated frequently. You file changed by 1 author as of Sunday, November 27 2011 - 22:00 EST

1 file changed by 1 author as of Sunday, November 27 2011 - 22:00 EST

Nightly-Packages

Site	Build Name	Update		Configure		Build	
		Files	Error	Warn	Error	Warn	
factory-win7.kitware	Windows7-VS2010-32bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	0	0	0	0	107	
factory-mac-64bits.kitware	SnowLeopard-g++4.2.1-64bits-QT4.7-PythonQt-With-Tcl-CLI-Release	1	0	0	0	14	
factory-ubuntu-64bits.kitware	Linux-g++4.4.3-64bits-QT4.7-PythonQt-With-Tcl-CLI-Release	1	0	0	0	13	
factory-win7.kitware	Windows7-VS2008-64bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	0	0	0	0	1000	
factory-win7.kitware	Windows7-VS2008-32bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	1	0	0	0	1000	

Nightly

Site	Build Name	Update		Configure		Build		Test			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass		
whitecube.kitware	SnowLeopard-gcc4.2.1-QT4.7.0-PythonQt-With-Tcl-Release	7	0	0	27	190	0	26	331	11 hours ago	
youpi.sci.utah.edu	OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Tcl-NoCLI-Release	0	0	0	0	15	0	0	5	11 hours ago	
erik.kitware	Linux-g++4.4-QT4.6.3-PythonQt-CLI-Release	1	0	0	0	15	0	20	151	3 hours ago	
factory-ubuntu-64bits.kitware	Linux-g++4.4.3-QT4.7-PythonQt-With-Tcl-CLI-Valgrind-Release	0	0	0	0	13	0	27	160	11 hours ago	
factory-ubuntu-64bits.kitware	Linux-g++4.4.3-64bits-QT4.7-PythonQt-With-Tcl-NoCLI-Coverage-Release	0	0	0	0	12	0	0	287	11 hours ago	
sagemath.kitware	Linux-g++4.3.3-QT4.7-PythonQt-With-Tcl-NoCLI-Release	0	0	0	0	12	0	29	288	12 hours ago	

Continuous

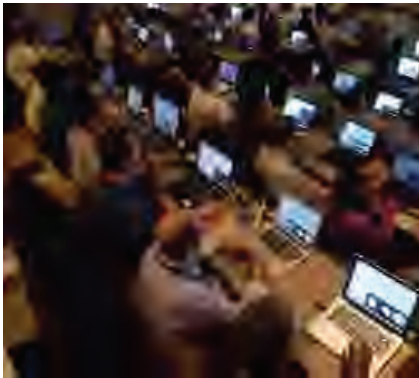
Site	Build Name	Update		Configure		Build		Test			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass		
youpi.sci.utah.edu	OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Tcl-NoCLI-Release	2	0	0	0	0	0	20	5	1 hour ago	

Slicer is built
night on Win
Mac and Lin
platforms

Slicer is built every night on Windows, Mac and Linux platforms



Slicer Training events



- Hands-on training workshops at national and international venues
- More than 2,700 clinicians, clinical researchers and scientists trained since 2005



Slicer Training events



RSNA 2011

Major international conferences

- **RSNA** 2008, 2009, 2010, 2011, 2012, 2013, 2014
- **MICCAI** 2008, 2009, 2011, 2012, 2013, 2014
- **SfN** 2009, 2011
- **SPIE** 2012, 2013, 2014
- **CAOS** 2010
- **CARS** 2010, 2012, 2013



RSNA Activities

Hands-on refresher courses

- 3D Visualization of DICOM images for Radiology Applications
- Quantitative Imaging for Clinical Research and Practice

Quantitative Imaging Reading Room Exhibit

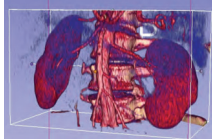
- 3DSlicer: An Open Source Platform for Segmentation, Registration, Quantitative Imaging, and 3D Visualization of Multi-Modal Image Data.



Overview

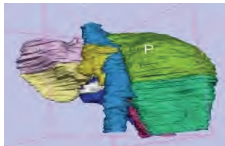


Part I: Introduction to the 3DSlicer software



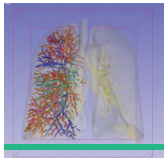
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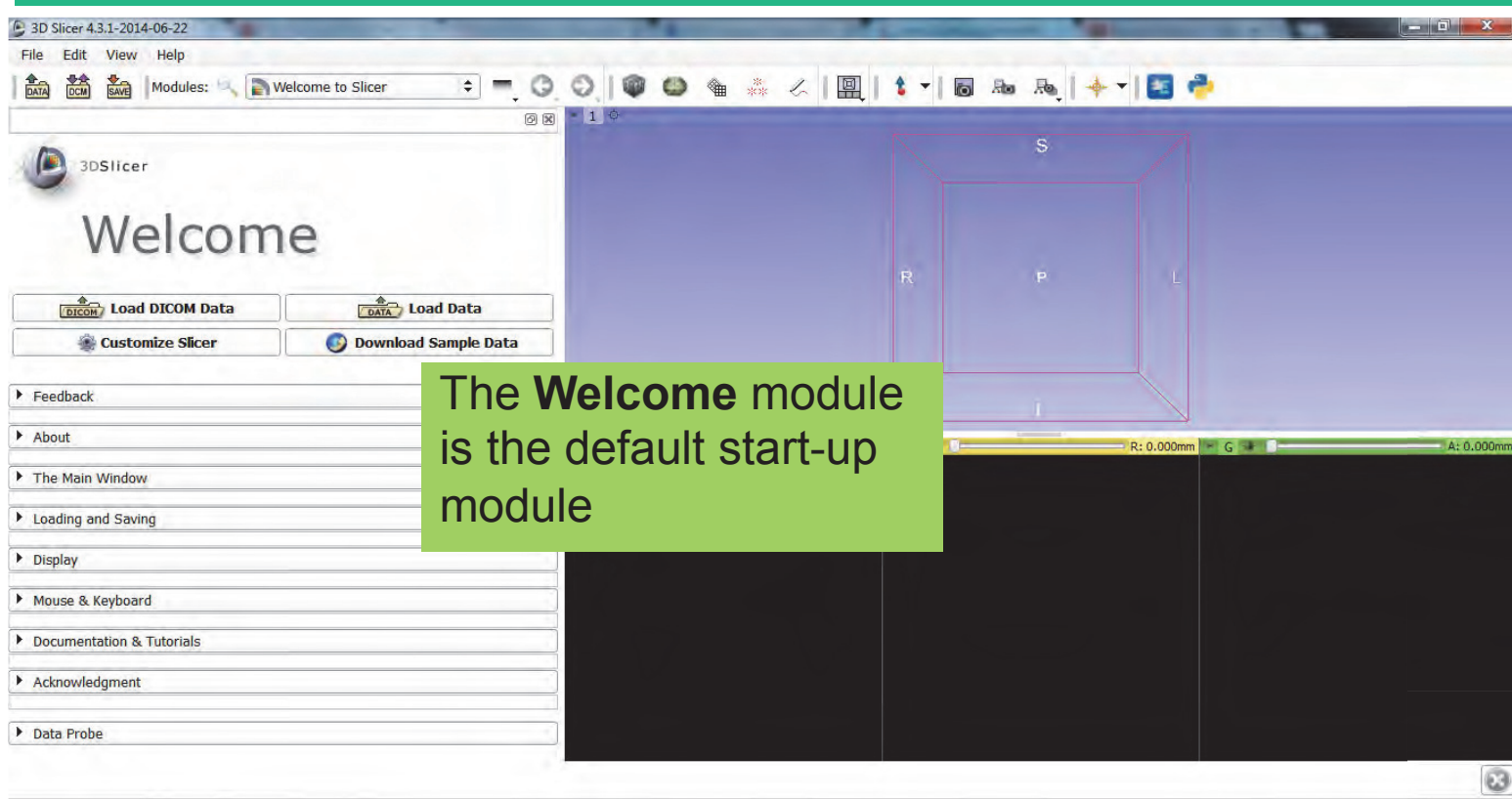
Part III: 3D interactive exploration of the anatomy

- Exploration of the Segments of the liver
- Exploration of the Segments of the lung



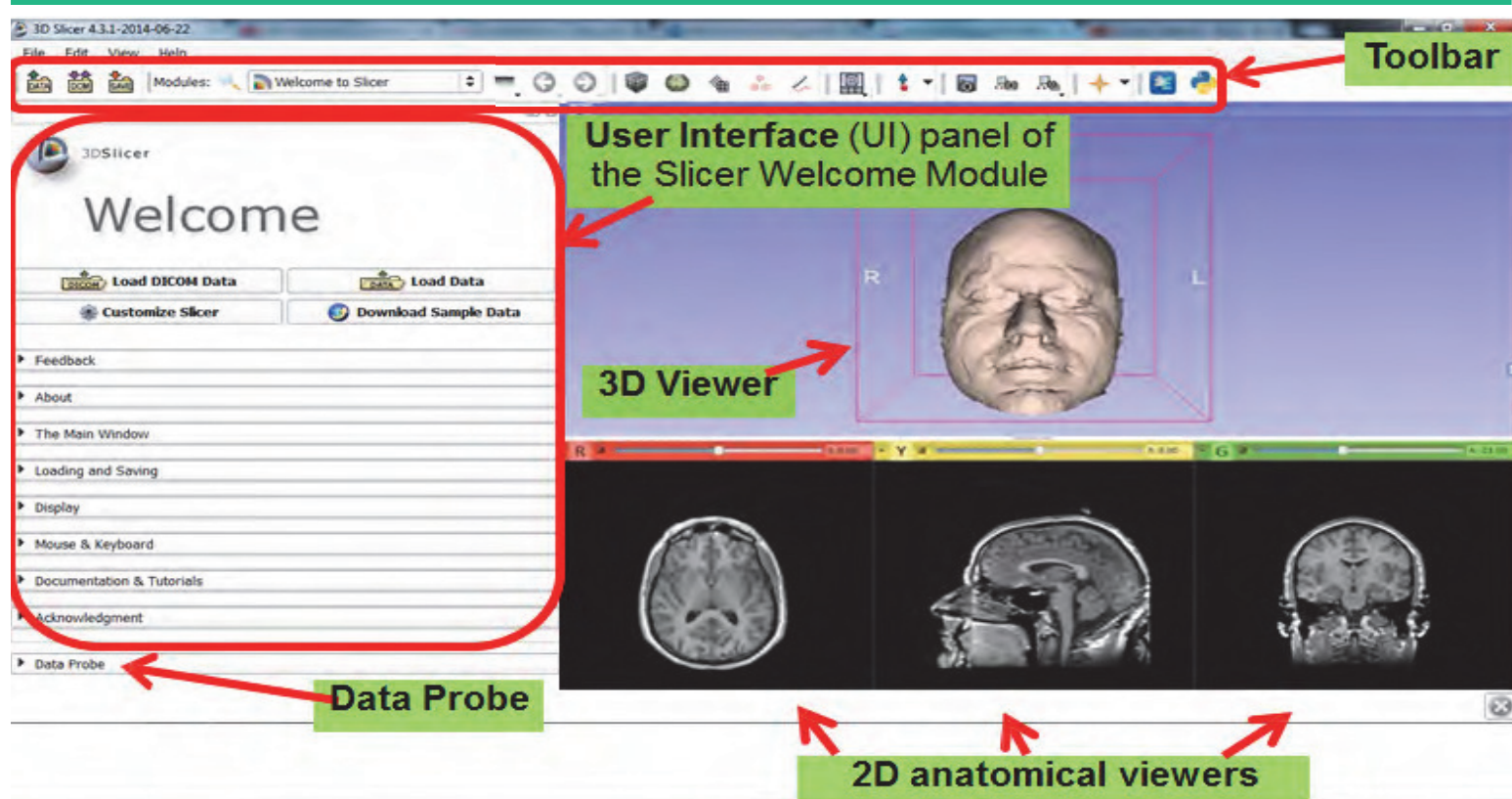


Welcome to Slicer4



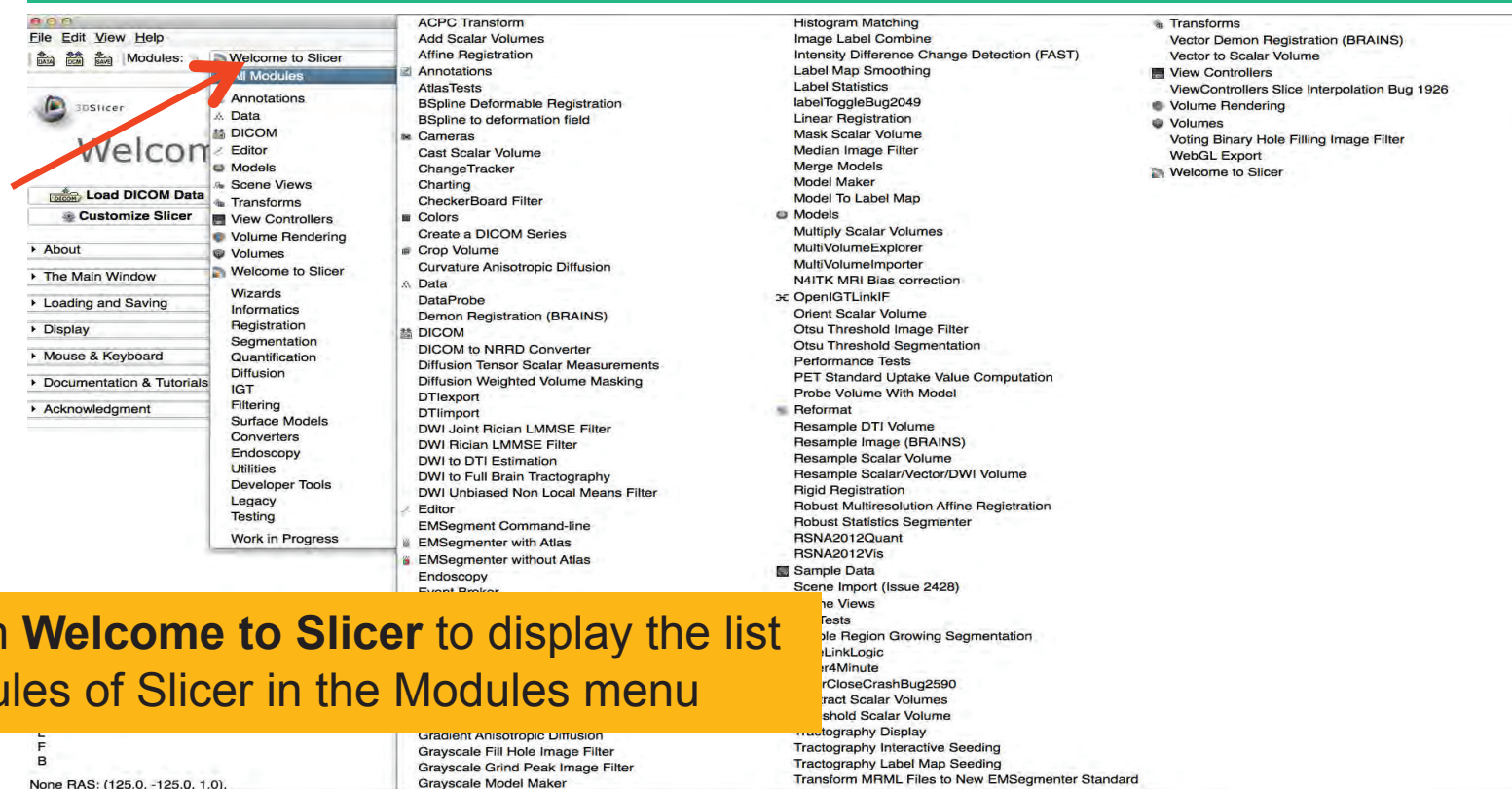


Navigating the Application GUI





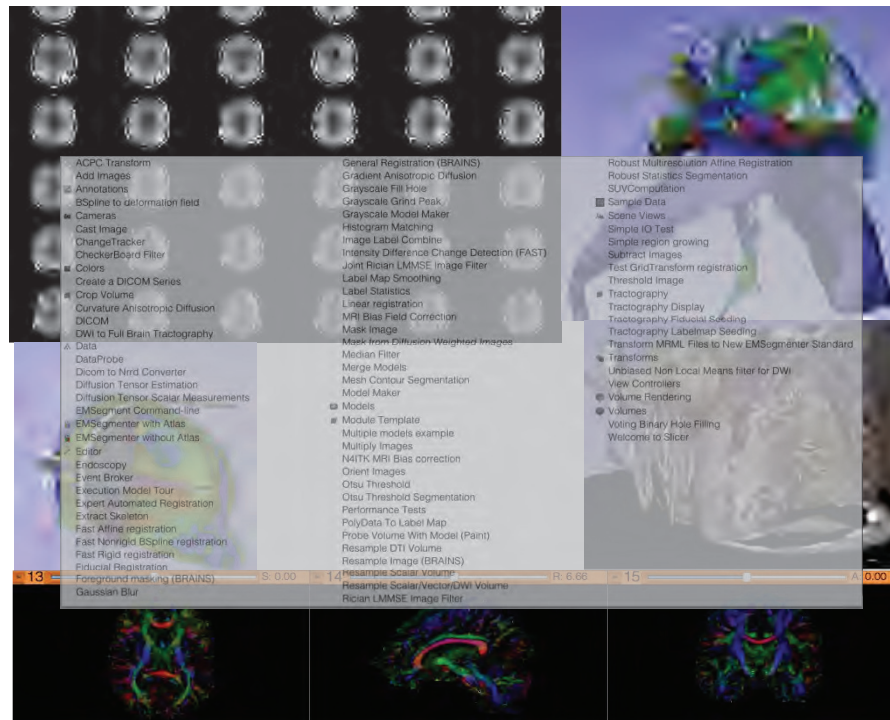
Welcome to Slicer4.3.1.1



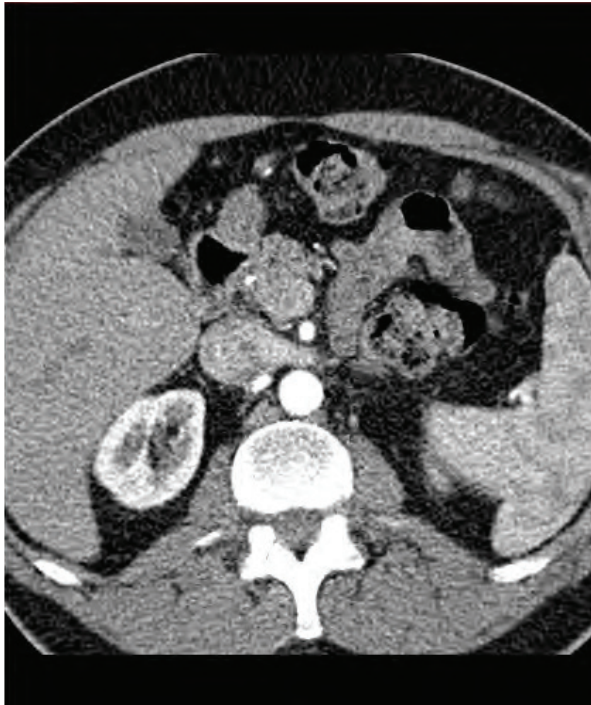
Click on **Welcome to Slicer** to display the list of modules of Slicer in the Modules menu



Welcome to Slicer4



Slicer4.3.1 contains more than 100 modules for image segmentation, registration and 3D visualization of medical imaging data

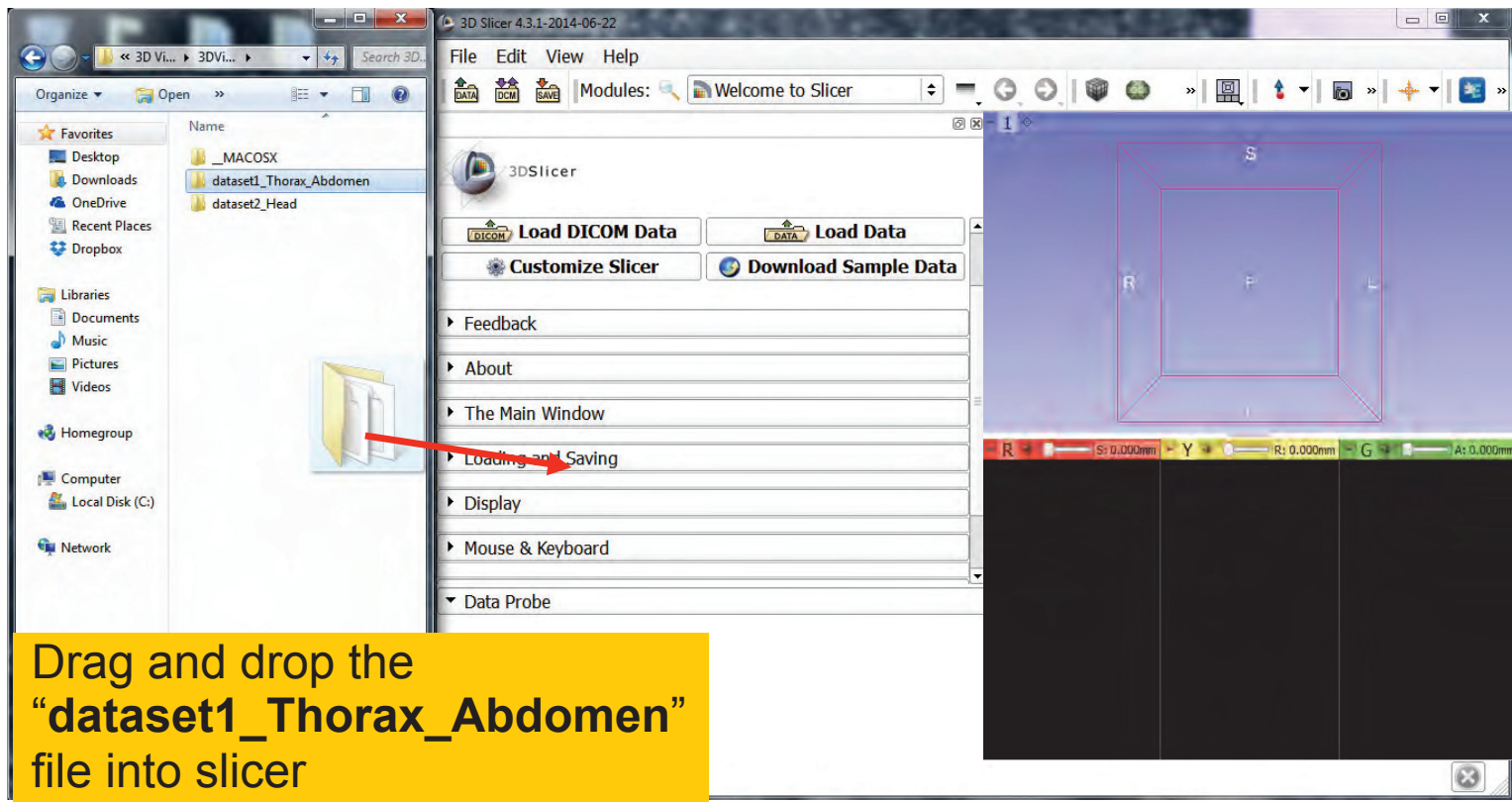


Part 1:

Loading a DICOM Volume

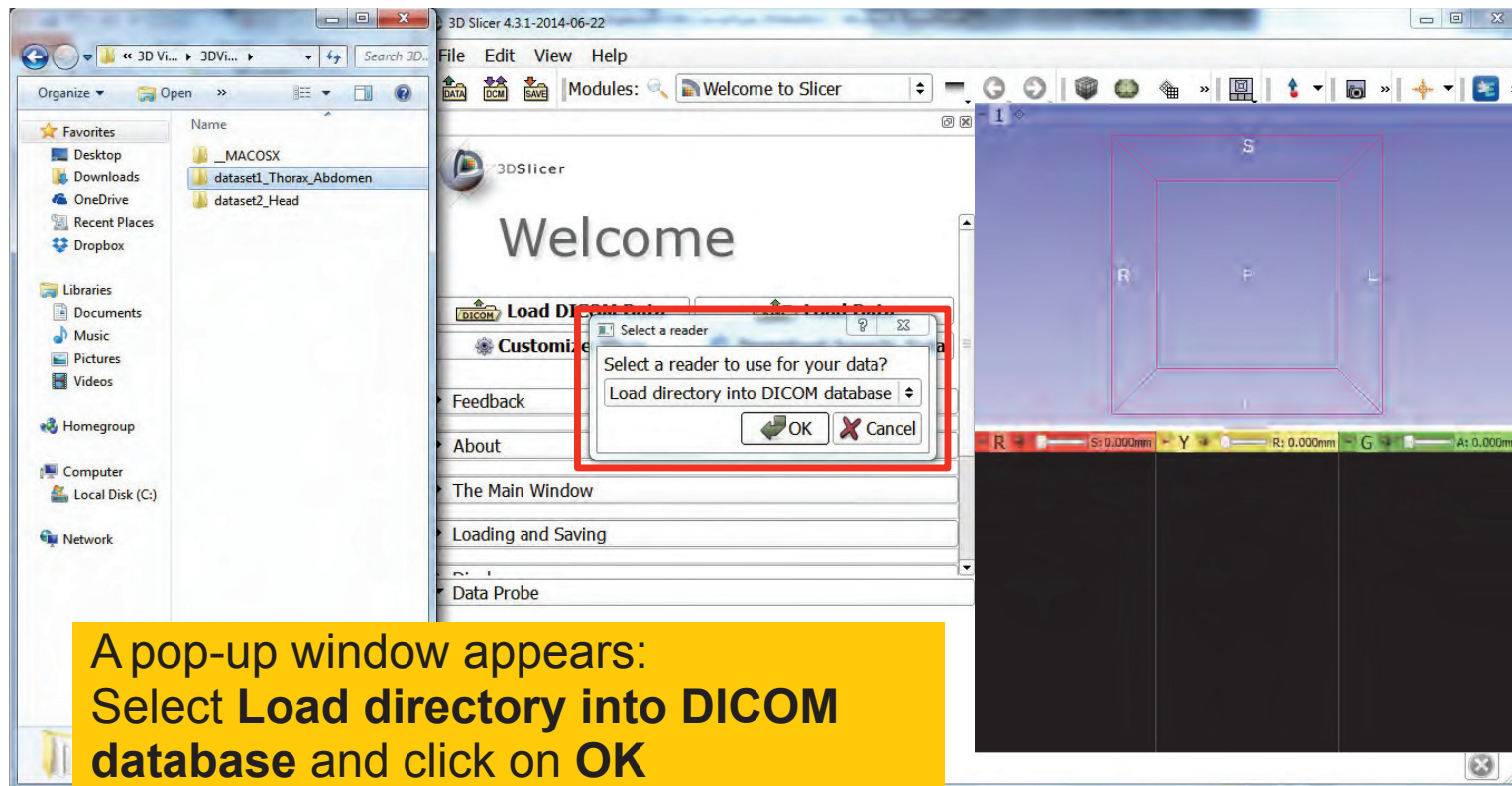


Loading a DICOM volume





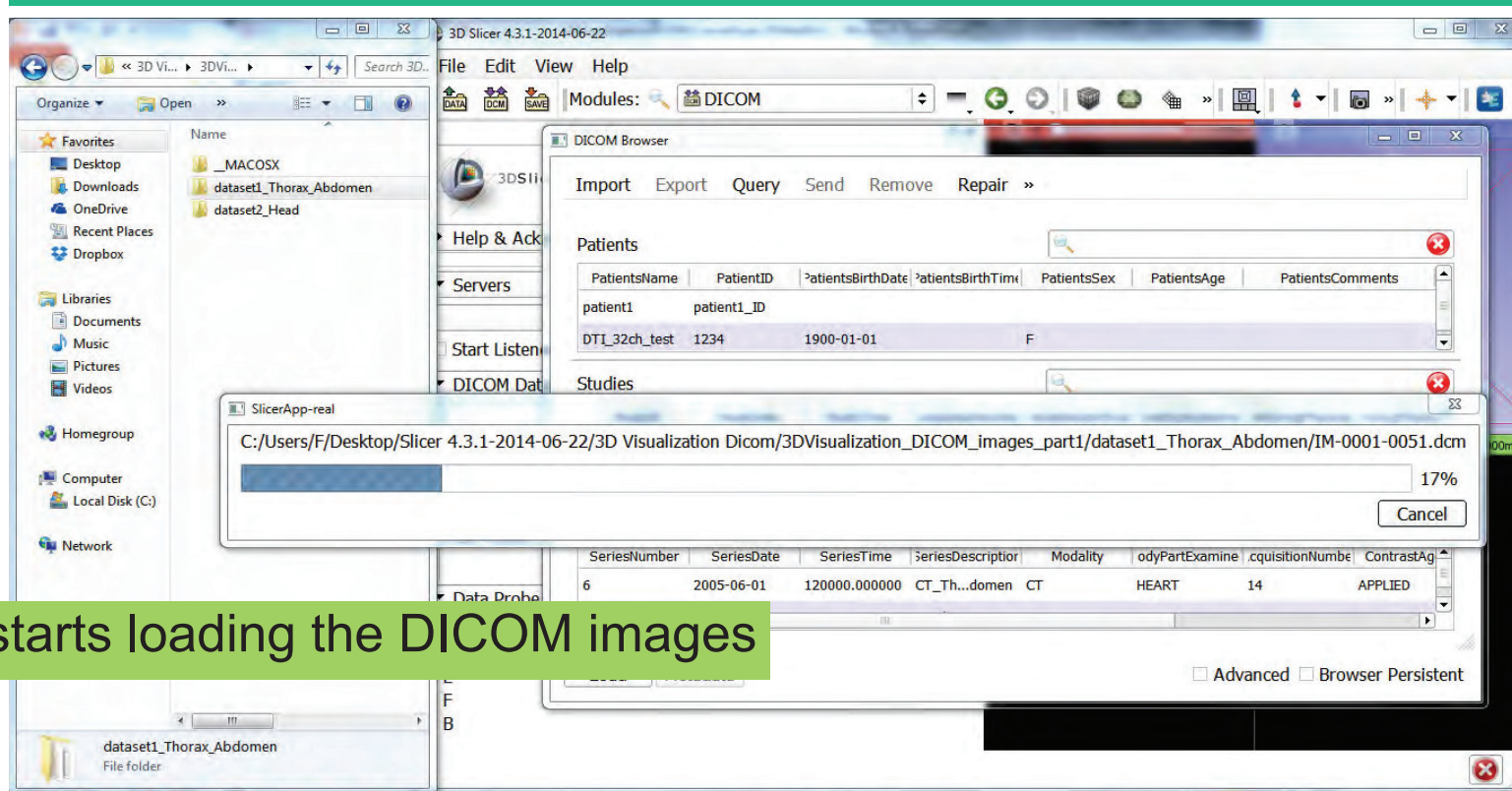
Loading a DICOM volume



A pop-up window appears:
Select Load directory into DICOM database and click on **OK**



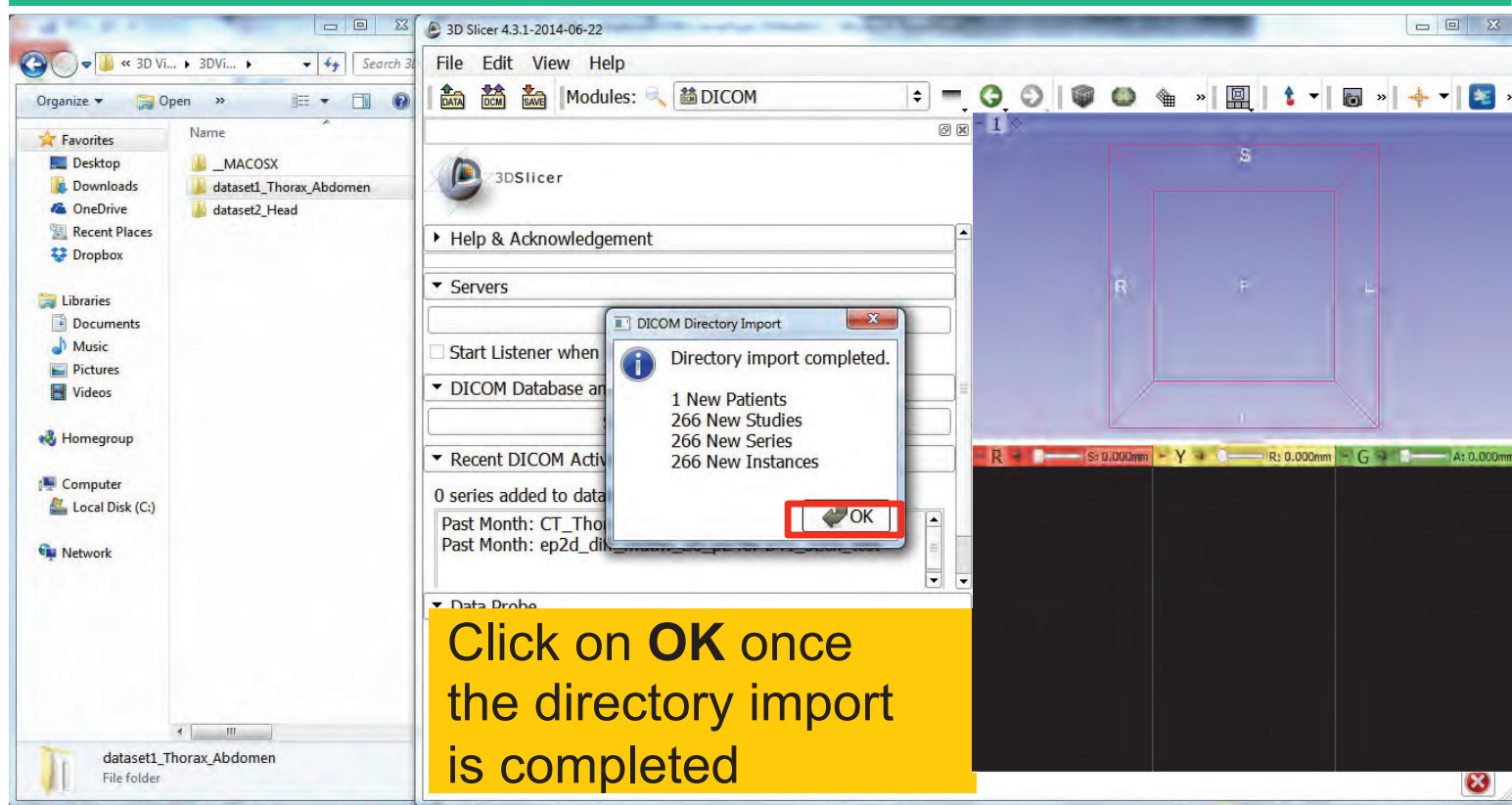
Loading a DICOM volume



Slicer starts loading the DICOM images

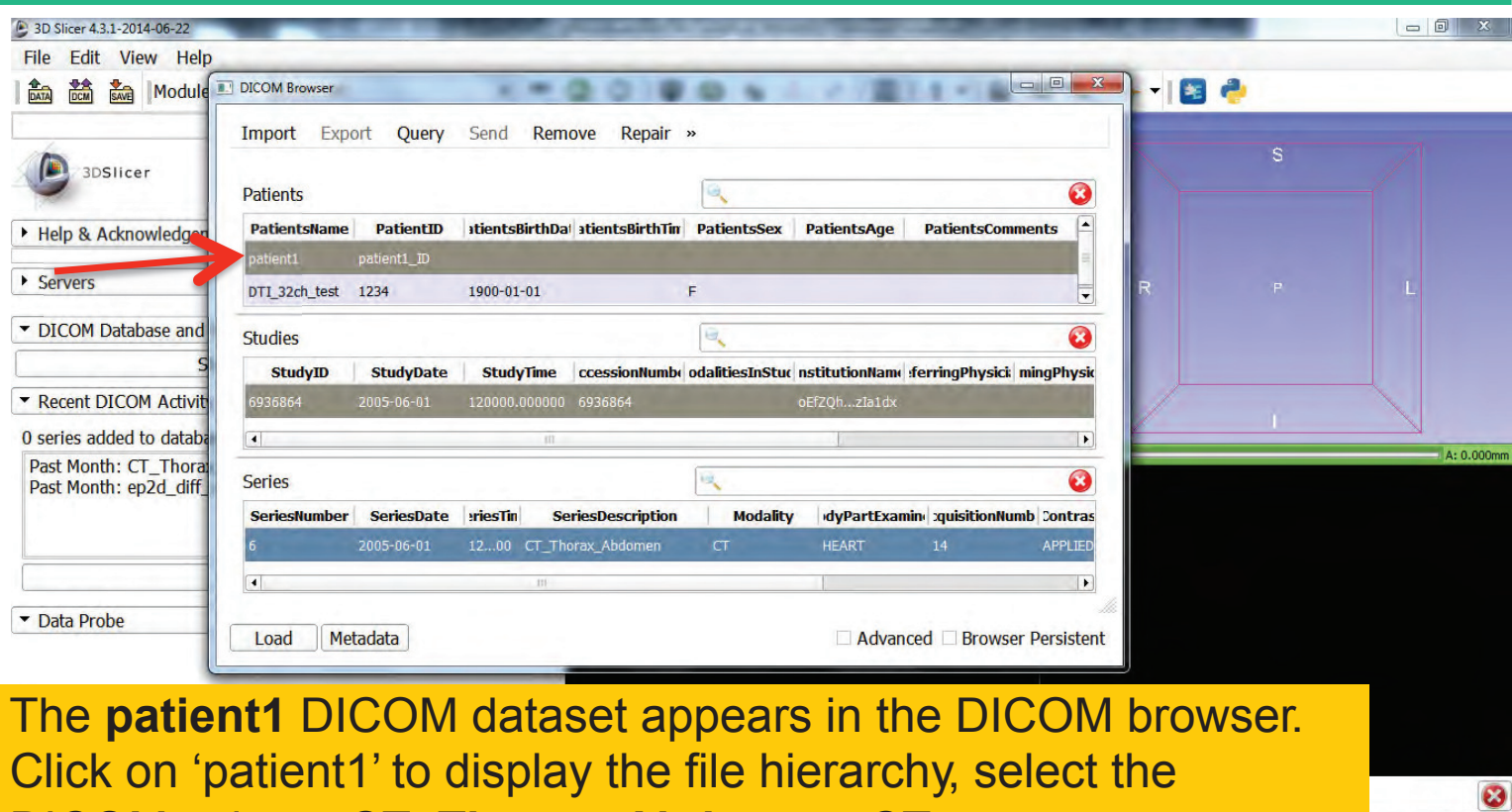


Loading a DICOM volume





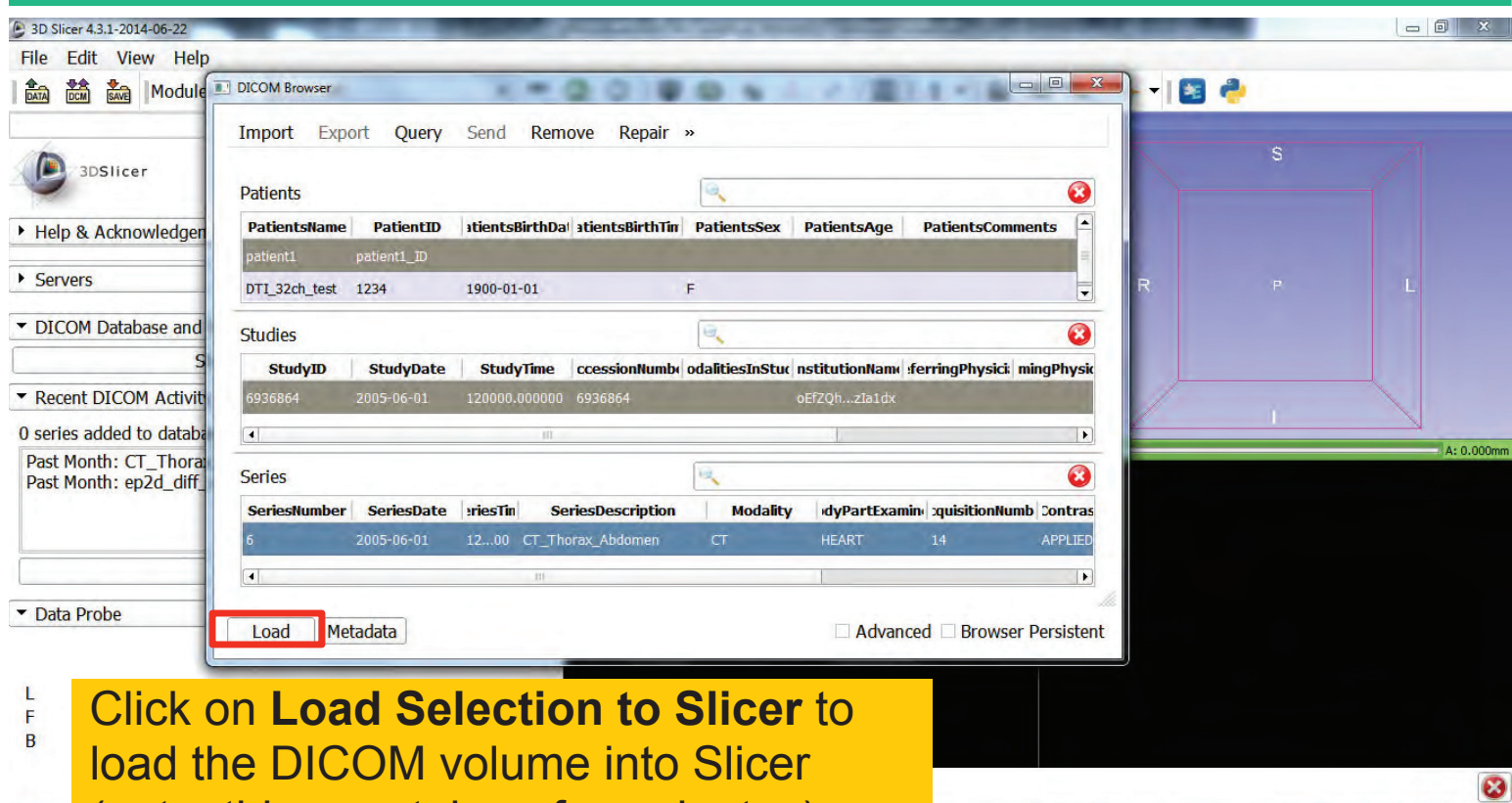
Loading a DICOM volume



The **patient1** DICOM dataset appears in the DICOM browser. Click on 'patient1' to display the file hierarchy, select the DICOM volume **CT_Thorax_Abdomen_CT**



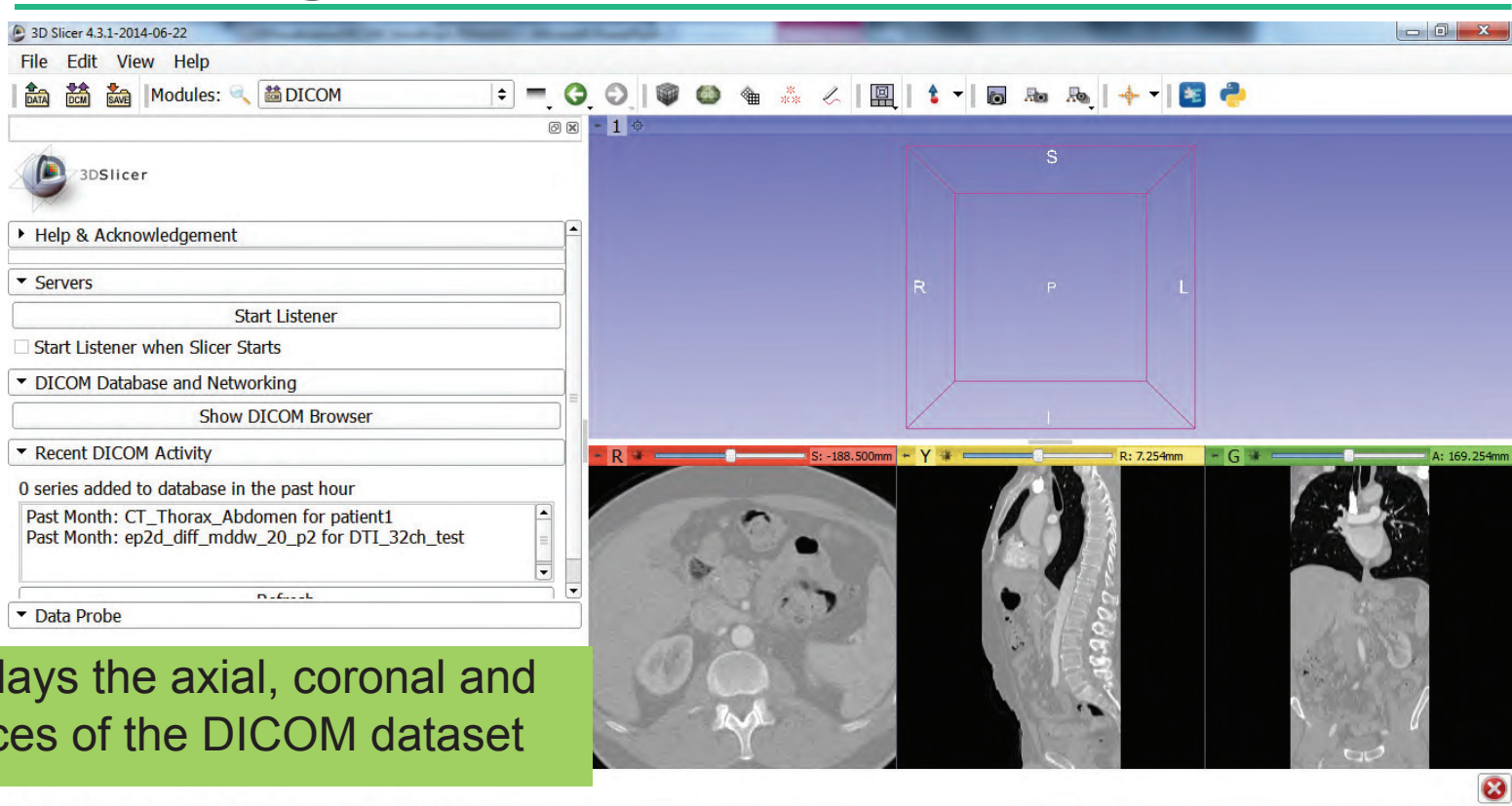
Loading a DICOM volume



Click on **Load Selection to Slicer** to load the DICOM volume into Slicer (note: this may take a few minutes)



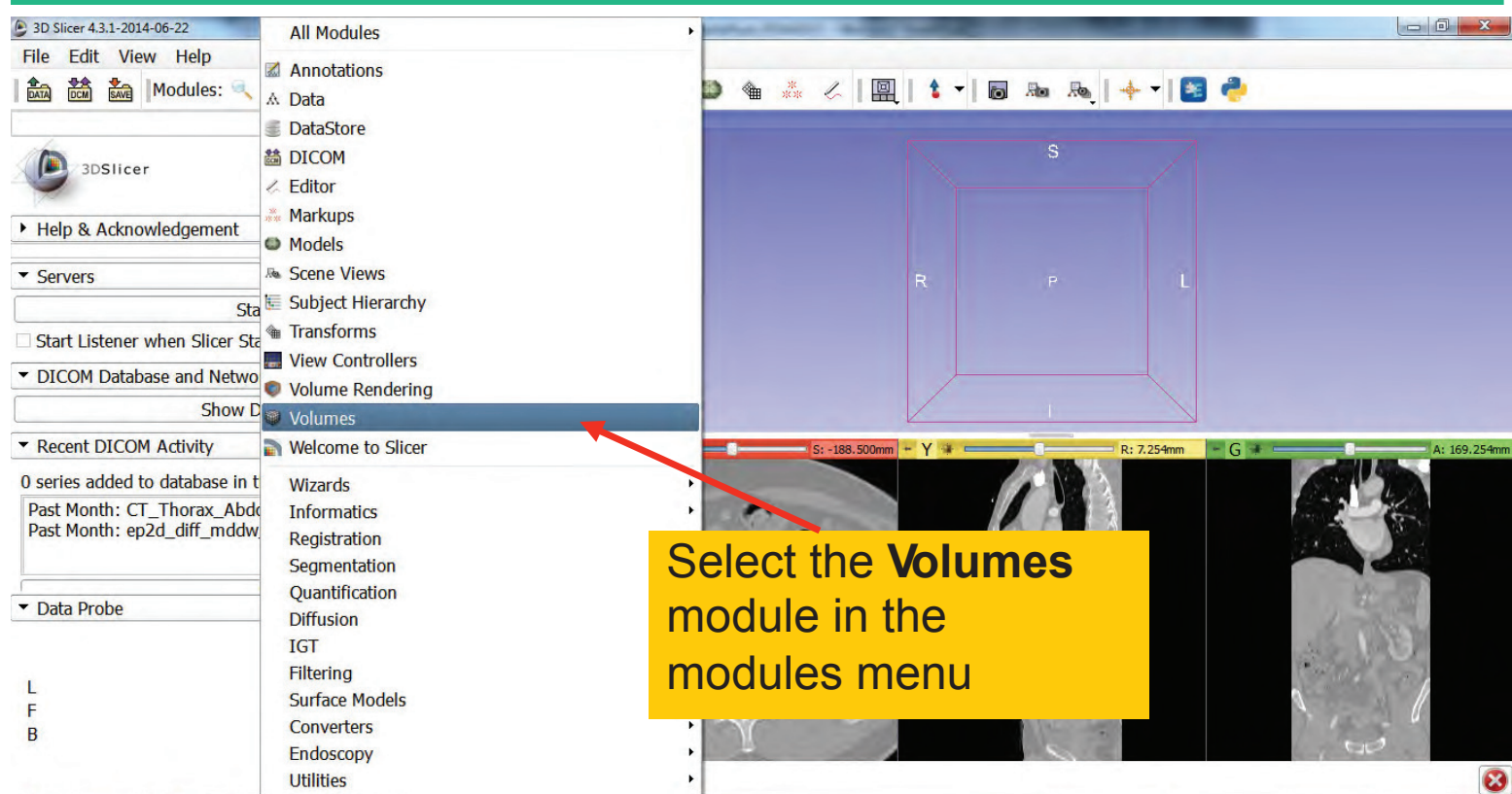
Loading a DICOM volume



Slicer displays the axial, coronal and sagittal slices of the DICOM dataset



Loading a DICOM volume

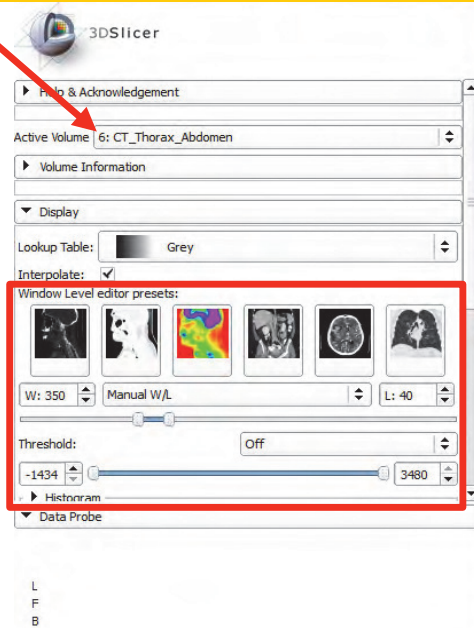




Loading a DICOM volume

Select the Active Volume
6:CT_Thorax_Abdomen

Slicer has a series of window/level presets available.

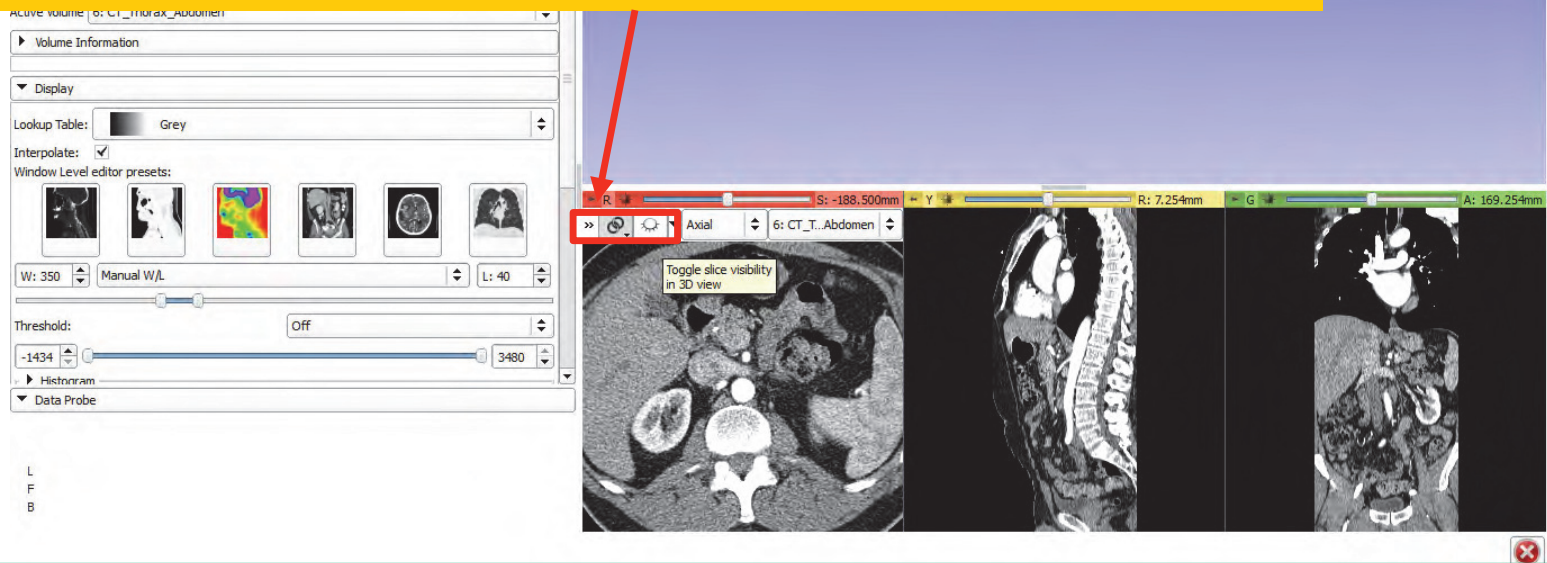


Click on the Window Level Preset **CT-abdomen**, or adjust manually the Window and Level using the Manual W/L slider



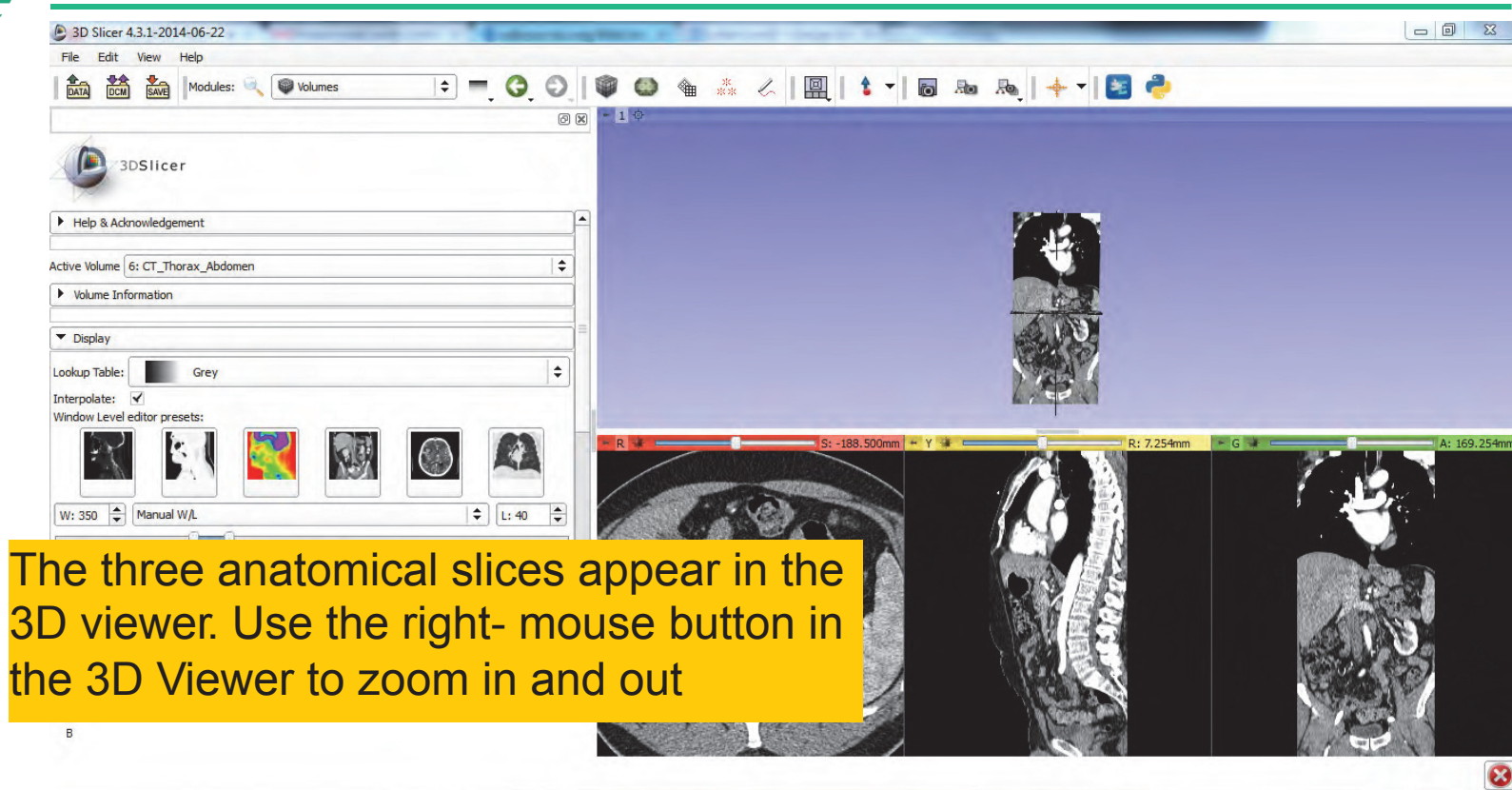
Loading a DICOM volume

Position the mouse cursor over the red banner in the Red Viewer to display the slice menu. Click on the **Links** icon to link the slice controls across all Slice Viewers. Click on the **Eye** icon to display the three anatomical slices in the 3D Viewer



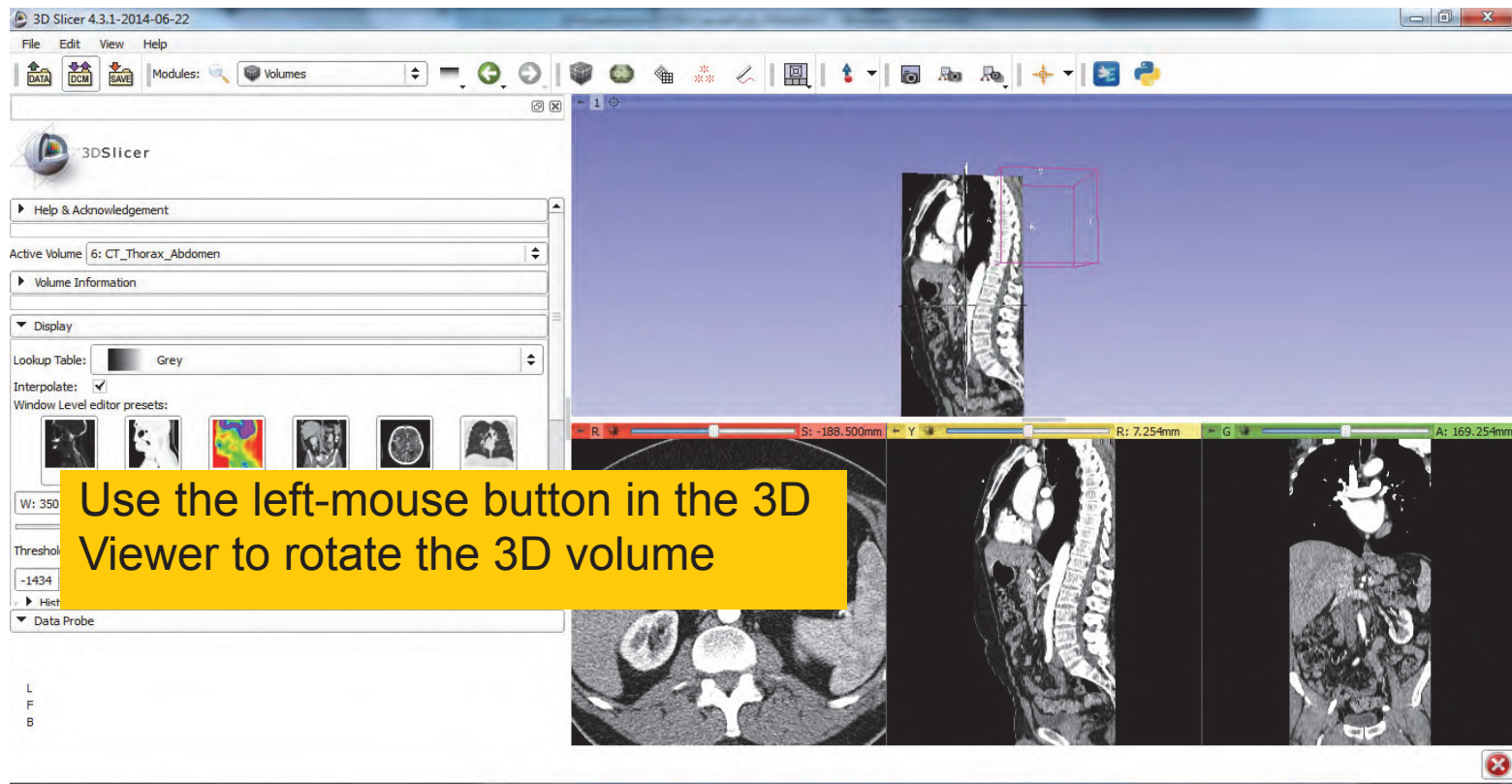


Loading a DICOM volume



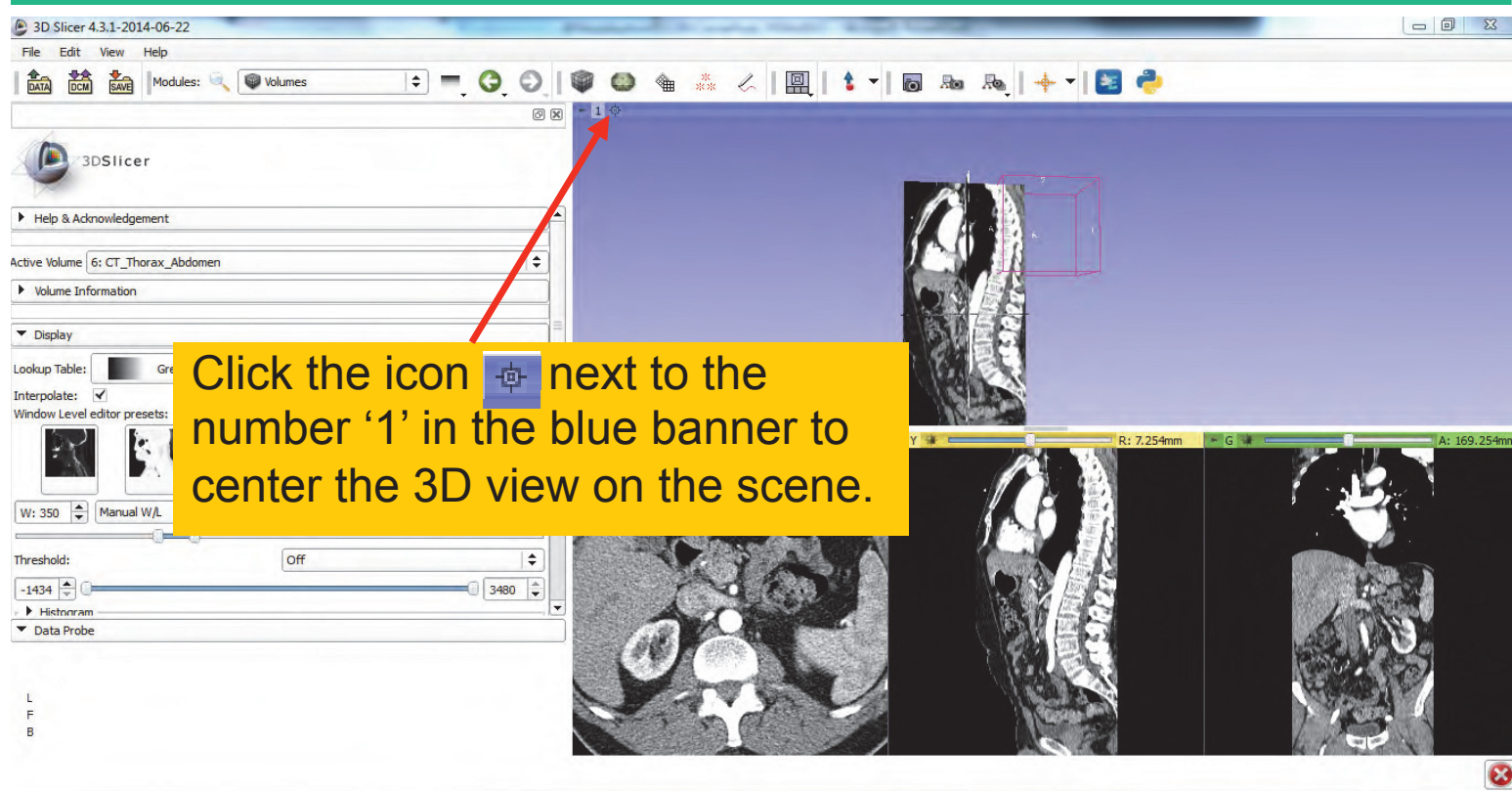


Loading a DICOM volume



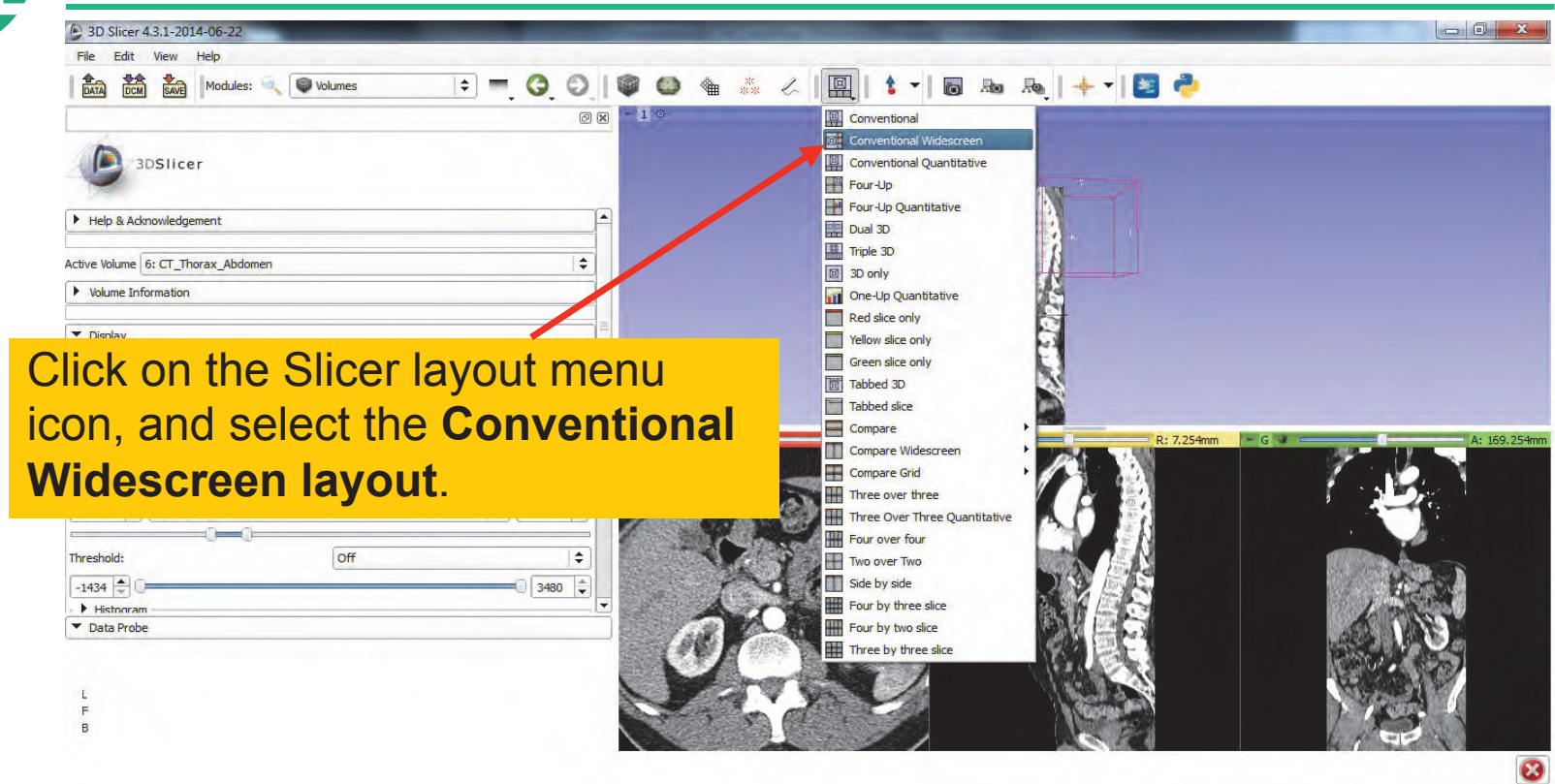


Loading a DICOM volume



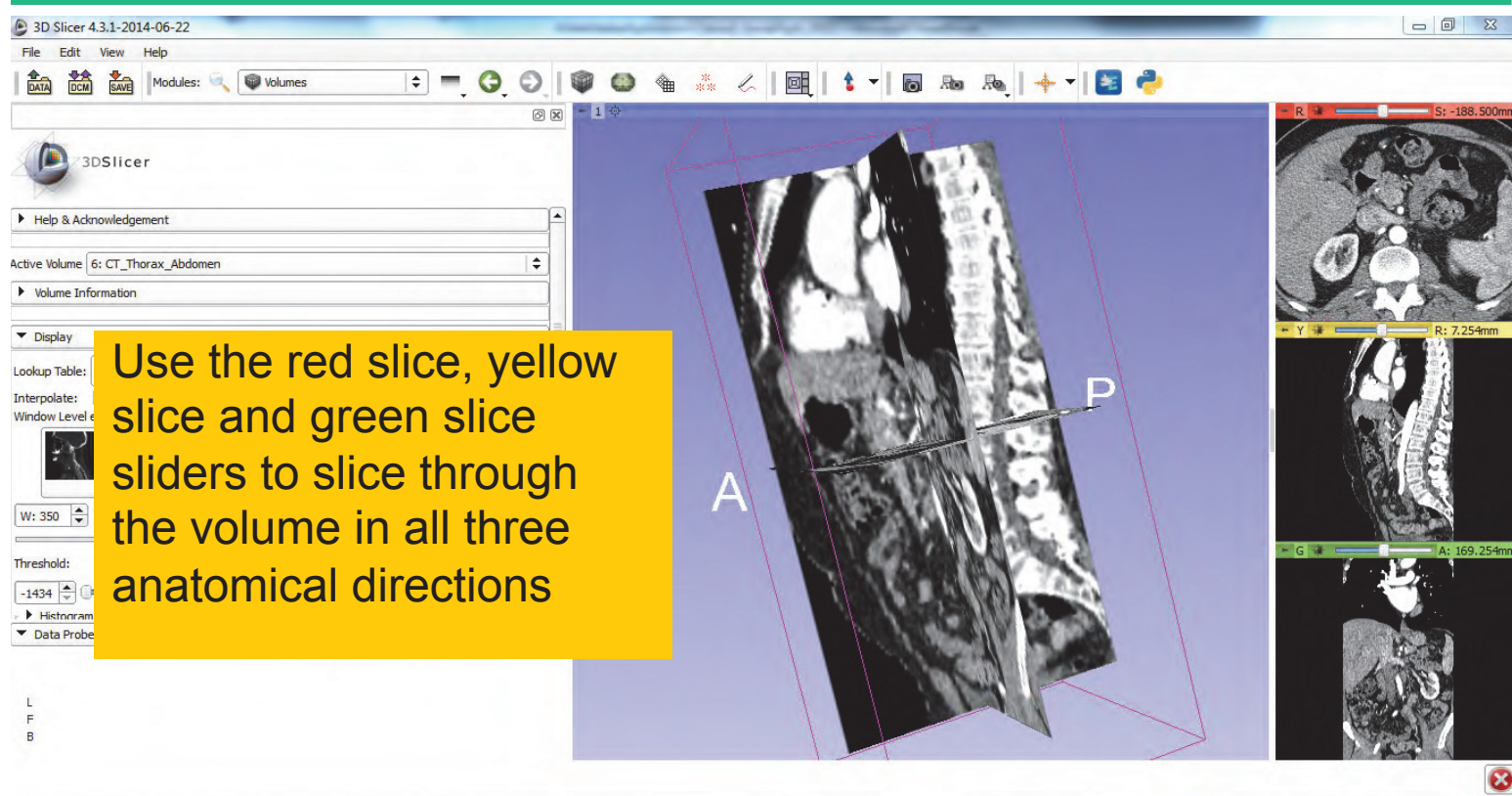


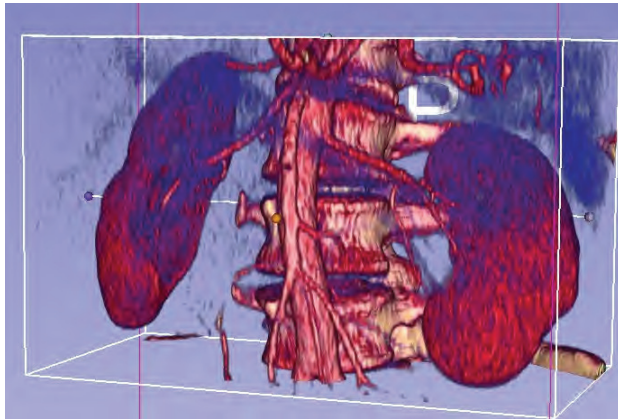
Loading a DICOM volume





Loading a DICOM volume

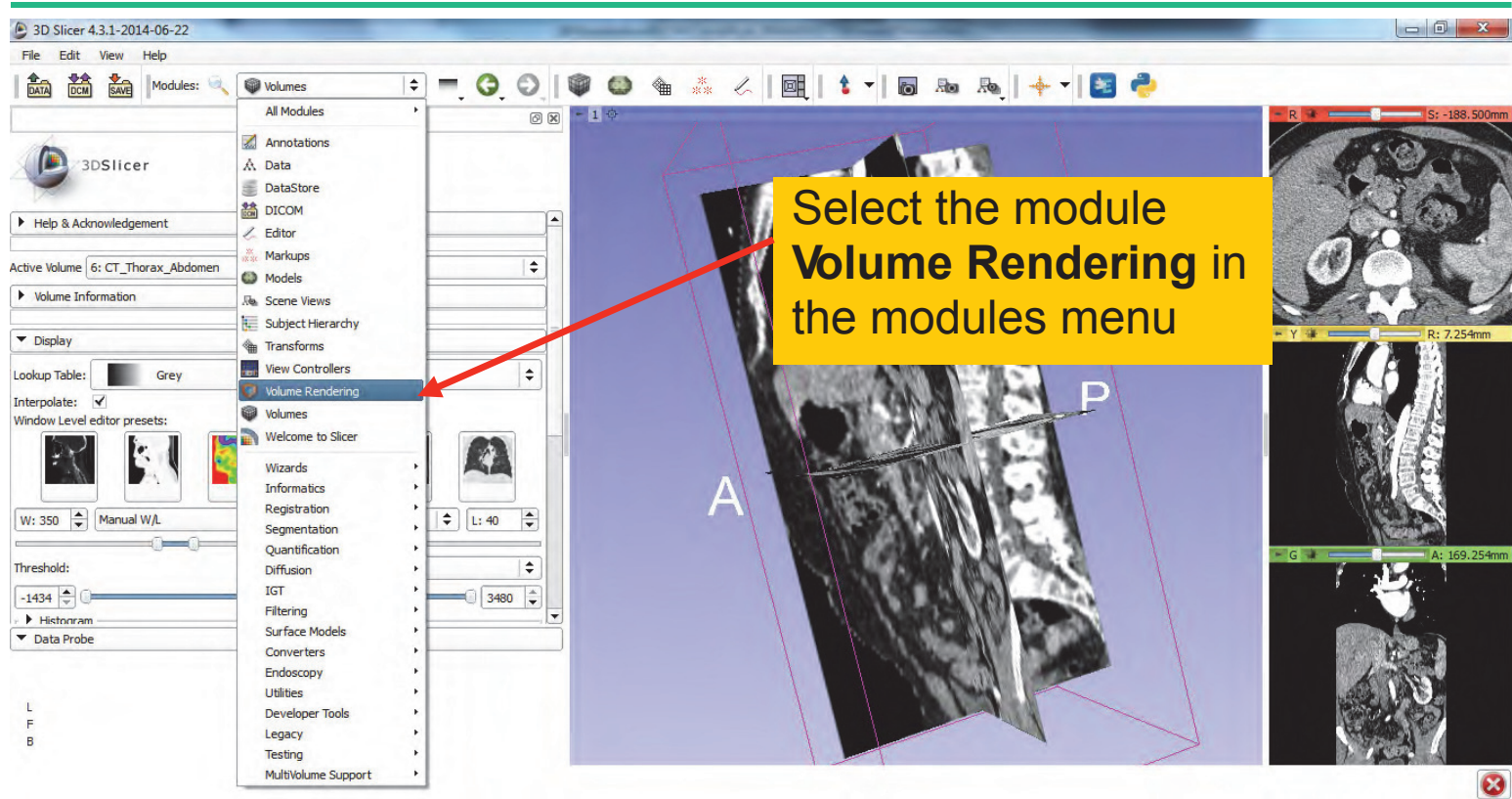




3D Interactive exploration of
thoraco-abdominal CT data
using Volume Rendering

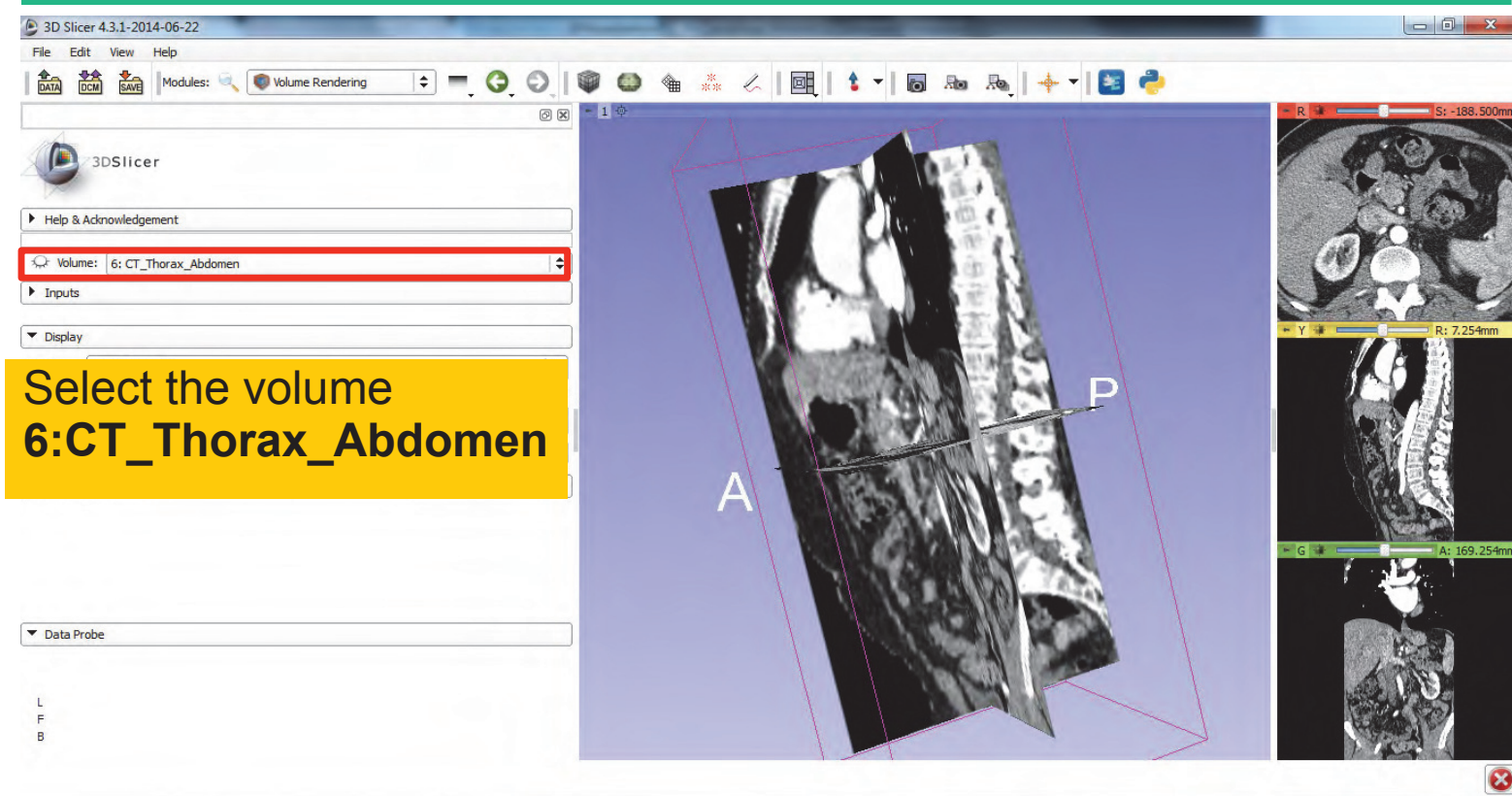


Volume Rendering





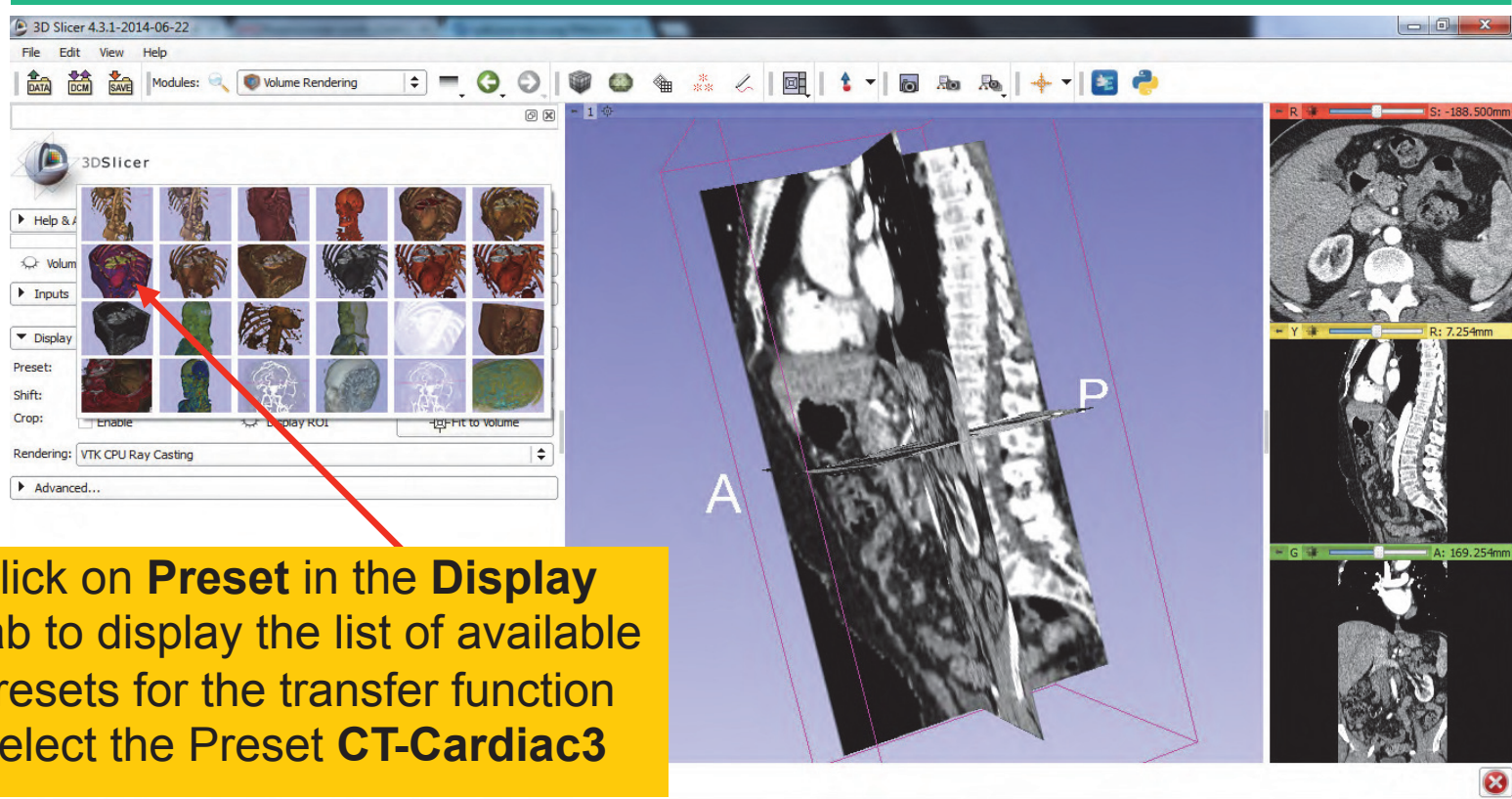
Volume Rendering



Select the volume
6:CT_Thorax_Abdomen

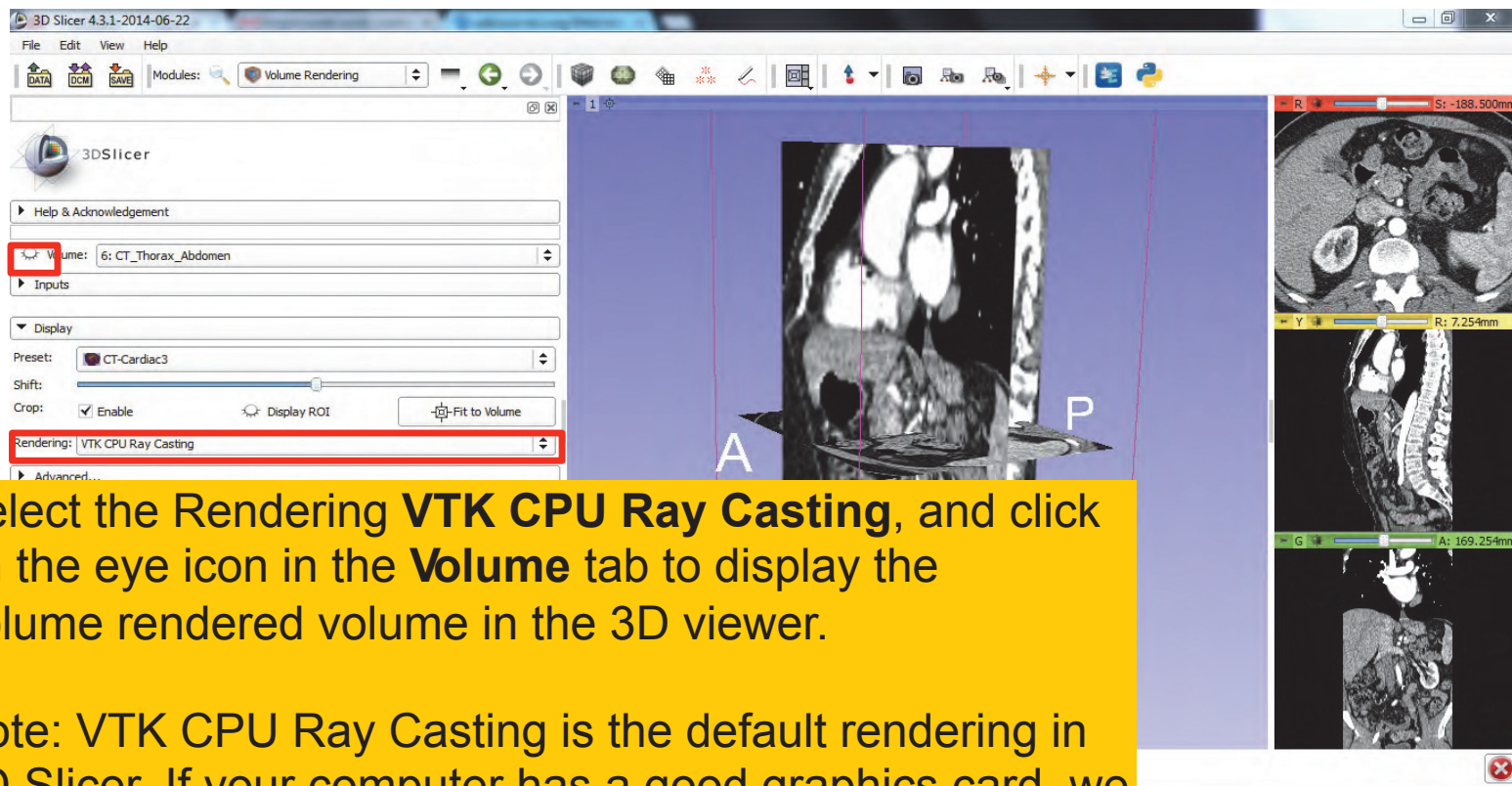


Volume Rendering





Volume Rendering

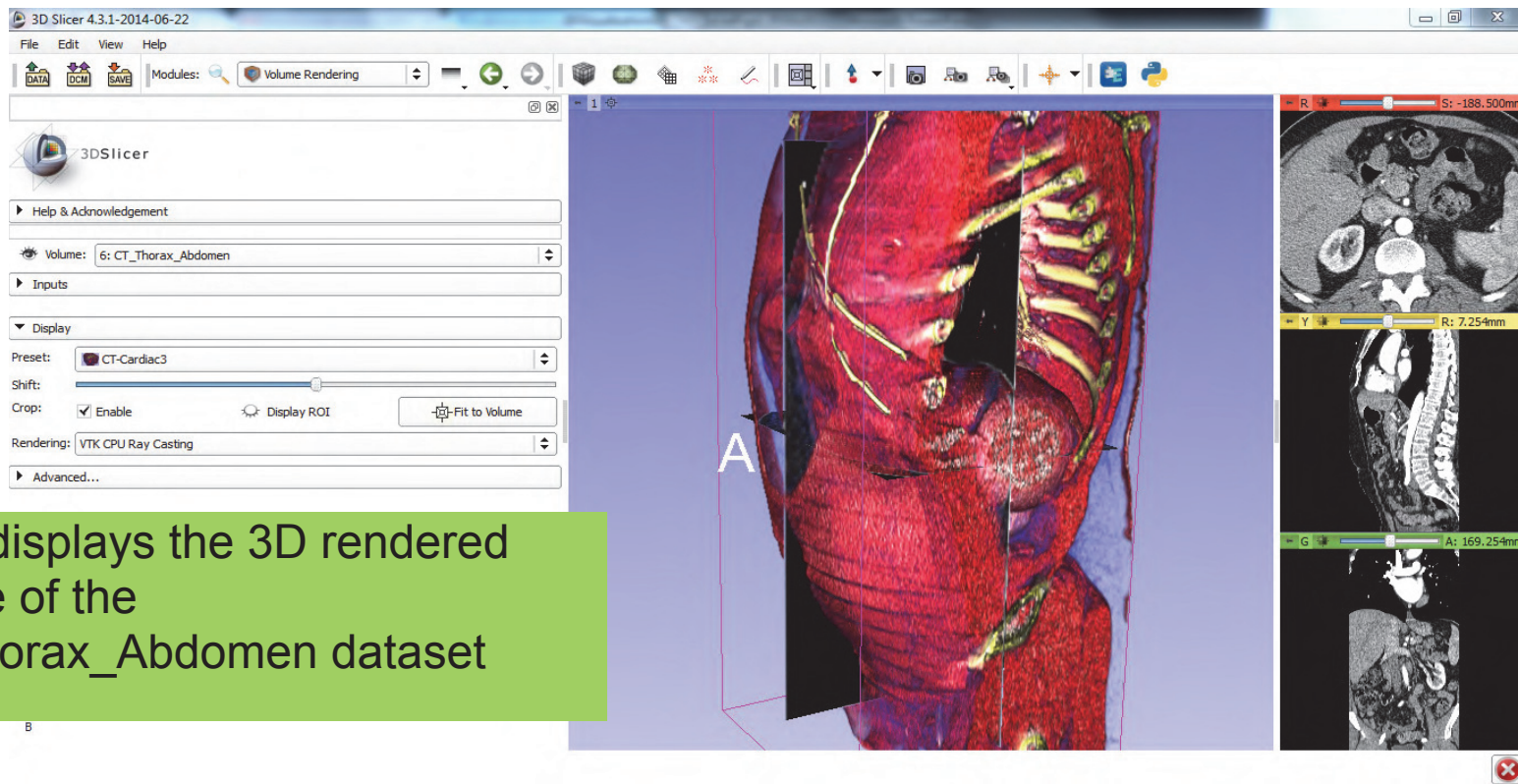


Select the Rendering **VTK CPU Ray Casting**, and click on the eye icon in the **Volume** tab to display the Volume rendered volume in the 3D viewer.

Note: VTK CPU Ray Casting is the default rendering in 3D Slicer. If your computer has a good graphics card, we recommend the **VTK GPU Ray Casting**



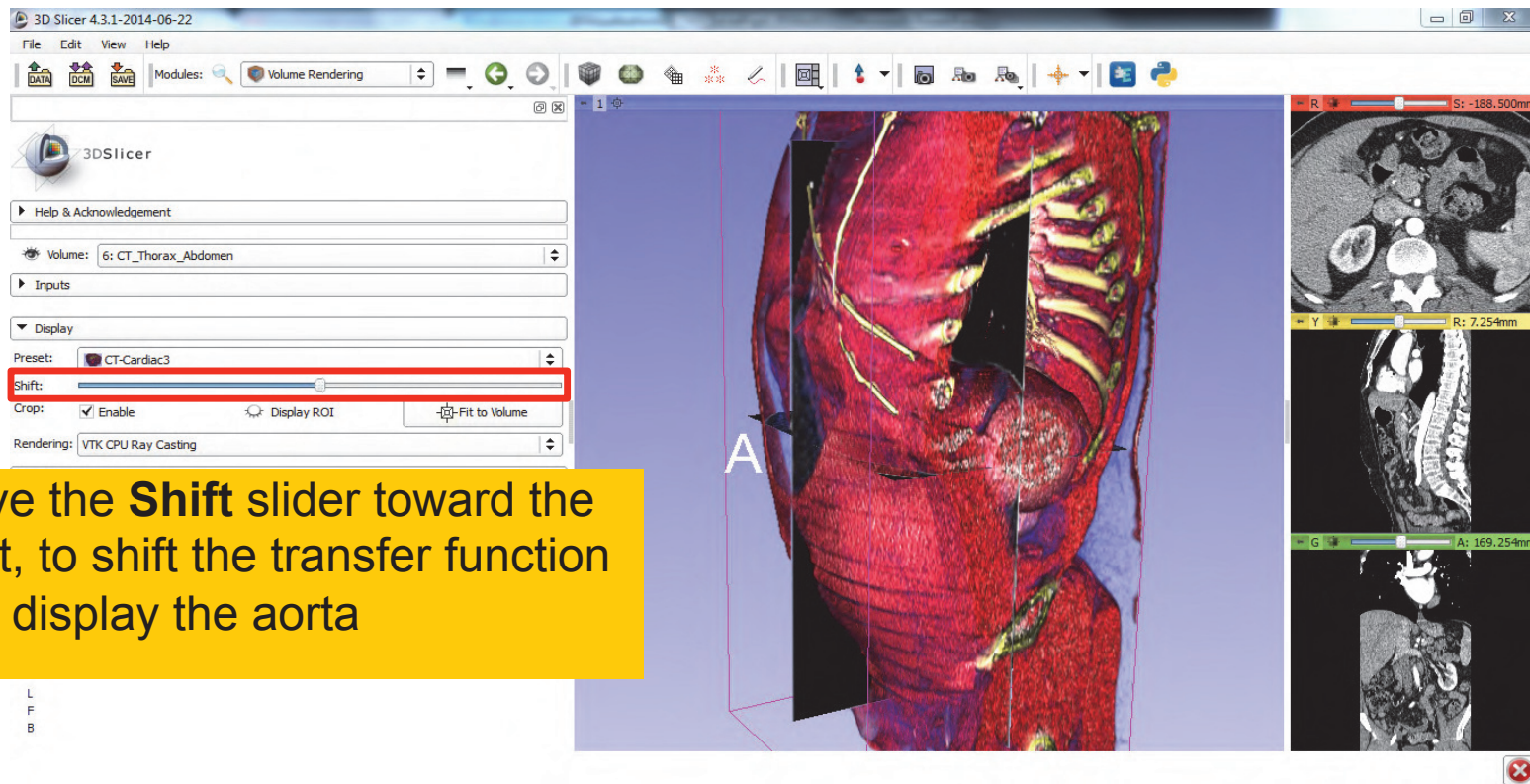
Volume Rendering



Slicer displays the 3D rendered volume of the CT_Thorax_Abdomen dataset



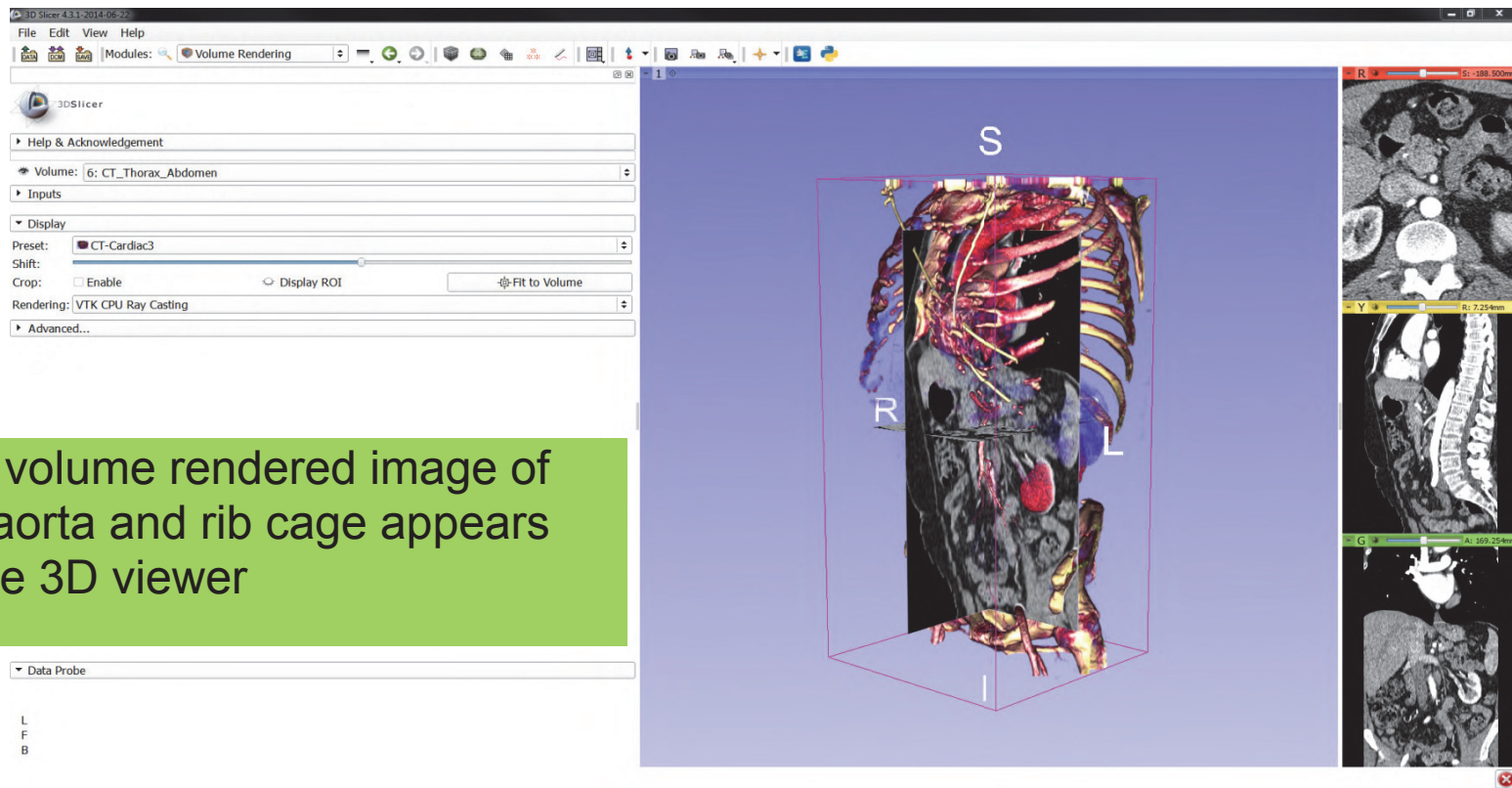
Volume Rendering



Move the **Shift** slider toward the right, to shift the transfer function and display the aorta

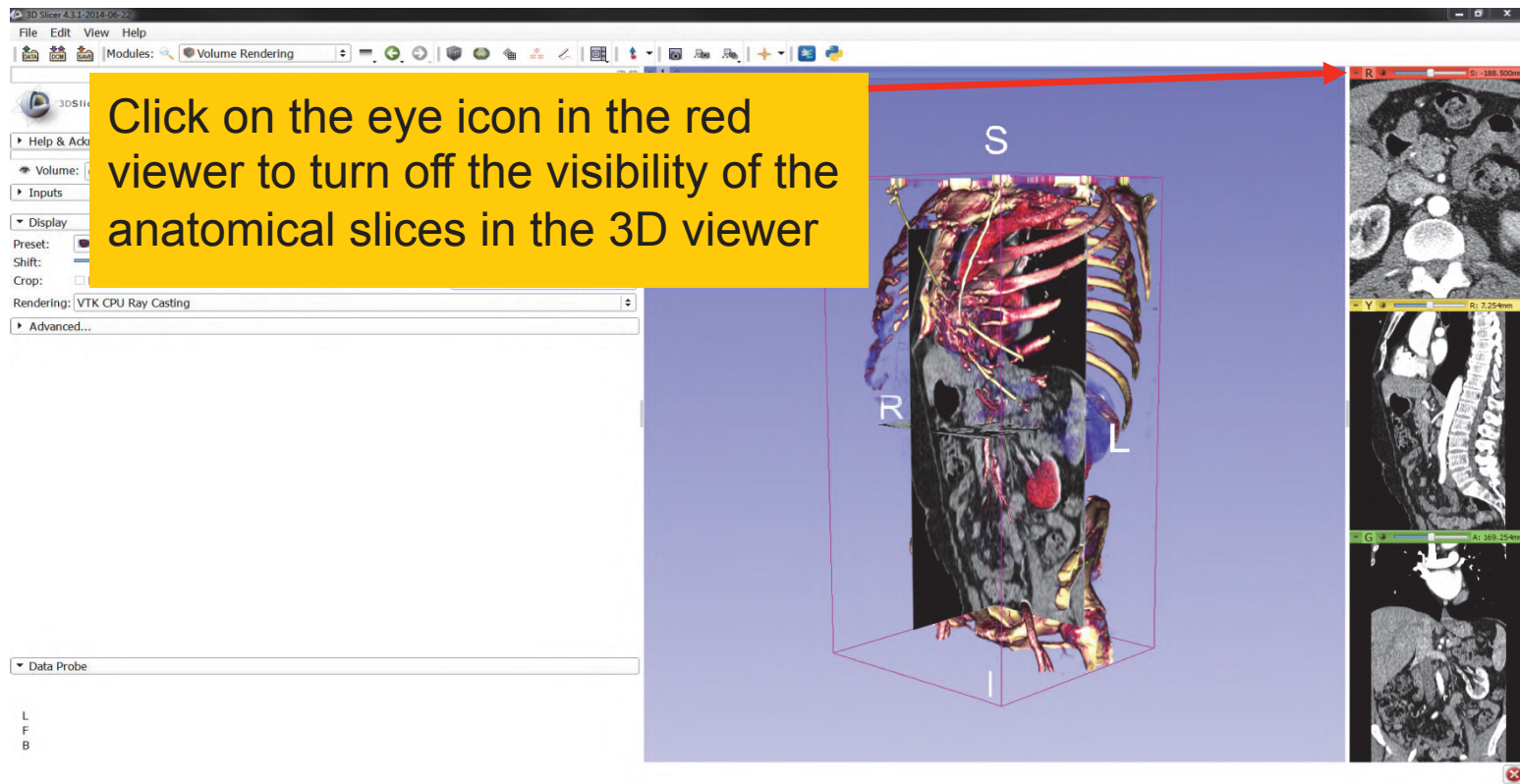


Volume Rendering



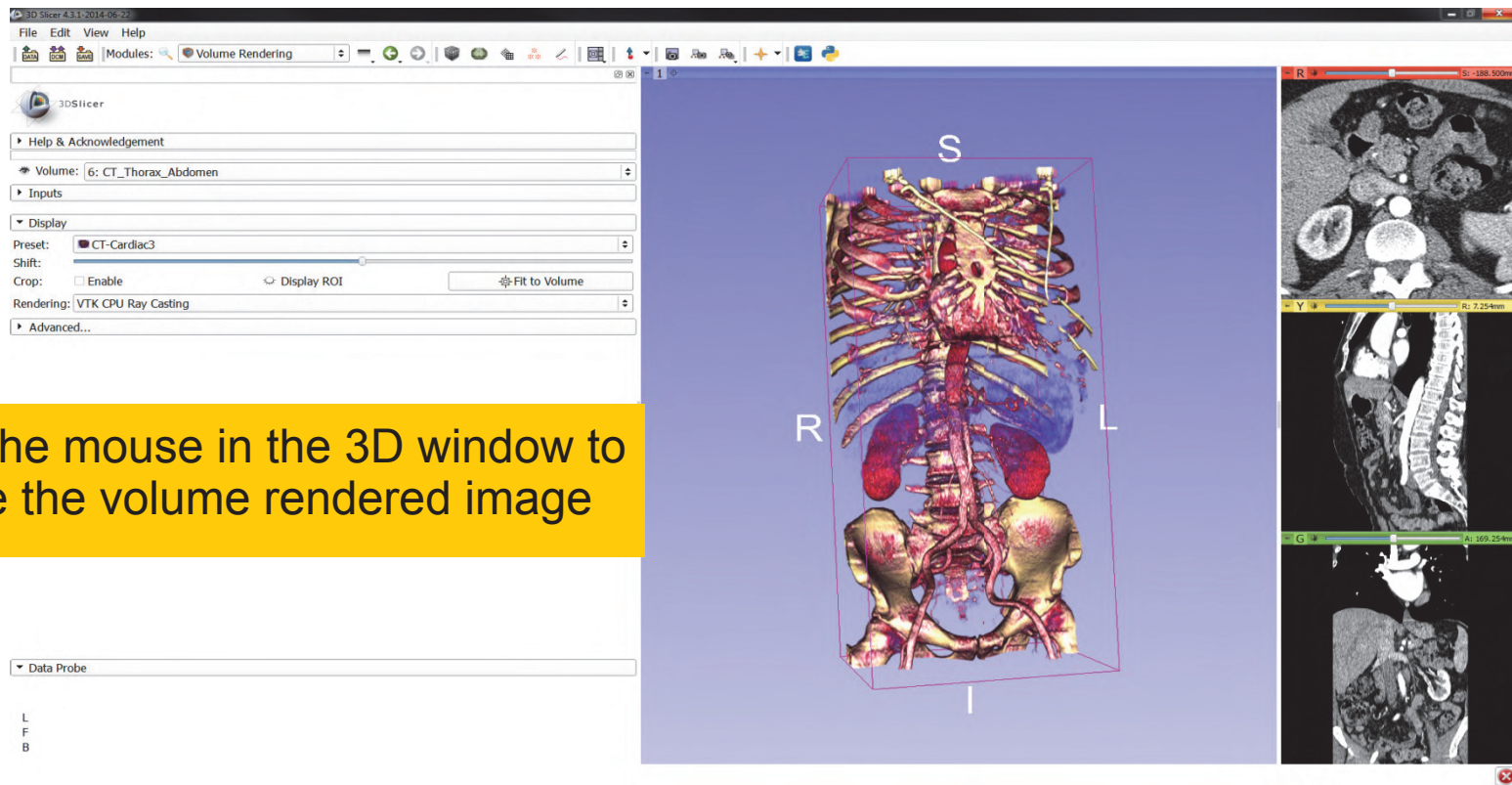


Volume Rendering





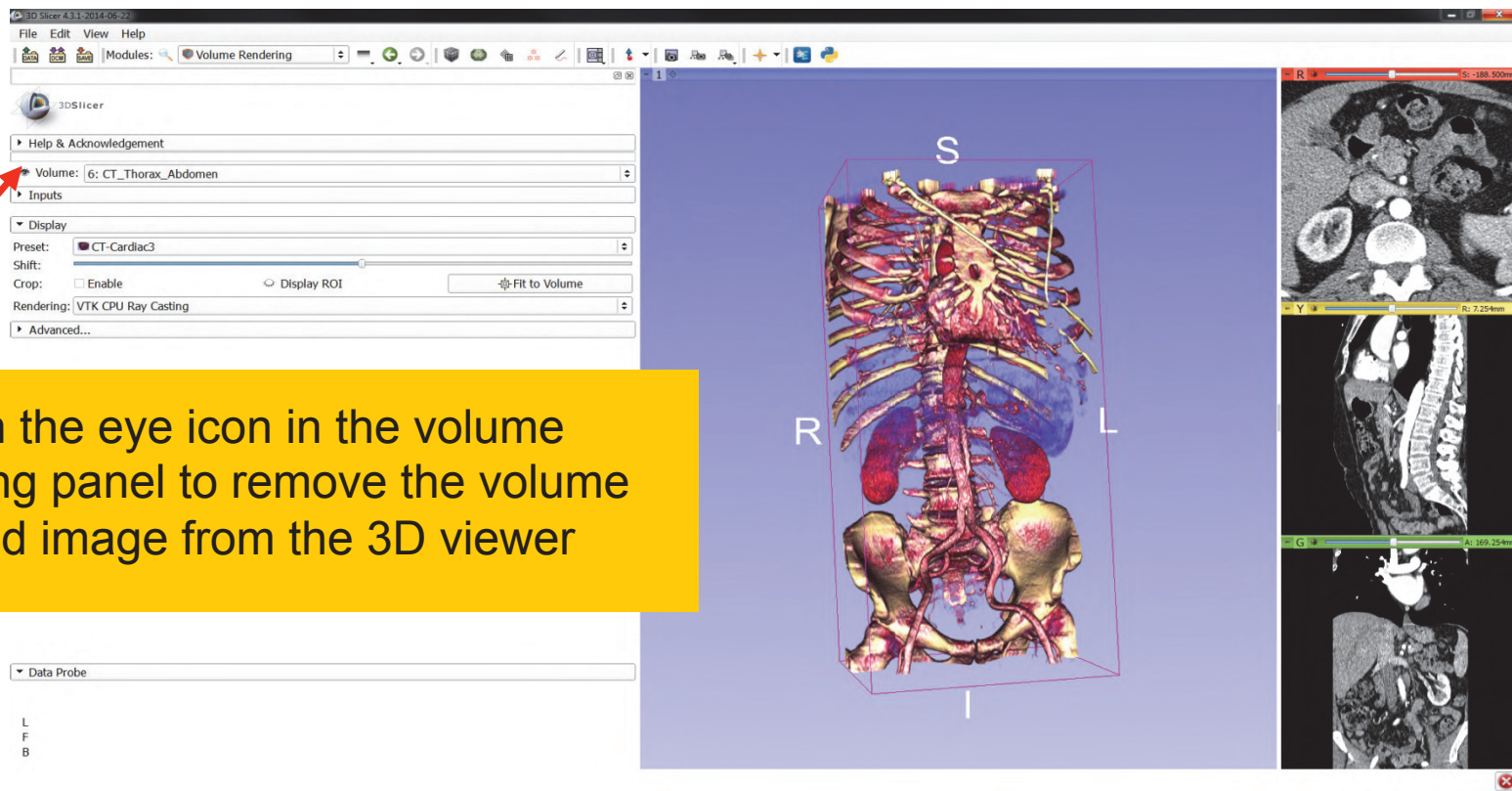
Volume Rendering



Use the mouse in the 3D window to rotate the volume rendered image



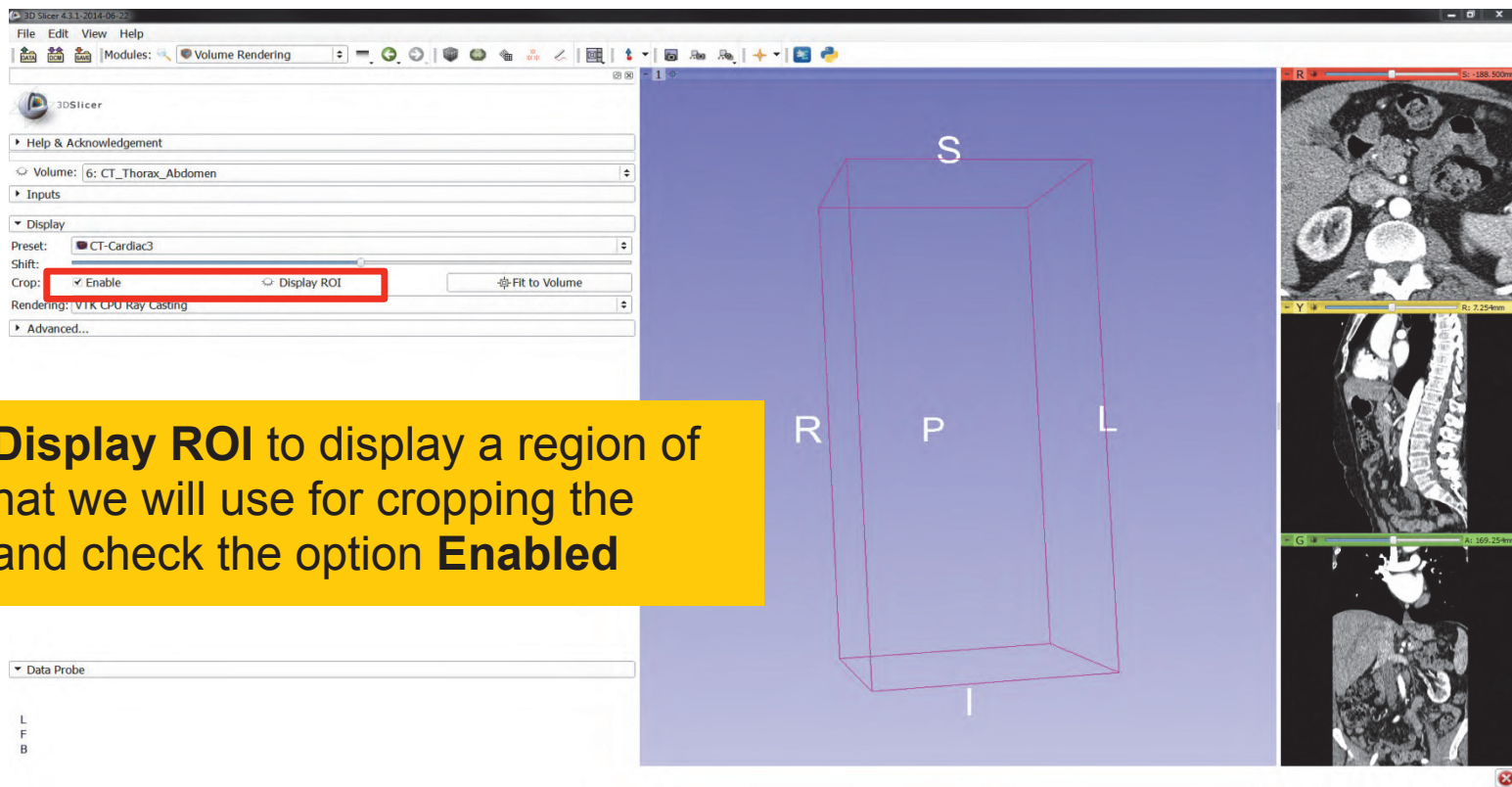
Volume Rendering



Click on the eye icon in the volume rendering panel to remove the volume rendered image from the 3D viewer



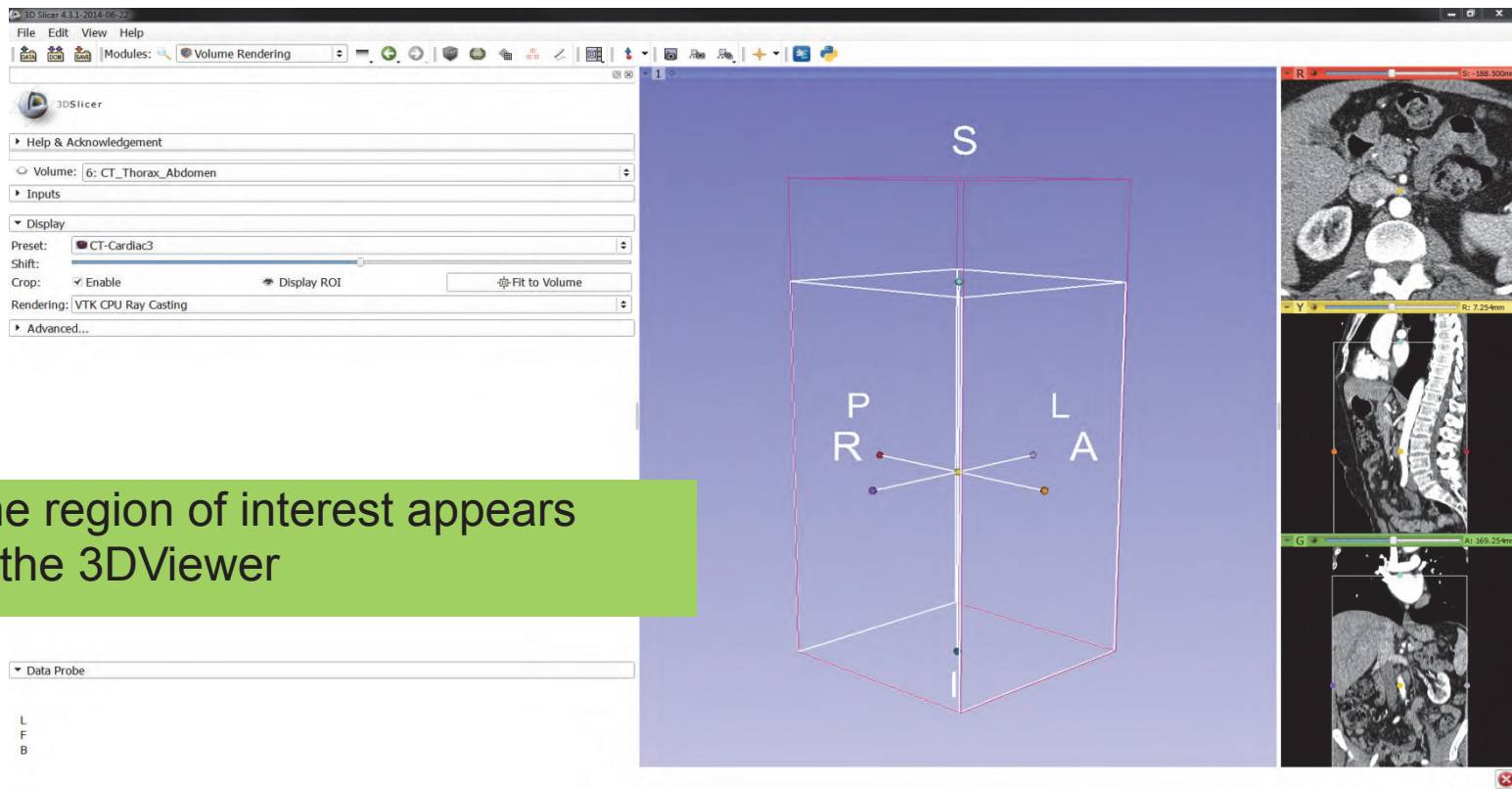
Volume Rendering



Click on **Display ROI** to display a region of interest that we will use for cropping the dataset, and check the option **Enabled**

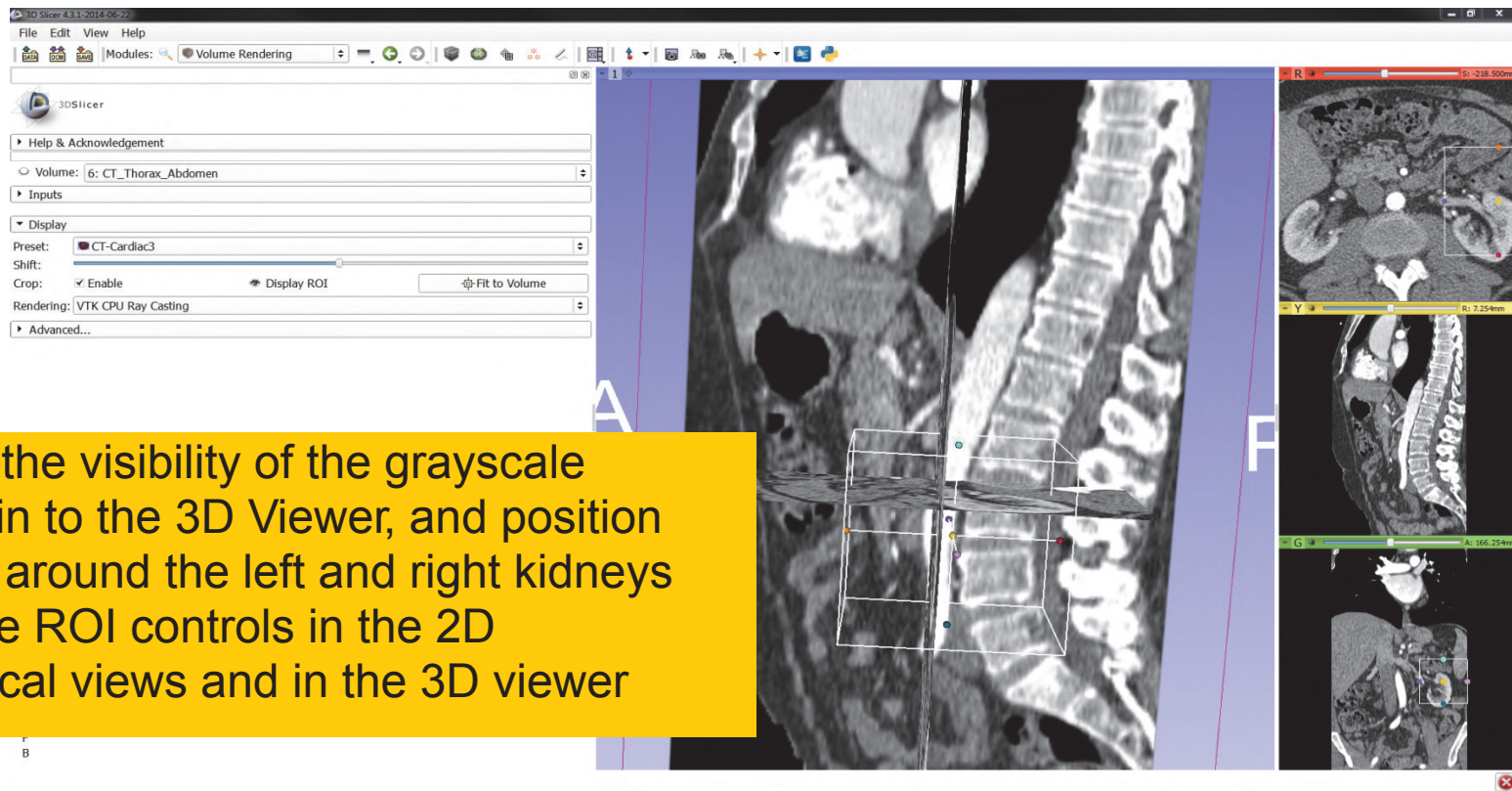


Volume Rendering





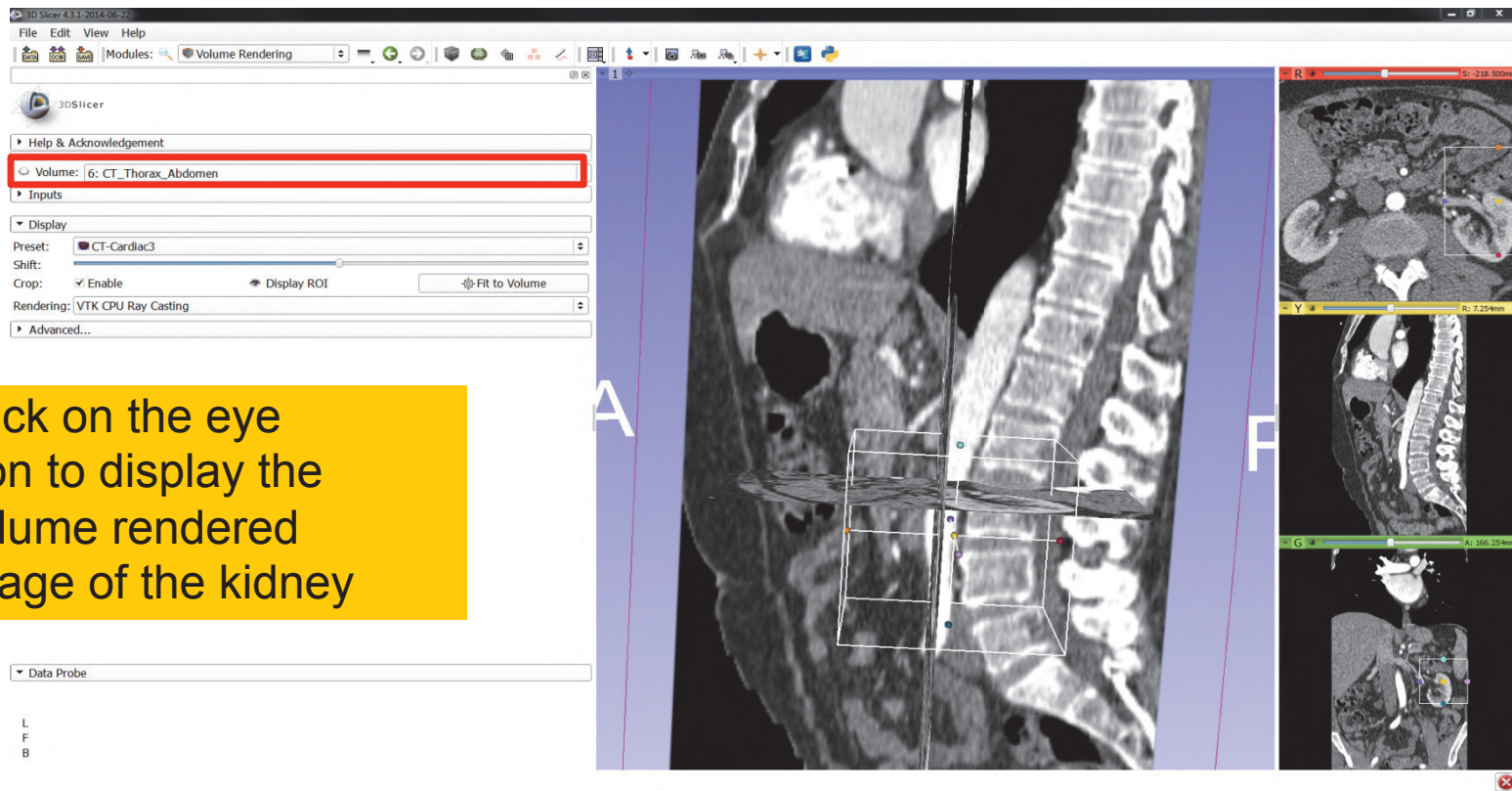
Volume Rendering



Turn on the visibility of the grayscale images in to the 3D Viewer, and position the ROI around the left and right kidneys using the ROI controls in the 2D anatomical views and in the 3D viewer



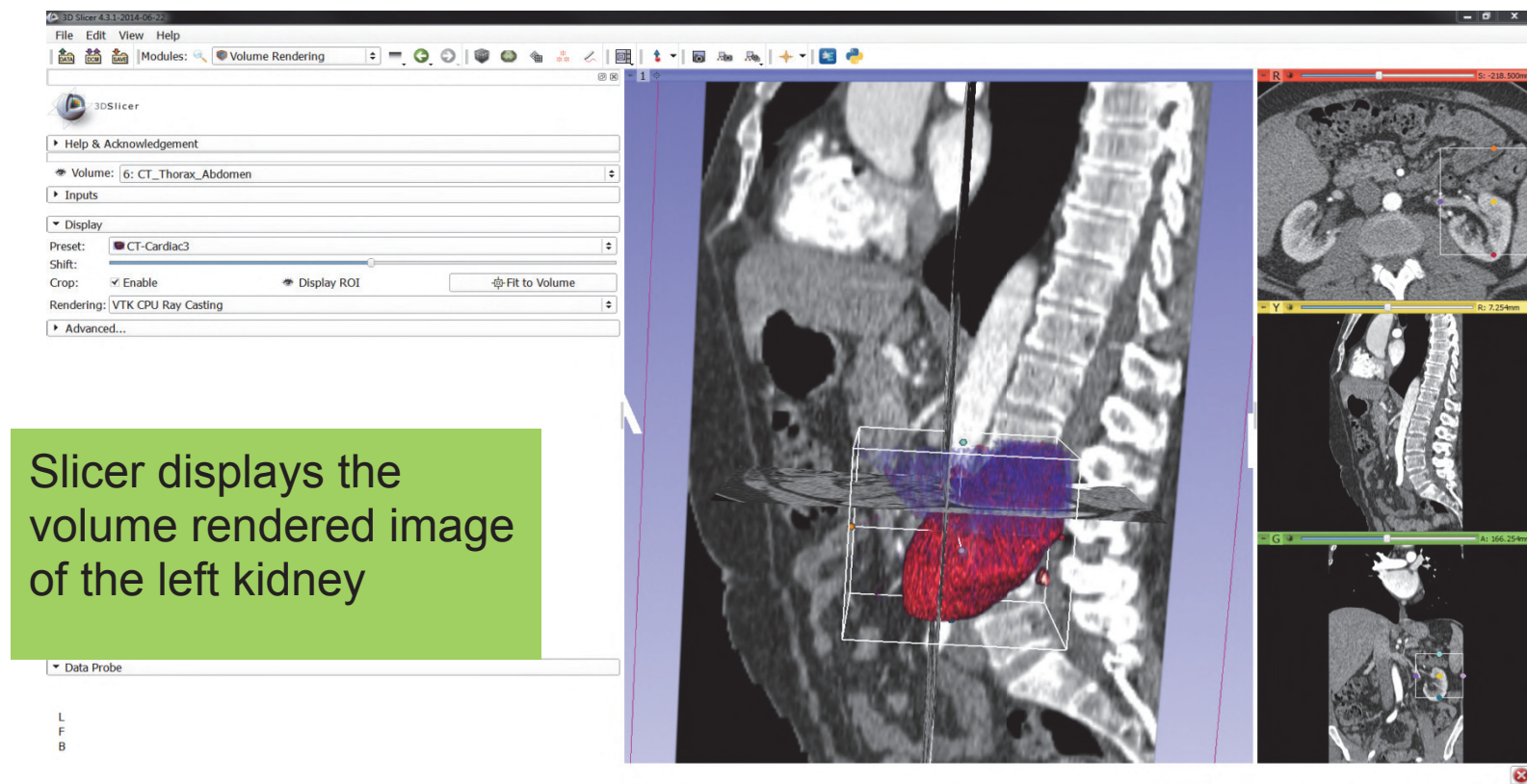
Volume Rendering



Click on the eye icon to display the volume rendered image of the kidney



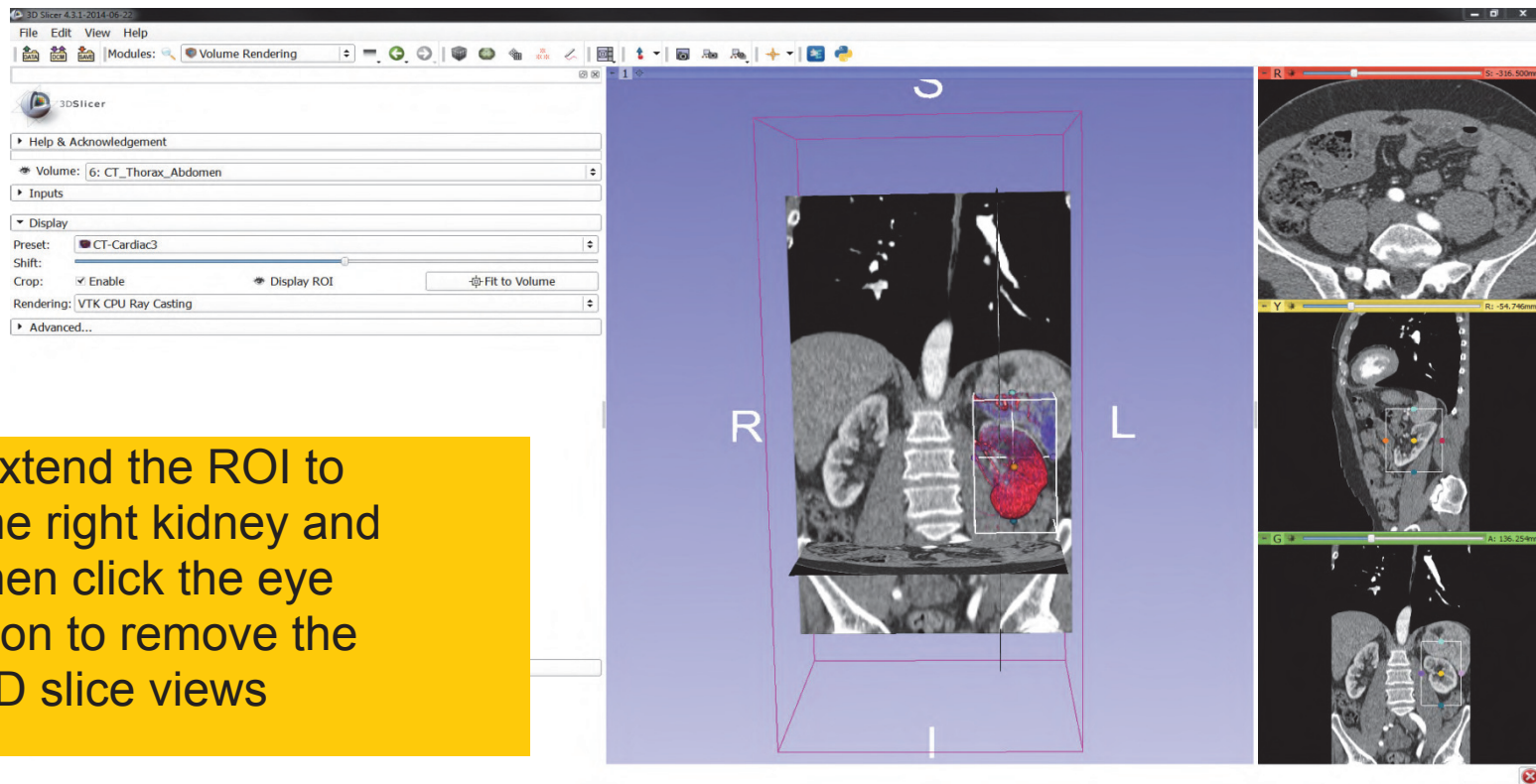
Volume Rendering





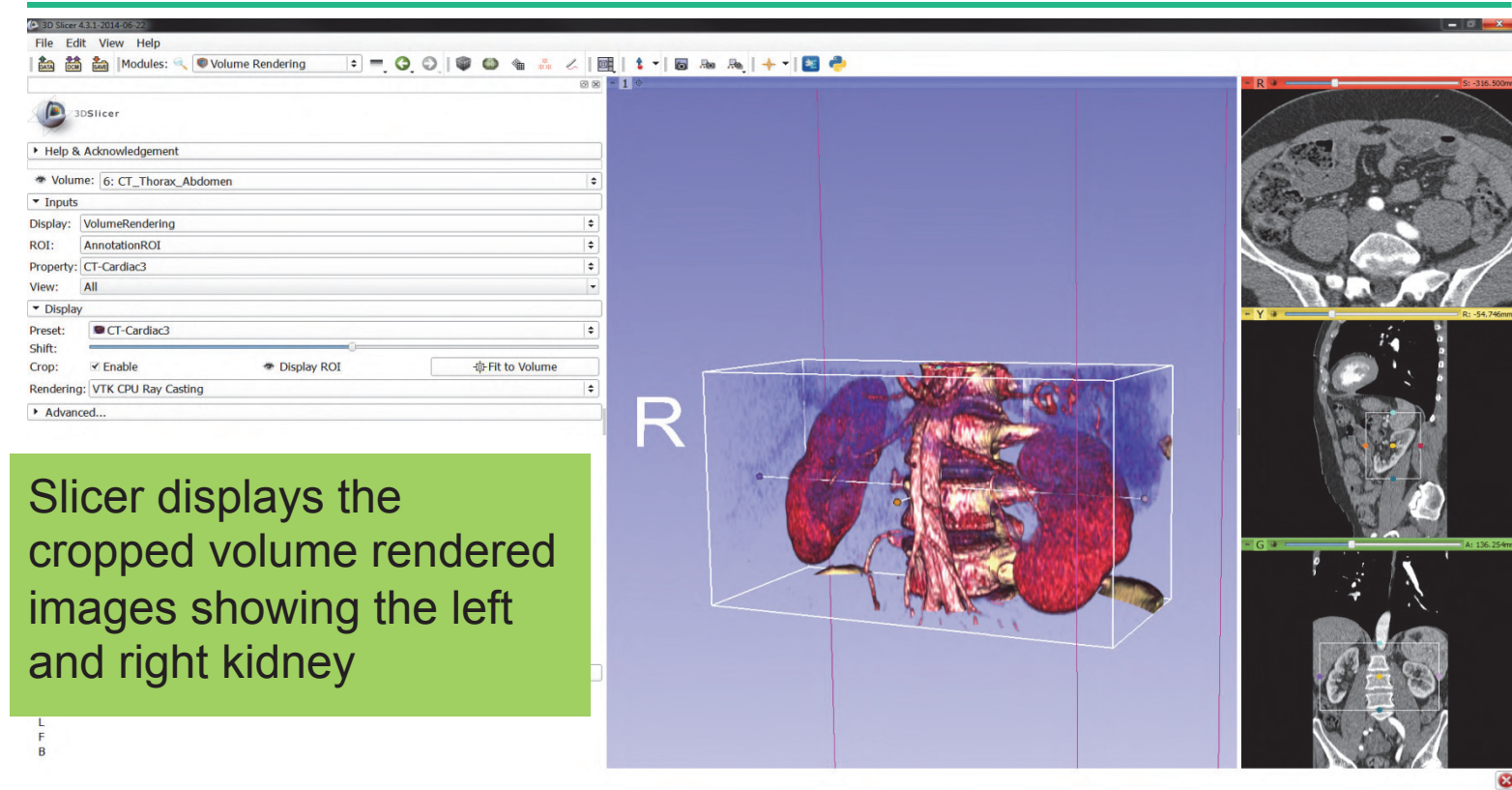
Volume Rendering

Extend the ROI to the right kidney and then click the eye icon to remove the 2D slice views





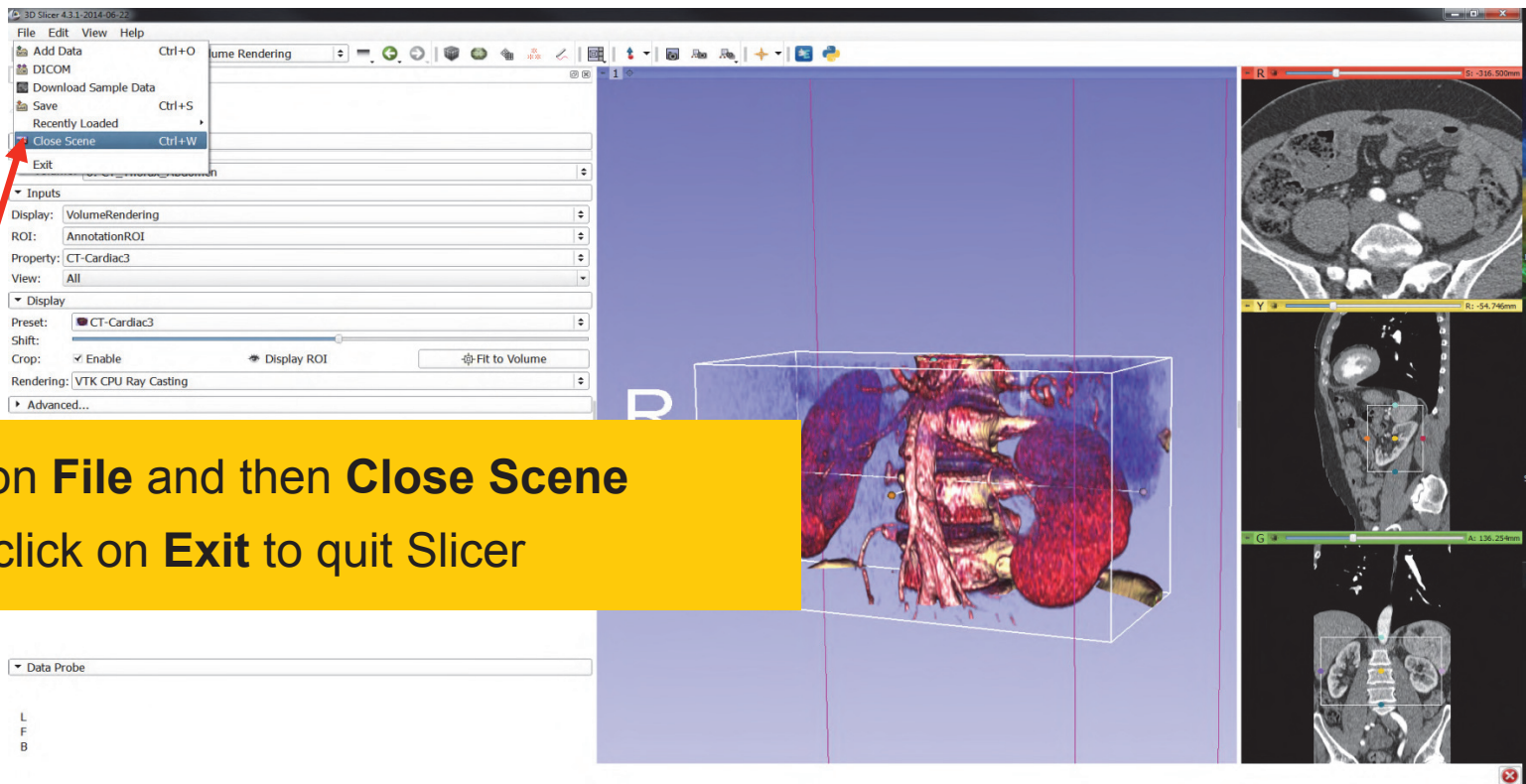
Volume Rendering



Slicer displays the cropped volume rendered images showing the left and right kidney



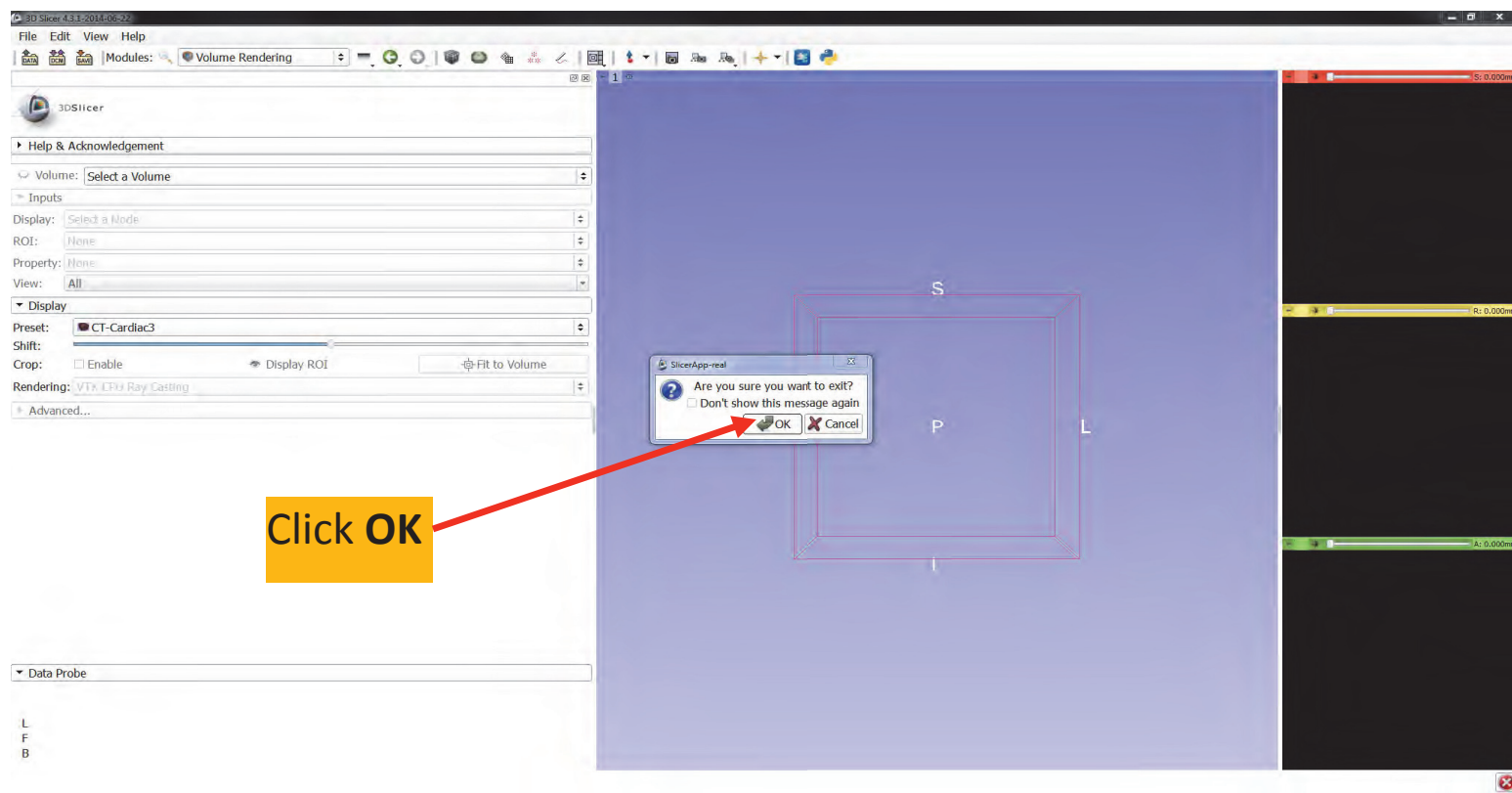
Volume Rendering

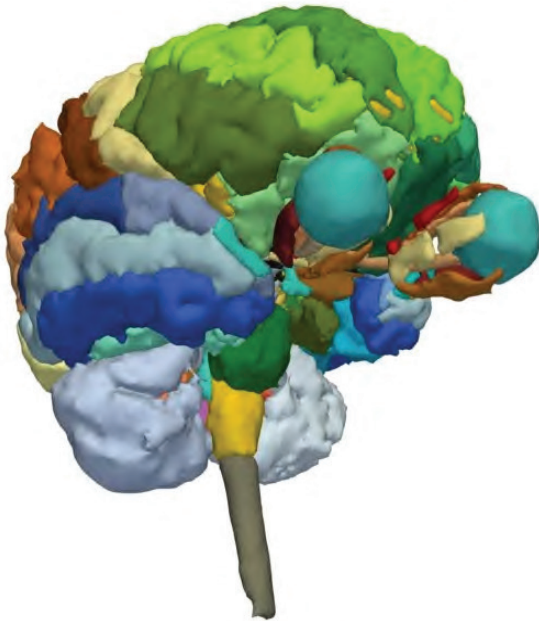


Click on **File** and then **Close Scene**
Then click on **Exit** to quit Slicer



Volume Rendering

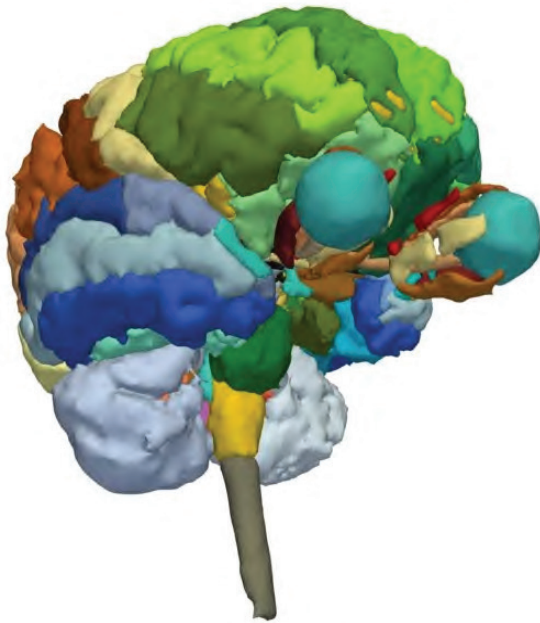




3D visualization of surface models of the brain



3D Data Loading and Visualization

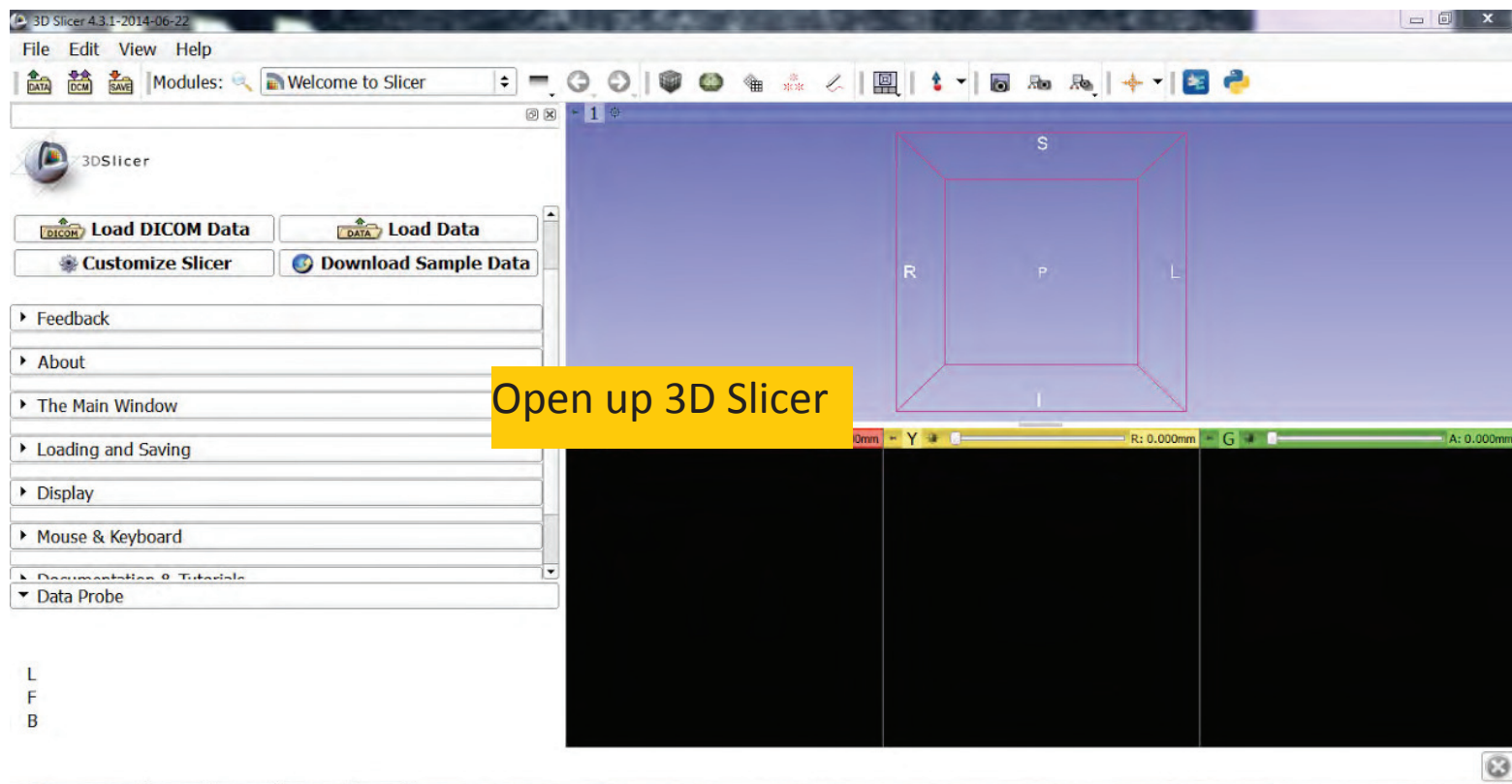


- This tutorial is a short introduction to the advanced **3D visualization capabilities Slicer**
- The Slicer4 Minute dataset is composed of an MR scan of the brain and 3D surface reconstructions of anatomical structures.
- The data are part of the **SPL Multi-modality MRI-based atlas of the brain** by Halle et al. The atlas is available at:

<http://www.spl.harvard.edu/publications/item/view/2037>

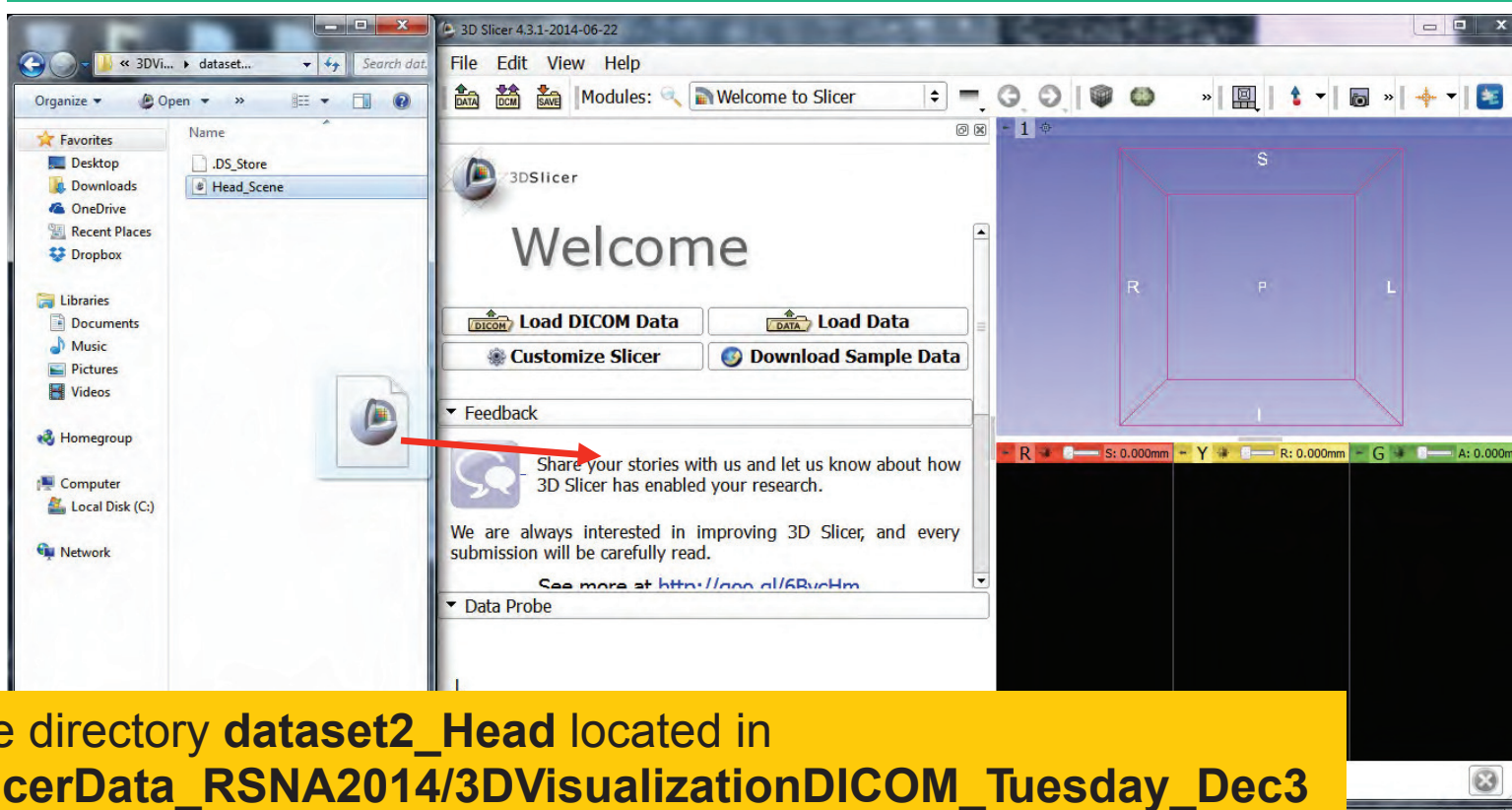


Welcome to Slicer4





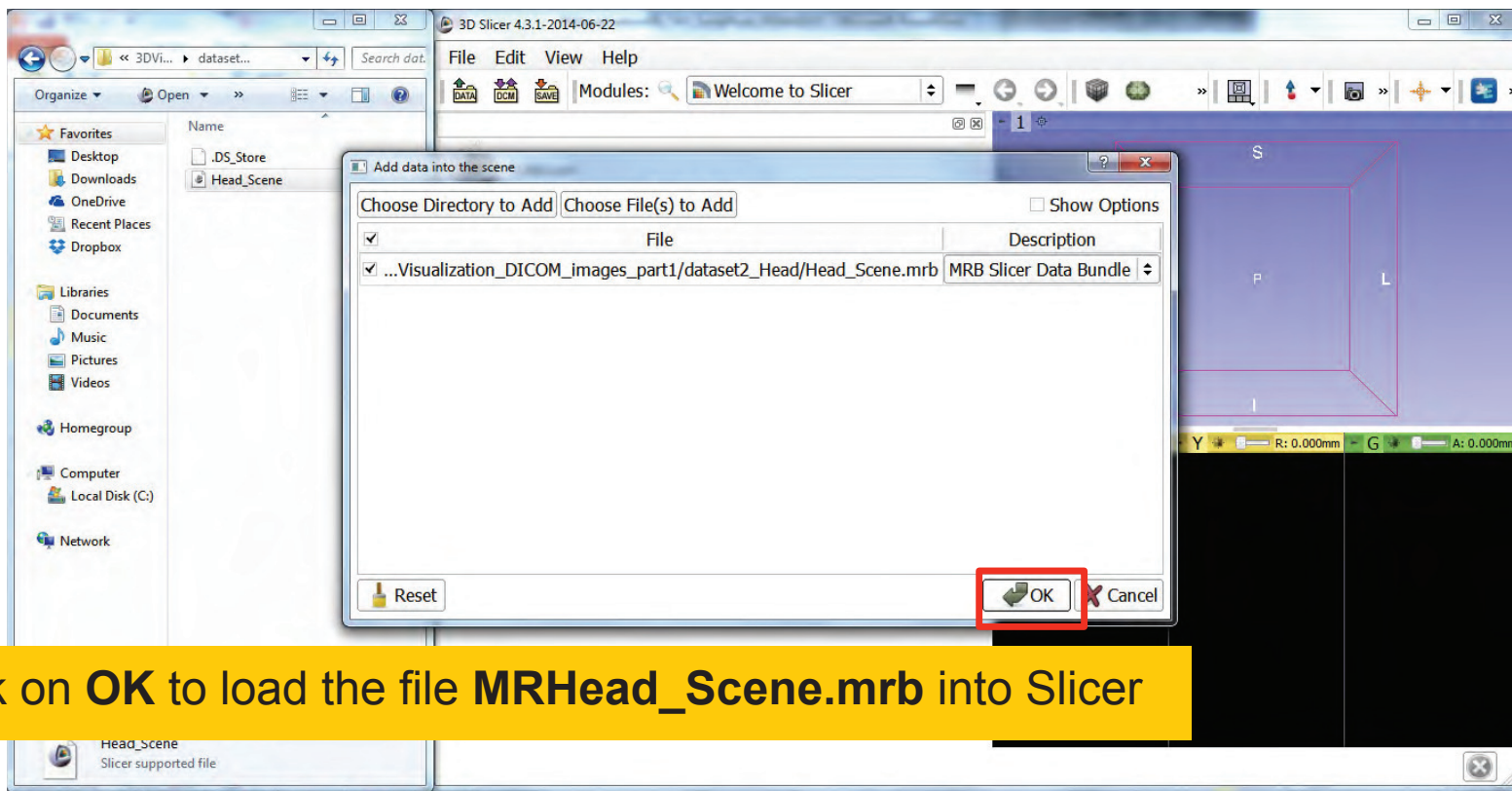
Slicer4 Minute Tutorial: Viewing the Scene



Open the directory **dataset2_Head** located in **C:/3DSlicerData_RSNA2014/3DVisualizationDICOM_Tuesday_Dec3** and drop the file **Head_Scene.mrb** into Slicer



Slicer4 Minute Tutorial: Viewing the Scene



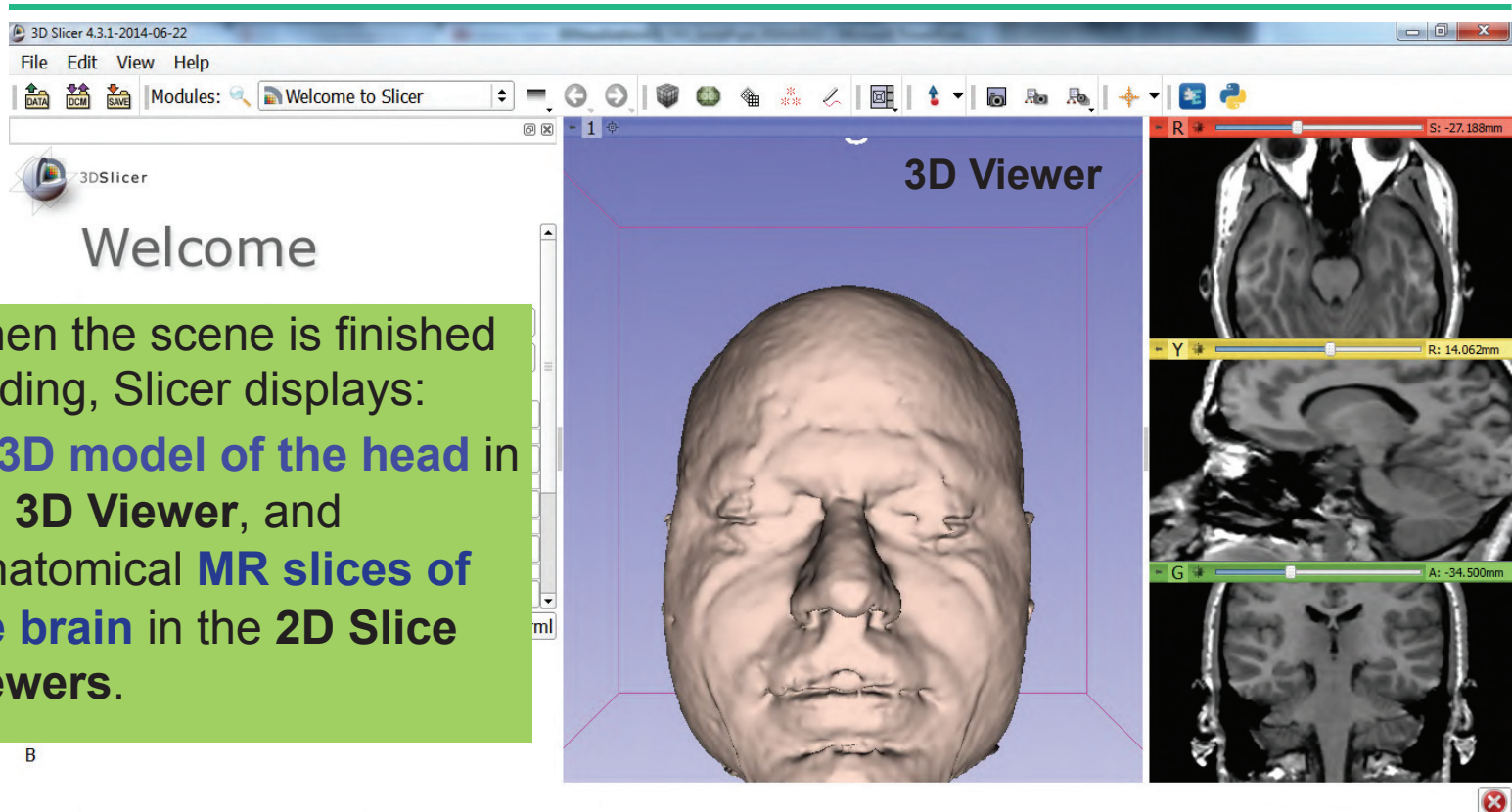


Slicer4 Minute Tutorial: Viewing the Scene

When the scene is finished loading, Slicer displays:

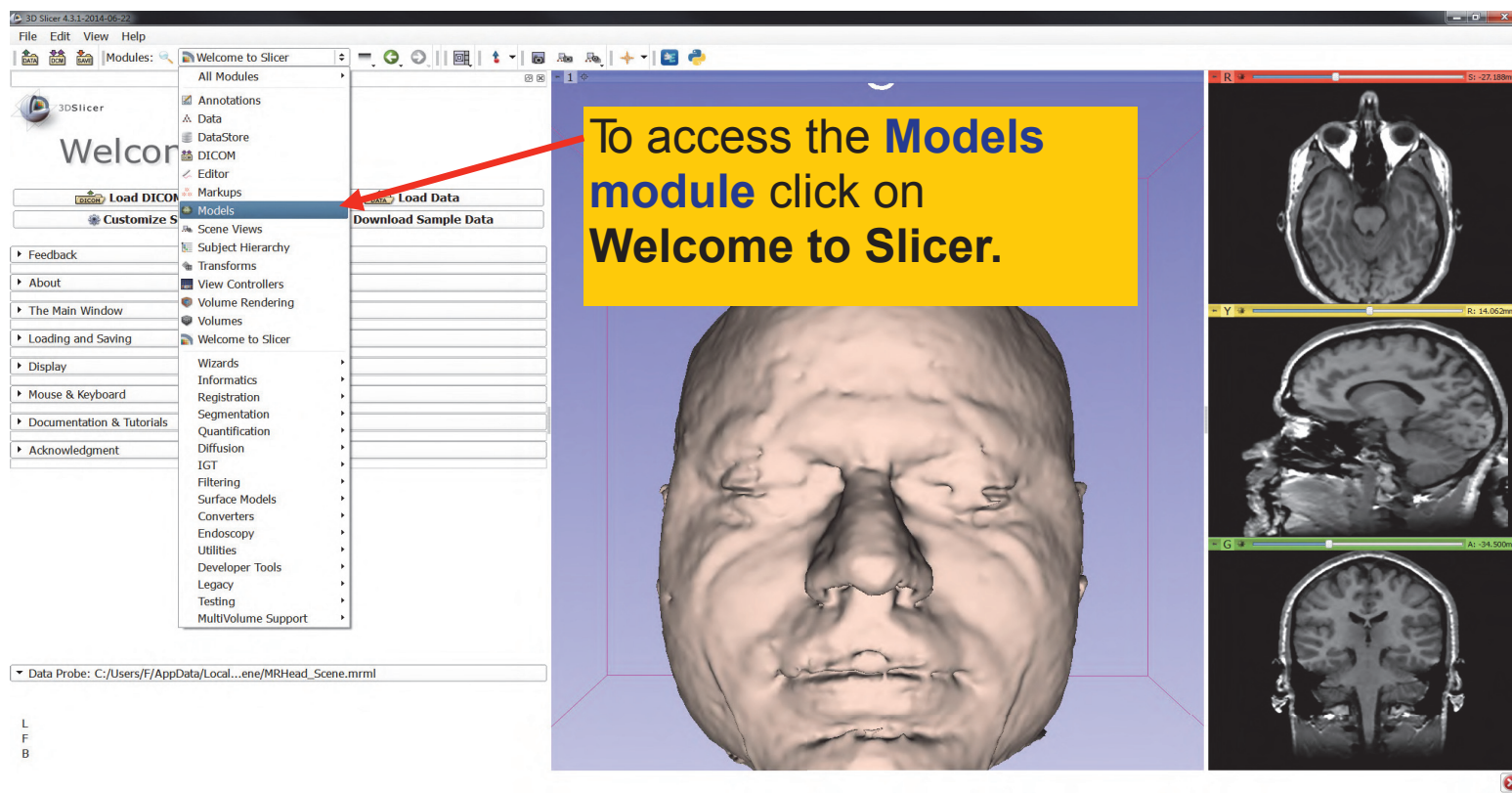
- a **3D model of the head** in the **3D Viewer**, and
- anatomical **MR slices of the brain** in the **2D Slice Viewers**.

B





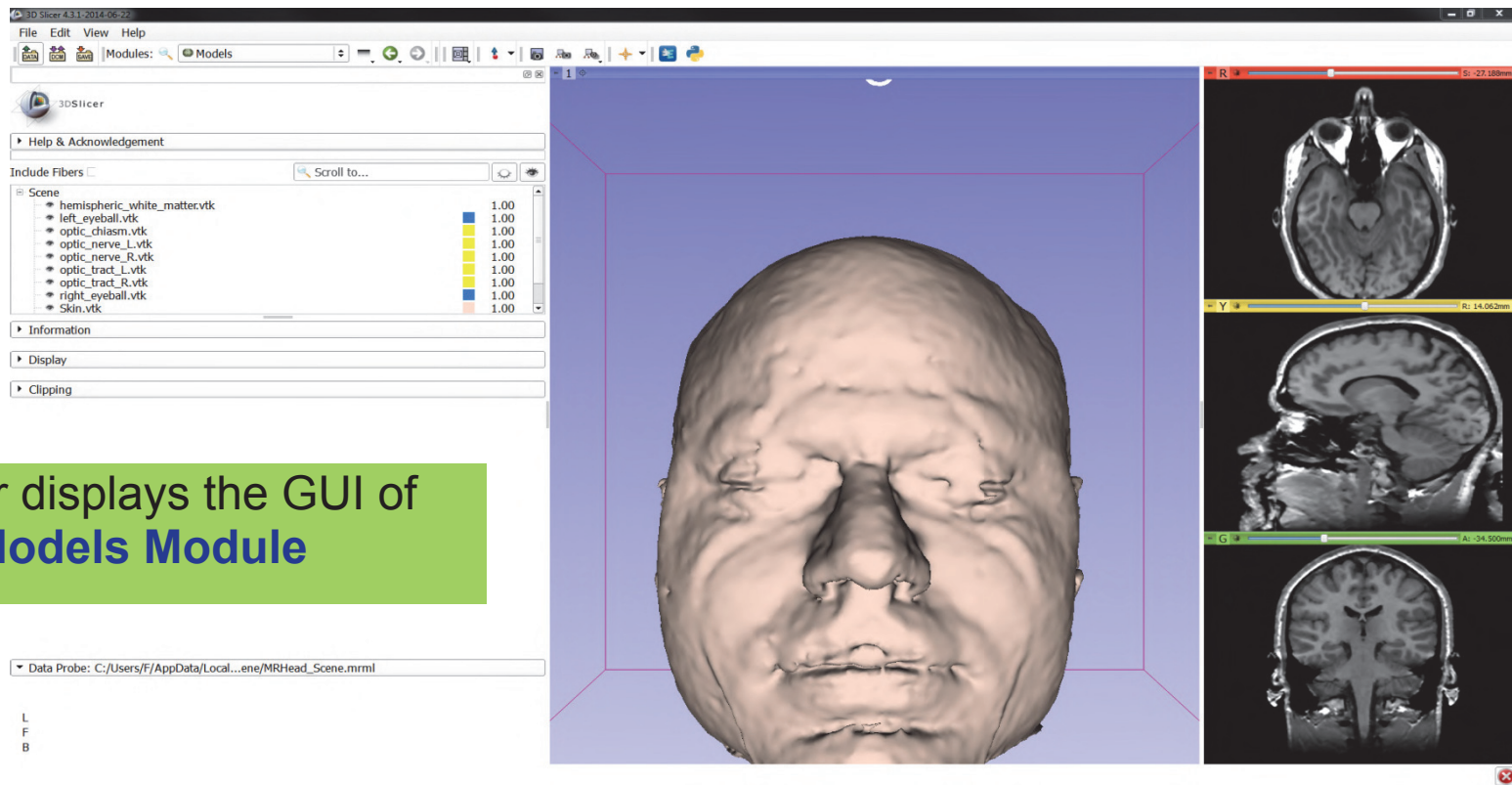
Slicer4 Minute Tutorial: Exploring Slicer's functionality





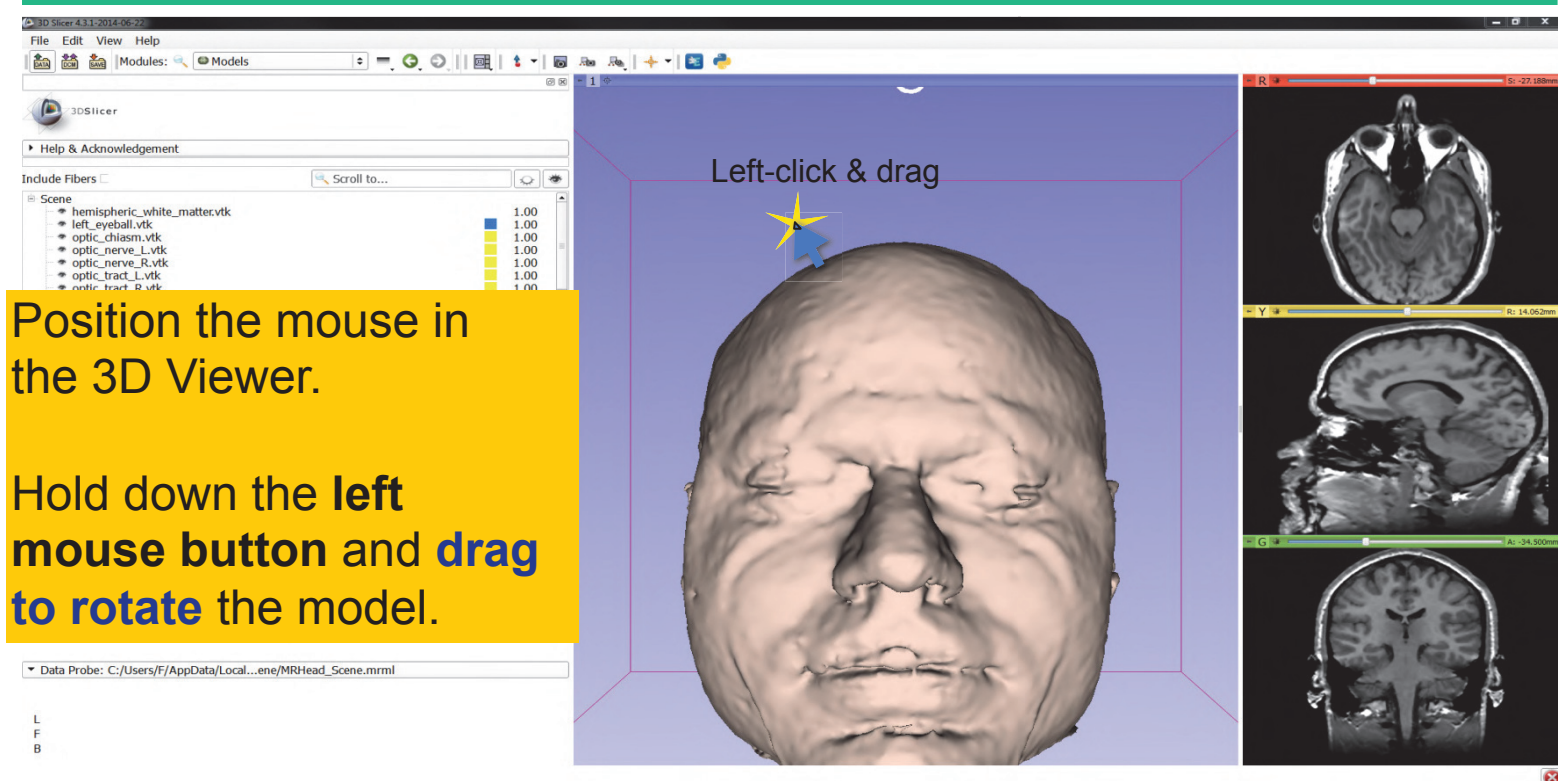
Slicer4 Minute Tutorial: Switching to the Models Module

Slicer displays the GUI of the **Models Module**





Slicer4 Minute Tutorial: Basic 3D Interaction

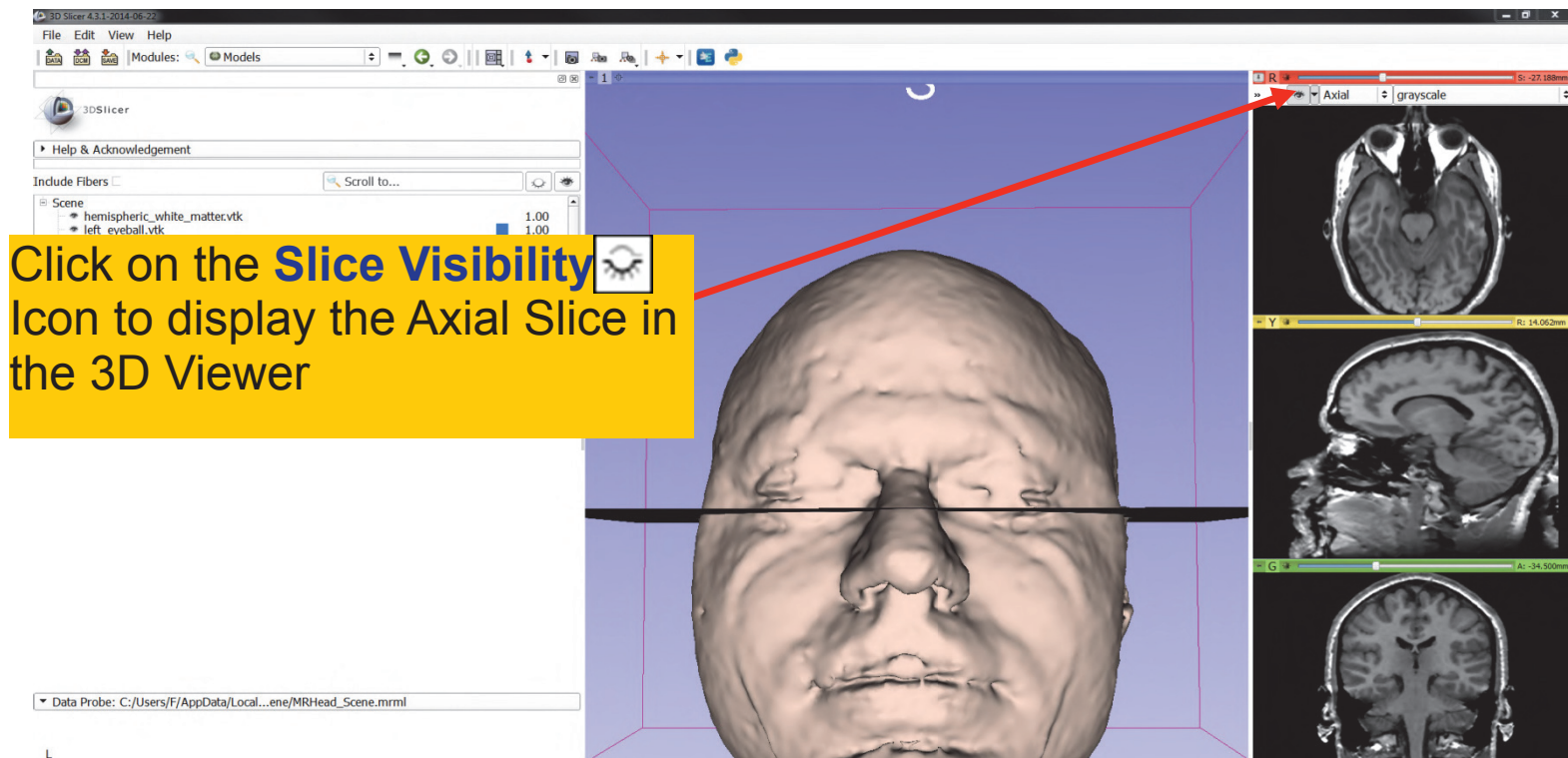


Position the mouse in the 3D Viewer.

Hold down the **left mouse button** and **drag** to **rotate** the model.



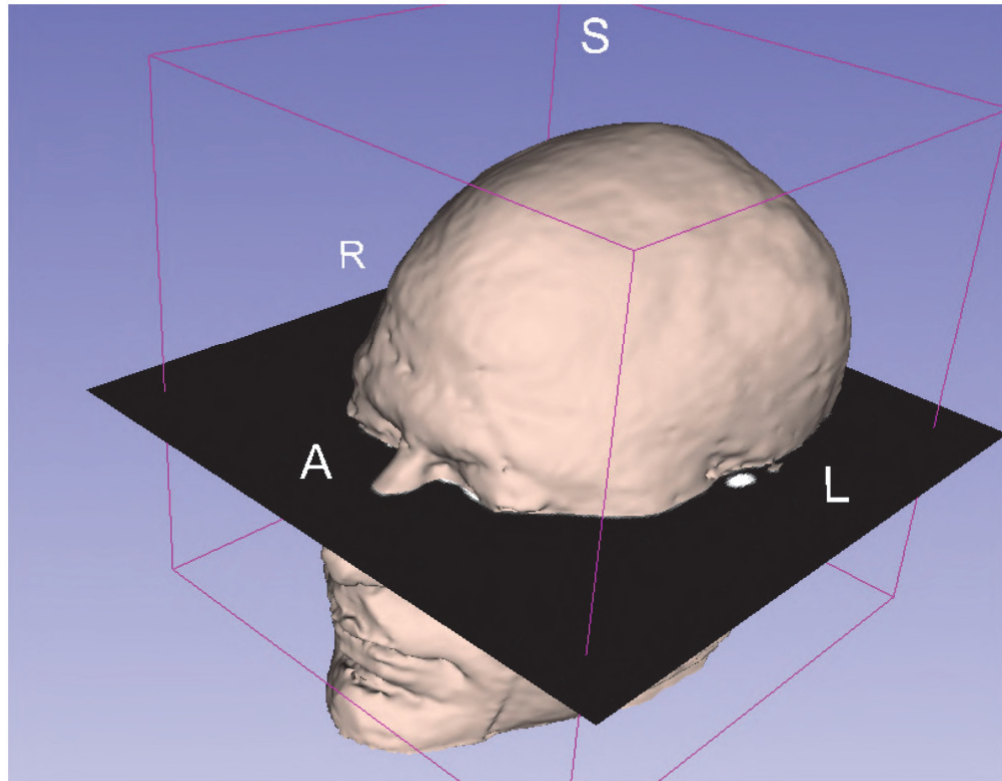
Slicer4 Minute Tutorial: Viewing Slices in the 3D Viewer





Slicer4 Minute Tutorial: 3D Visualization

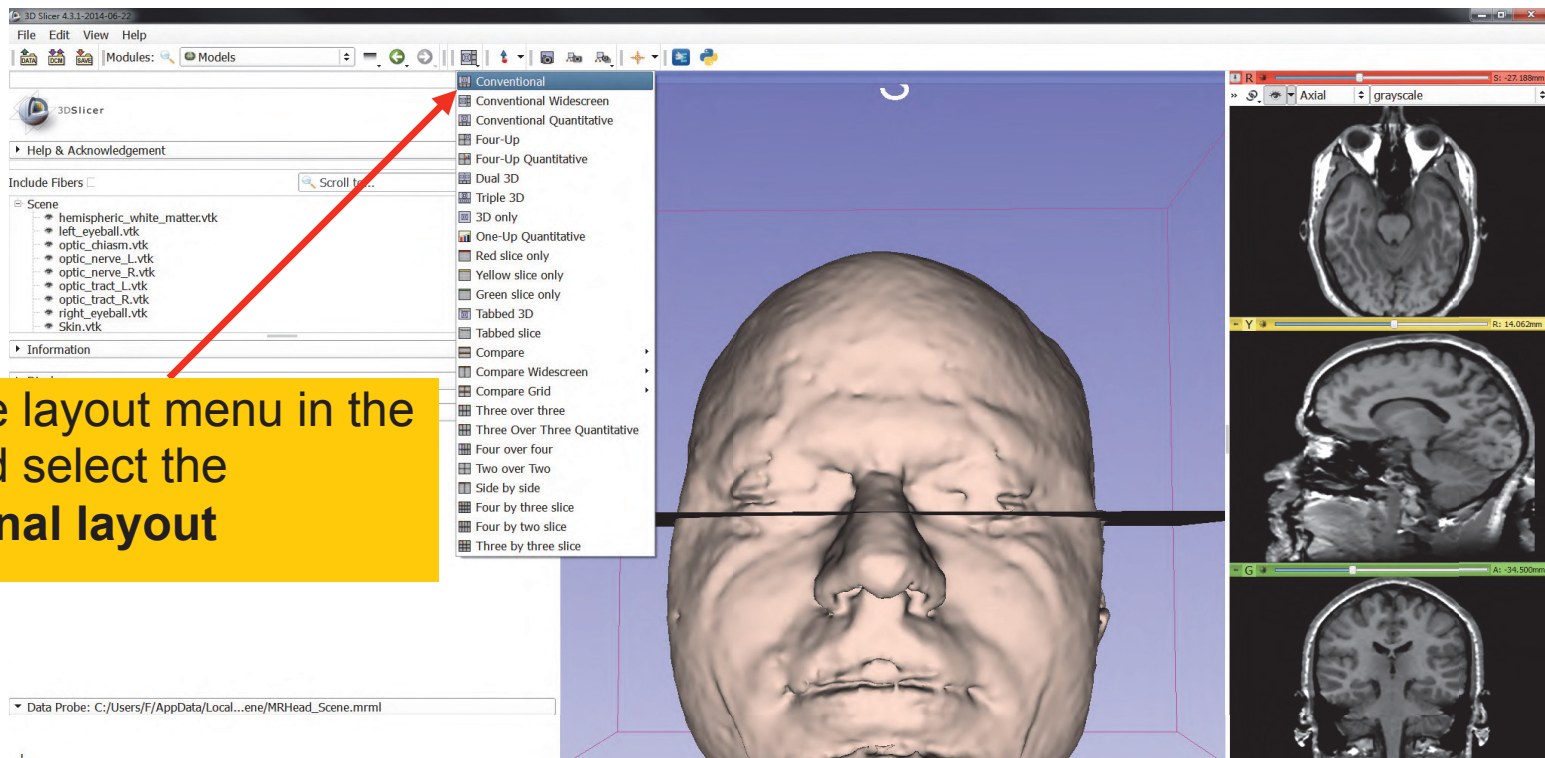
Slicer adds a view of the **Axial slice** in the 3D View.





Slicer4 Minute Tutorial: Viewing Slices in the 3D Viewer

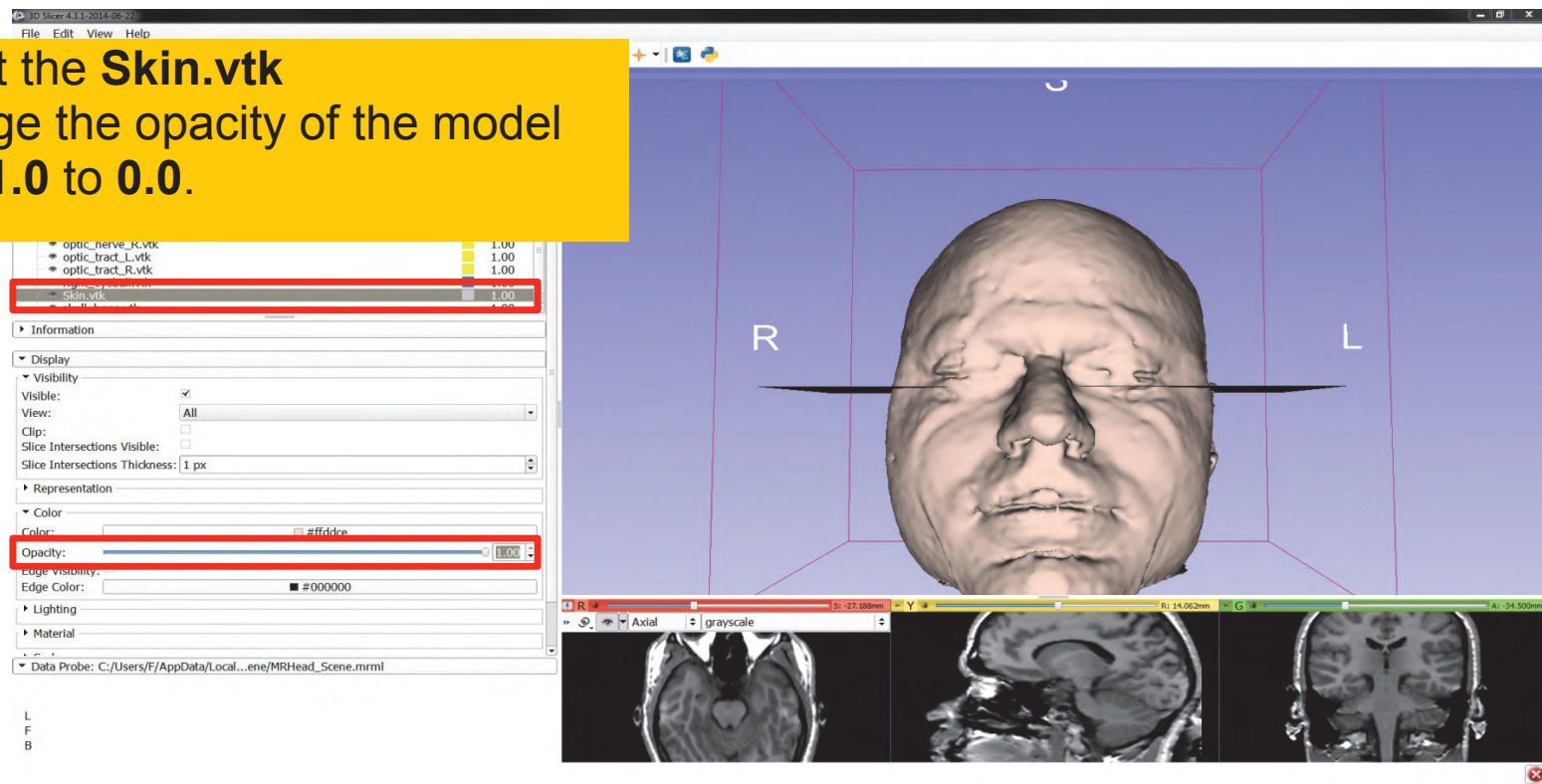
Click on the layout menu in the toolbar, and select the **Conventional layout**





Slicer4 Minute Tutorial: 3D Visualization

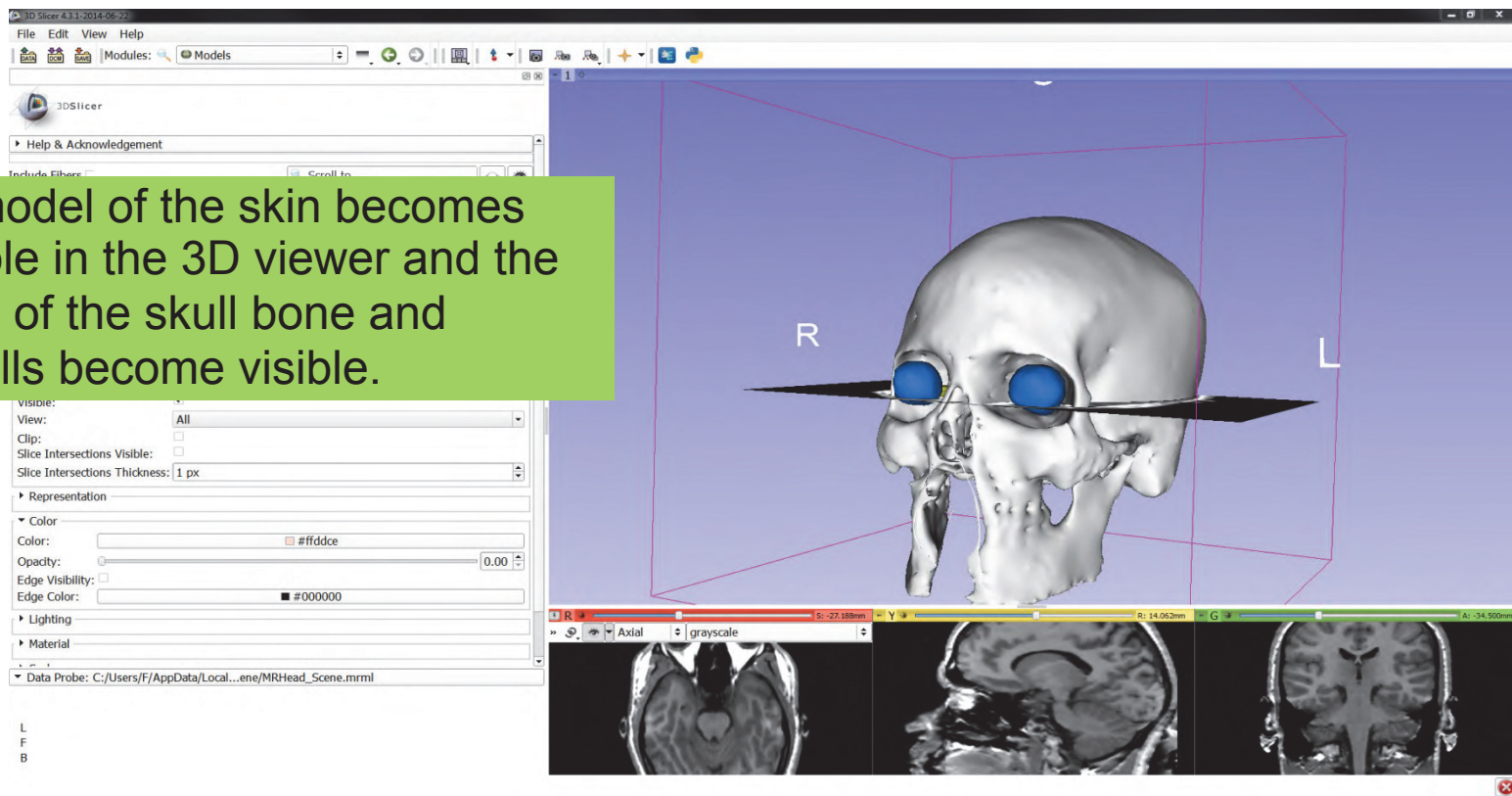
Select the **Skin.vtk**
Change the opacity of the model
from **1.0** to **0.0**.





Slicer4 Minute Tutorial: 3D Visualization

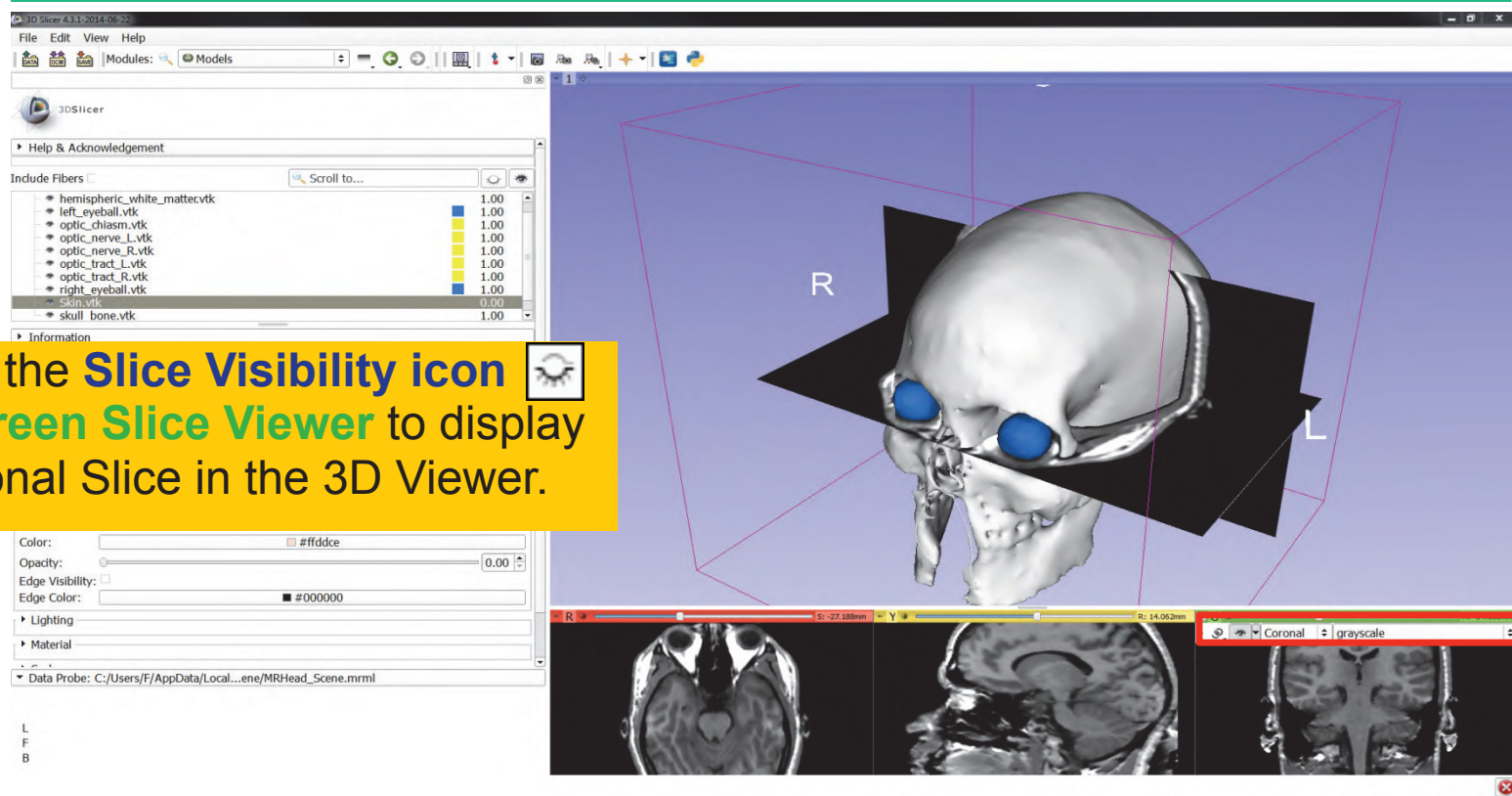
The model of the skin becomes invisible in the 3D viewer and the model of the skull bone and eyeballs become visible.





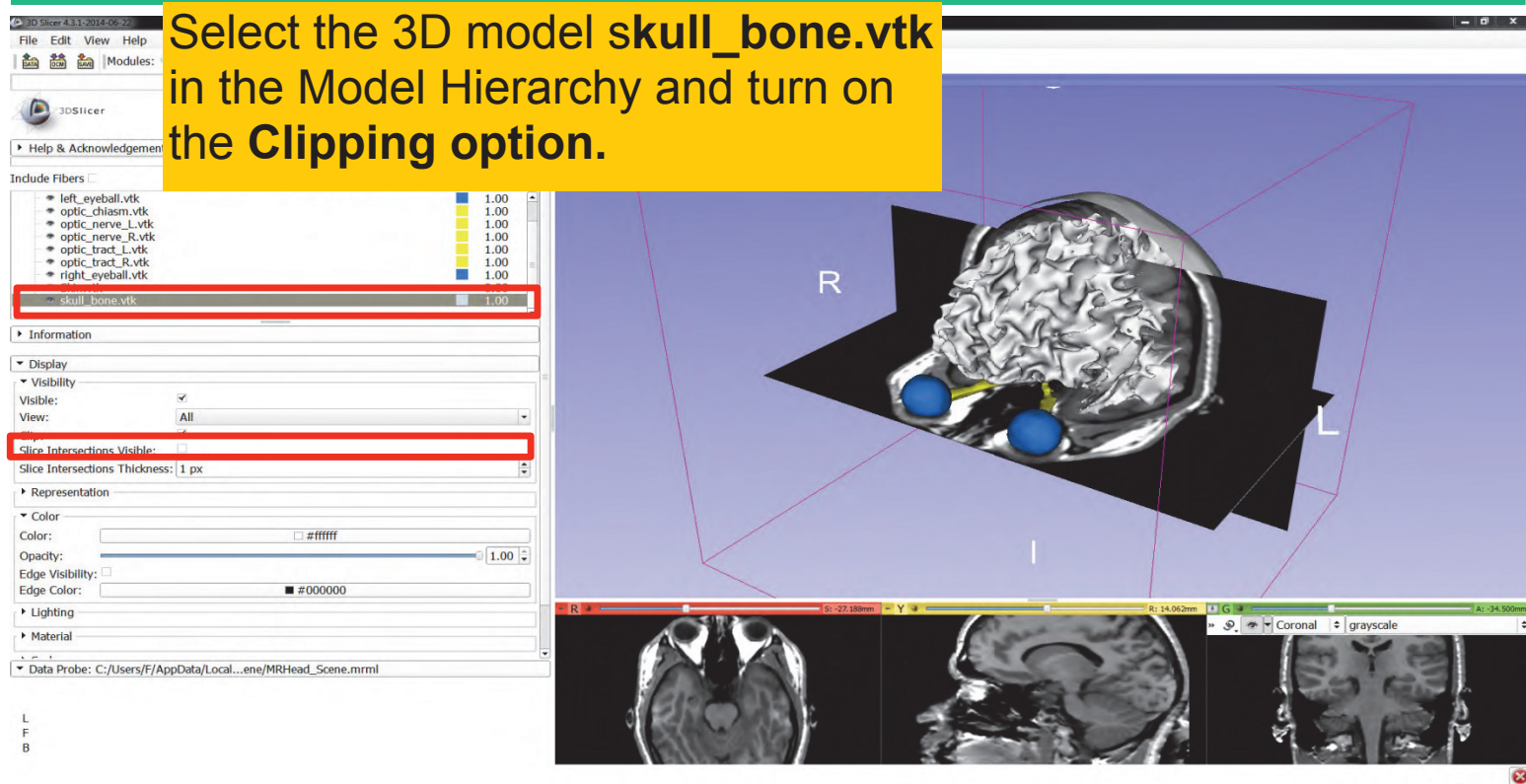
Slicer4 Minute Tutorial: 3D Visualization

Click on the **Slice Visibility** icon  in the **Green Slice Viewer** to display the Coronal Slice in the 3D Viewer.





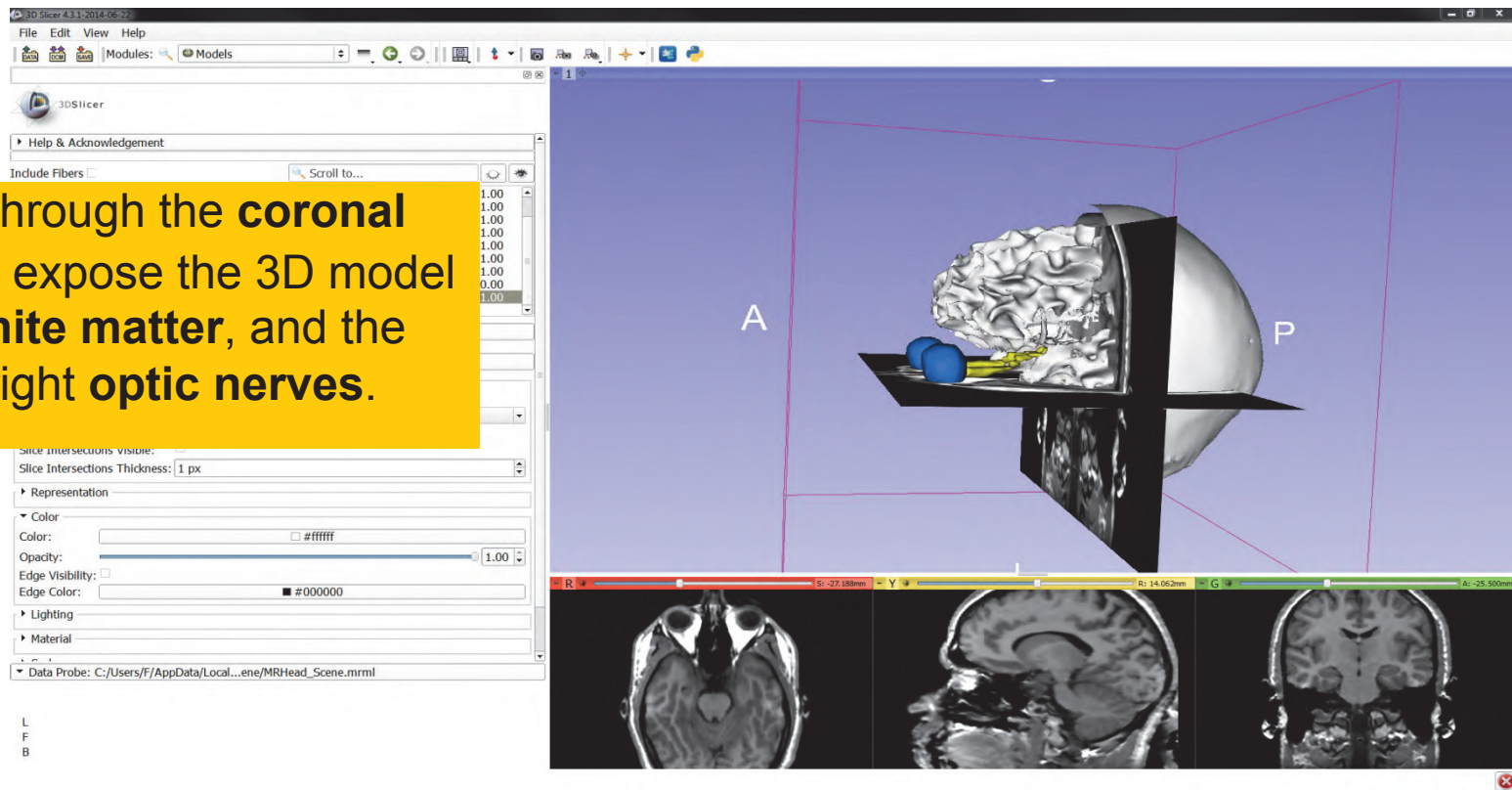
Slicer4 Minute Tutorial: 3D Visualization





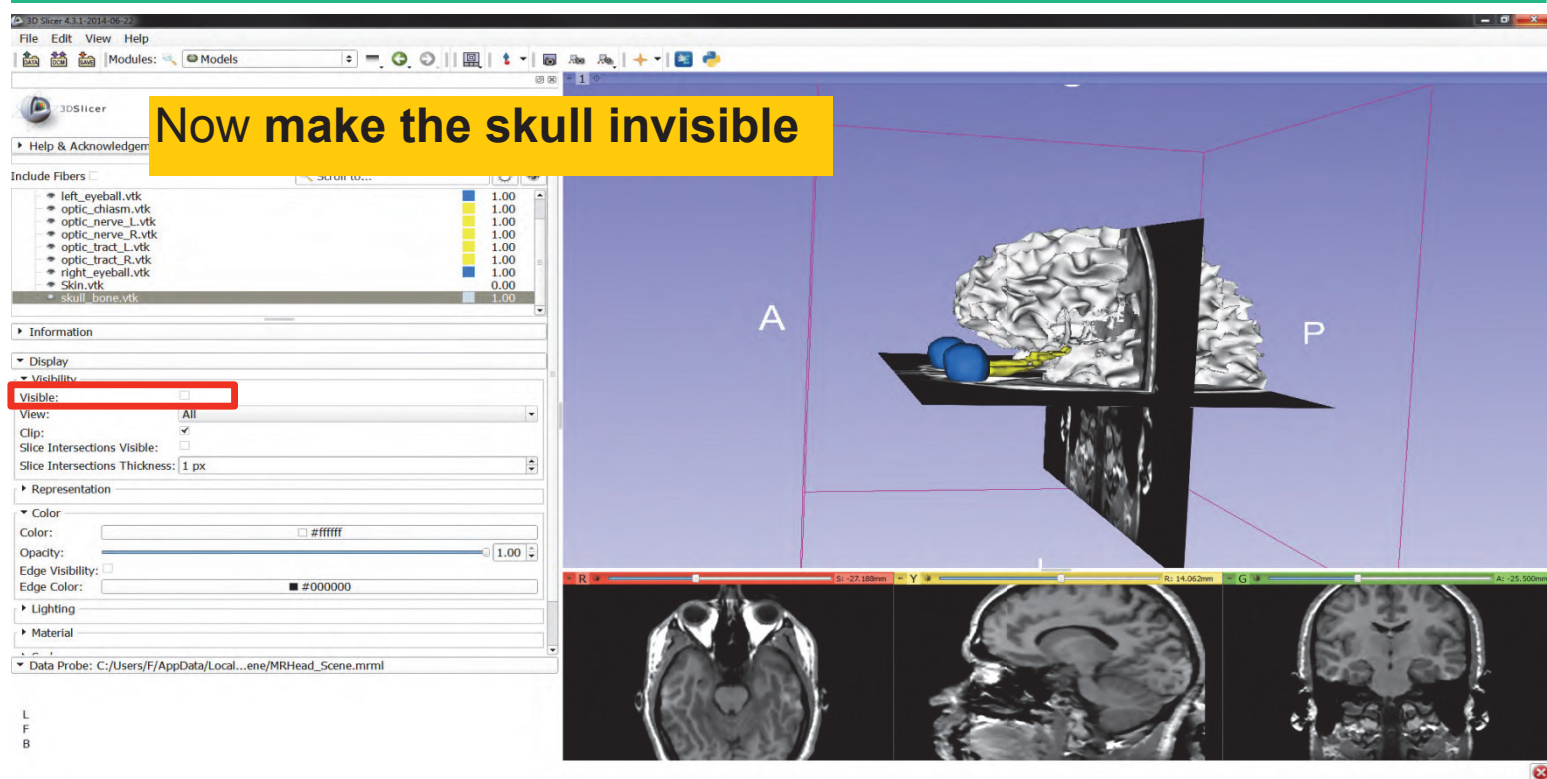
Slicer4 Minute Tutorial: 3D Visualization

Browse through the **coronal slices** to expose the 3D model of the **white matter**, and the left and right **optic nerves**.





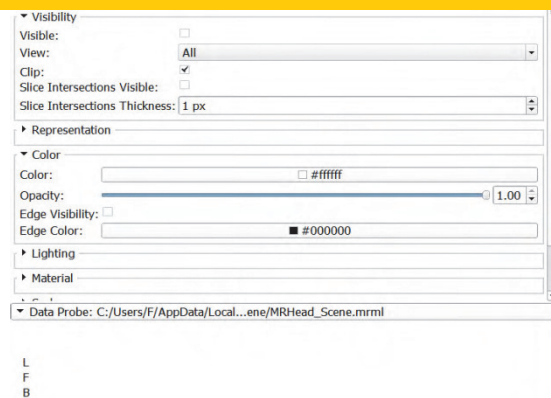
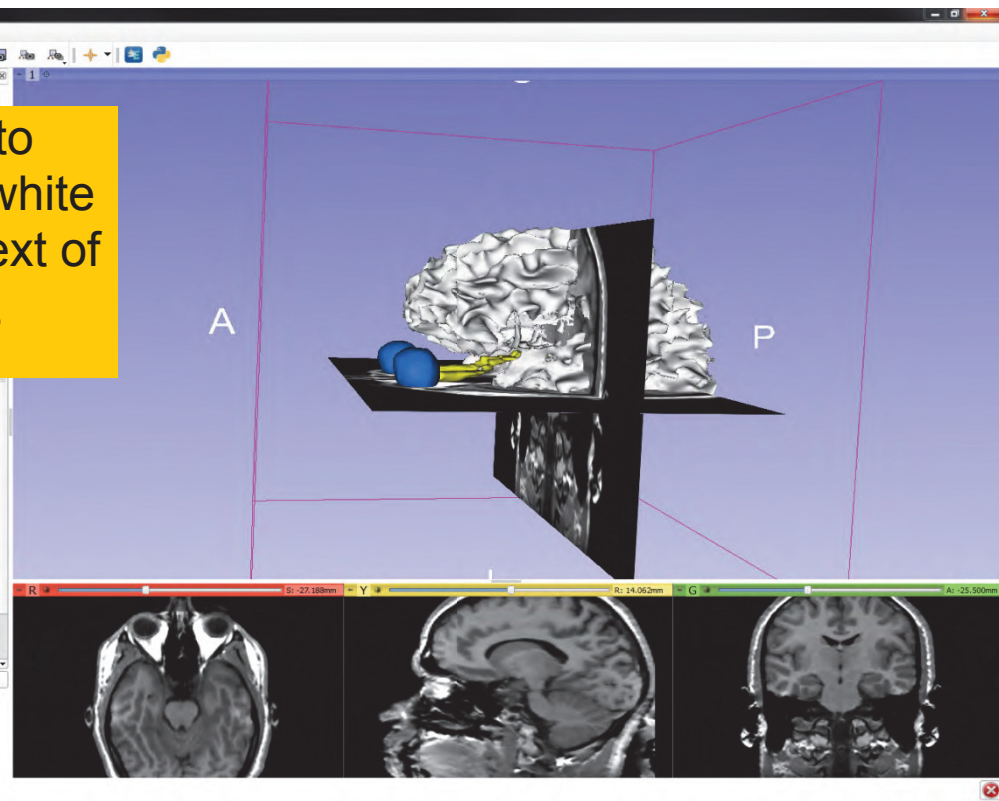
Slicer4 Minute Tutorial: 3D Visualization





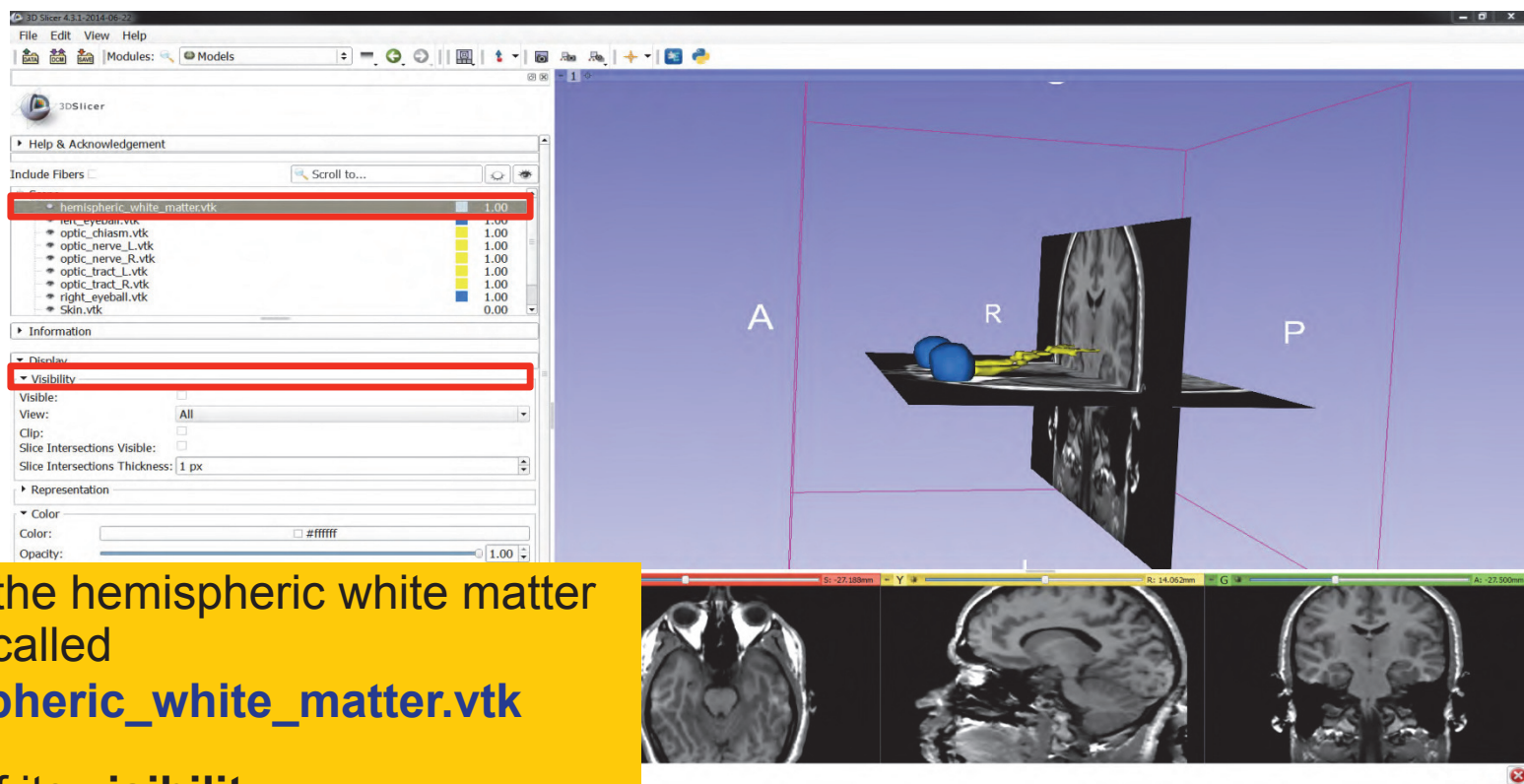
Slicer4 Minute Tutorial: 3D Visualization

Scroll the **Coronal Slices** to display the hemispheric white matter model in the context of the image data in the 3D.





Slicer4 Minute Tutorial: 3D Visualization



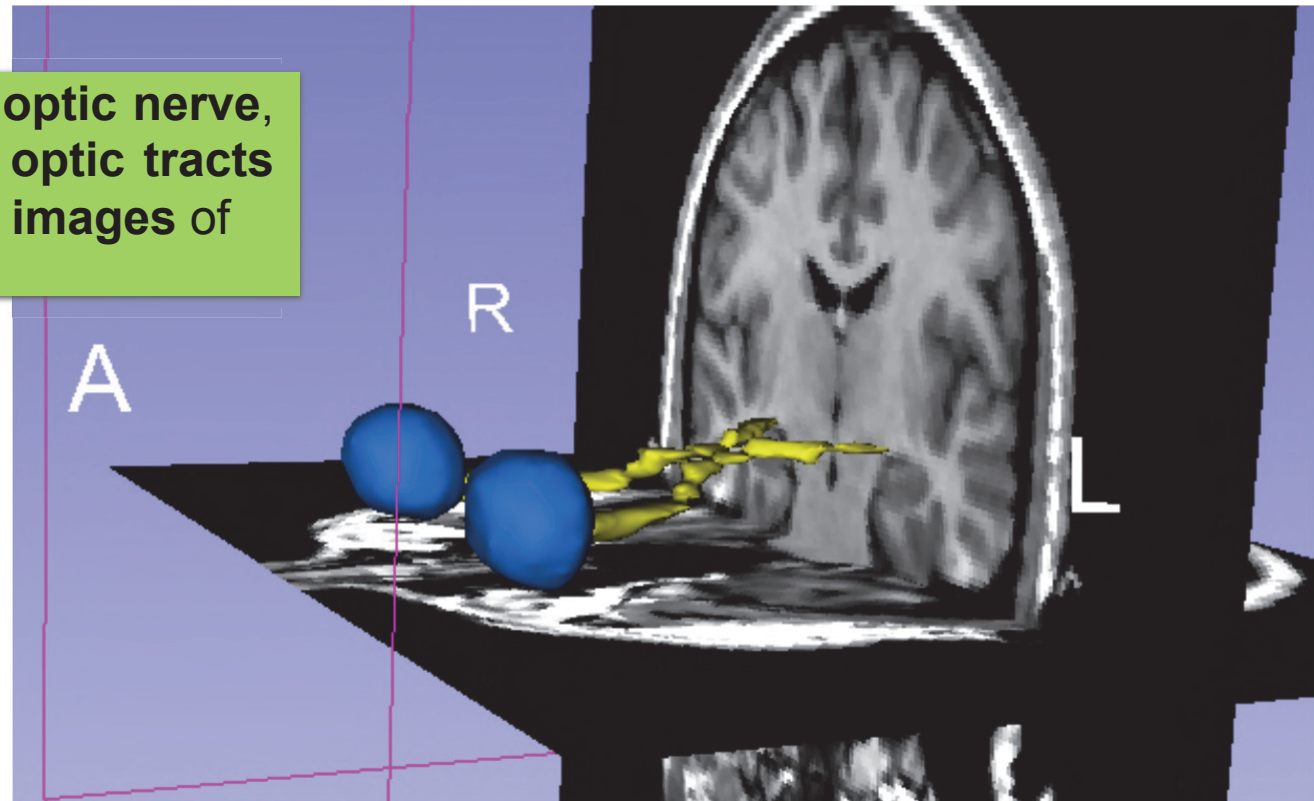
Select the hemispheric white matter model called **hemispheric_white_matter.vtk**

Turn off its **visibility**.



Slicer4 Minute Tutorial: 3D Visualization

Slicer displays the **optic nerve**, **optic chiasm** and **optic tracts** overlaid on the **MR images** of the brain.

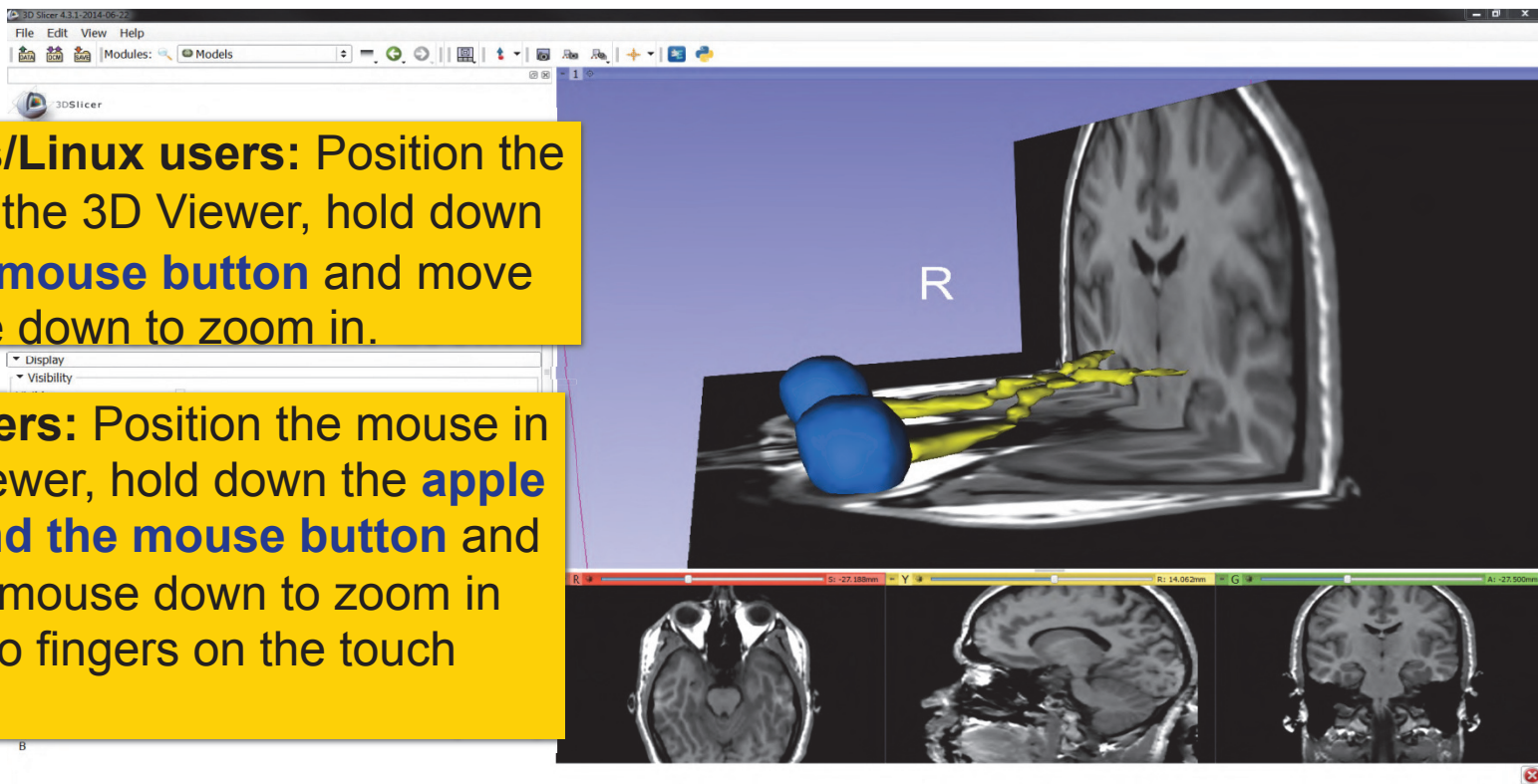




Slicer4 Minute Tutorial: 3D Visualization: Zoom the view

Windows/Linux users: Position the mouse in the 3D Viewer, hold down the **right mouse button** and move the mouse down to zoom in.

Mac users: Position the mouse in the 3D Viewer, hold down the **apple button and the mouse button** and move the mouse down to zoom in (or use two fingers on the touch pad).





Close the existing scene and all its data

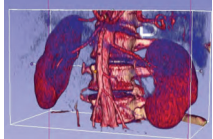
The screenshot shows the 3D Slicer 4.3.1-2014-06-22 interface. The 'File' menu is open, and a red arrow points to the 'Close Scene' option (Ctrl+W). A yellow text box over the menu says: 'Select **File->Close Scene** This removes any dataset previously loaded into slicer.' Another yellow text box over the 'Exit' option says: 'Click on **Exit** to exit Slicer'. The 'Scene' panel on the left lists several datasets: 'hemispheric_white_matter.vtk', 'left_eyeball.vtk', 'optic_chiasm.vtk', 'optic_nerve_L.vtk', 'optic_nerve_R.vtk', 'optic_tract_L.vtk', 'optic_tract_R.vtk', 'right_eyeball.vtk', and 'Skin.vtk'. The 'Information' panel shows settings for 'Display', 'Visibility', 'Representation', 'Color', 'Opacity', 'Edge Visibility', 'Edge Color', 'Lighting', and 'Material'. The 'Data Probe' at the bottom shows the path: 'C:/Users/F/AppData/Local...ene/MRHead_Scene.mrml'. The main 3D view shows a brain model with two blue spheres and yellow lines. The bottom status bar shows coordinates: 'R: -27.188mm', 'S: 14.062mm', 'G: -27.500mm'.



Overview

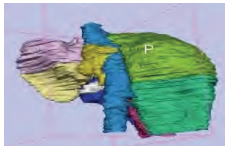


Part I: Introduction to the 3DSlicer software



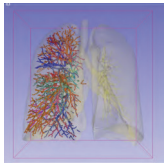
Part II: 3D Data Loading and visualization of DICOM images

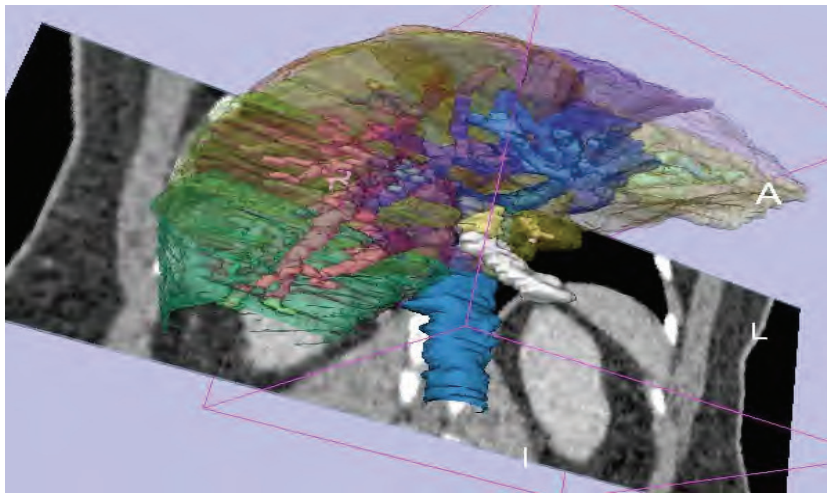
- Volume Rendering of thoraco-abdominal CT data
- Surface Rendering of MR head data



Part III: 3D interactive exploration of the anatomy

- Exploration of the Segments of the liver
- Exploration of the Segments of the lung



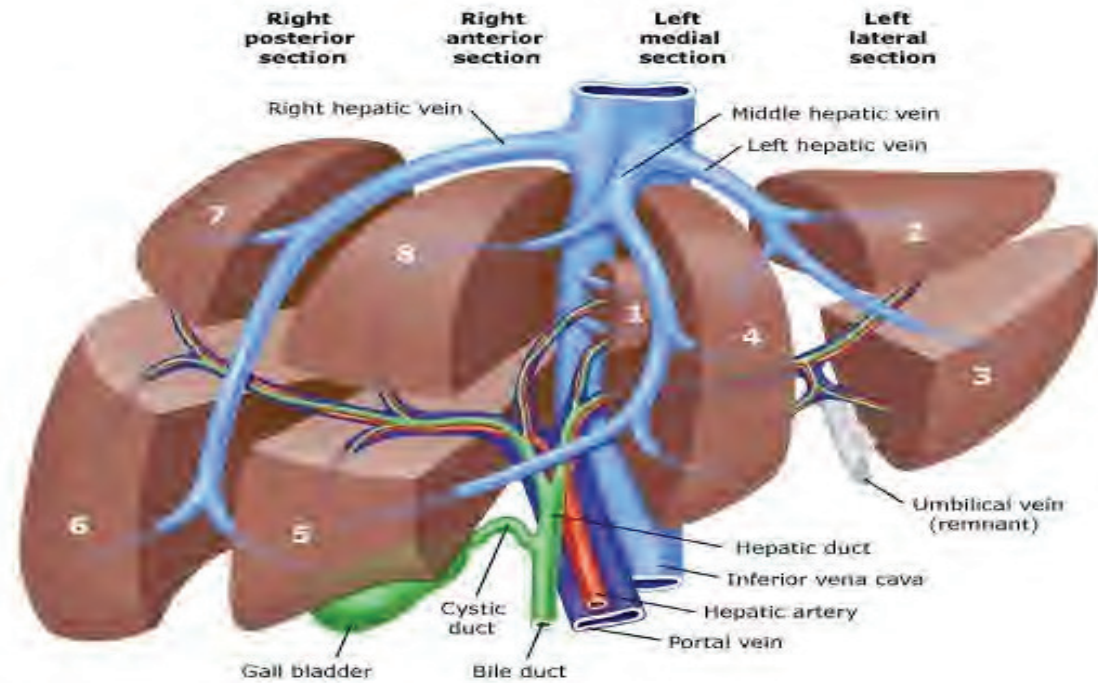


Part II:

Interactive 3D Visualization
of the segments of the liver

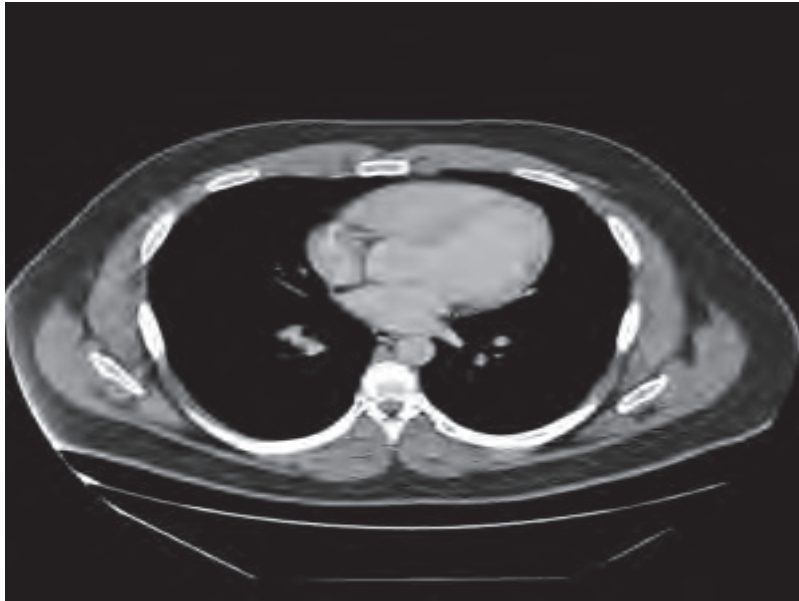


Anatomy of the liver





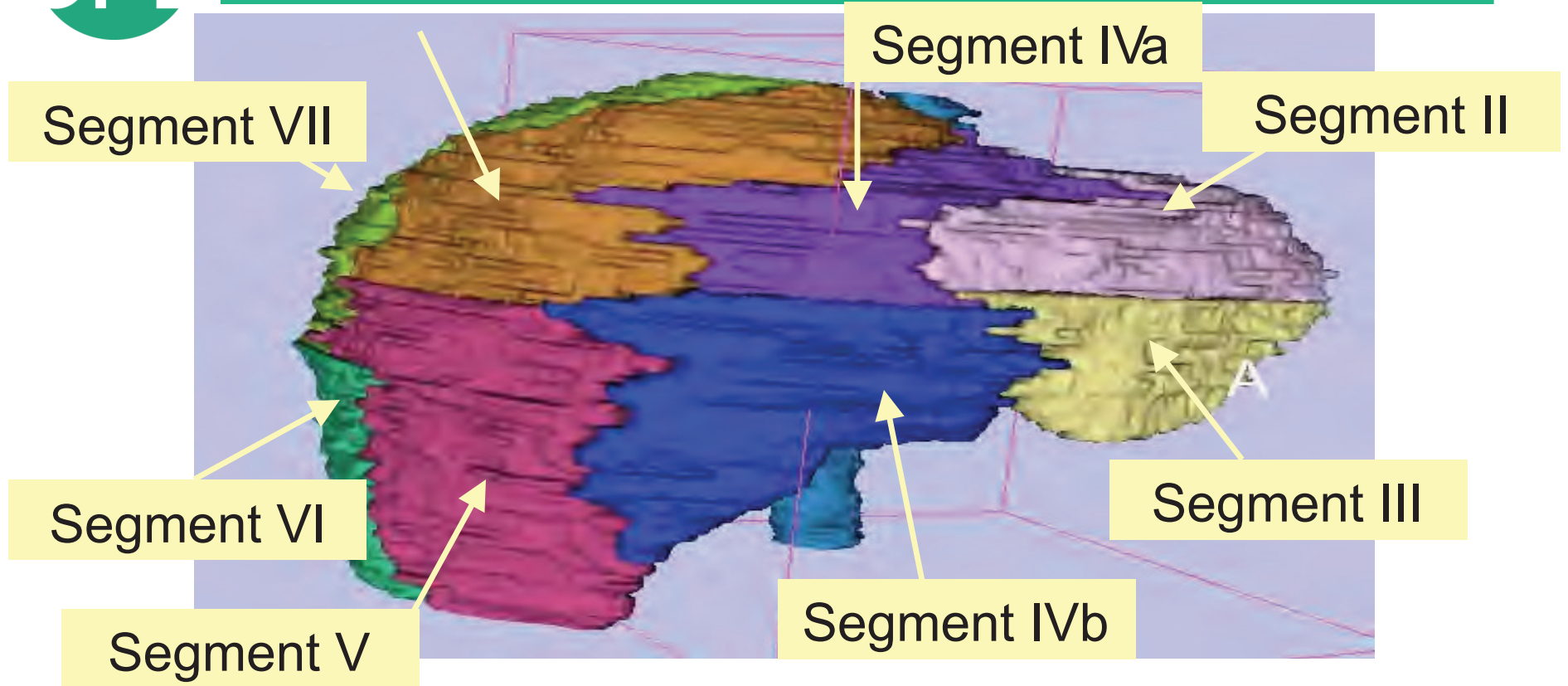
Liver dataset



The liver dataset is a contrast-enhanced CT abdominal scan of a healthy 36 year-old male.

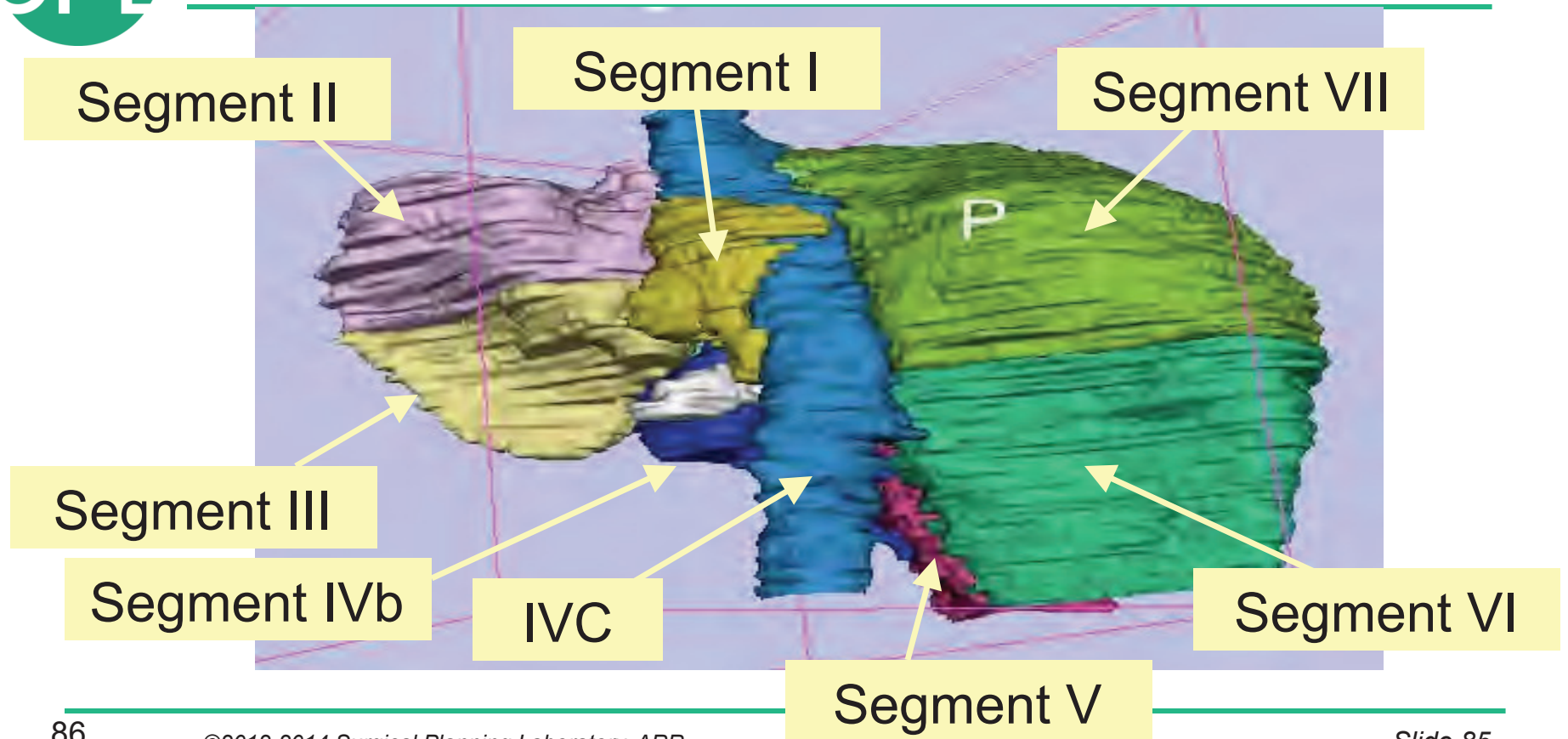


3D segments of the liver



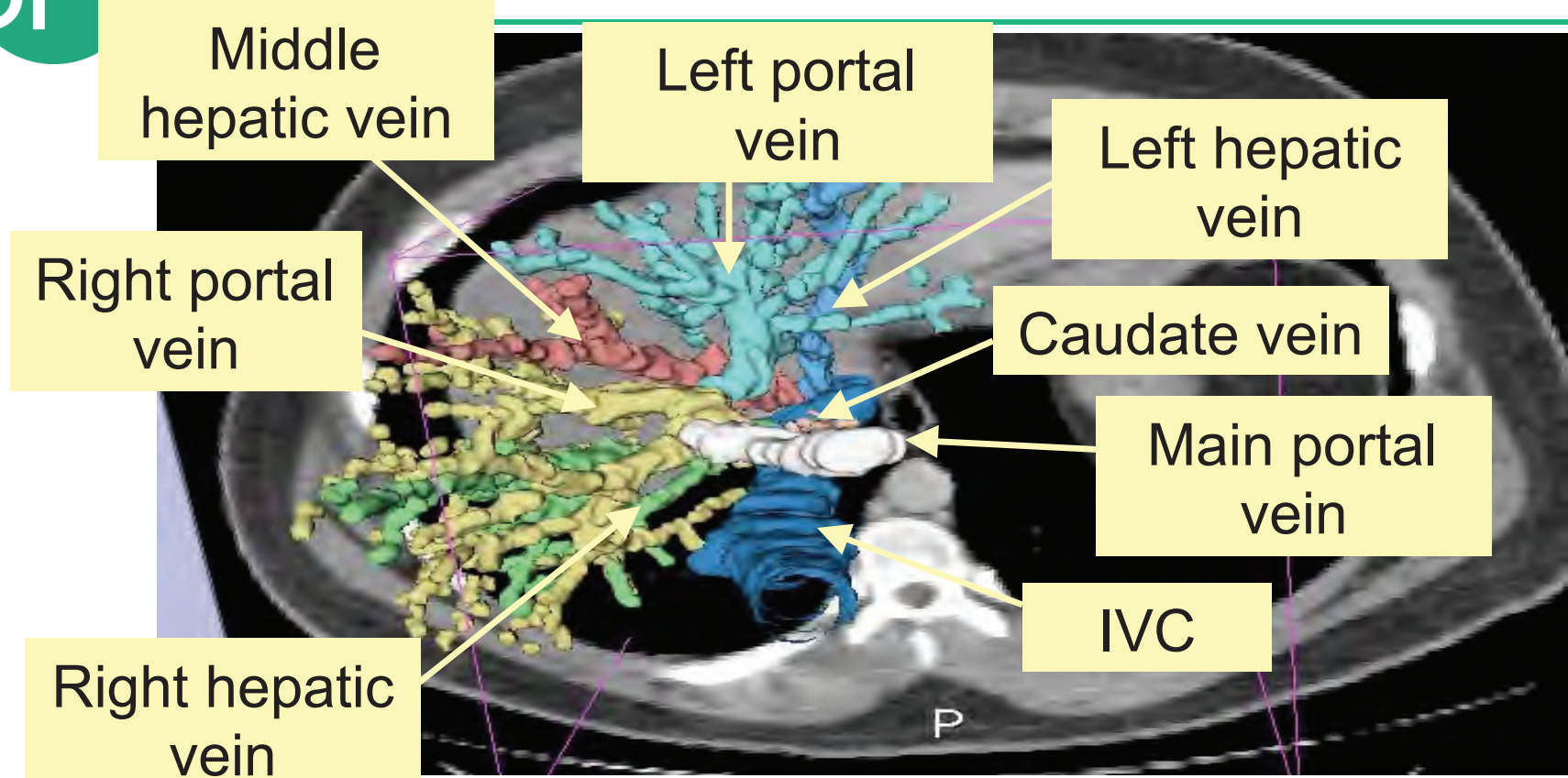


3D segments of the liver



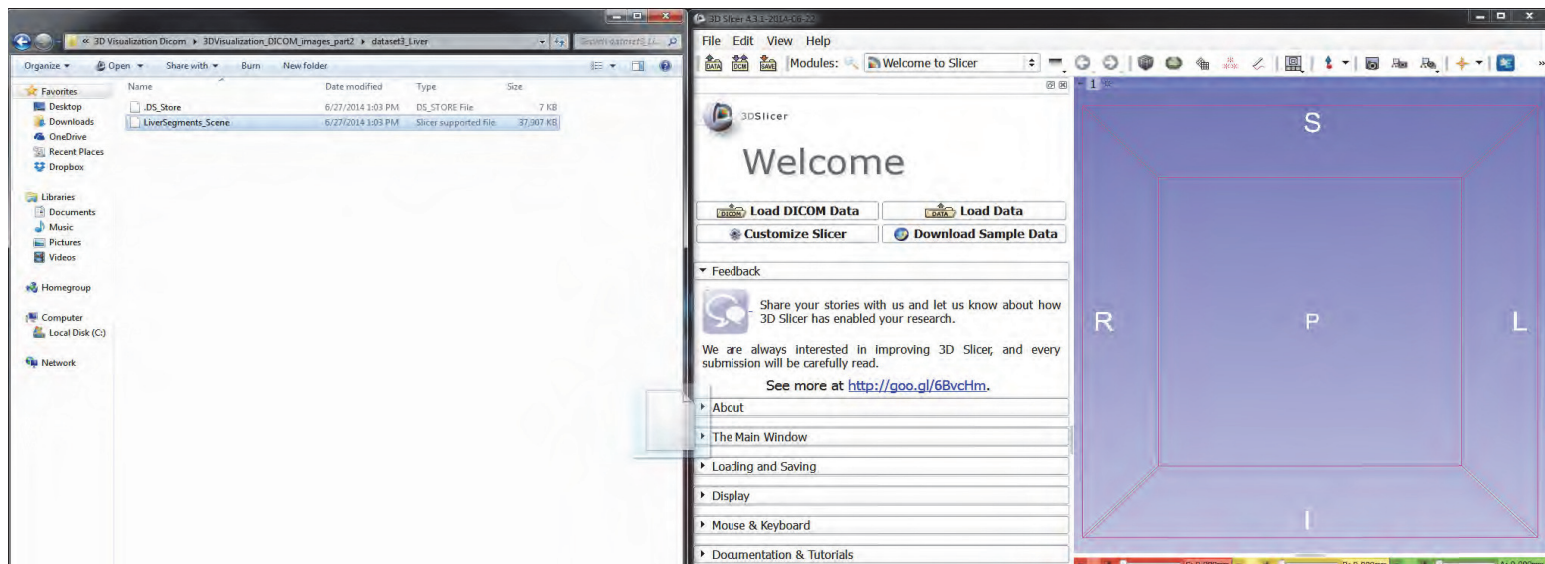


Liver vasculature





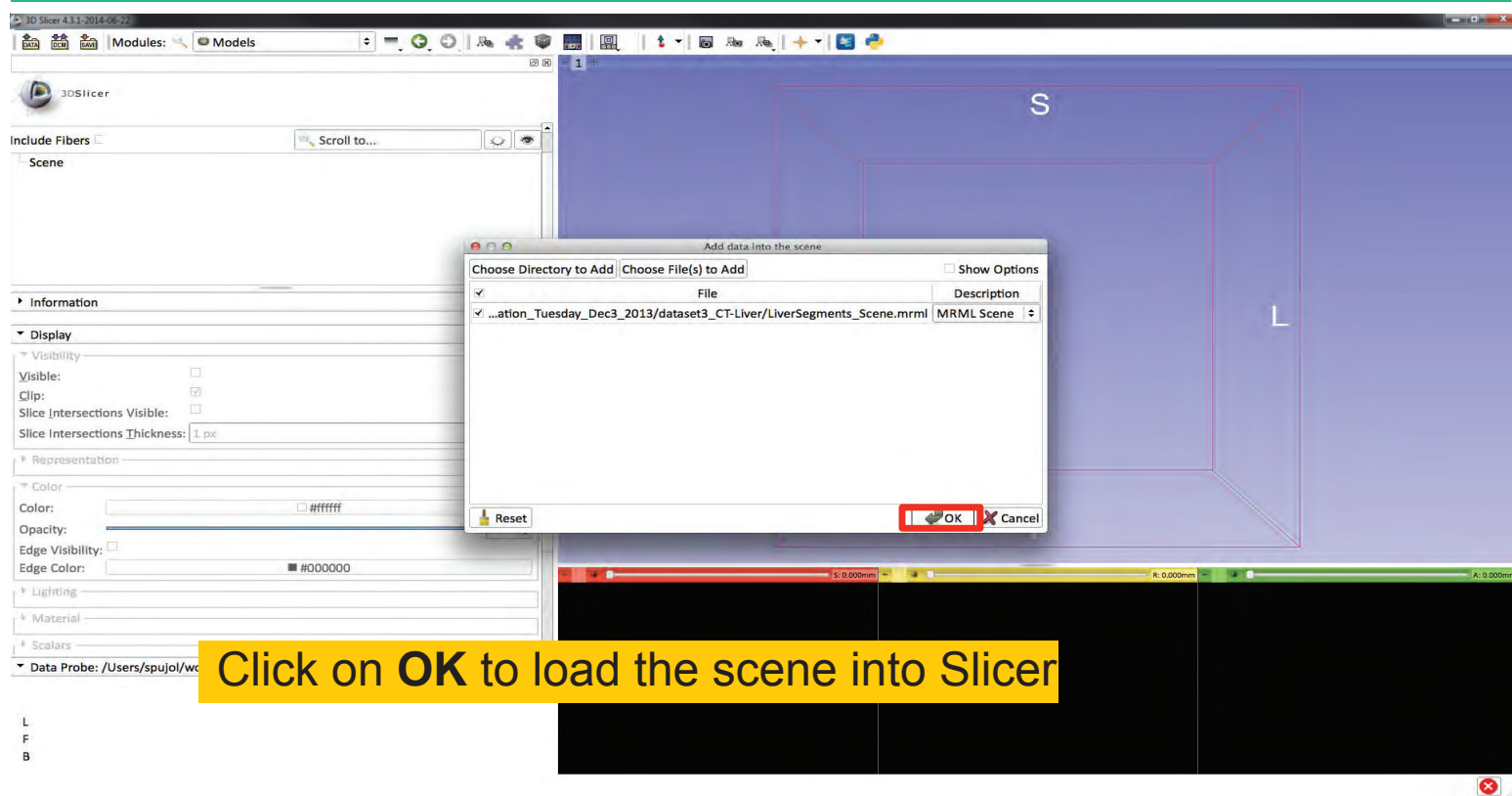
Loading the Liver Scene



Browse to the directory
C:\3DSlicerData_RSNA2014\3DVisualizationDICOM_Monday_Dec1
Select the directory **dataset3_Liver**
Drag and drop the file **LiverSegments_Scene.mrb** into Slicer



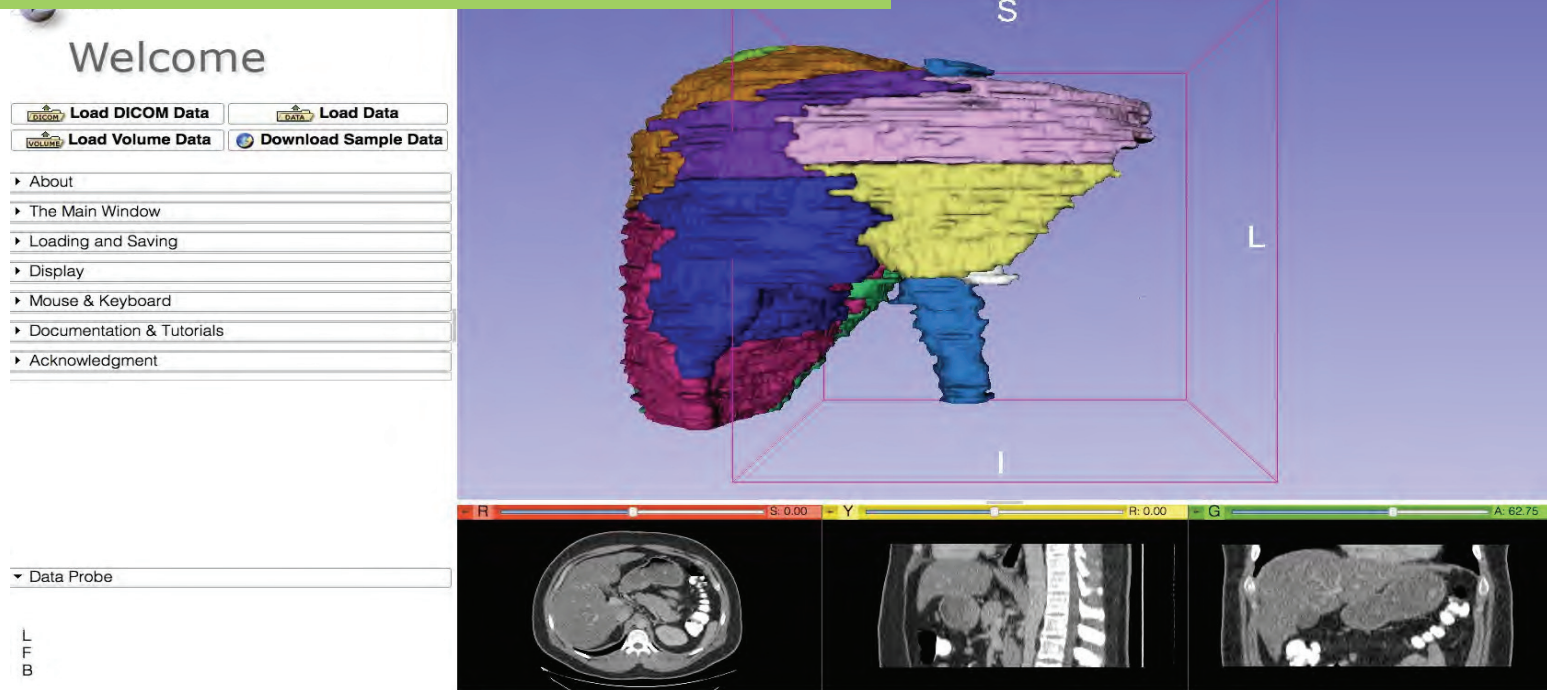
Loading the Liver Scene





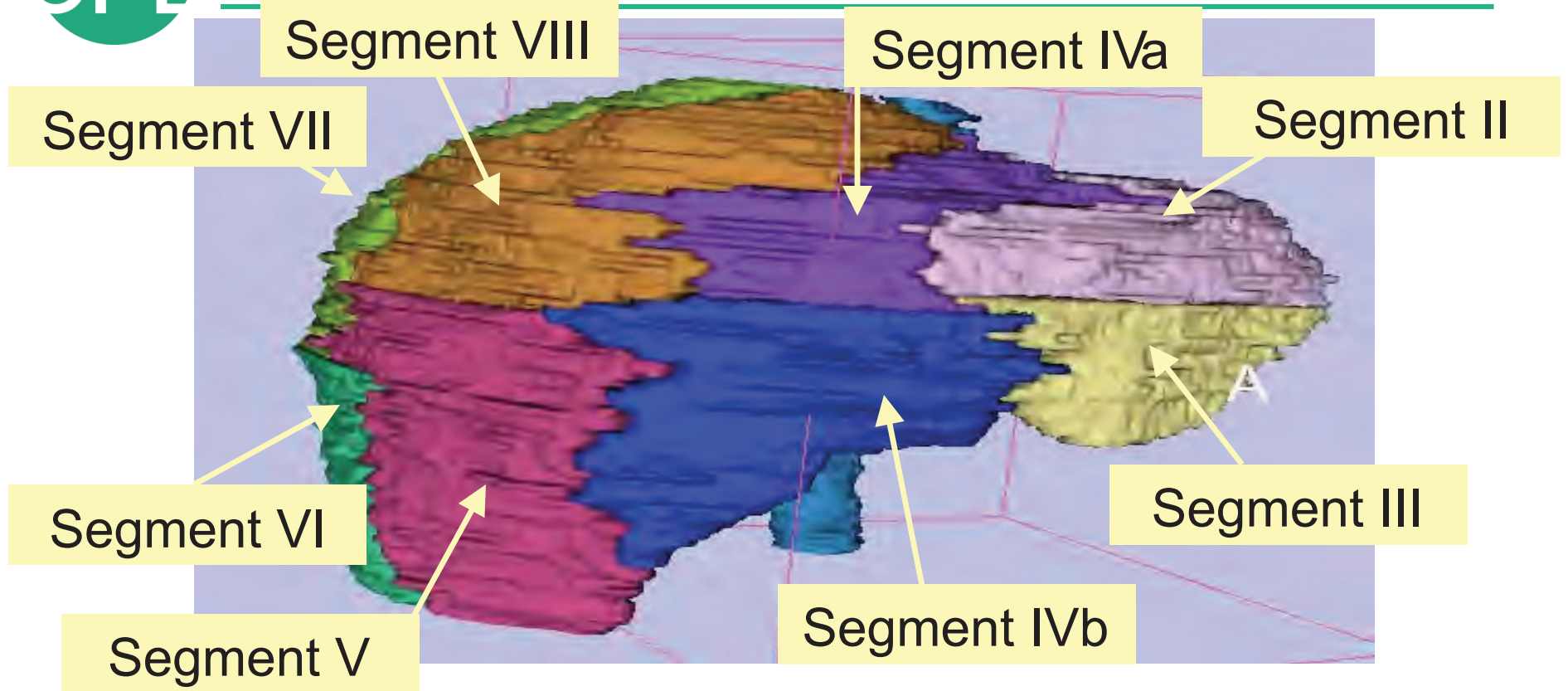
Liver Segments Scene

The elements of the scene appear in the Viewer



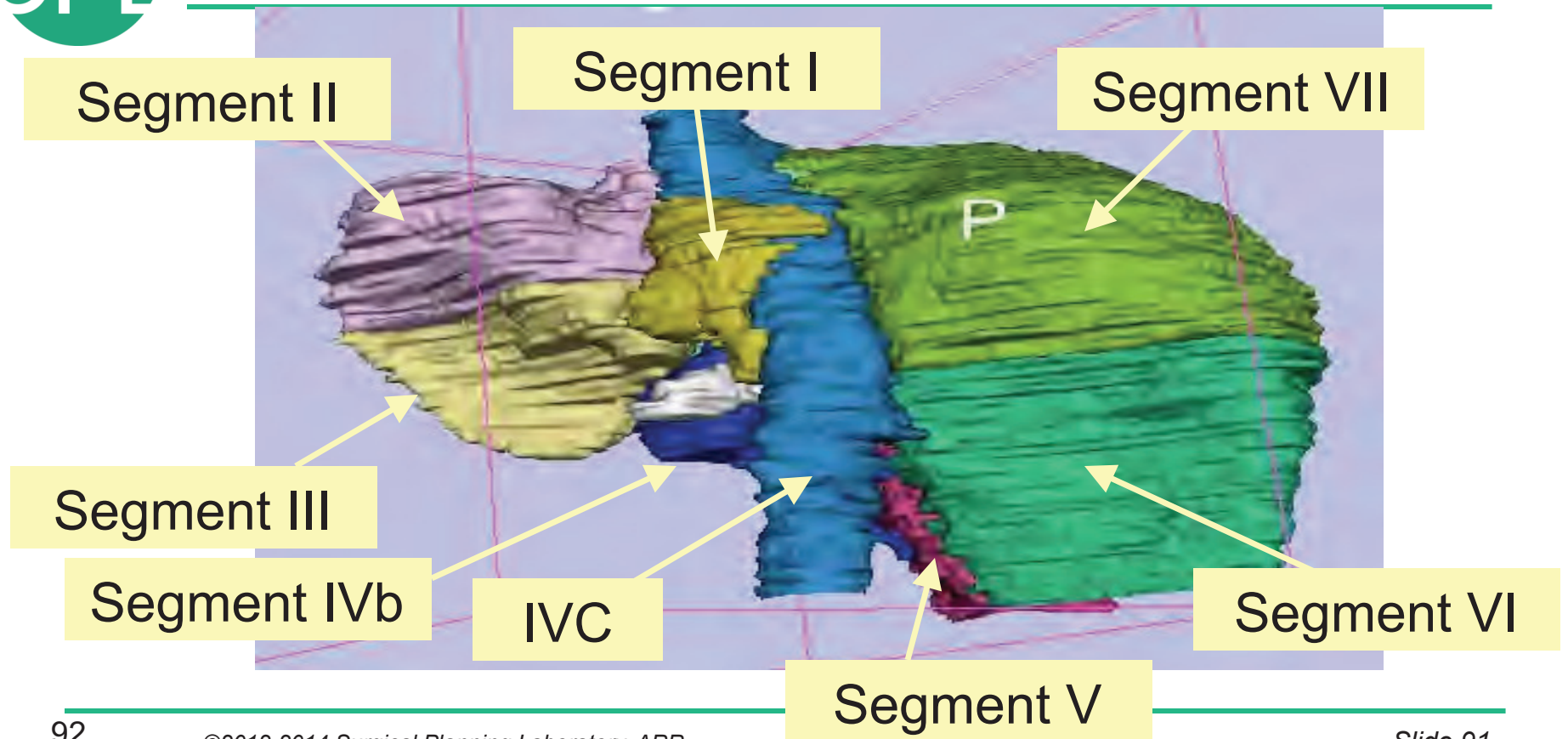


3D models of the liver



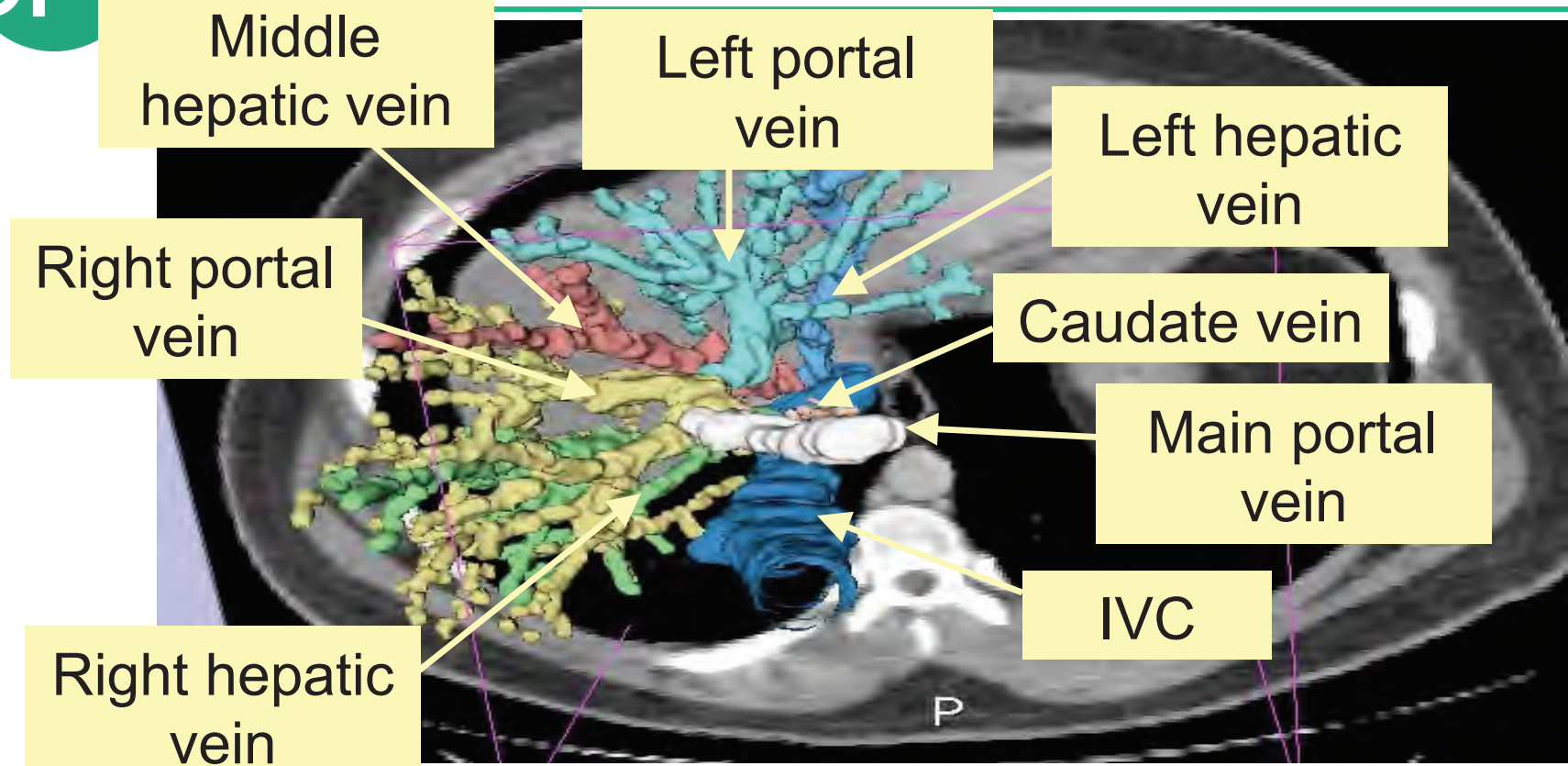


3D models of the liver



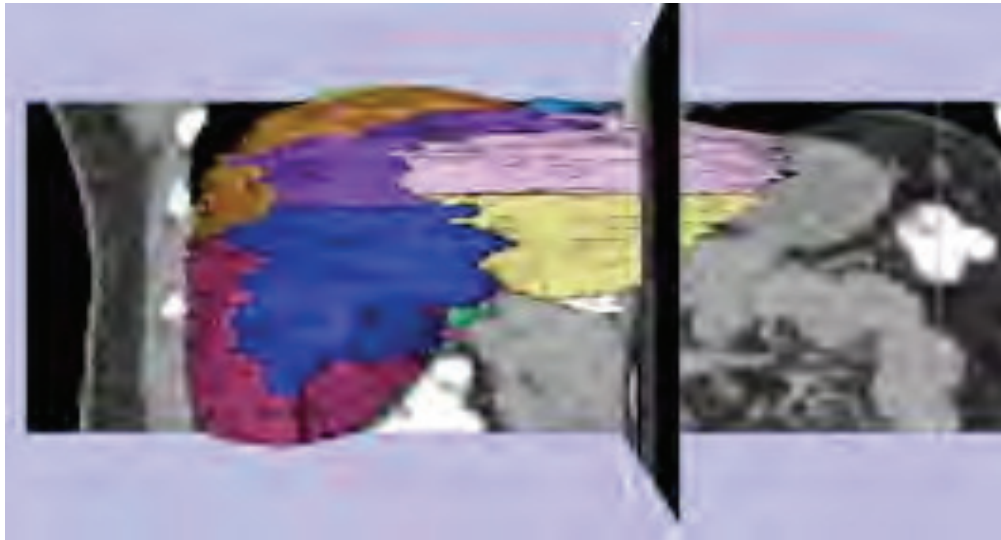


3D models of the liver





3D Exploration of Liver Segments

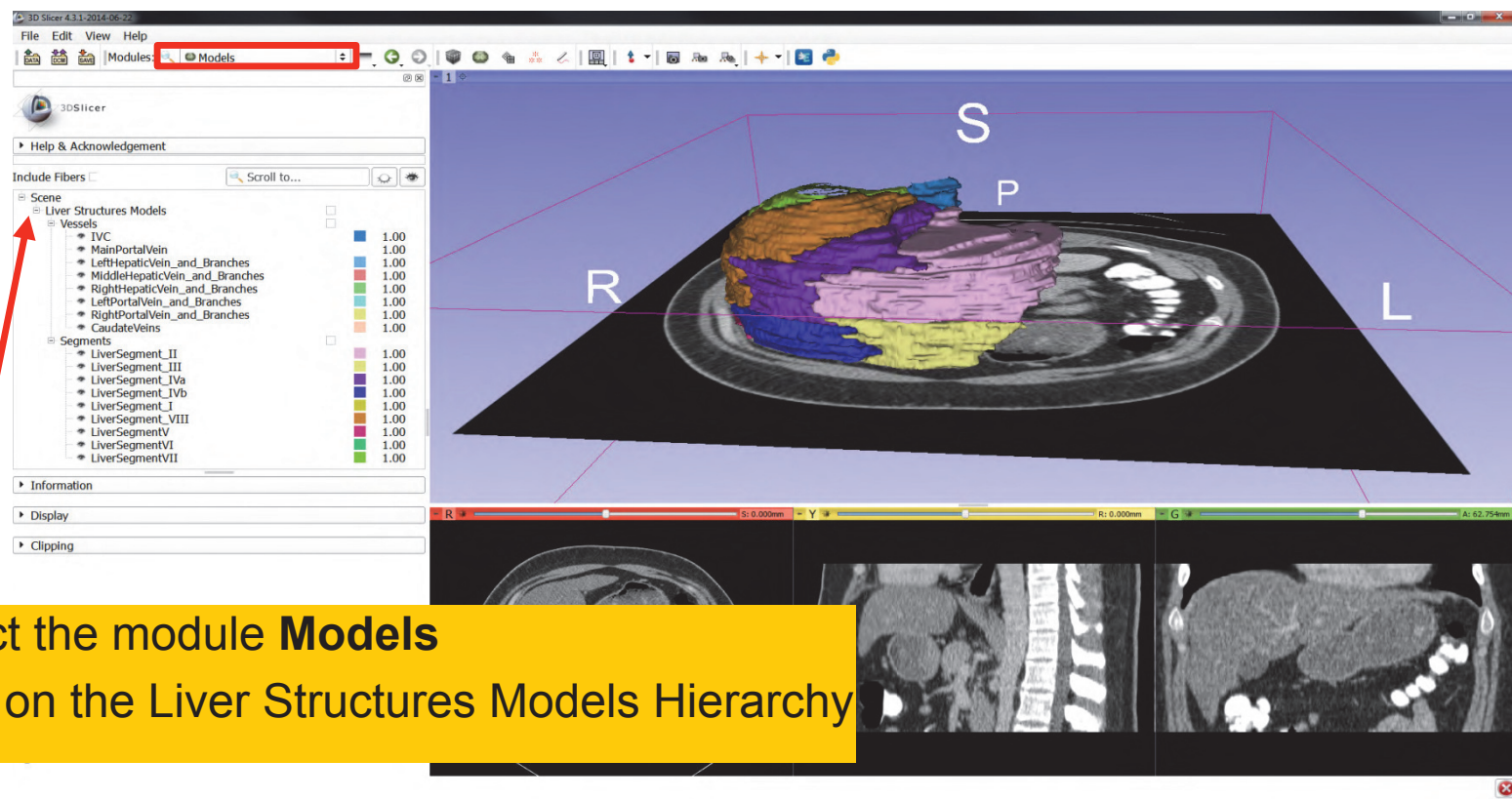


Example:

What organ abuts the left-most margin of segment II in this patient ?

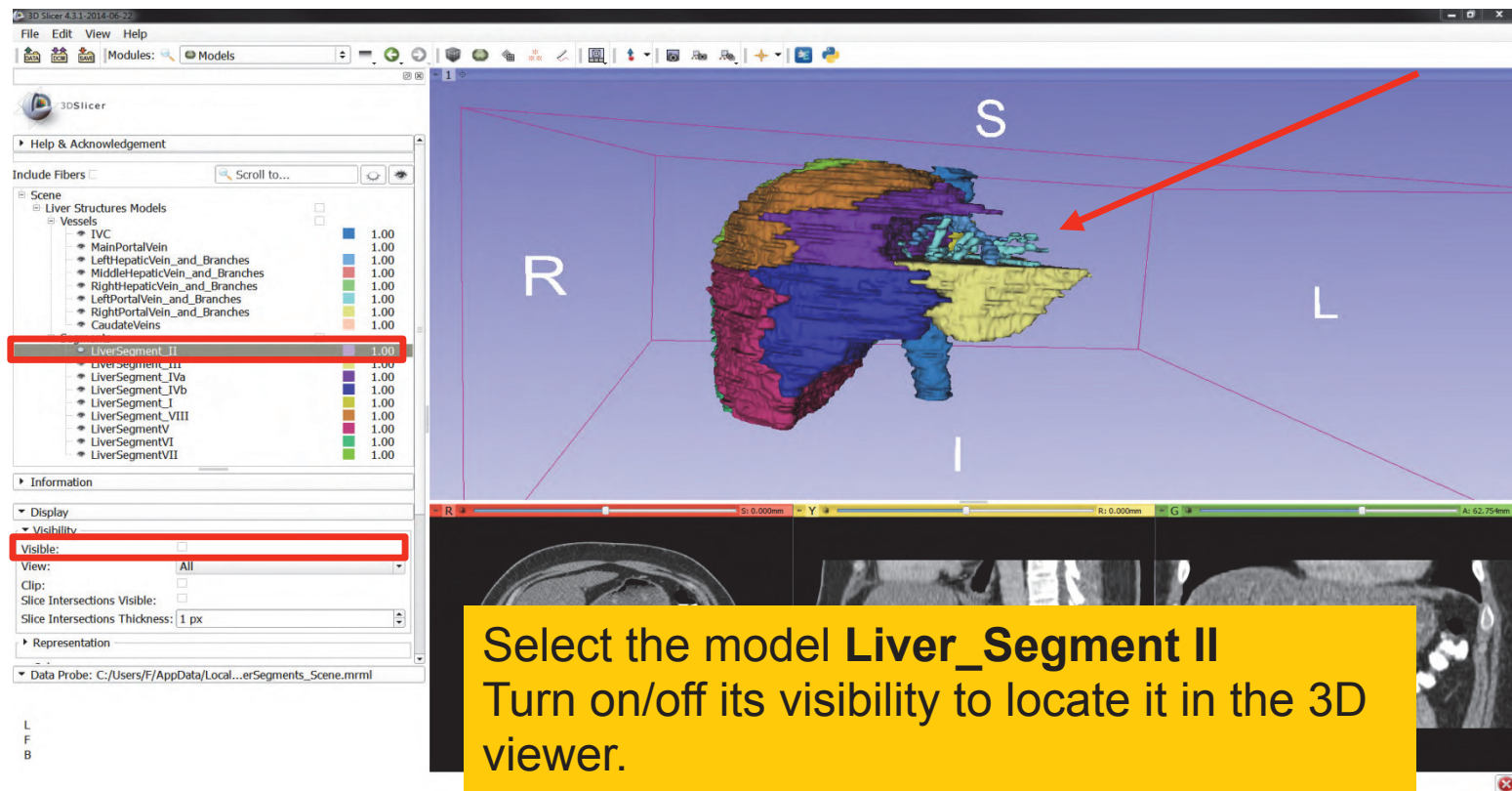


3D Exploration of Liver Segments





3D Exploration of Liver Segments





3D Exploration of Liver Segments

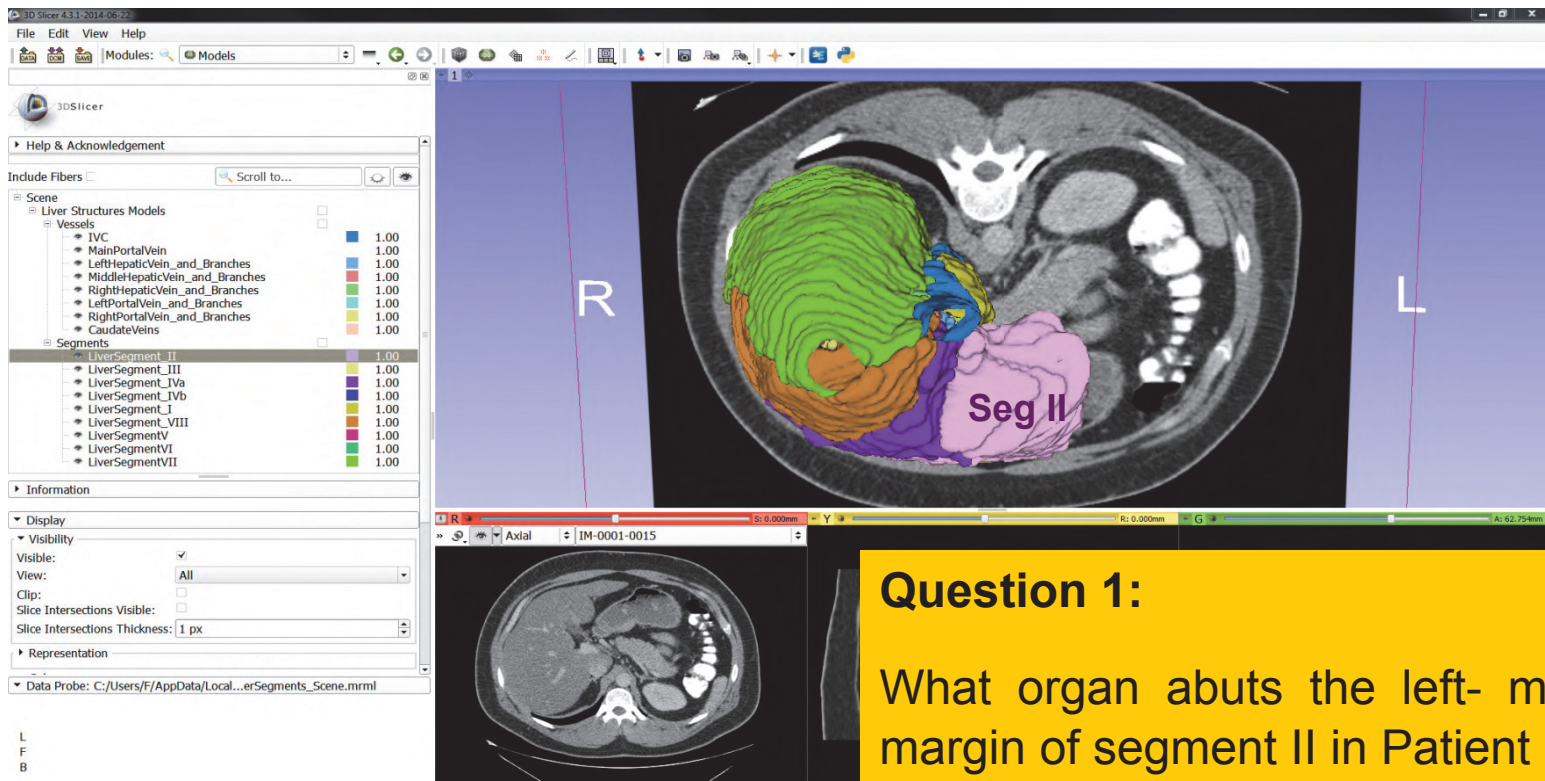
Click the **eye icon** on the Red Slicer

Position the mouse in the 3D Viewer, hold down the left mouse button and drag to orient the 3D model to a superior view.





3D Exploration of Liver Segments



Question 1:

What organ abuts the left- most margin of segment II in Patient 1?

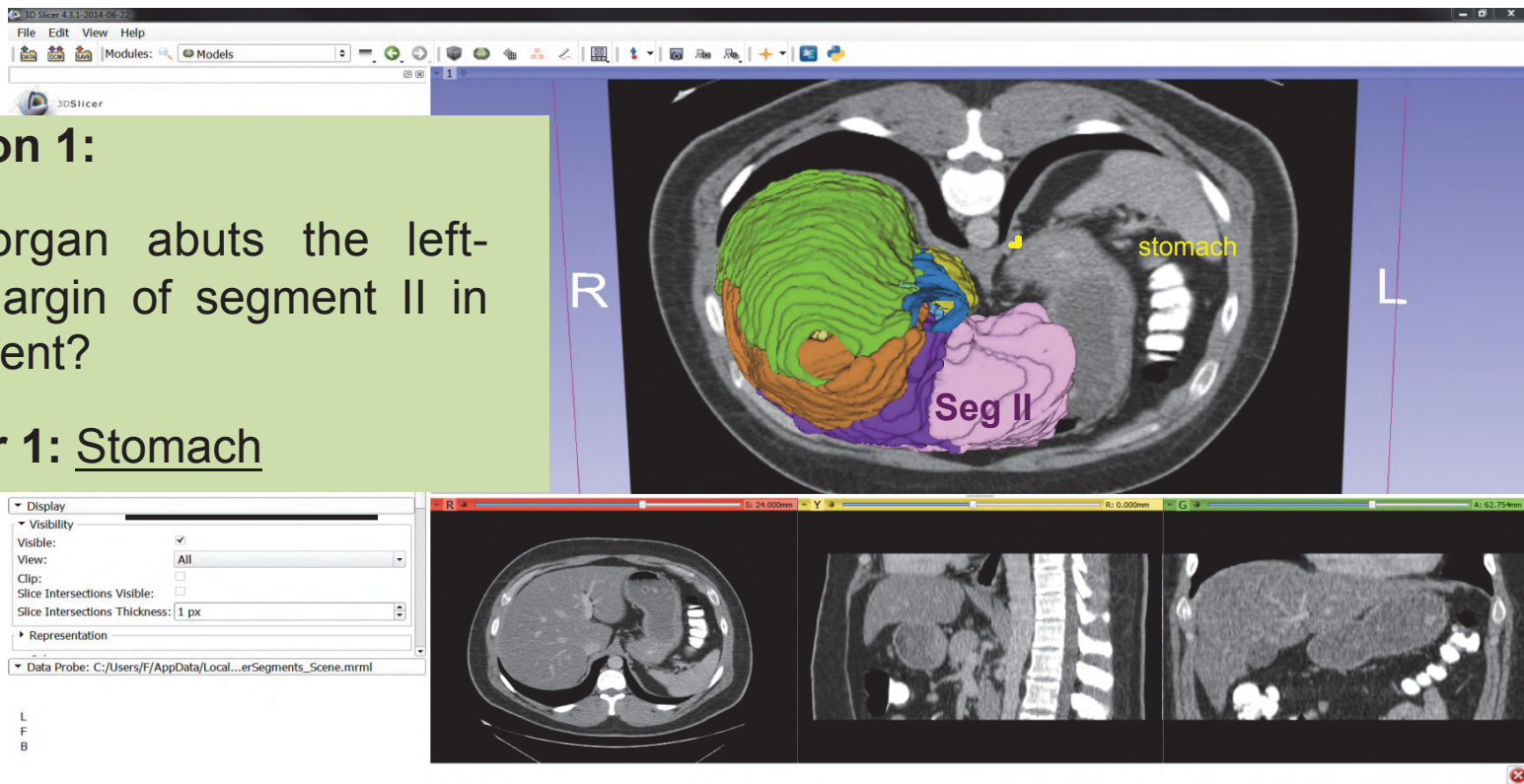


3D Exploration of Liver Segments

Question 1:

What organ abuts the left-most margin of segment II in this patient?

Answer 1: Stomach

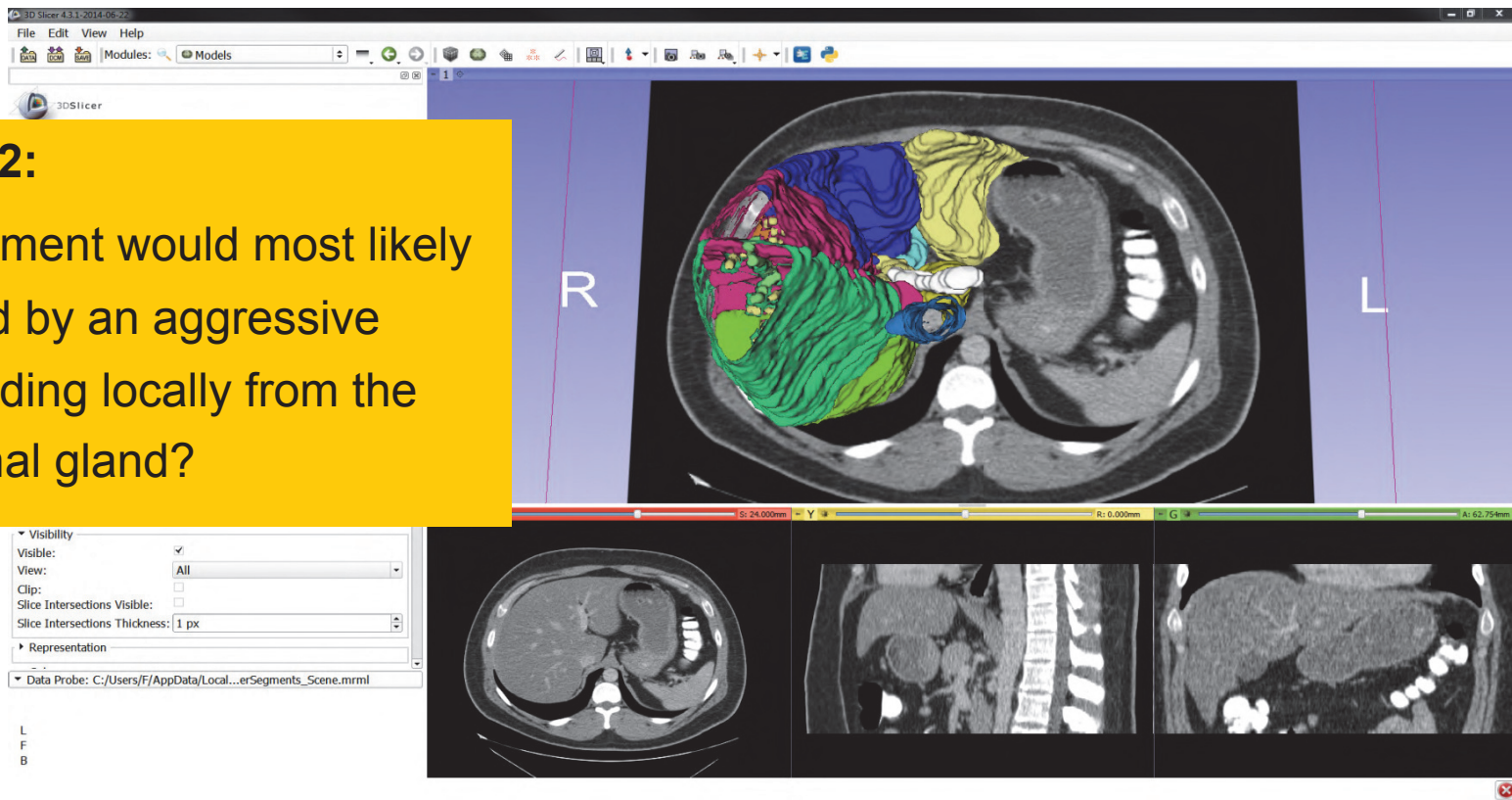




3D Exploration of Liver Segments

Question 2:

Which segment would most likely be affected by an aggressive tumor invading locally from the right adrenal gland?



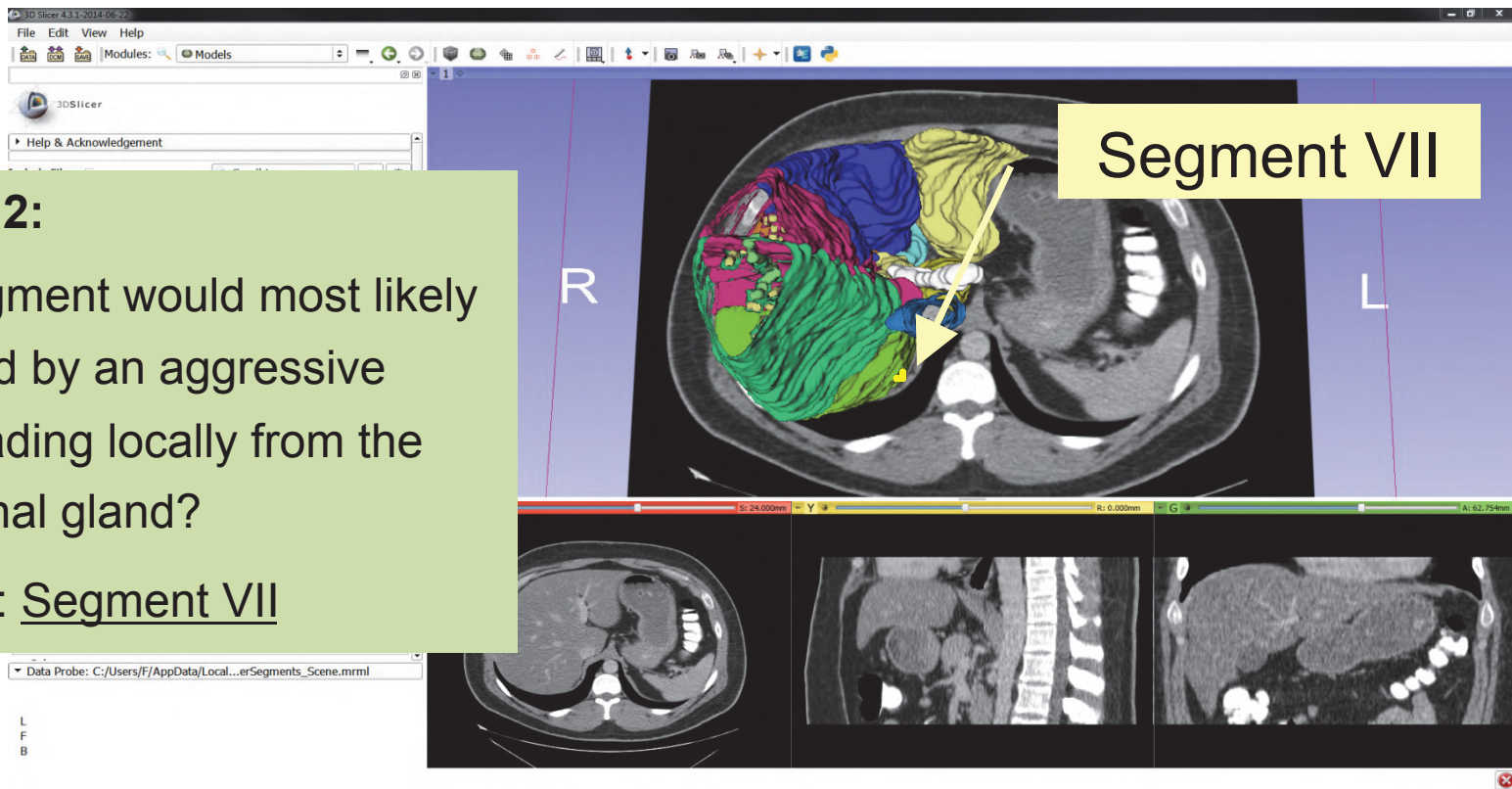


3D Exploration of Liver Segments

Question 2:

Which segment would most likely be affected by an aggressive tumor invading locally from the right adrenal gland?

Answer 2: Segment VII





3D Exploration of Liver Segments

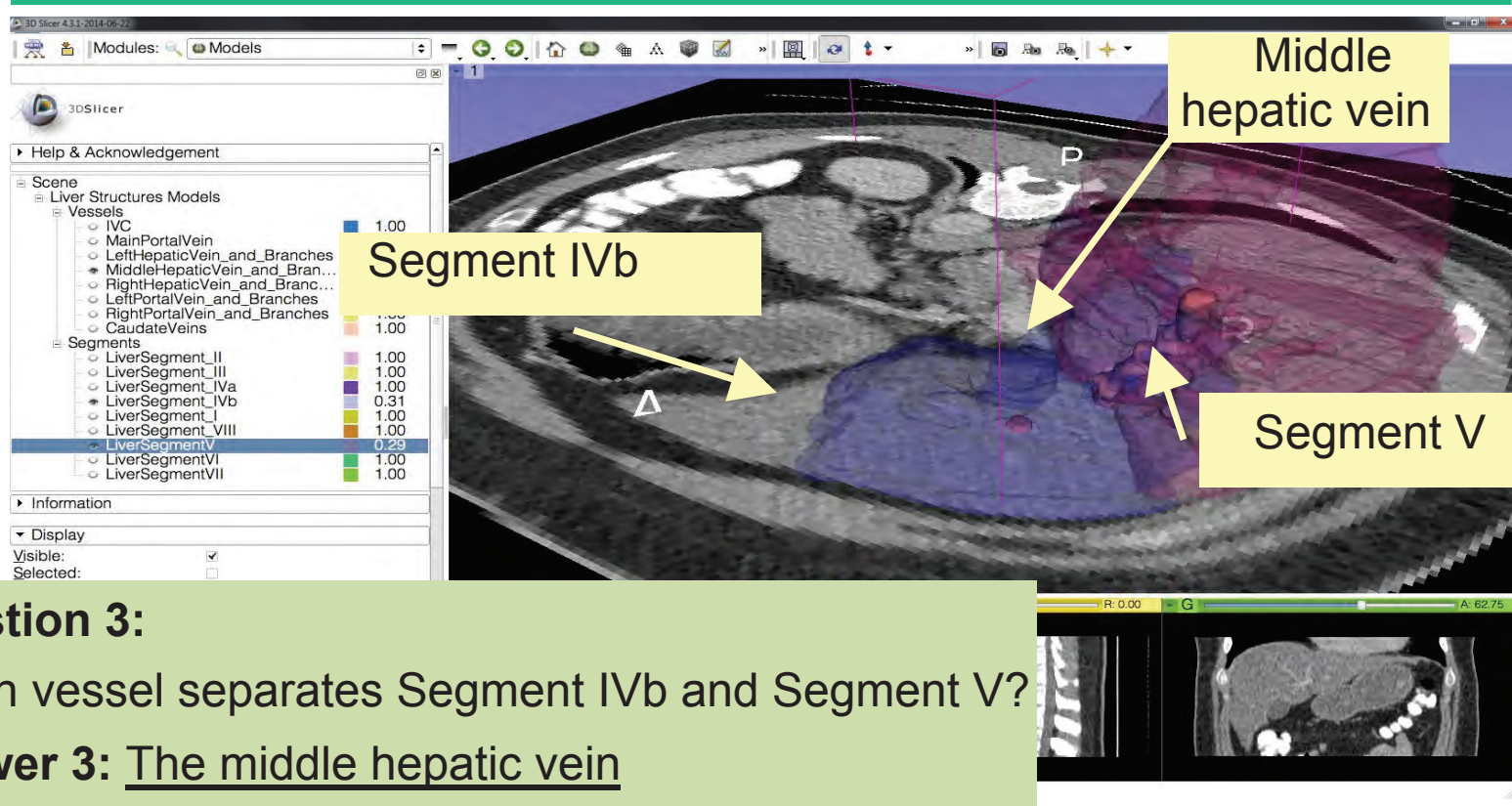


Question 3:

Which vessel separates Segment IVb and Segment V?



Middle Hepatic Vein



Question 3:

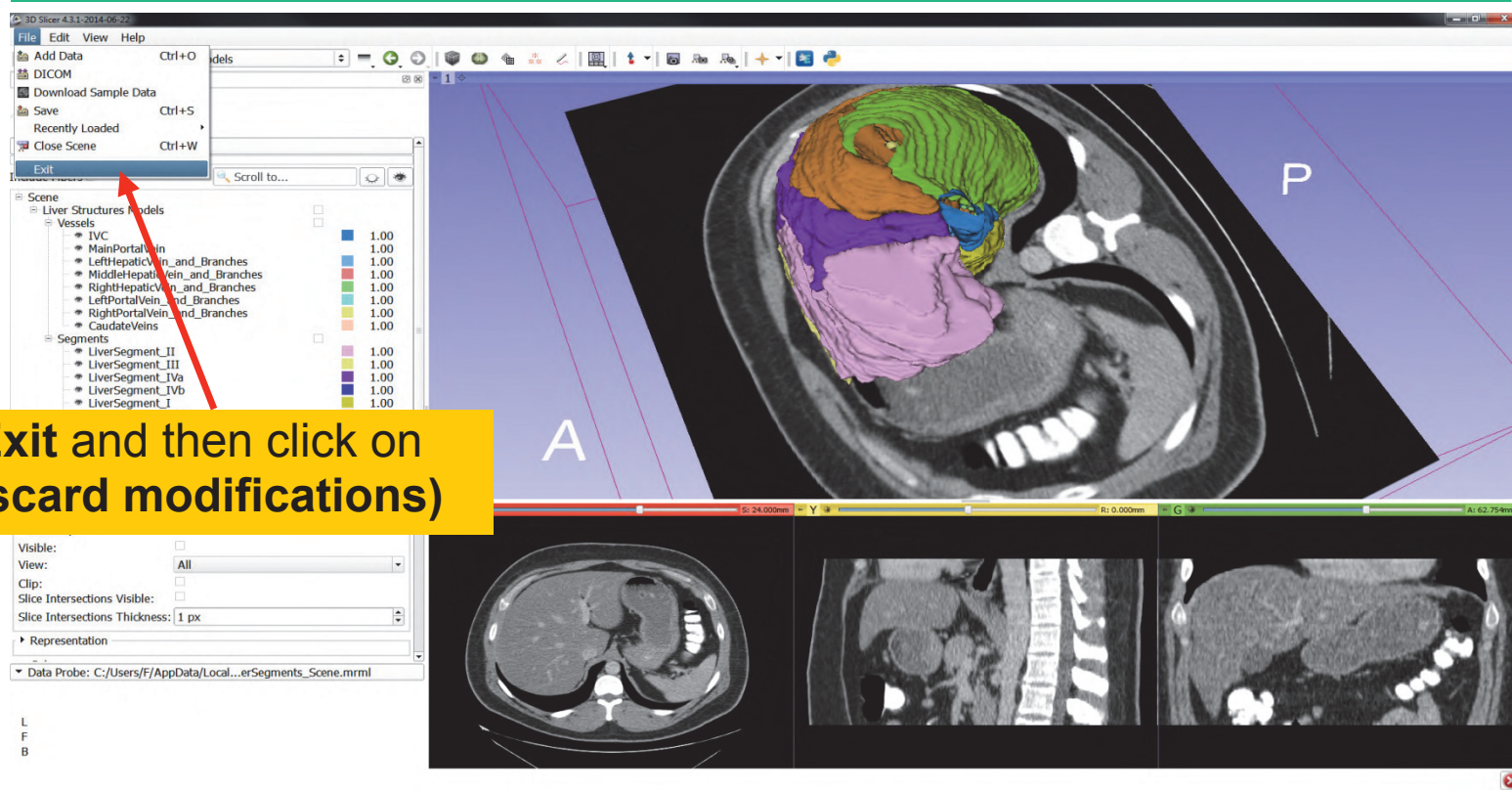
Which vessel separates Segment IVb and Segment V?

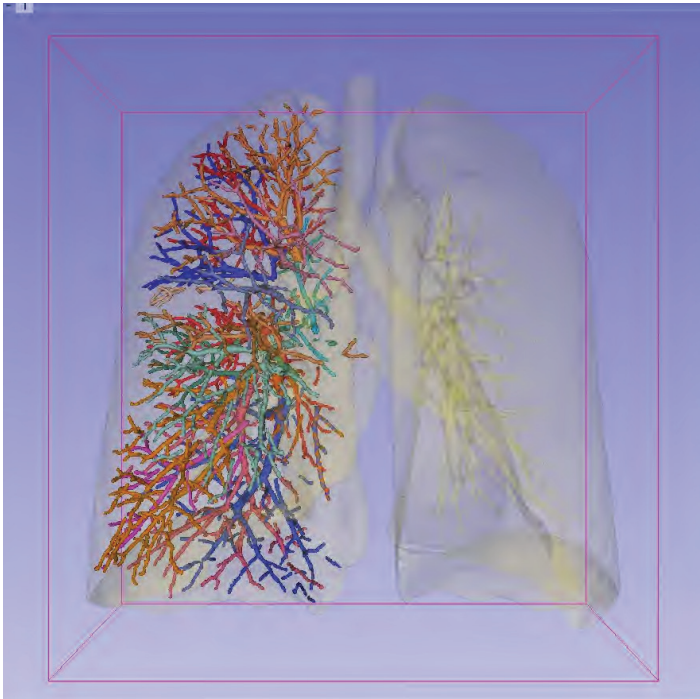
Answer 3: The middle hepatic vein



Closing the Liver Scene

Select **Exit** and then click on **Exit** (discard modifications)

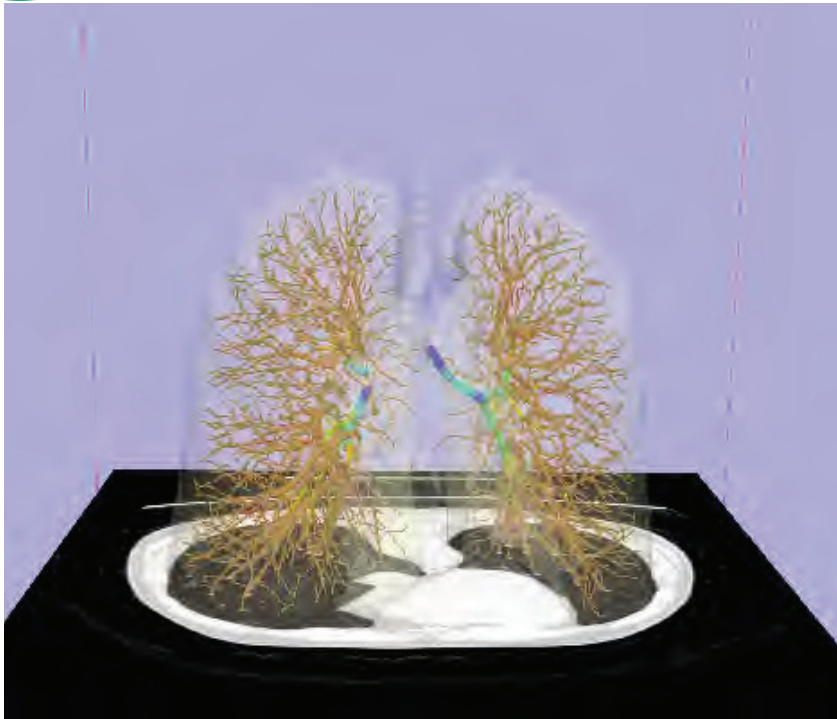




Interactive 3D Visualization
of the segments of the lungs



Segments of the lung



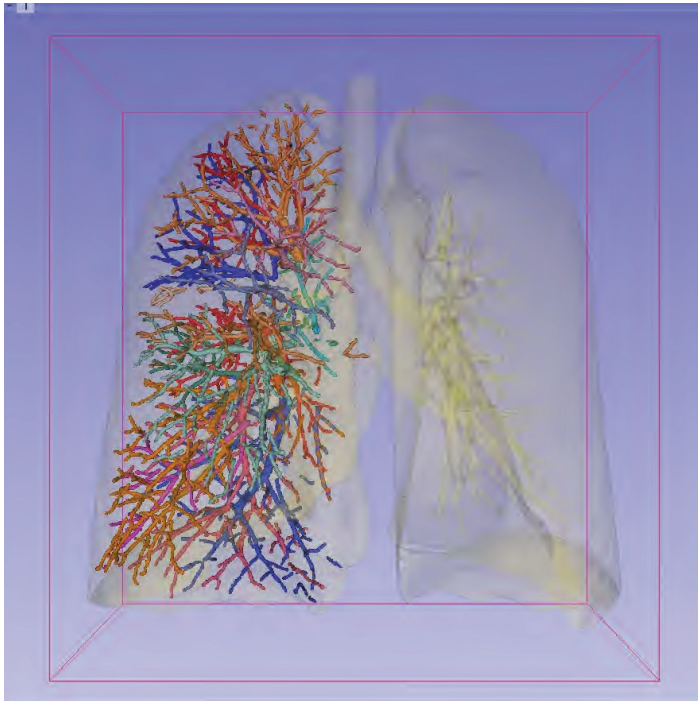
Segmentation and 3D surface reconstruction of the lung and pulmonary vessels

Acknowledgment:

Segmentation of the lung surface and vasculature: Raul San Jose Estepar, Ph.D., George Washko, M.D., Ed Silverman, M.D. and James Ross, MSc. Brigham and Women's Hospital (K25 HL104085) and COPDGene (01 HL089897 and U01 HL089856)



Segments of the lung

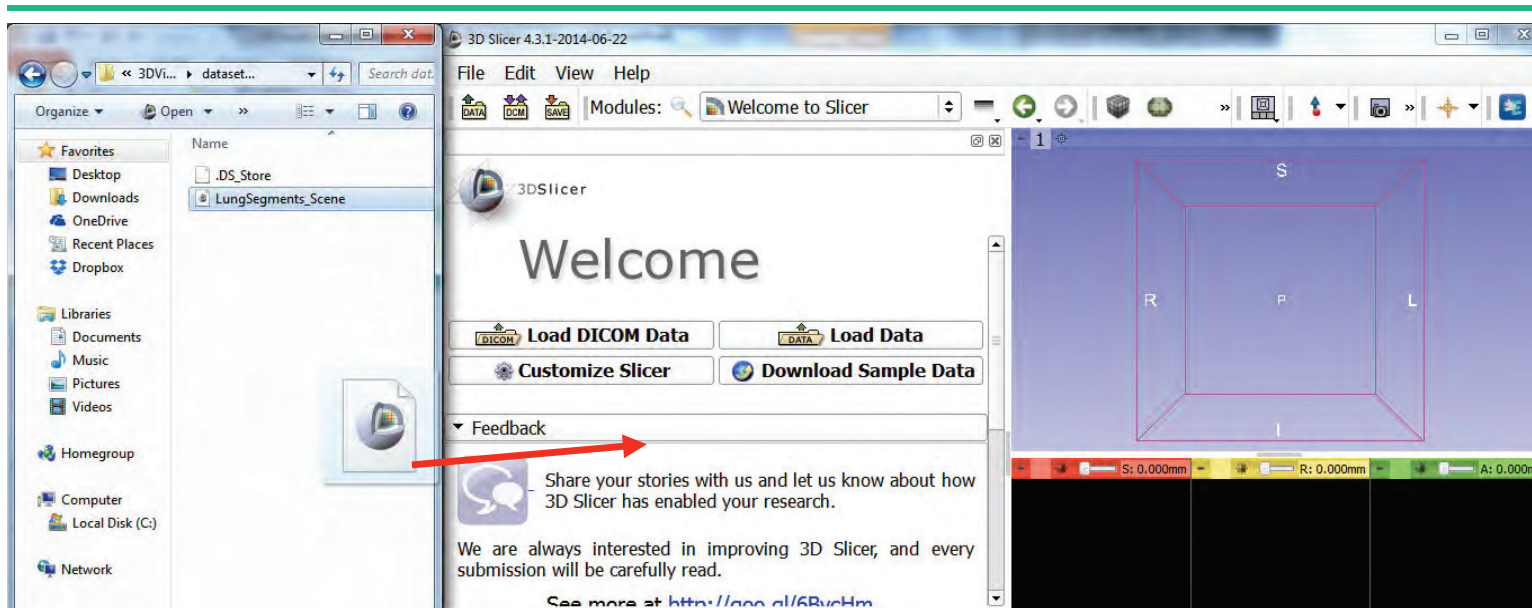


3D parcellation of arteries and veins from original model of pulmonary vessels
(Kitt Shaffer, M.D., Ph.D. - Sonia Pujol, Ph.D.)

- Right Upper Lobe (RUL)
 - RUL Pulmonary Vein
 - RUL Anterior Segment
 - RUL Apical Segment
 - RUL Posterior Segment
- Right Middle Lobe (RML)
 - RML Pulmonary Vein 1 & 2
 - RML Lateral Segment
 - RML Medial Segment
- Right Lower Lobe (RLL)
 - RLL Pulmonary Vein 1,2,3
 - RLL Anterior Basal Segment
 - RLL Medial Basal Segment
 - RLL Lateral Basal Segment
 - RLL Posterior Basal Segment



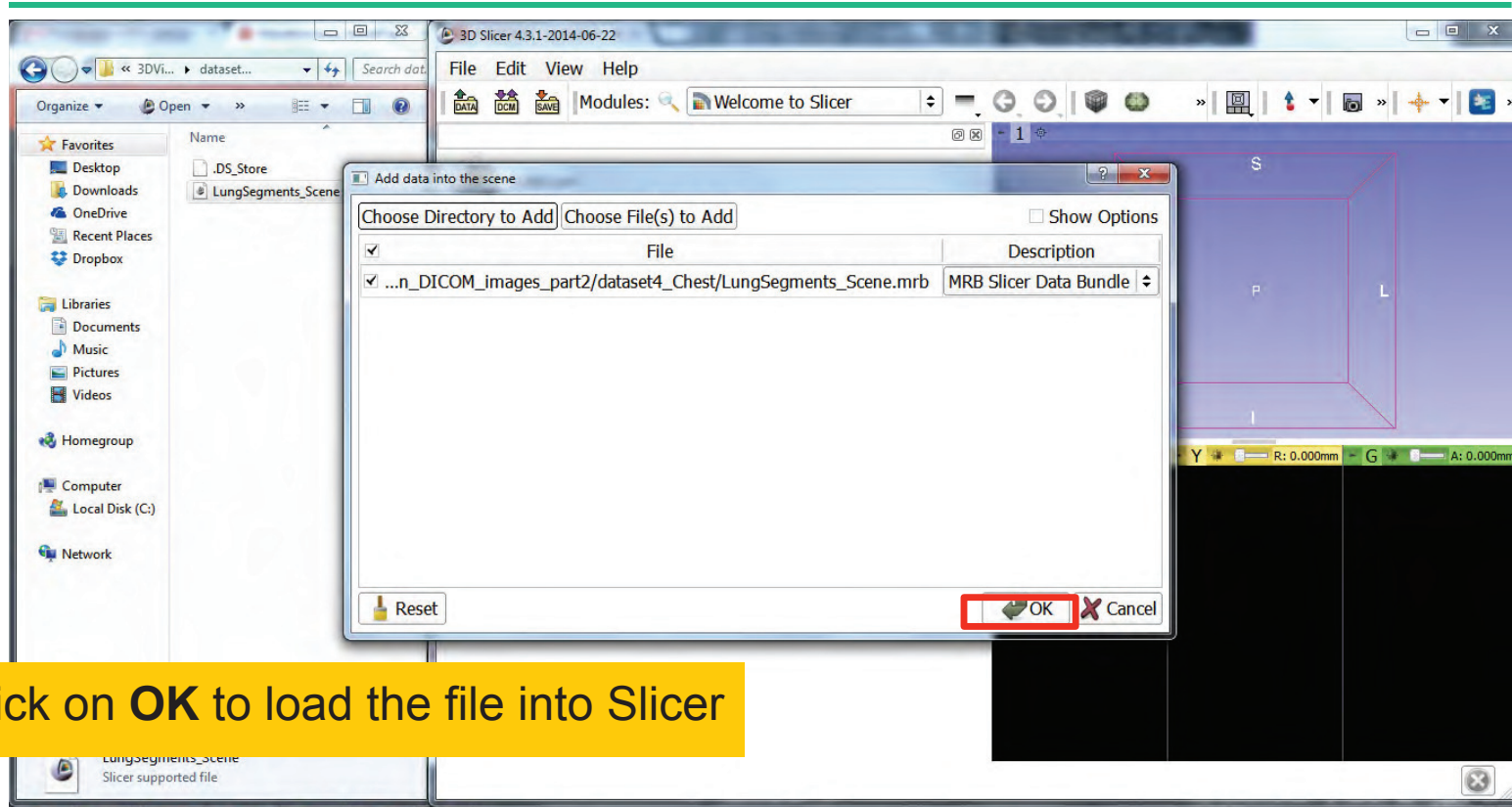
Loading the Chest Data Scene



Open the directory **C:\3DVisualizations\dataset4_Chest**
Select the subdirectory **dataset4_Chest**
Drag and drop the file **LungSegments_Scene.mrb** into Slicer

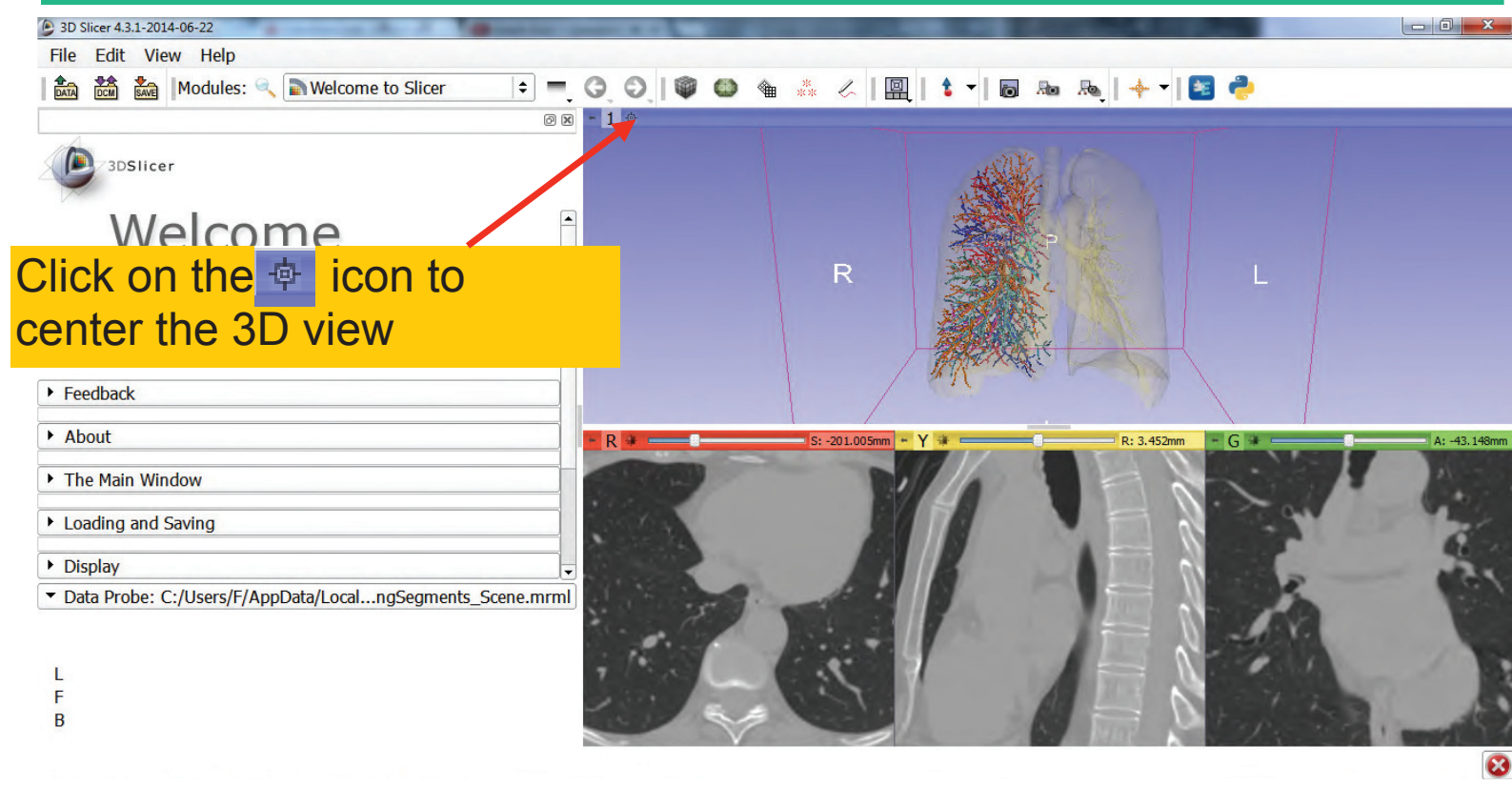


Loading the Lung Scene



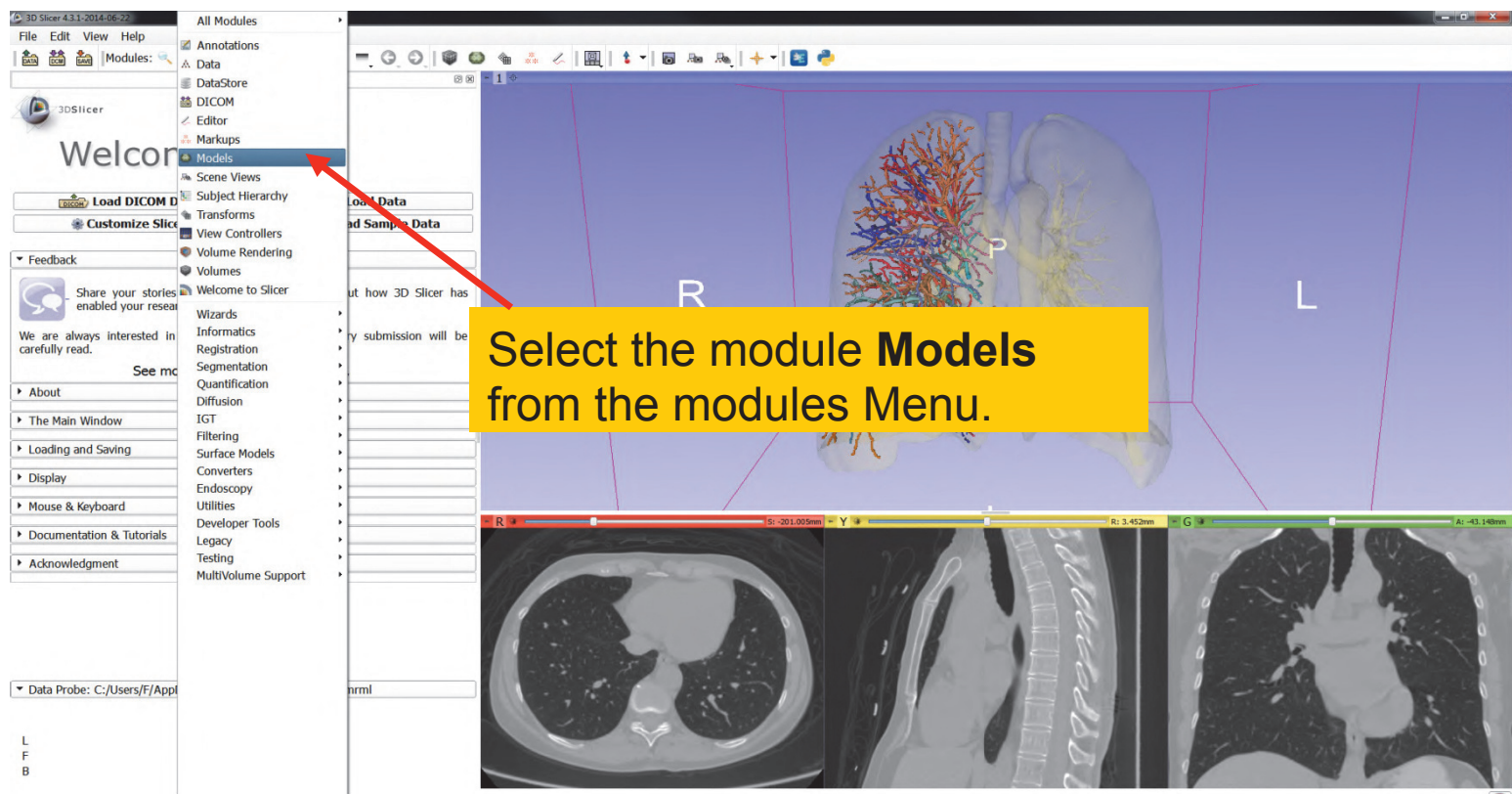


Loading the Lung Scene



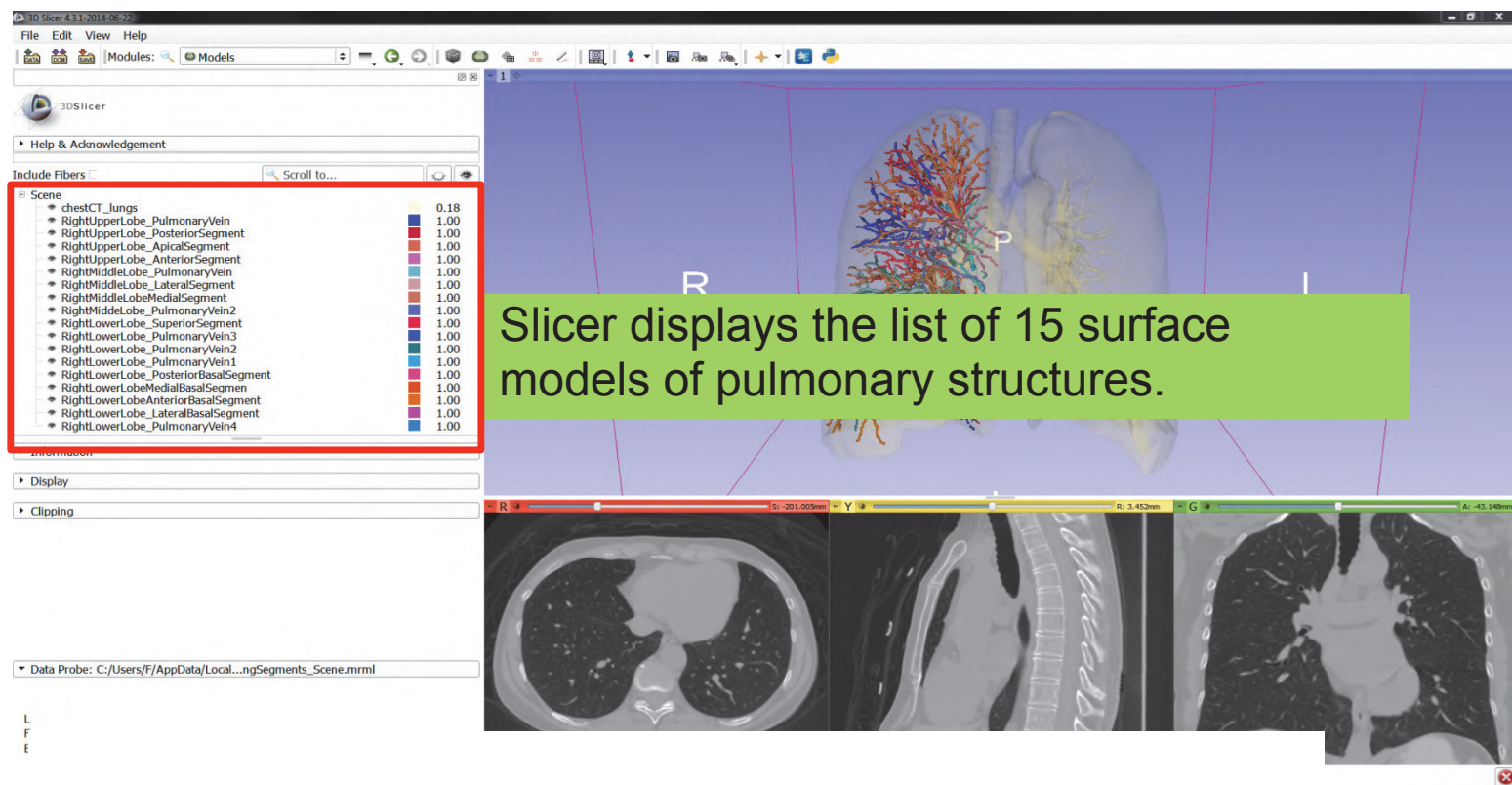


Loading the Lung Scene



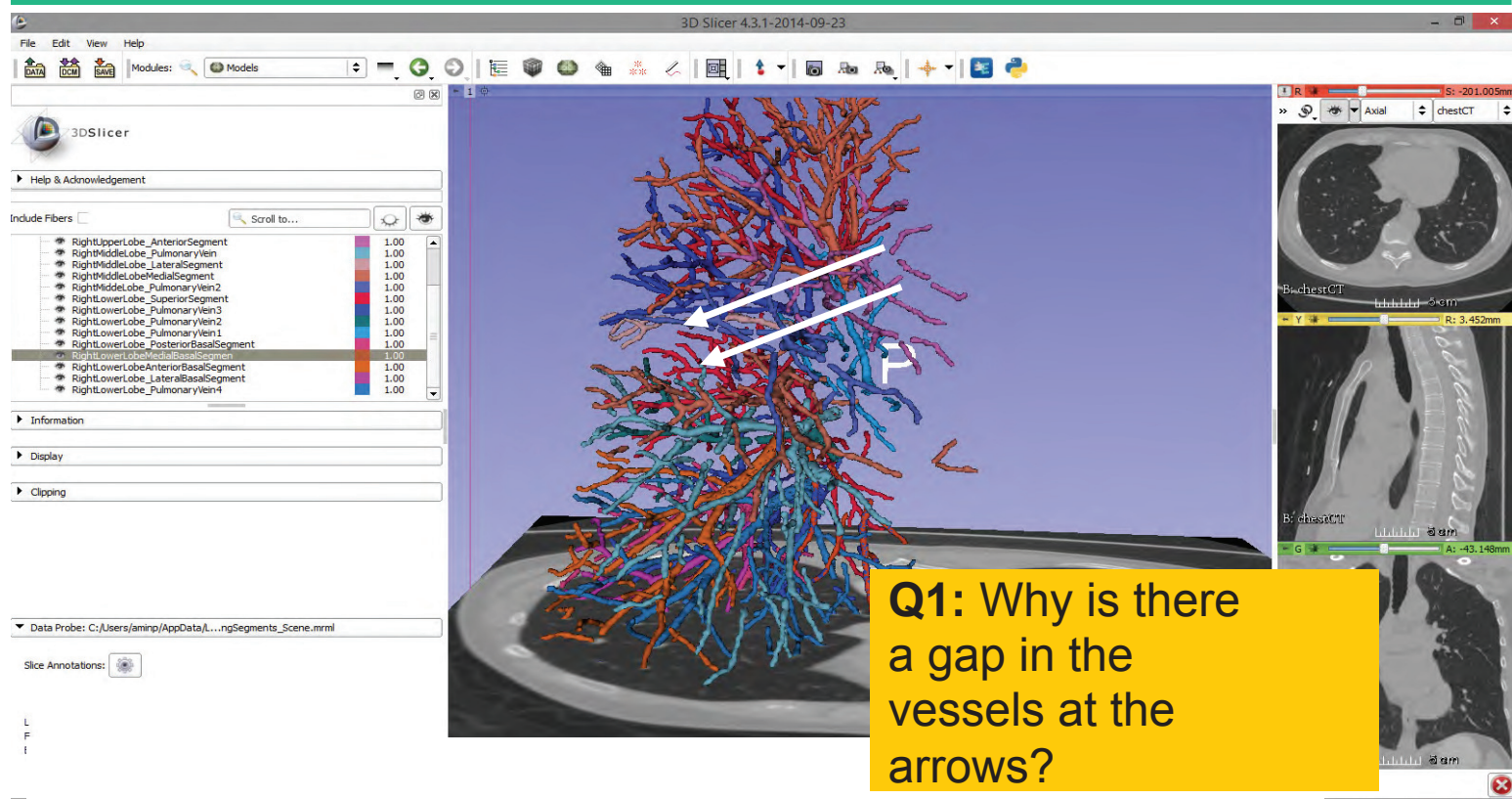


Lung Segments



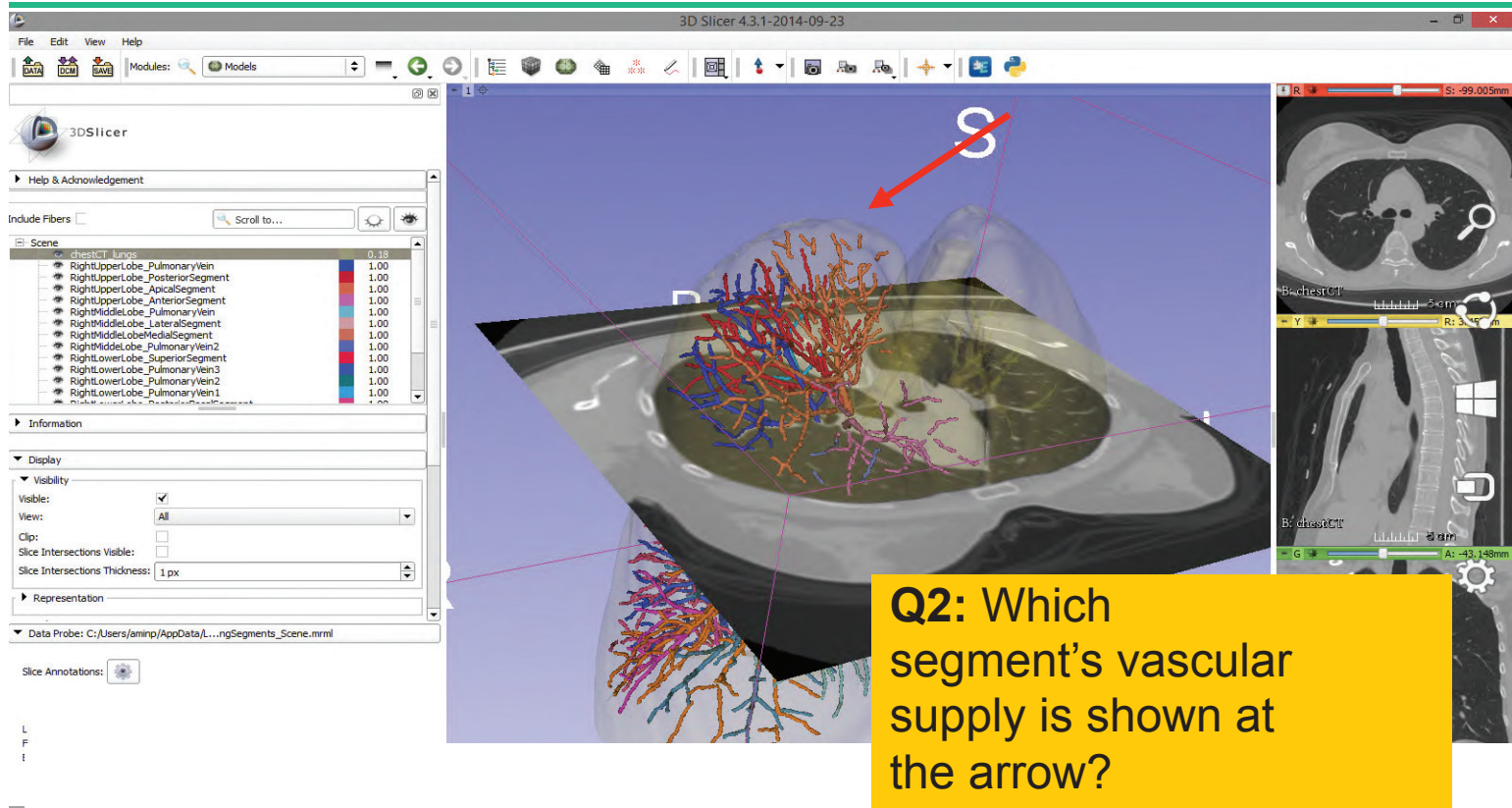


Lung Segments – Question 1



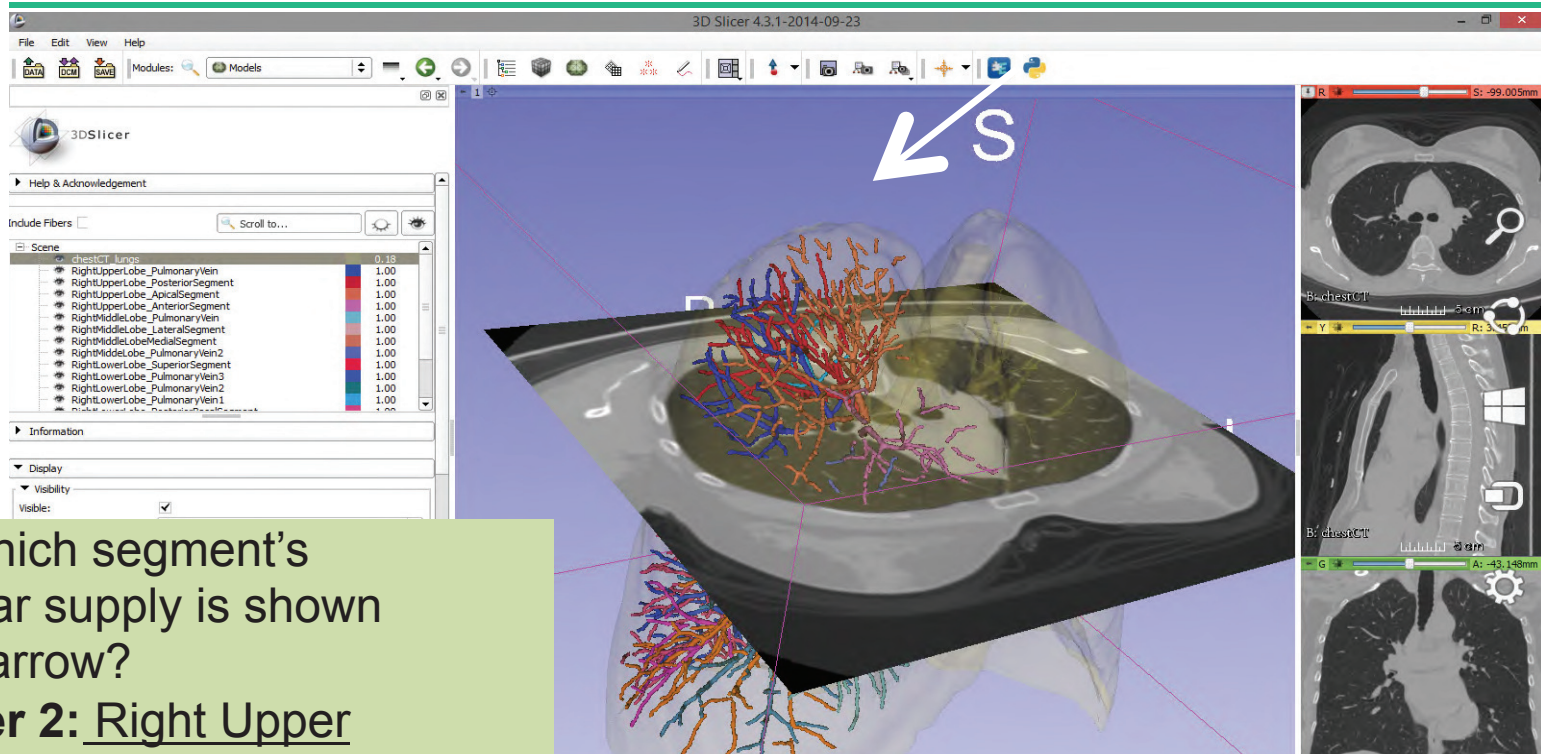


Lung Segments – Question 2





Lung Segments – Question 2

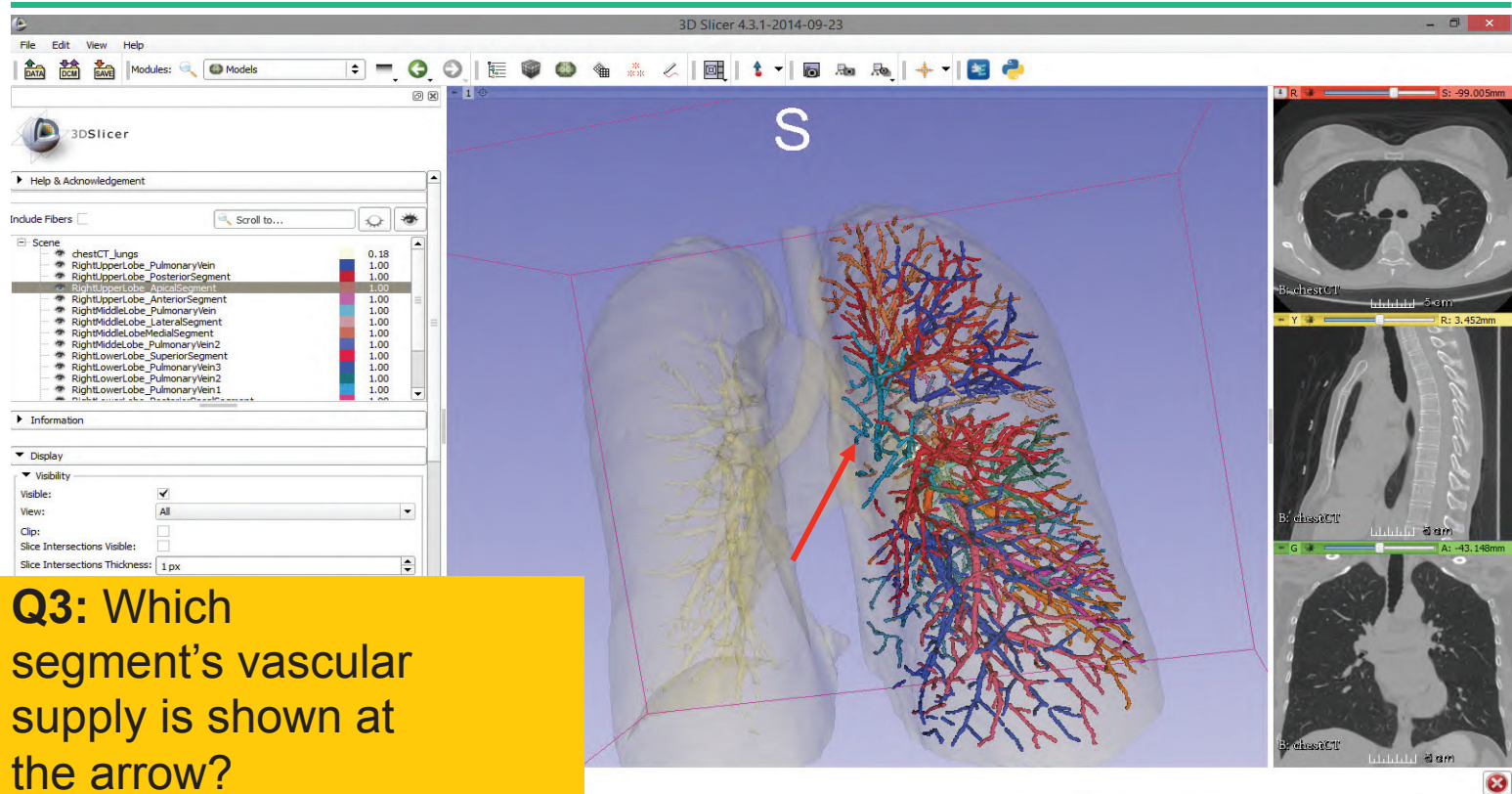


Q2: Which segment's vascular supply is shown at the arrow?

Answer 2: Right Upper Lobe Apical Segment



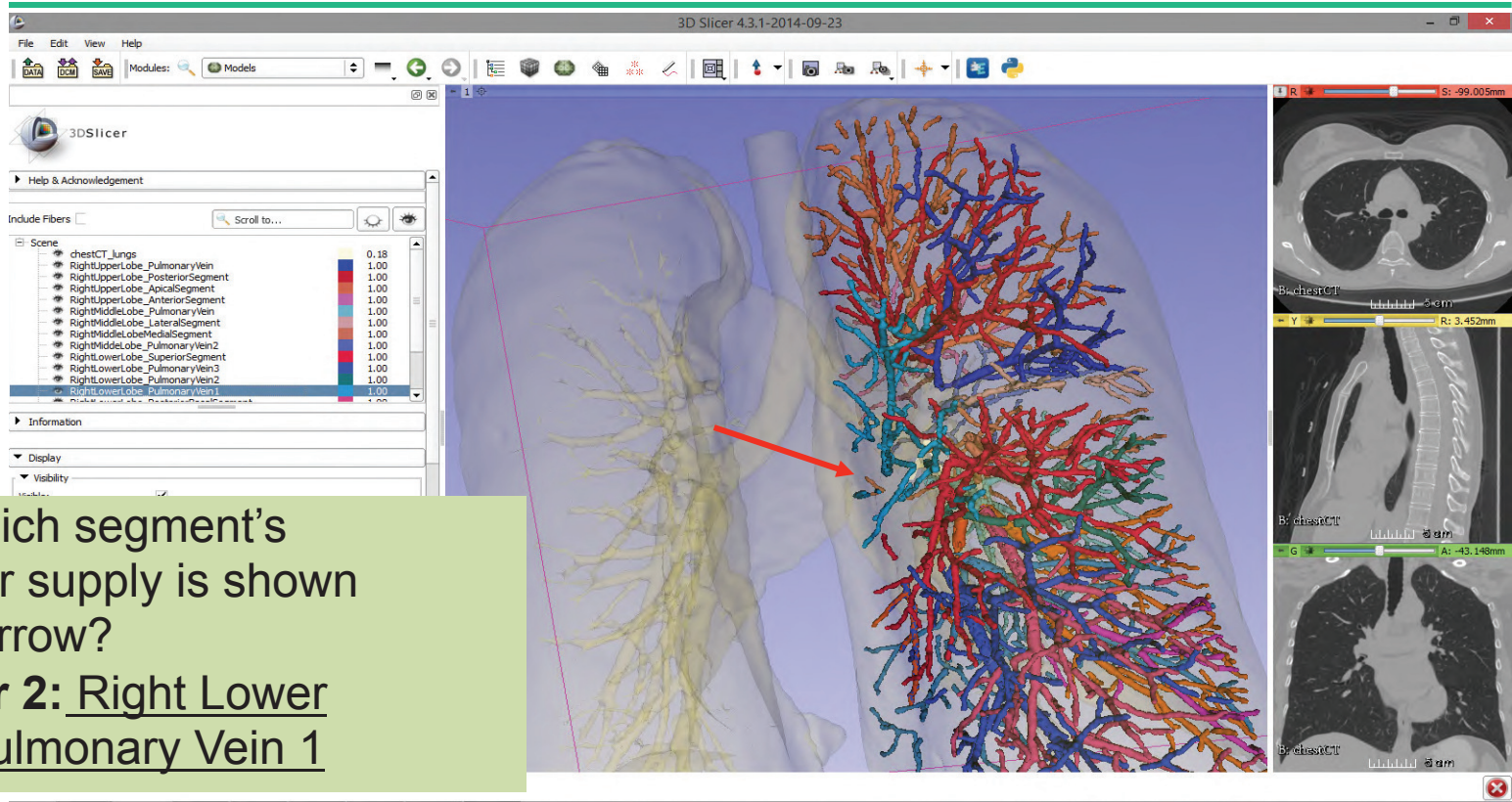
Lung Segments – Question 3



Q3: Which segment's vascular supply is shown at the arrow?



Lung Segments – Question 3

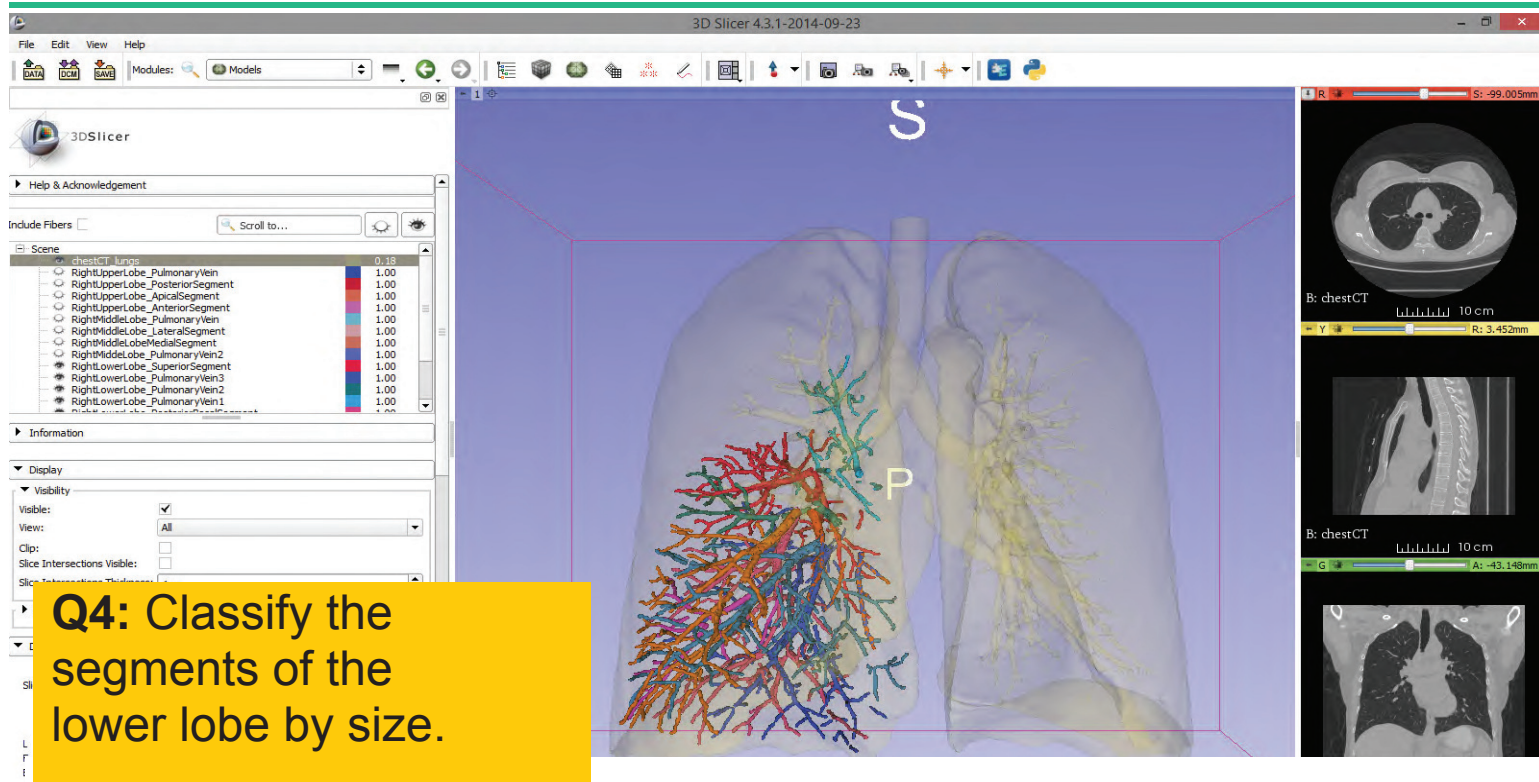


Q3: Which segment's vascular supply is shown at the arrow?

Answer 2: Right Lower Lobe Pulmonary Vein 1

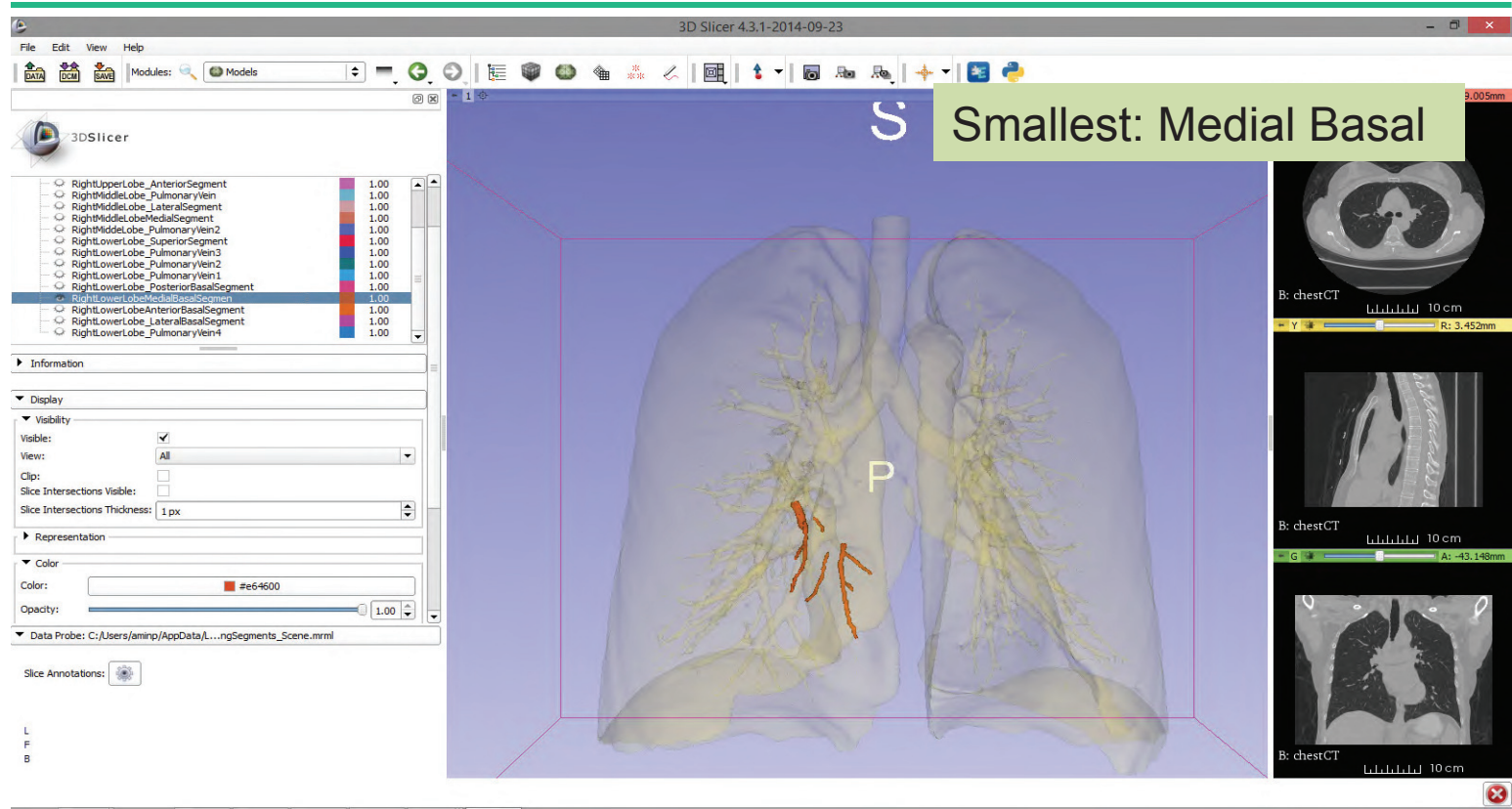


Lung Segments – Question 4



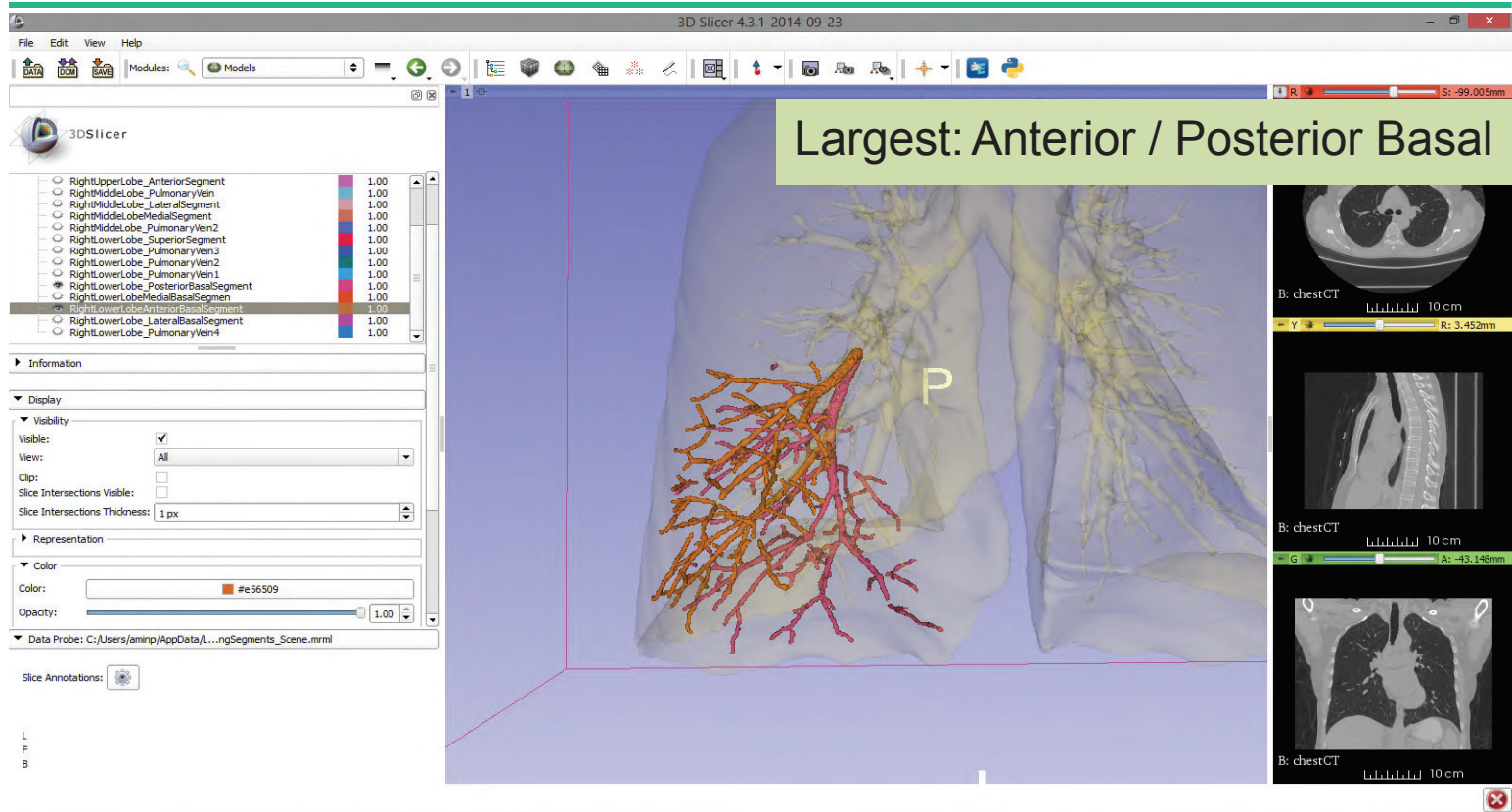


Lung Segments – Question 4



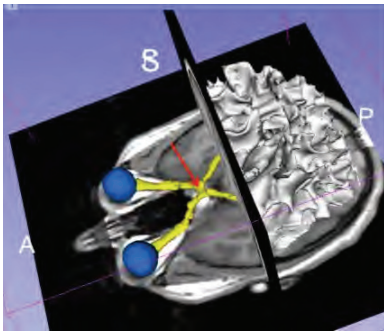
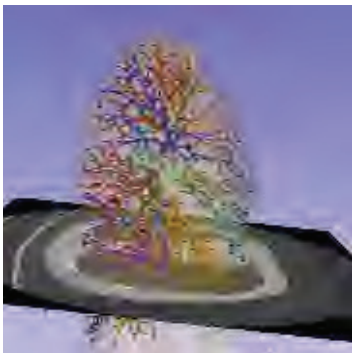
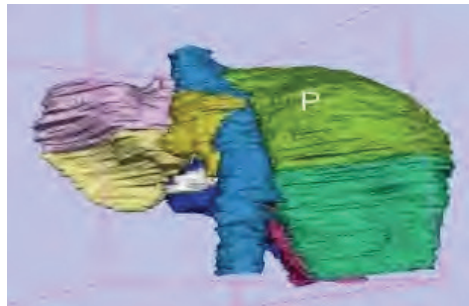


Lung Segments – Question 4





3D Visualization of DICOM images



- Interactive user-interface to load and manipulate greyscale volumes, labelmaps and 3D models.
- User-defined 3D view of the anatomy
- 3D Open-source platform for Linux, Mac and Windows



3DSlicer website





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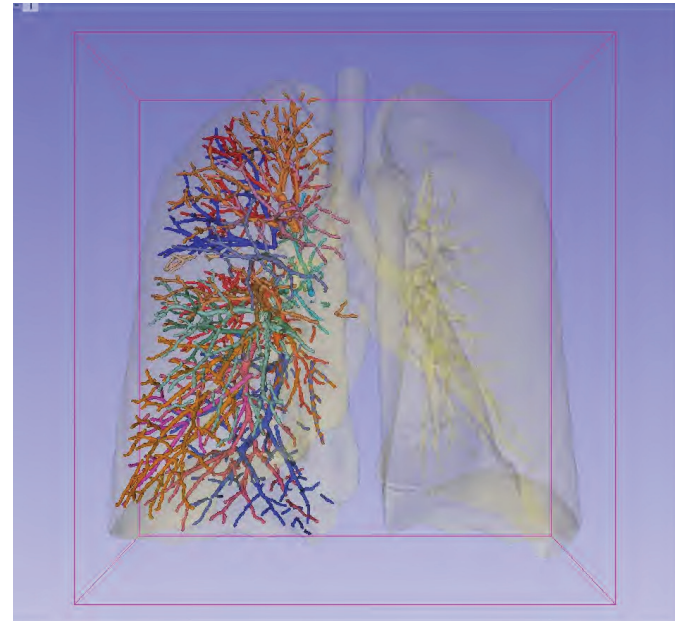
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www.slicer.org
www.na-mic.org



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