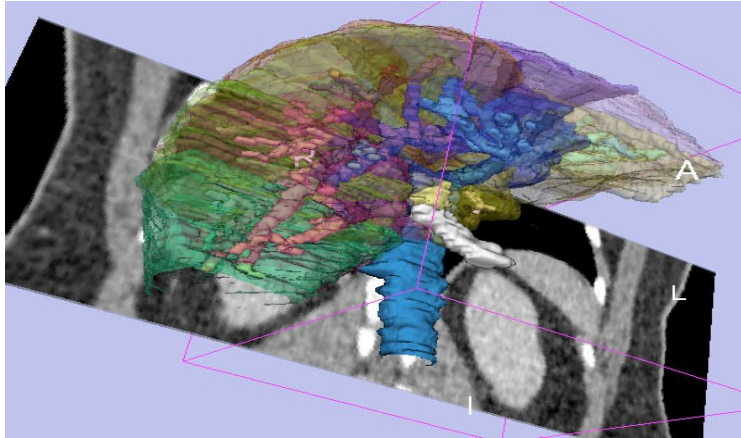


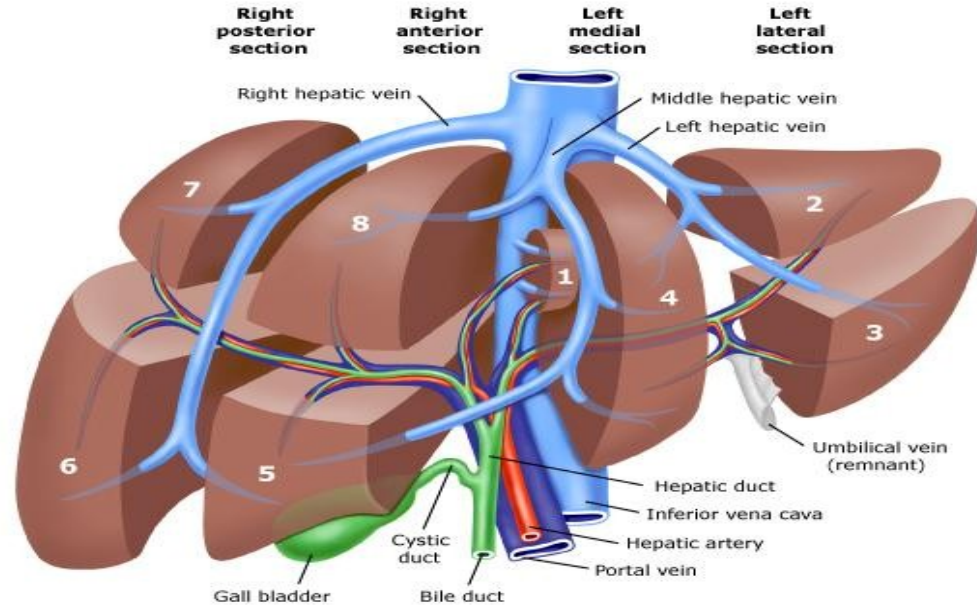


Part II:

Interactive 3D Visualization
of the segments of the liver



Anatomy of the liver





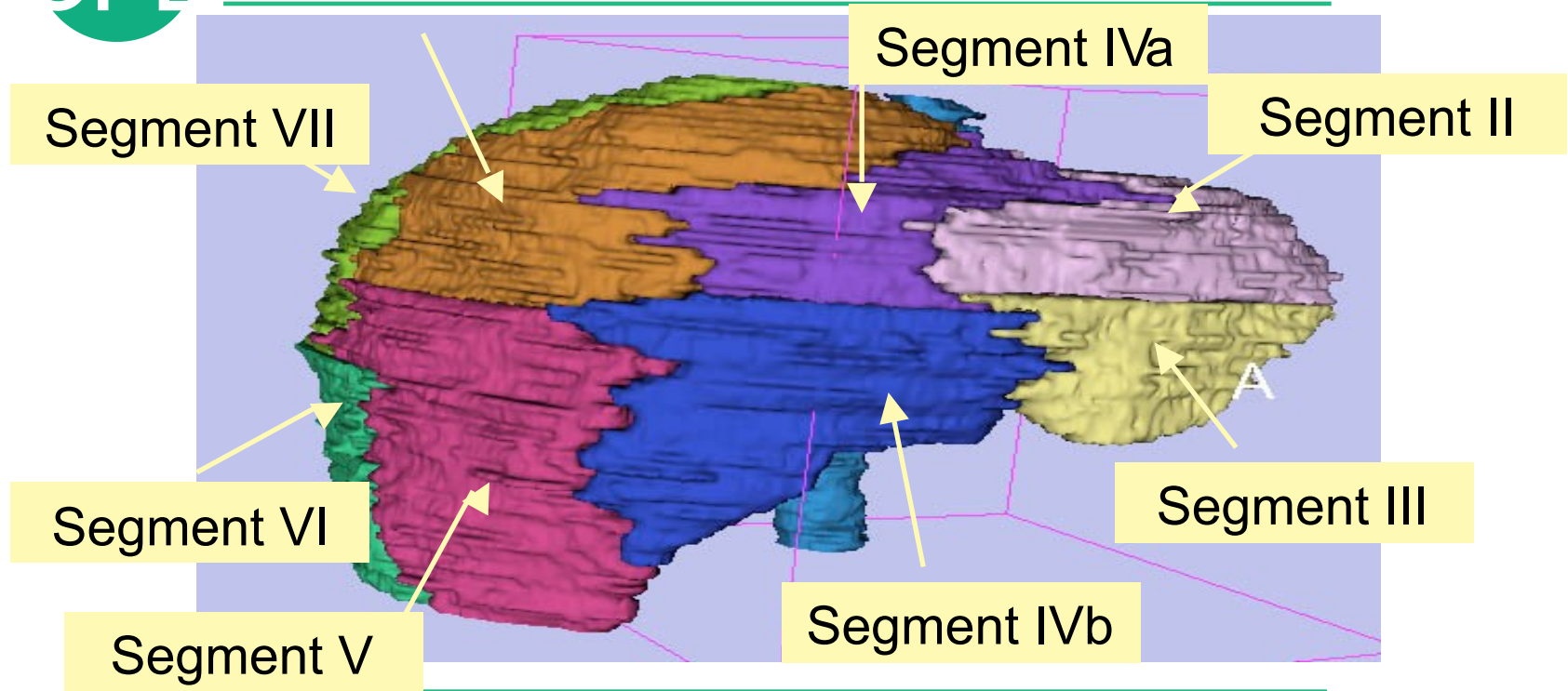
Liver dataset



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



3D segments of the liver

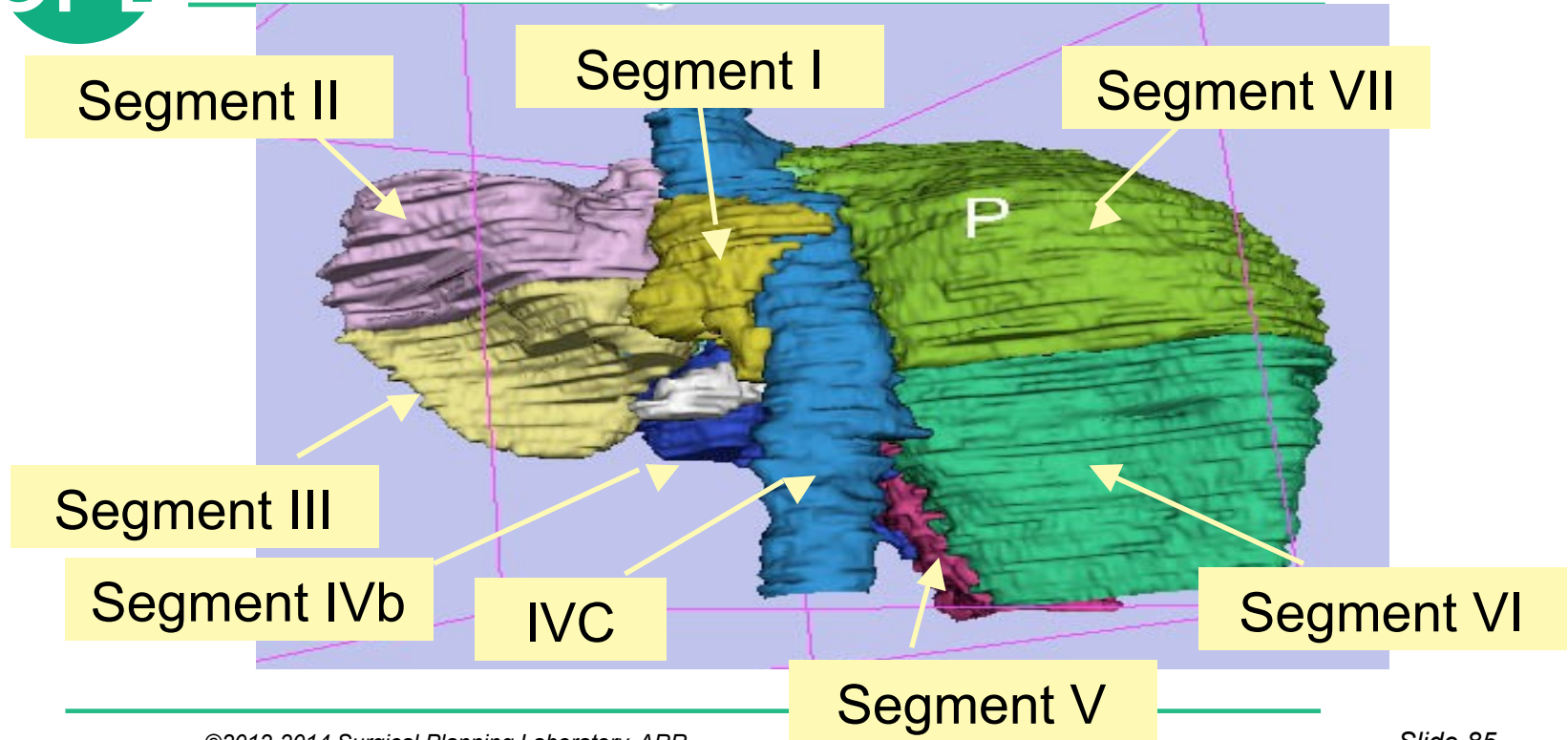


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3D segments of the liver

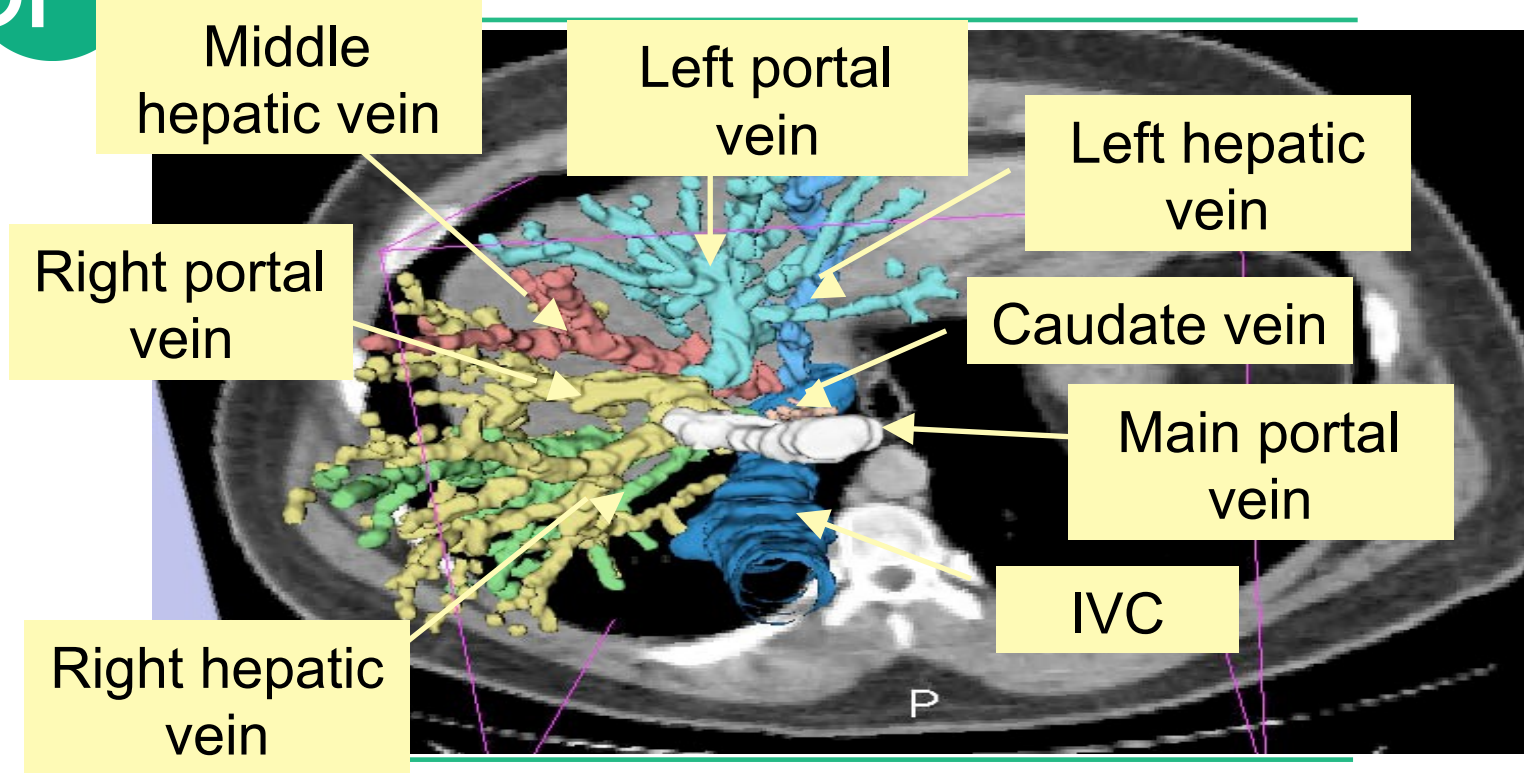


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Slide 85



Liver vasculature

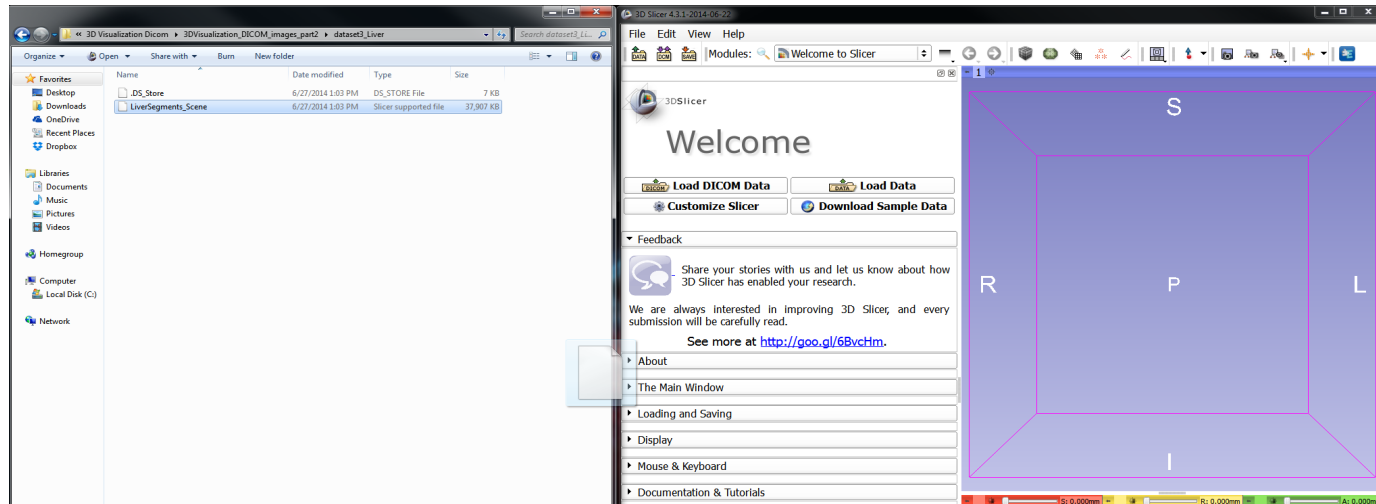


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Slide 86



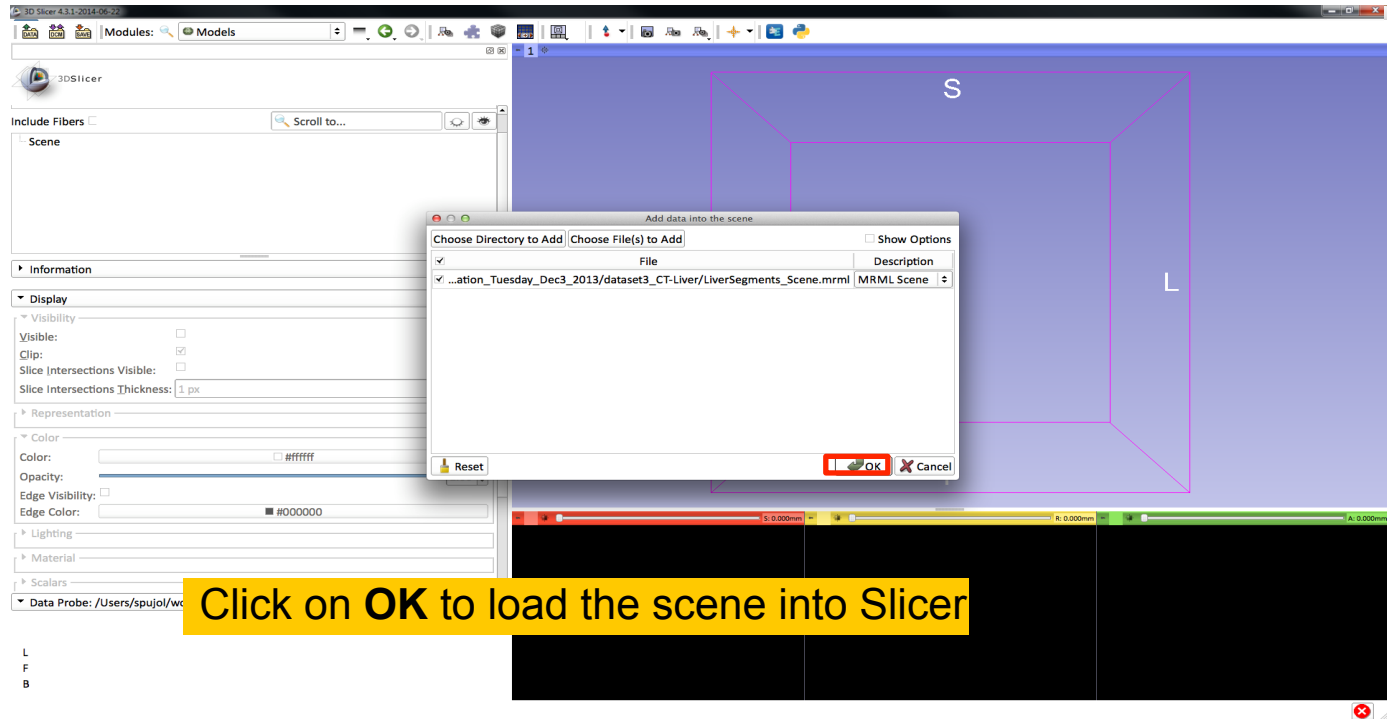
Loading the Liver Scene



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



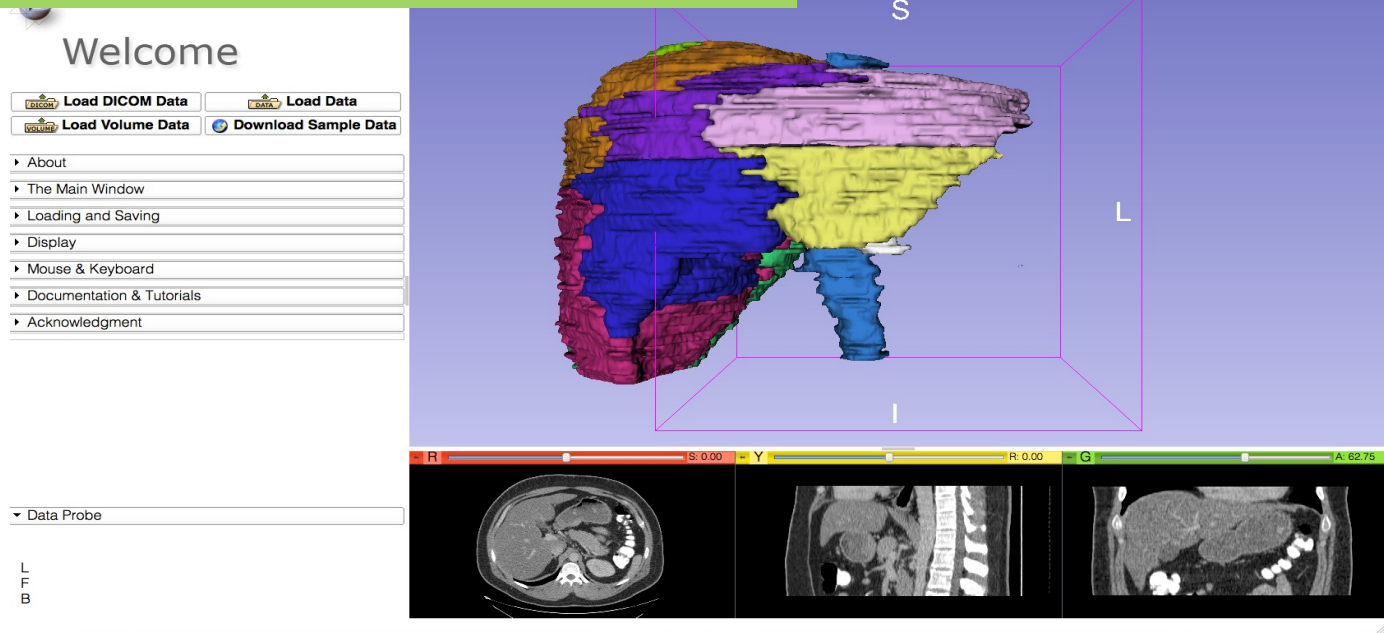
Loading the Liver Scene





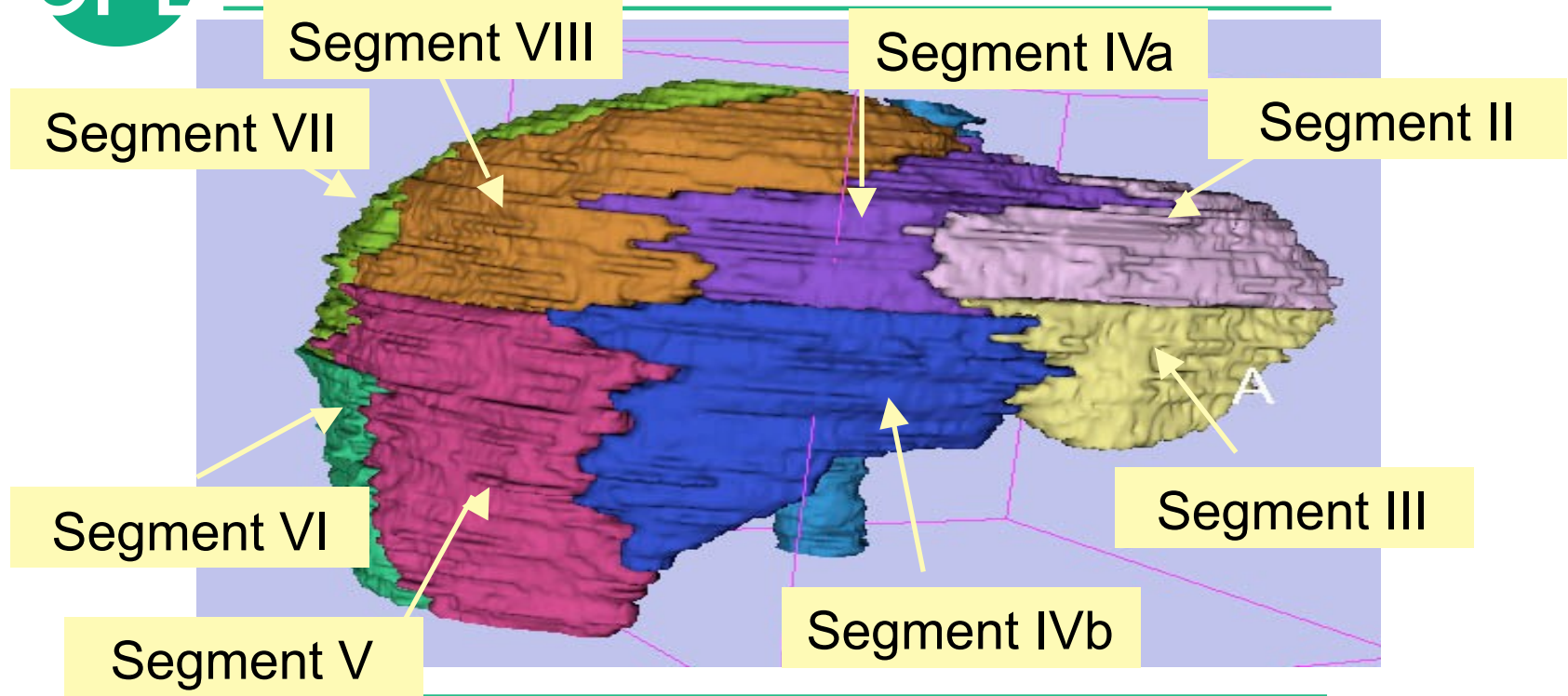
Liver Segments Scene

The elements of the scene appear in the Viewer





3D models of the liver

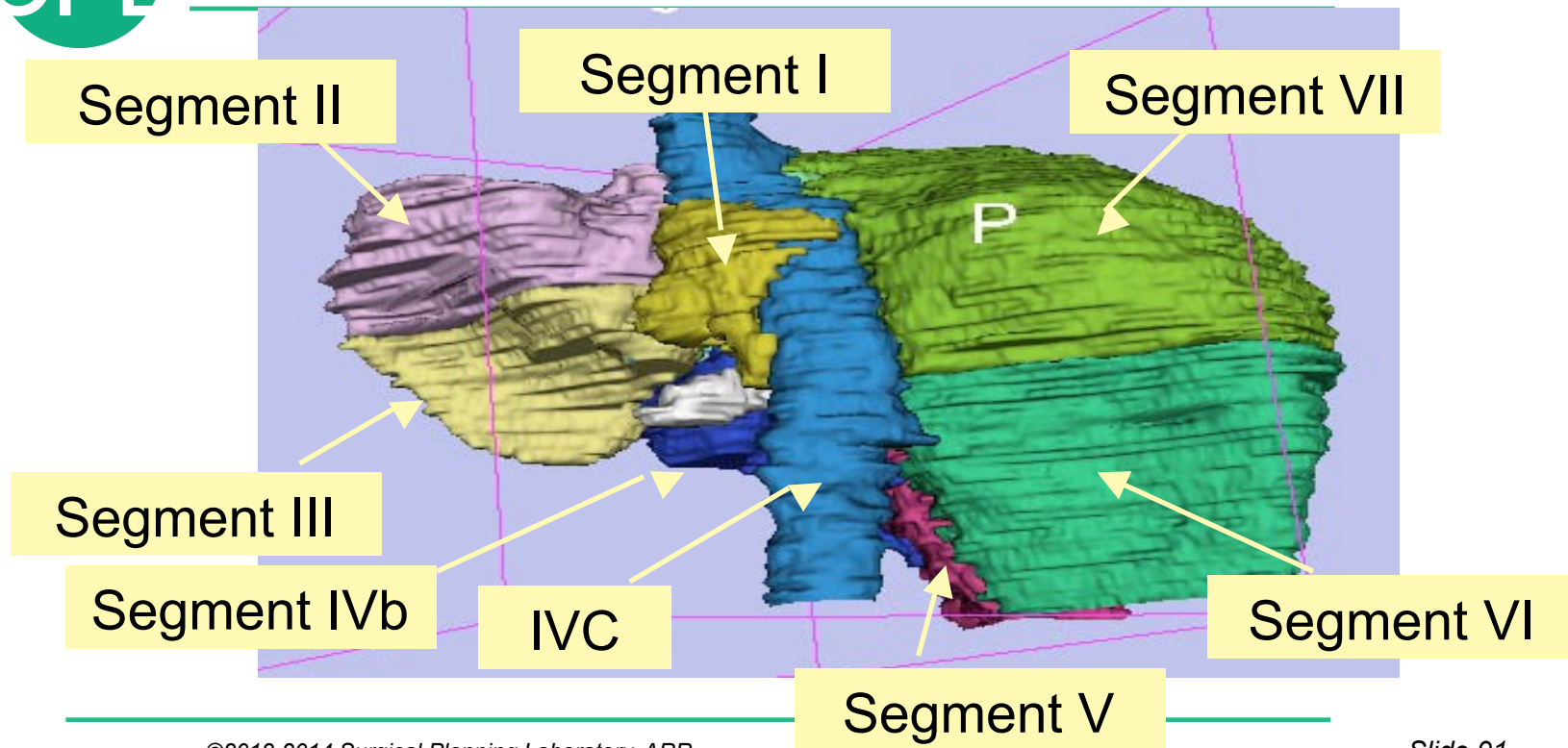


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Slide 90



3D models of the liver

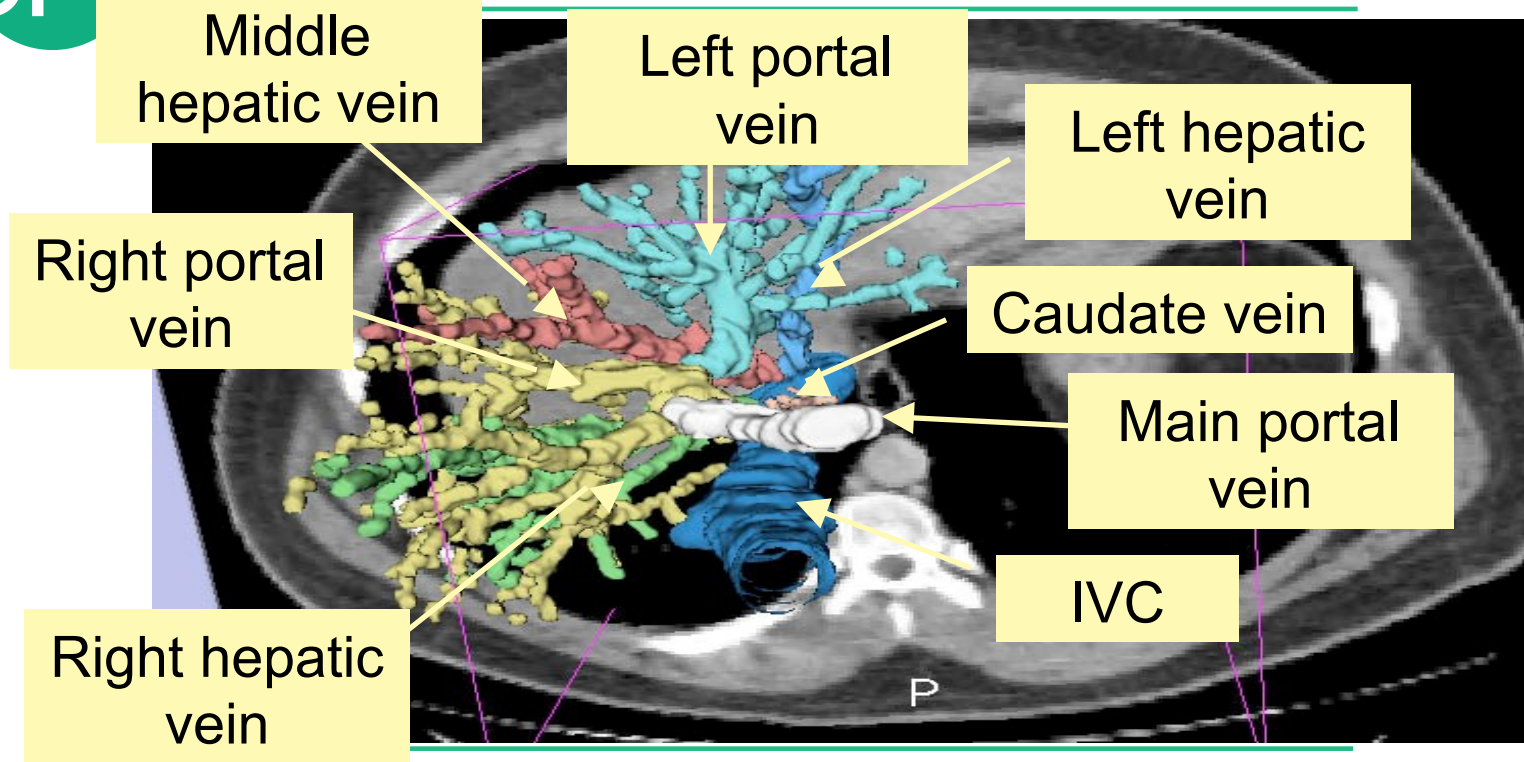


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Slide 91



3D models of the liver

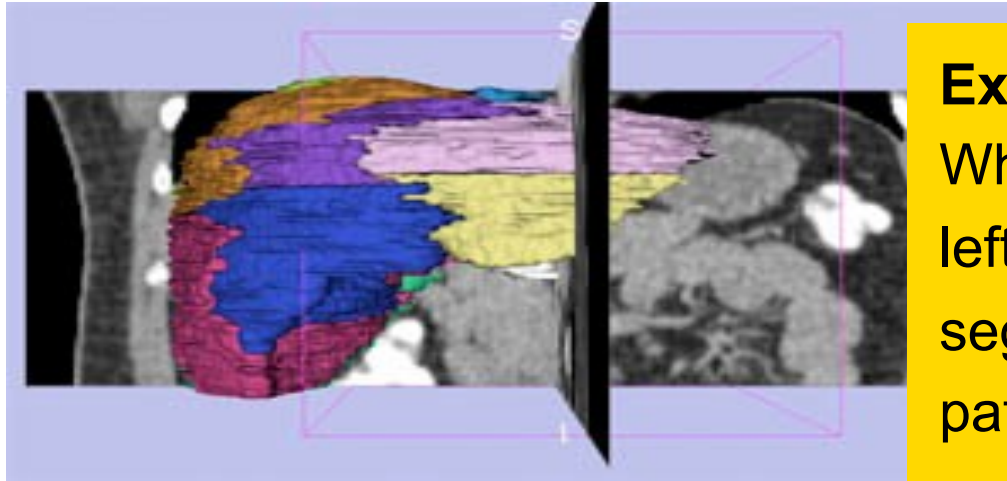


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Slide 92



3D Exploration of Liver Segments

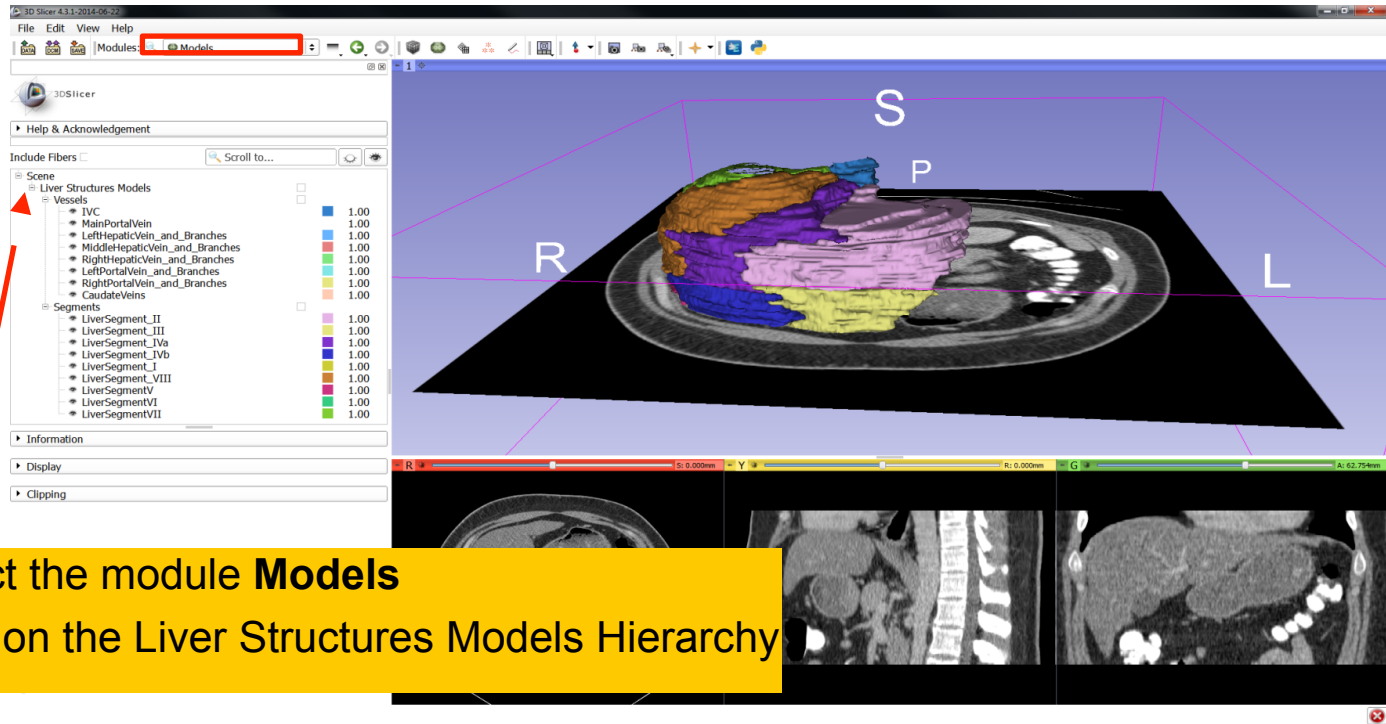


Example:

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



3D Exploration of Liver Segments

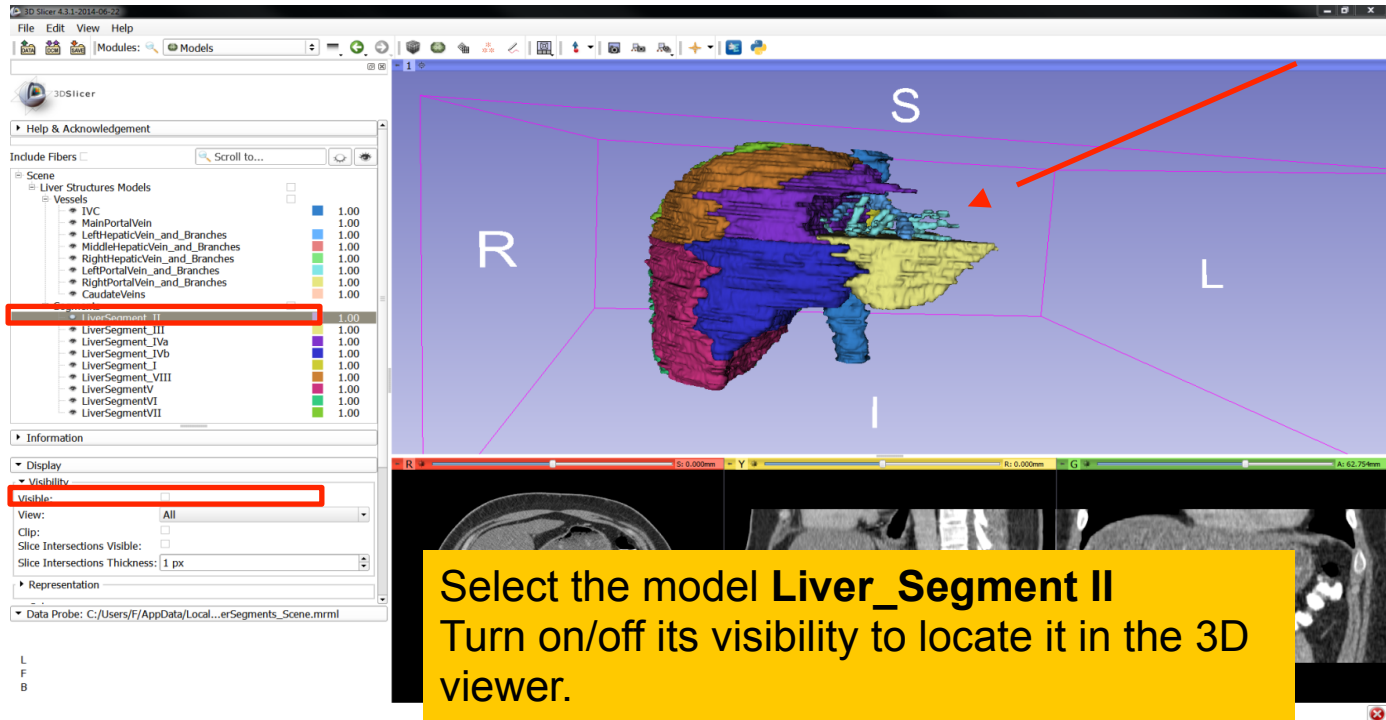


Select the module **Models**

Click on the Liver Structures Models Hierarchy



3D Exploration of Liver Segments

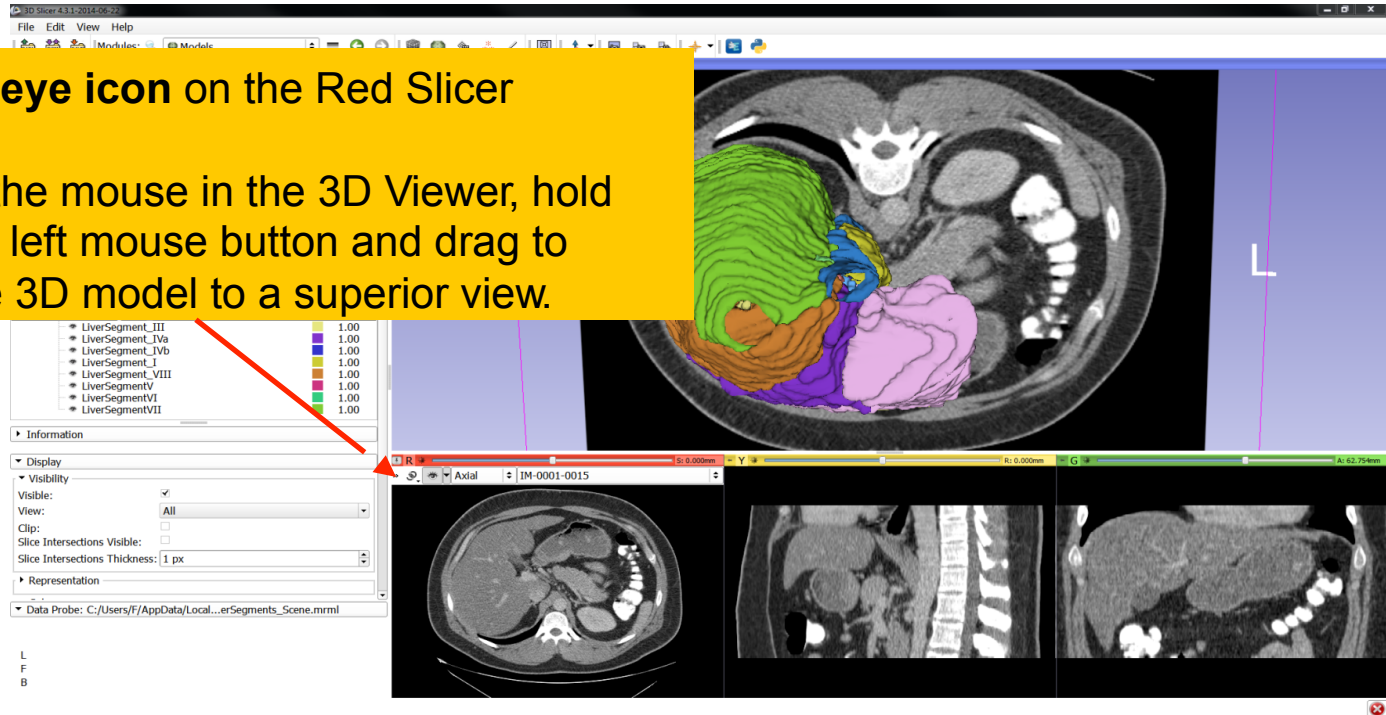




3D Exploration of Liver Segments

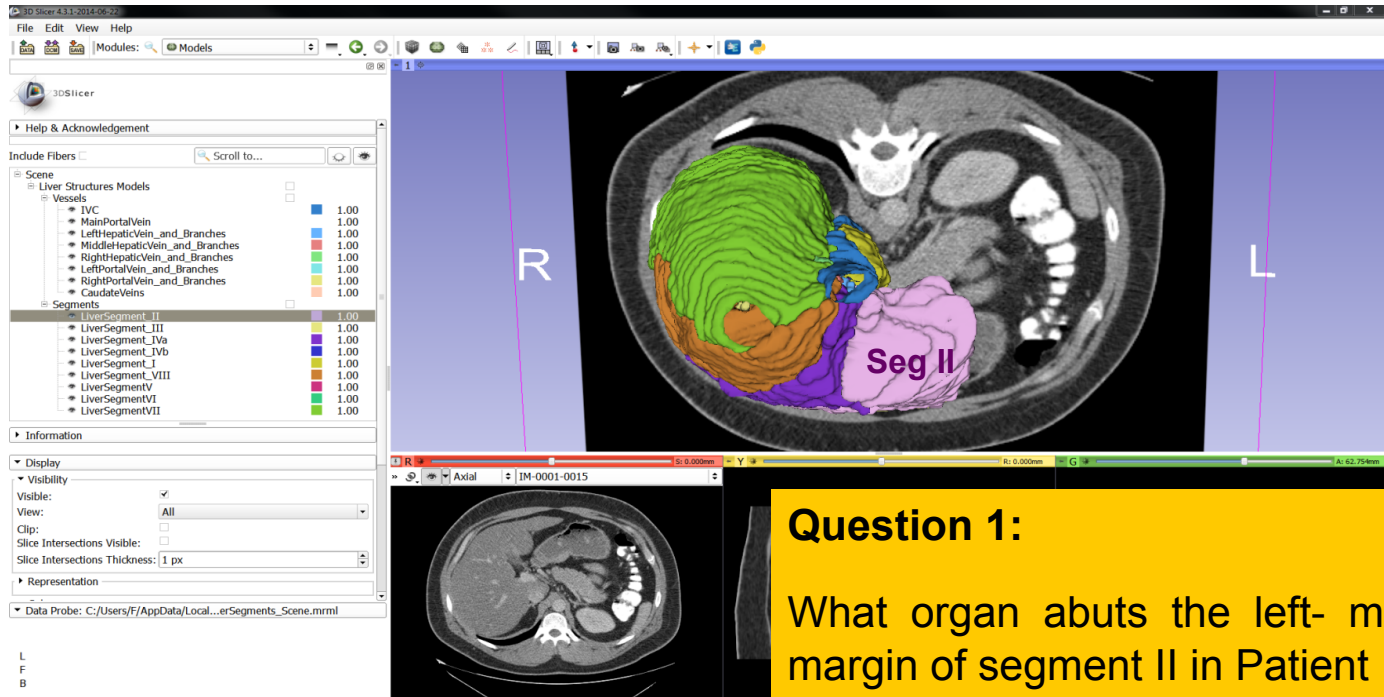
Click the **eye icon** on the Red Slicer

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?

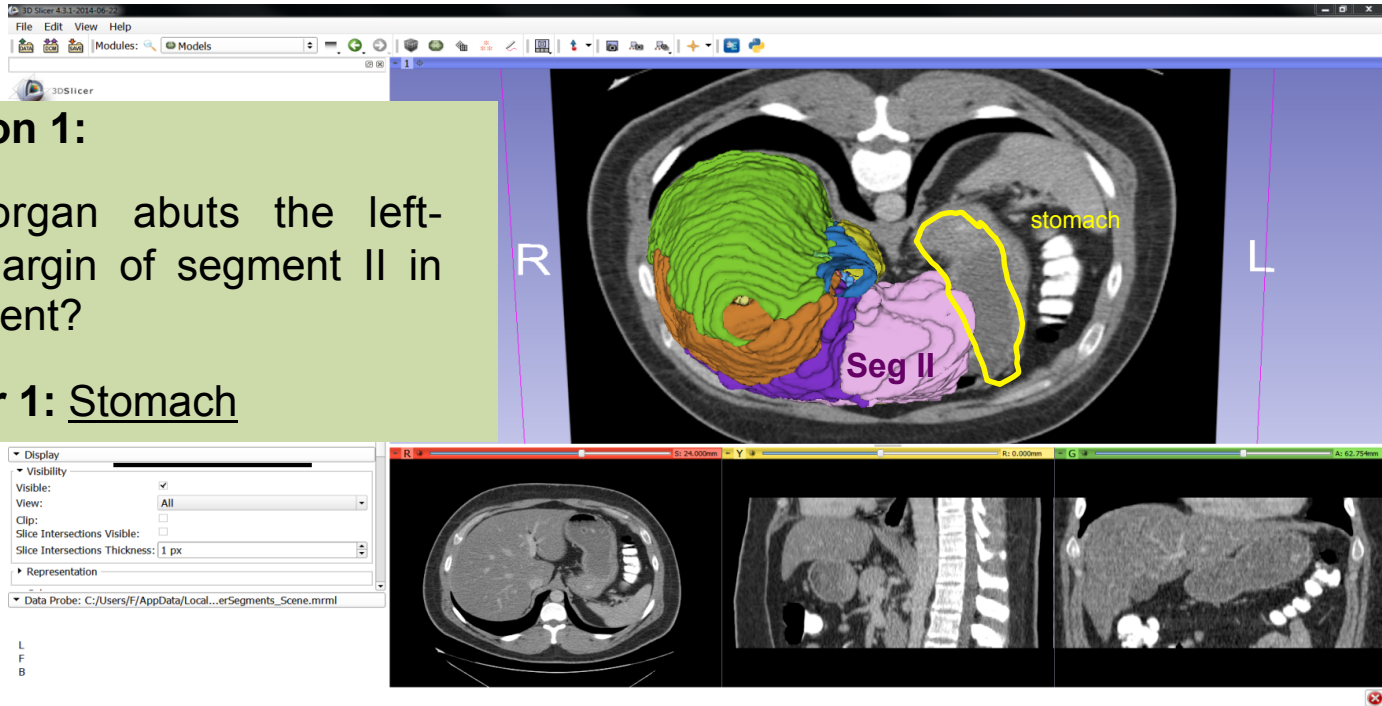


3D Exploration of Liver Segments

Question 1:

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

Answer 1: Stomach

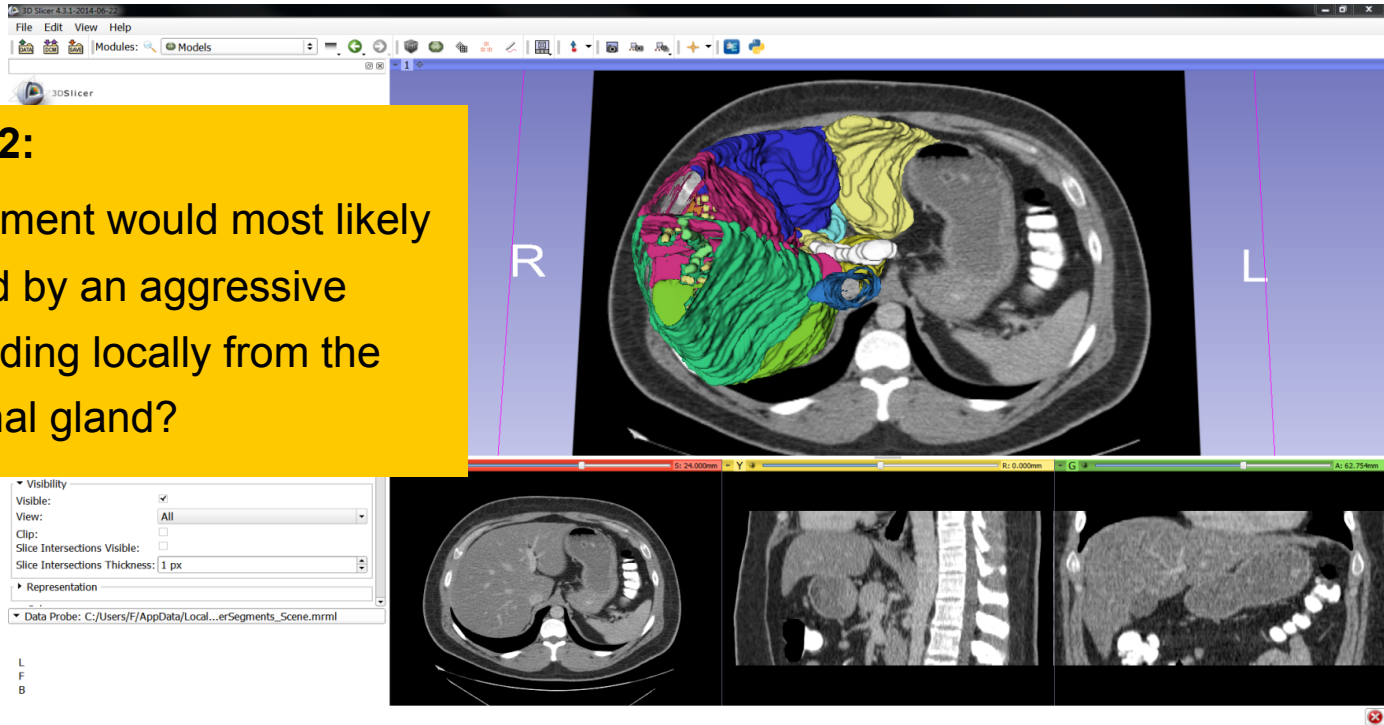




3D Exploration of Liver Segments

Question 2:

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



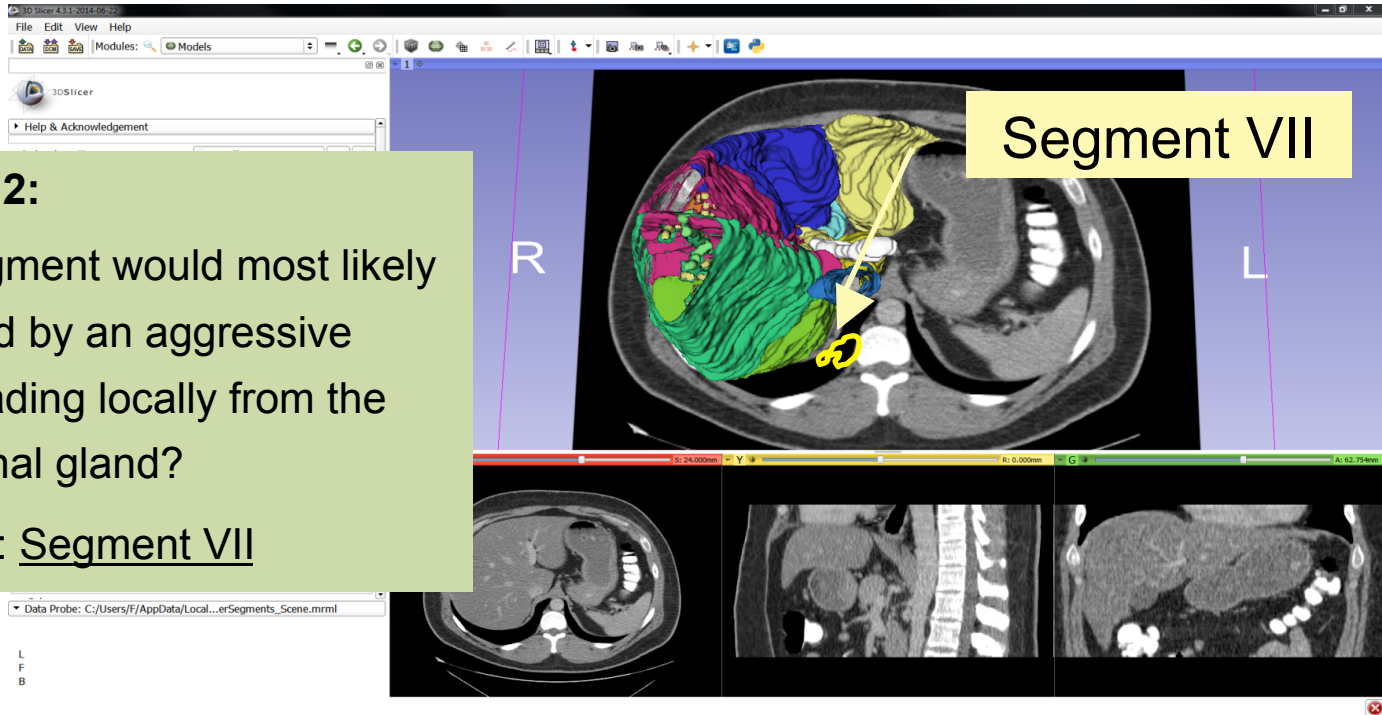


3D Exploration of Liver Segments

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

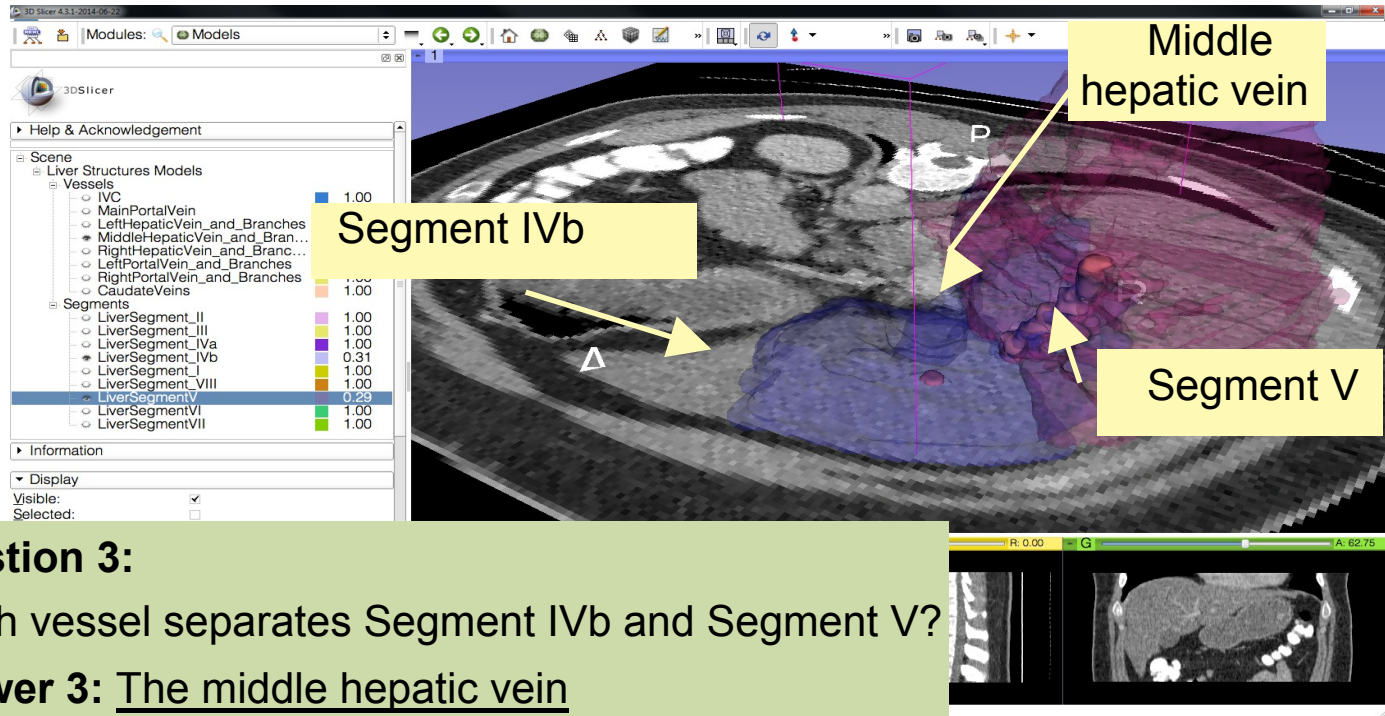


Question 3:

Which vessel separates Segment IVb and Segment V?

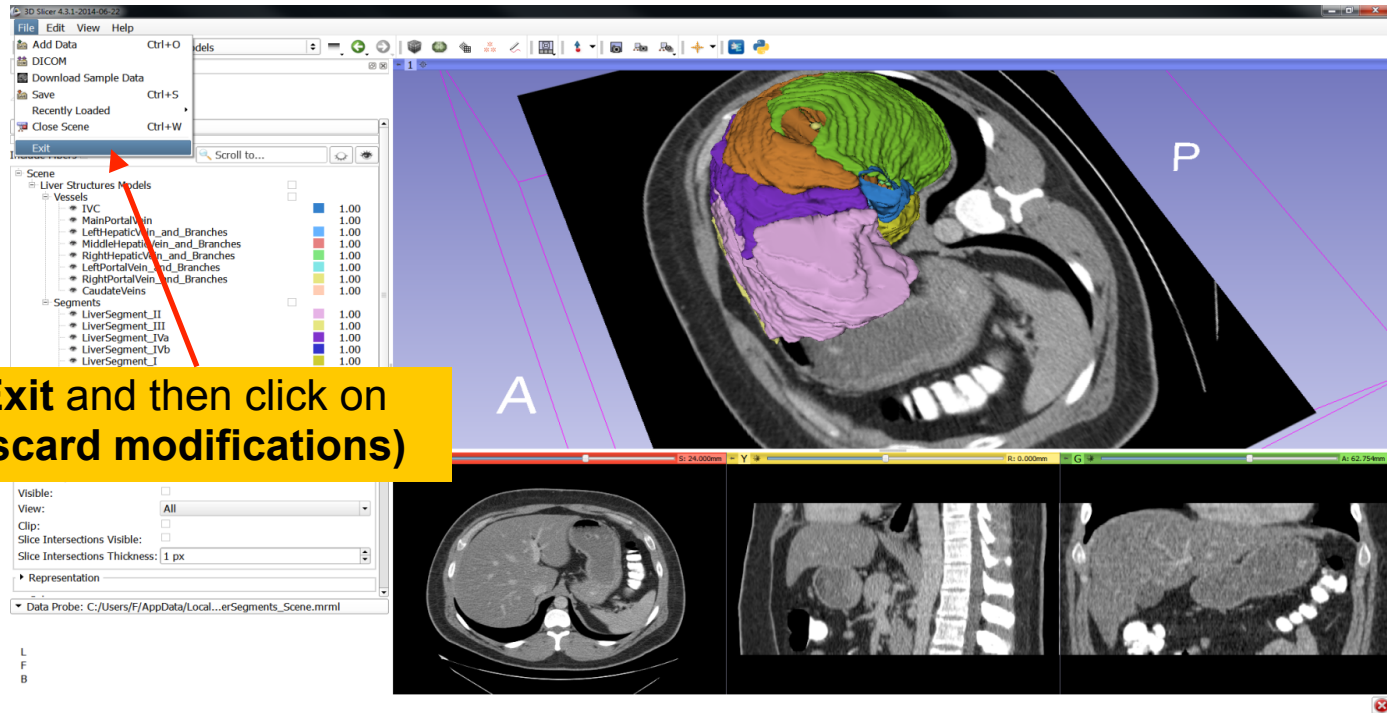


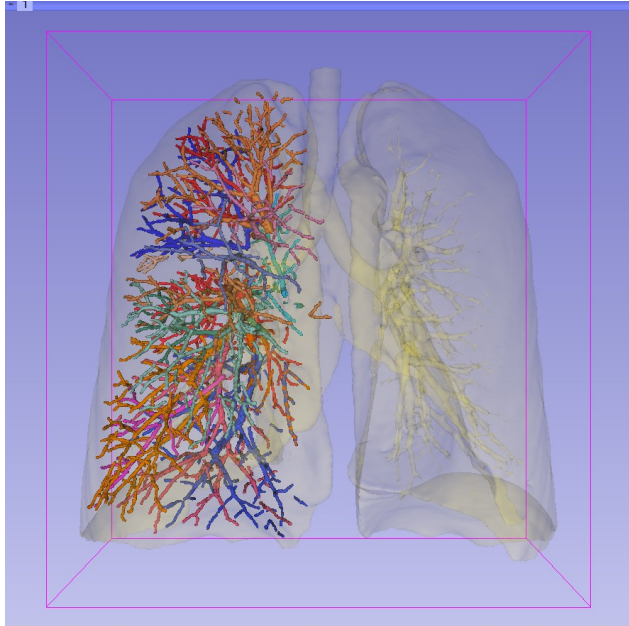
Middle Hepatic Vein





Closing the Liver Scene

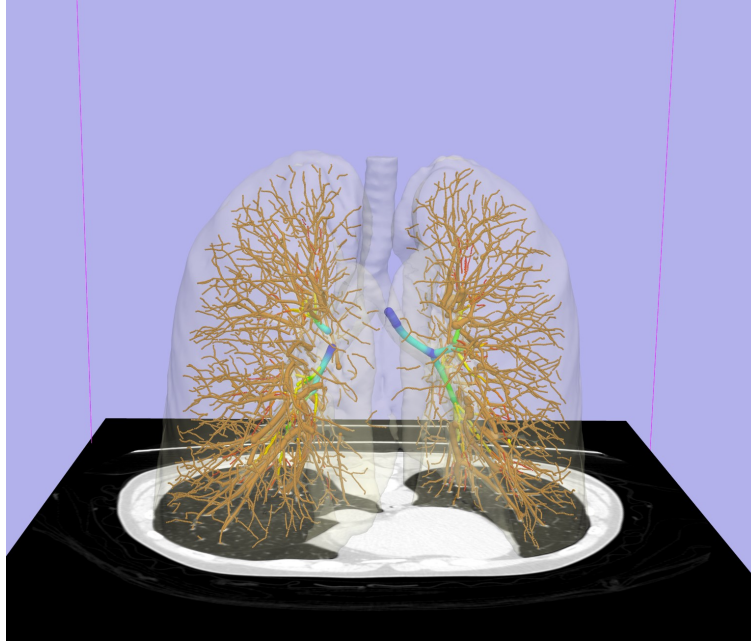




Interactive 3D Visualization of the segments of the lungs



Segments of the lung



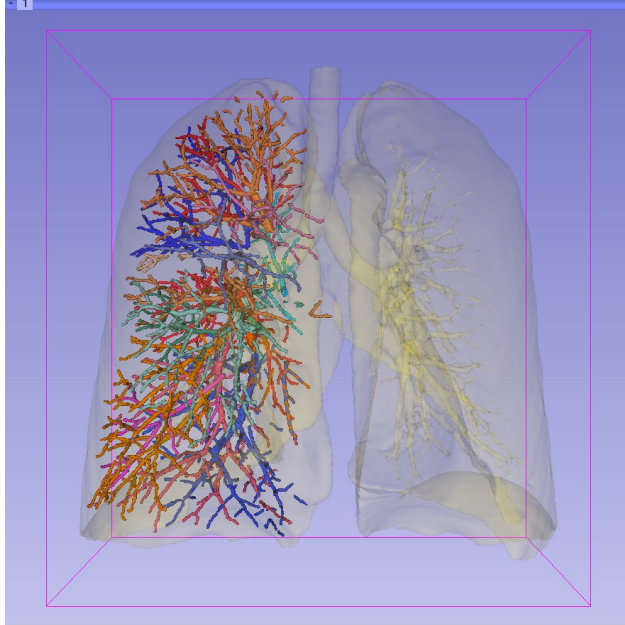
Segmentation and 3D surface reconstruction of the lung and pulmonary vessels

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



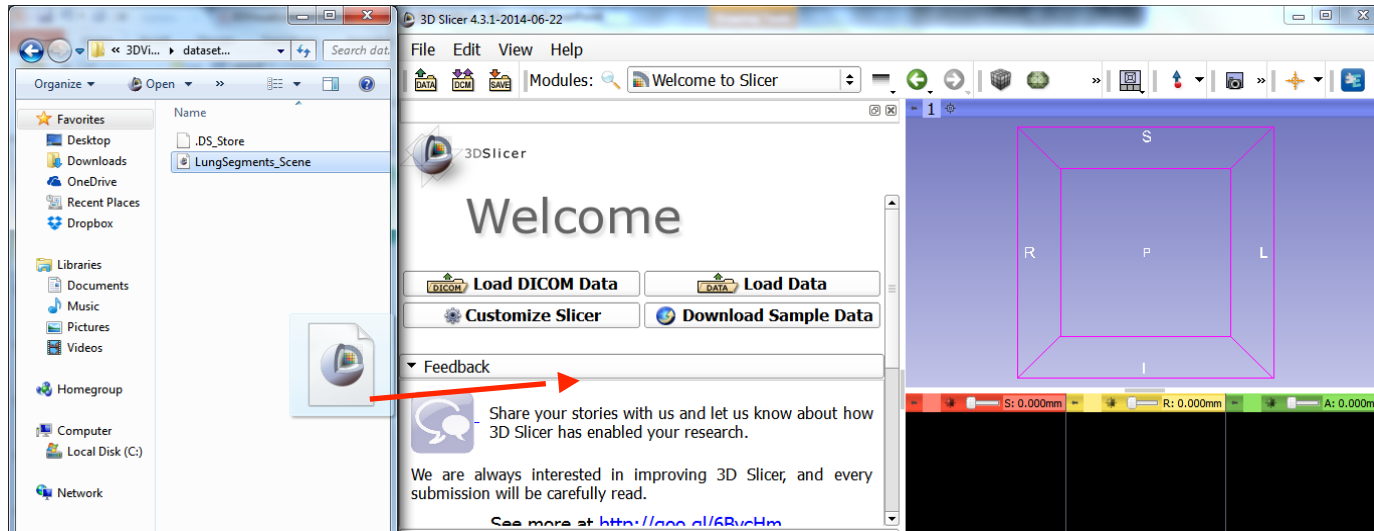
3D parcellation of arteries and veins from original model of pulmonary vessels
(Kitt Shaffer, M.D., Ph.D. - Sonia Pujol, Ph.D.)

- 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

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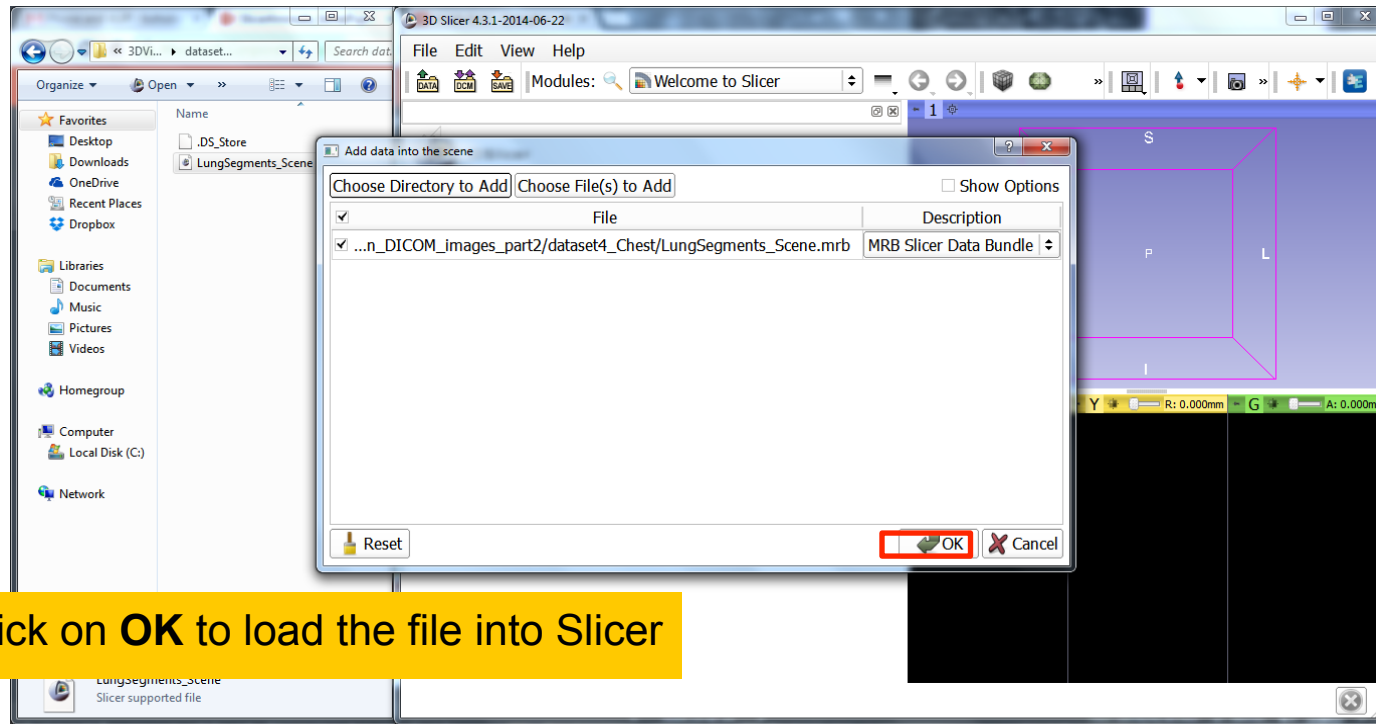
Loading the Chest Data Scene



Open the directory **C:\3DSlicerData_RSNA2014\3DVisualizationDICOM_Monday_Dec1**
Select the subdirectory **dataset4_Chest**
Drag and drop the file **LungSegments_Scene.mrb** into Slicer



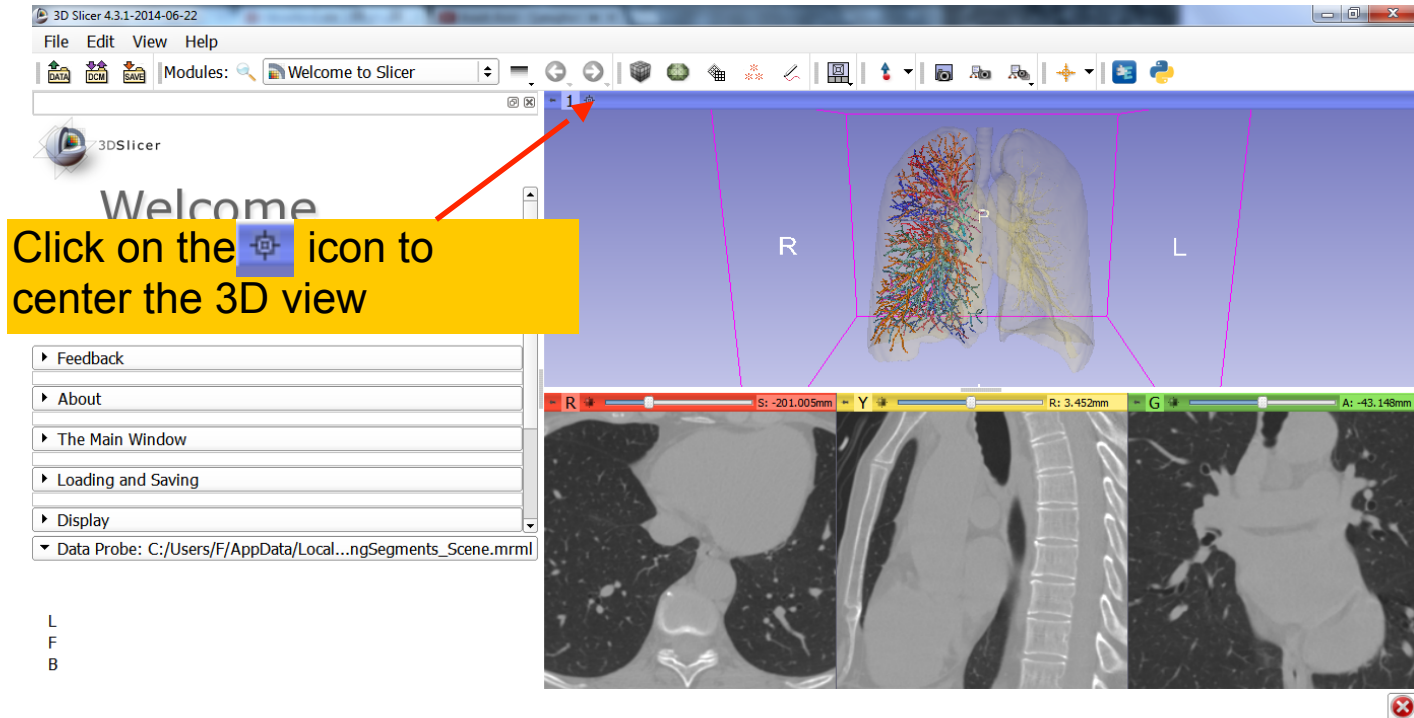
Loading the Lung Scene



Click on **OK** to load the file into Slicer

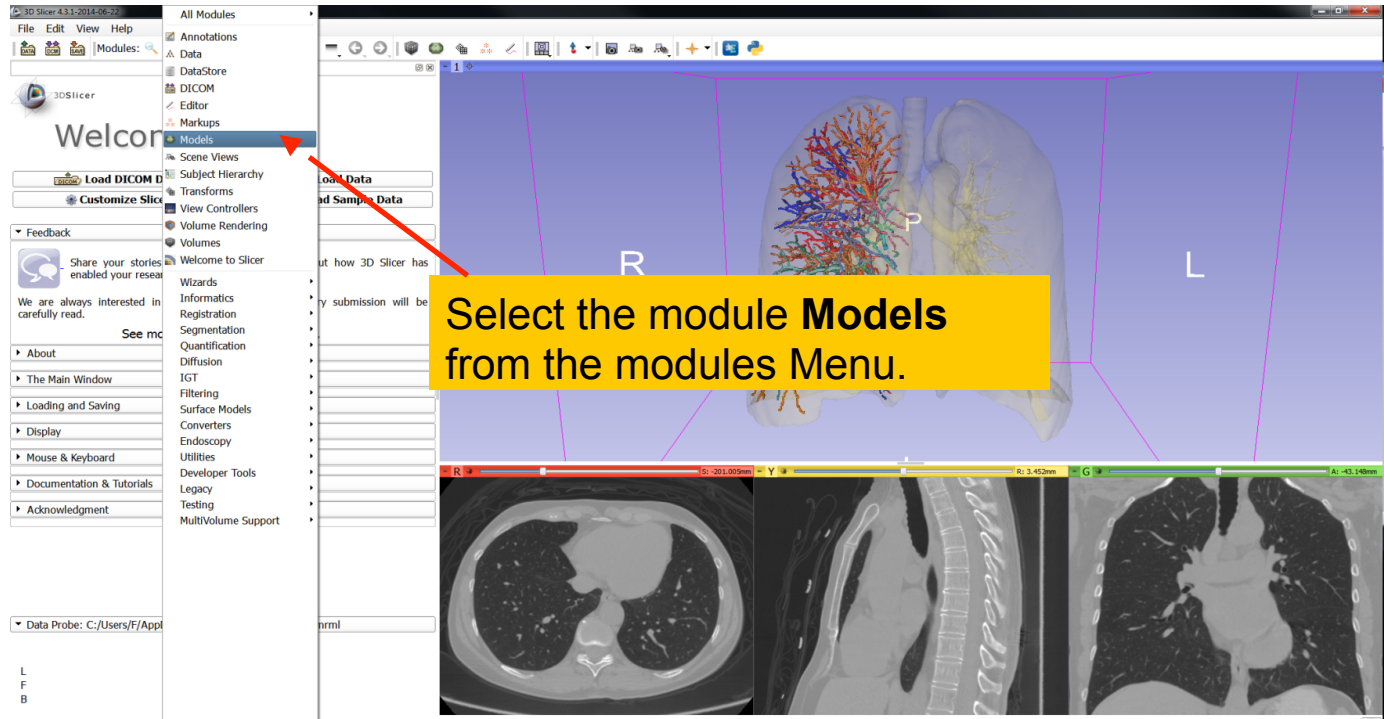


Loading the Lung Scene



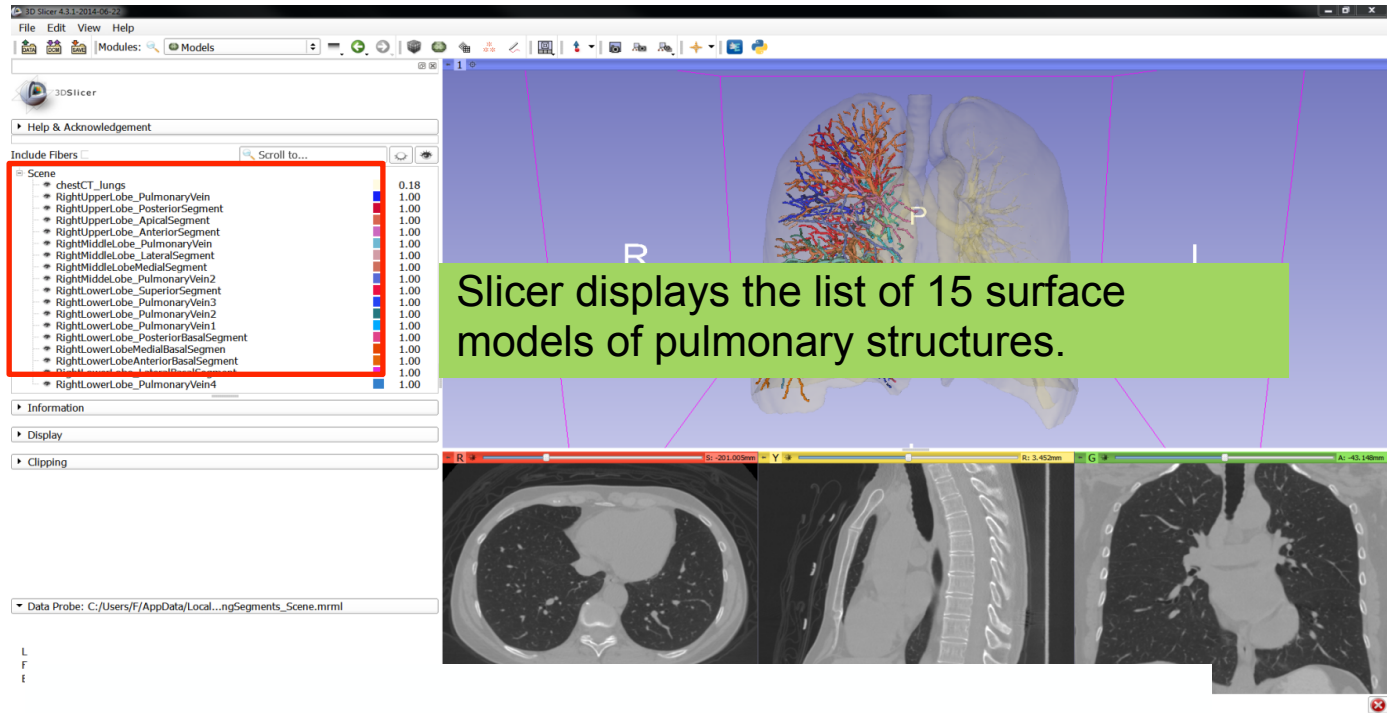


Loading the Lung Scene



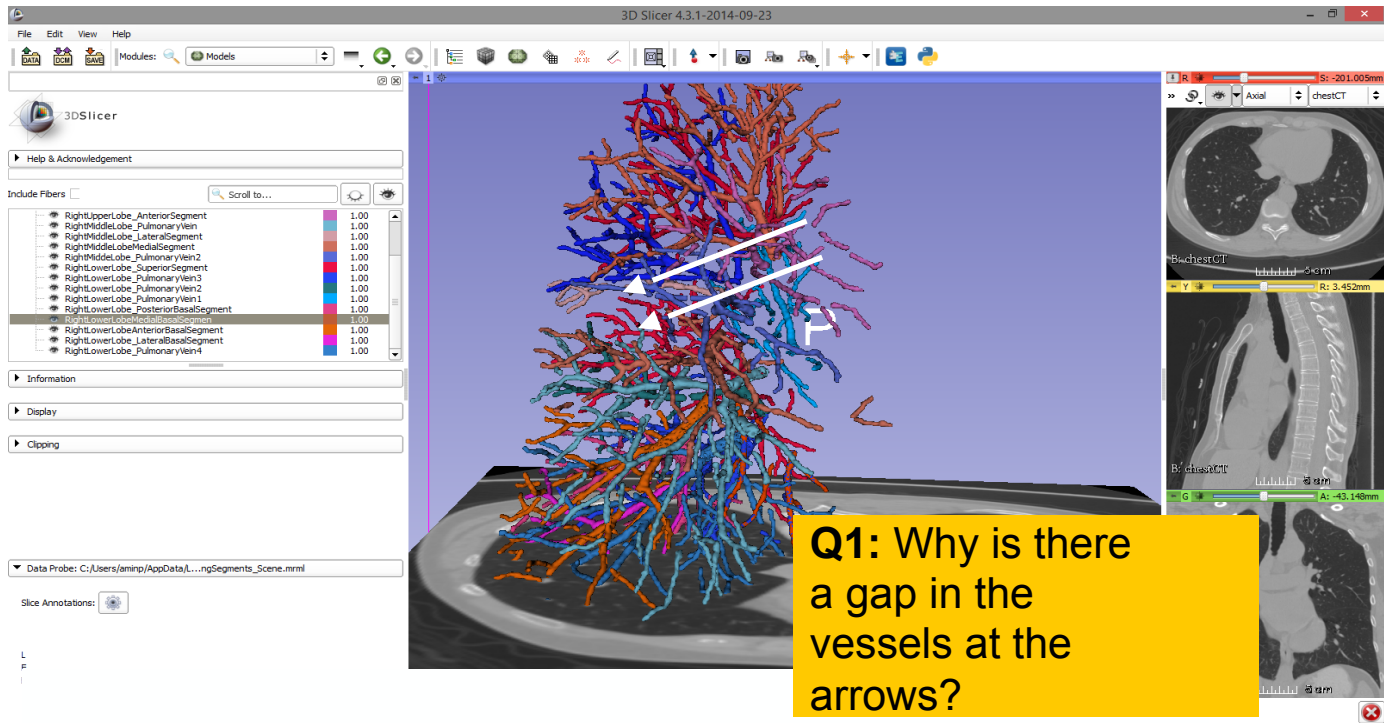


Lung Segments



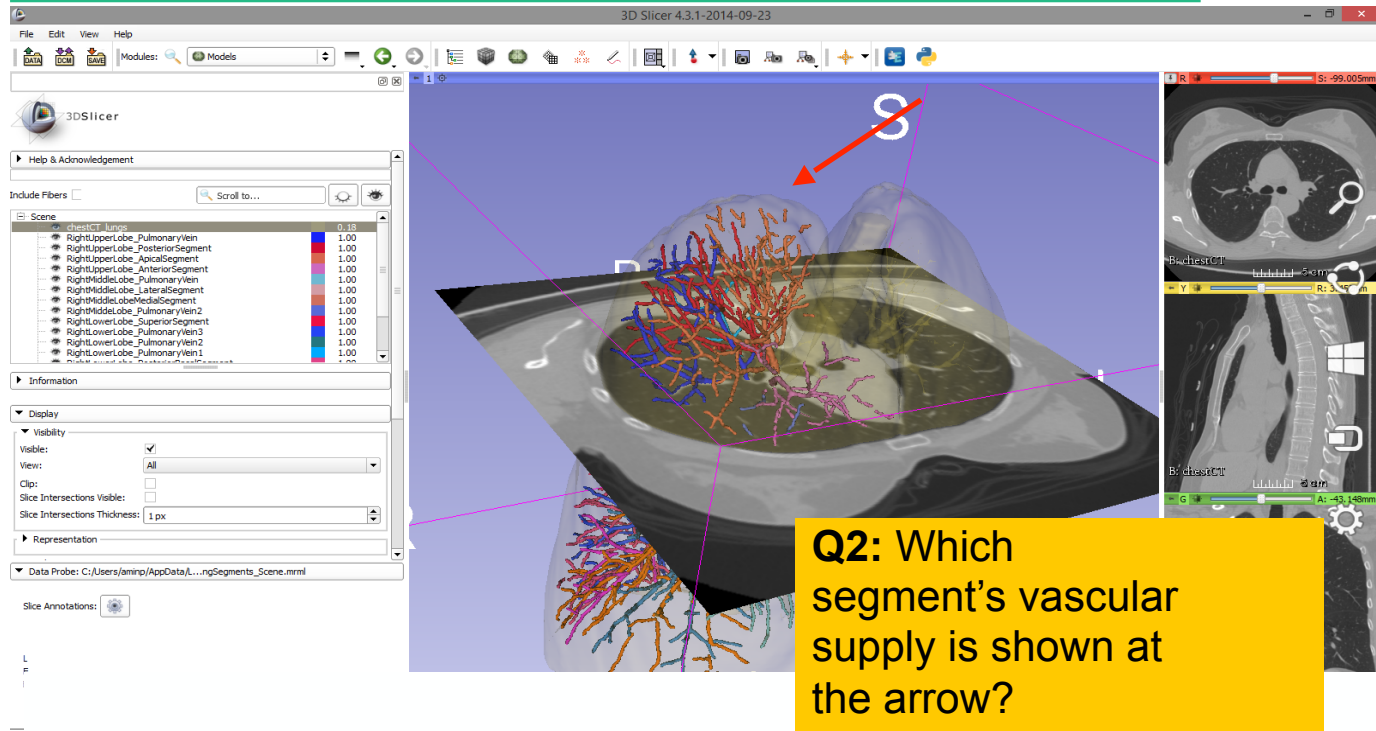


Lung Segments – Question 1



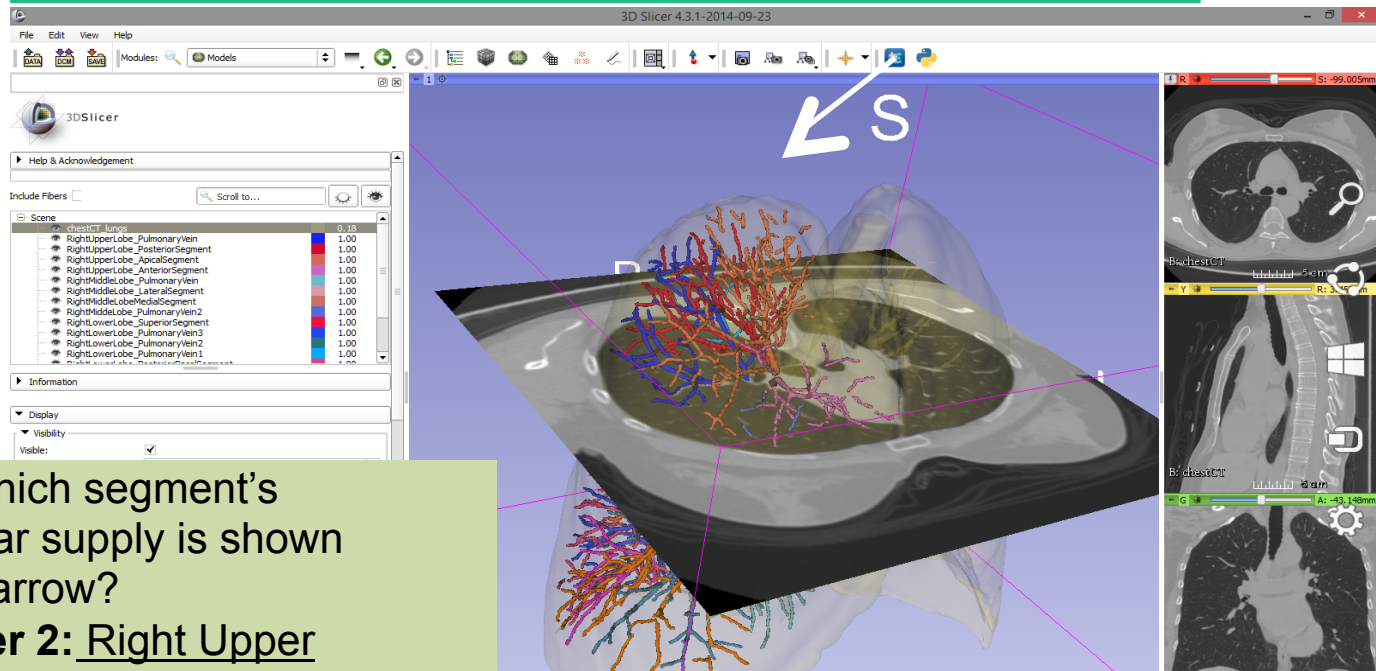


Lung Segments – Question 2





Lung Segments – Question 2

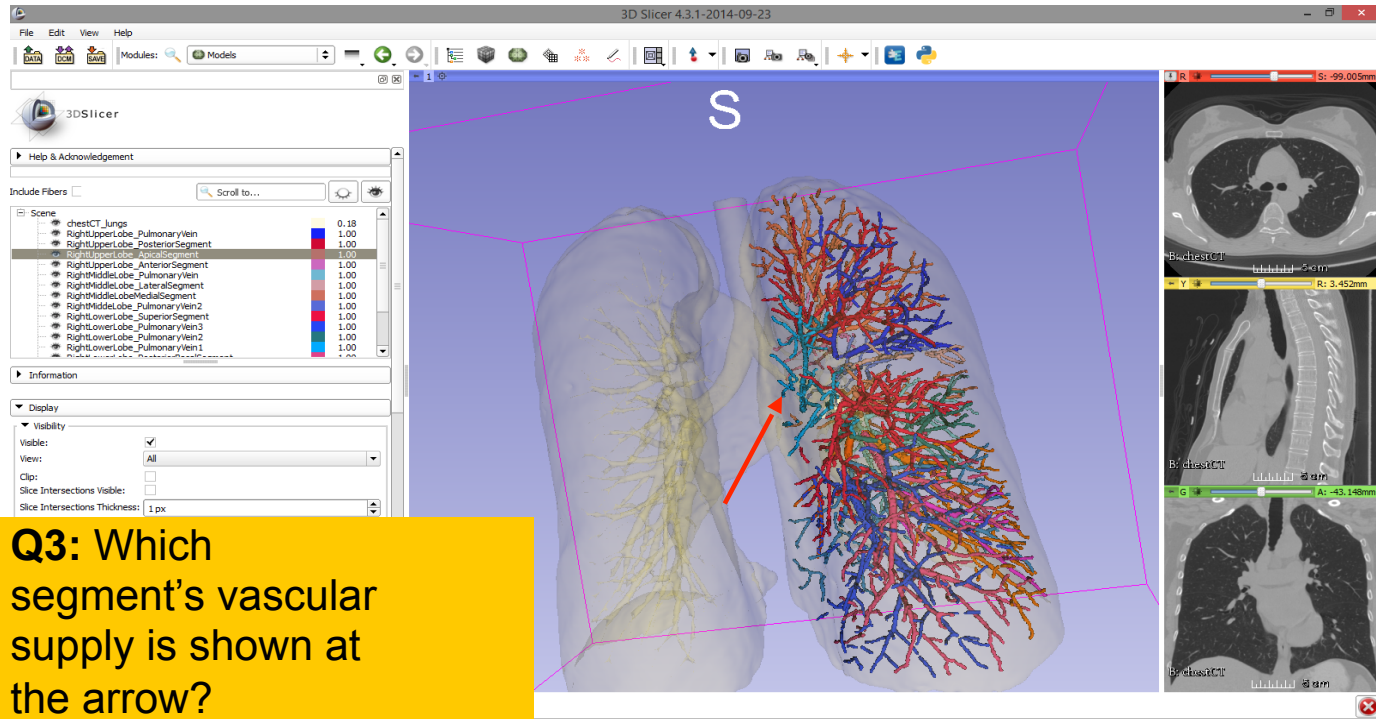


Q2: Which segment's vascular supply is shown at the arrow?

Answer 2: Right Upper Lobe Apical Segment

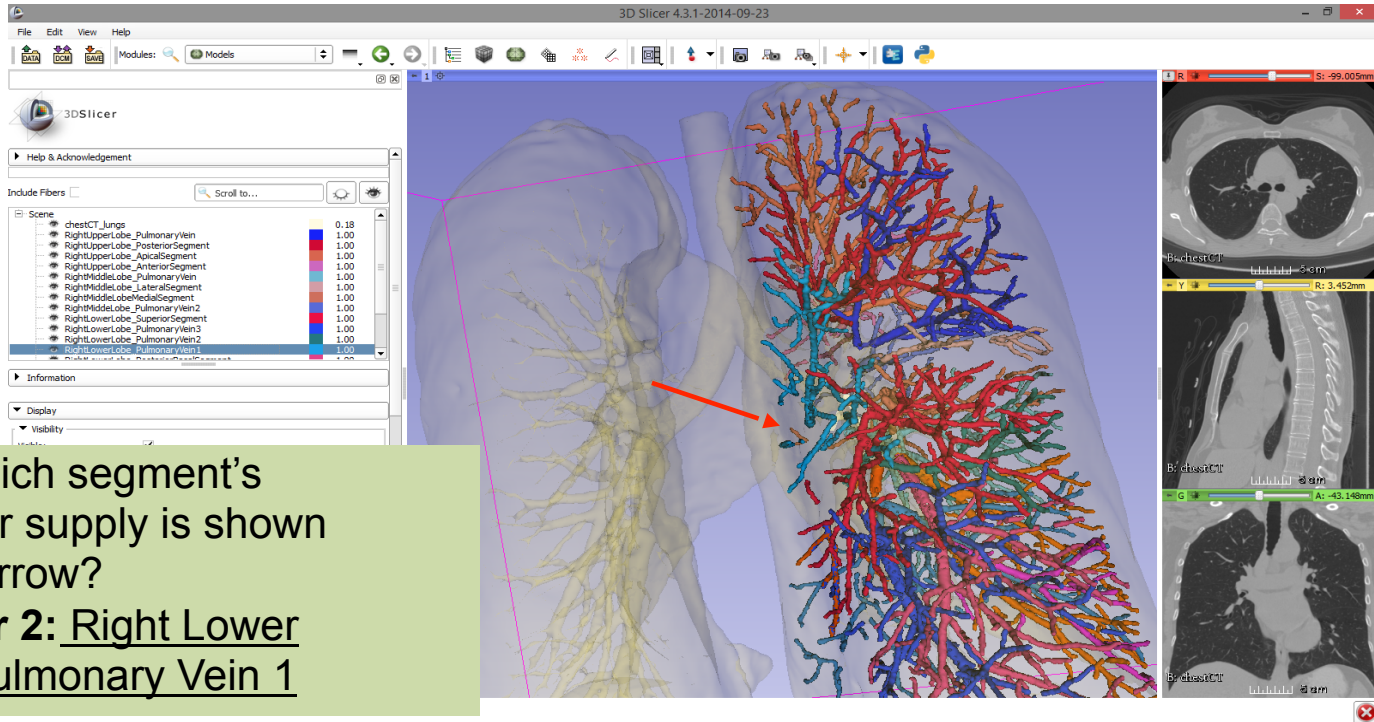


Lung Segments – Question 3



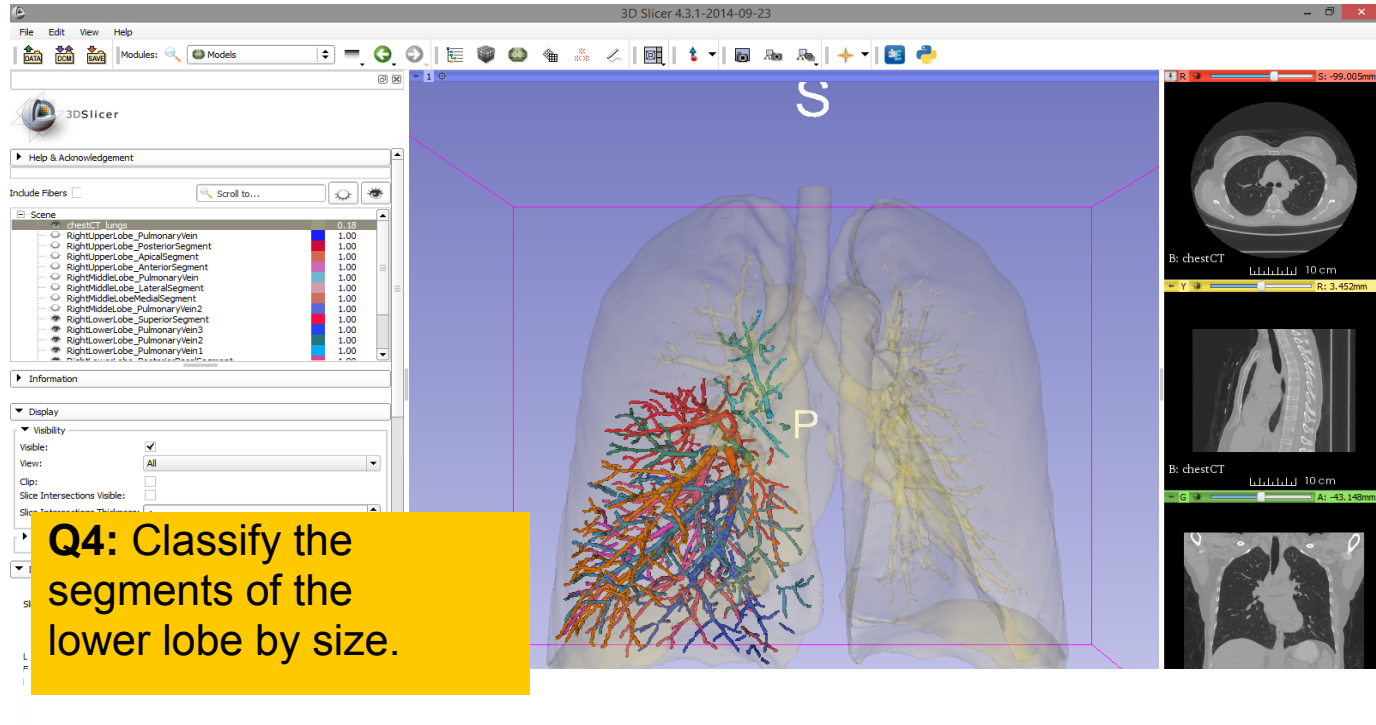


Lung Segments – Question 3



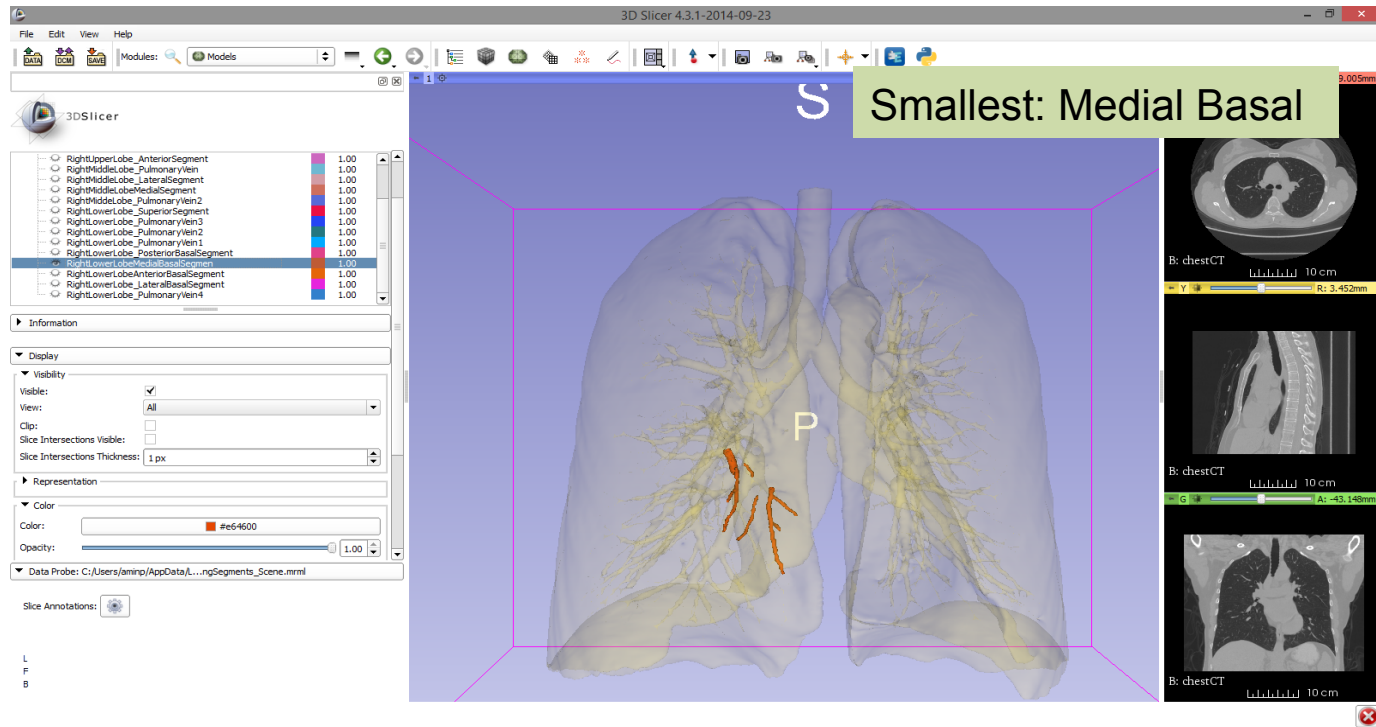


Lung Segments – Question 4



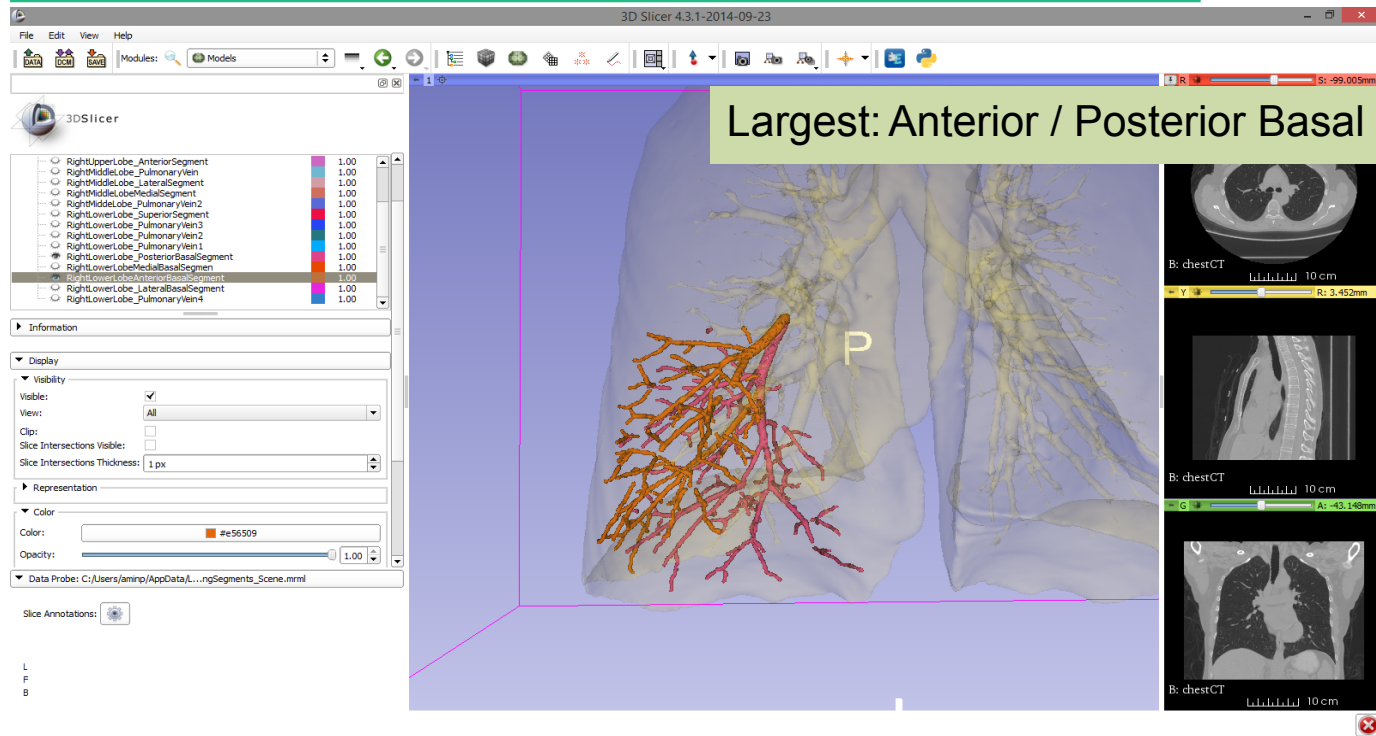


Lung Segments – Question 4



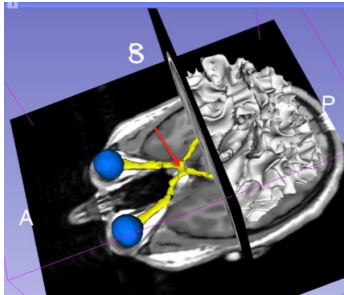
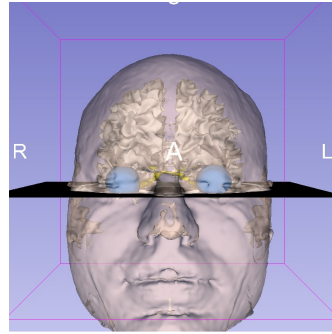
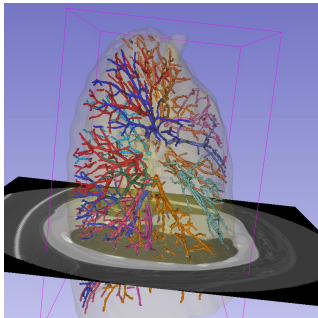
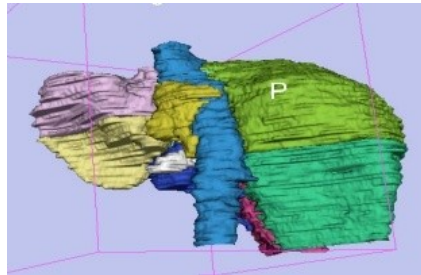


Lung Segments – Question 4





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

The screenshot shows the 3D Slicer website homepage. At the top left is the 3D Slicer logo, a stylized sphere with a grid. To its right is the text "3DSlicer" and a description: "A multi-platform, **free and open source** software package for **visualization and medical image computing**". Below this is a search bar and four buttons: "Download", "Tutorial", "Feedback", and "Documentation".

On the left side, there is a "Slicer Wiki" section with two sub-sections: "About Slicer" (containing links for Introduction, Acknowledgments, and Contact Us) and "Resources" (containing a "Download" button and links for For Users, For Developers, Commercial Use, NCIA, Publication DB, Image Gallery, Slicer Community, Source Code, Licensing, Mailing Lists, and Web Archive).

The main content area features three columns of images illustrating the software's capabilities: "Powerful processing." (showing medical image processing steps), "Streamlined interface." (showing a 3D model of a brain), and "Extensible platform." (showing various medical image processing tools and results). Below these images is a large banner for "3D Slicer version 4" with the website URL "www.slicer.org".

At the bottom, there is a notice: "The community of Slicer developers is proud to announce the release of Slicer 4.2. Find out more..." followed by a link to a webinar: "Webinar: Introduction to Slicer 4.1".

Footer text: "Content of this site is Copyright 2012 BWH and 3D Slicer contributors, unless otherwise noted. Contact webmaster@bwh.harvard.edu for questions about the use of this site's content. See [here](#) for more information about the web infrastructure."



Acknowledgments



National Alliance for Medical Image Computing (NA-MIC)
(NIH Grant U54EB005149)



Neuroimage Analysis Center (NAC)
(NIH Grant P41 EB015902)



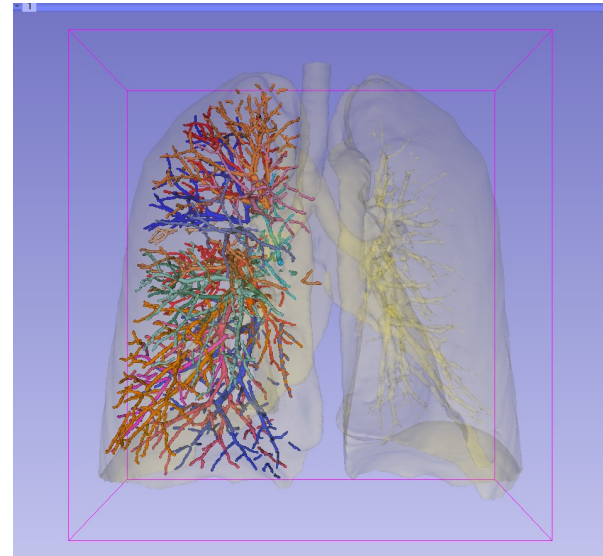
- Parth Amin, WIT '16



- Farukh Kohistani, BC '16



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



Questions and comments: spujol@bwh.harvard.edu

Page Vault Export Readme

This document describes the contents of your export/ZIP file. The ZIP contains the following:

1. Folder(s) containing captures. Your content will consist of the following:
 - folder(s) with screenshot captures
 - folder(s) with video captures
 - folders(s) with document captures (downloaded in their original format)
2. load-file.dat to import data into eDiscovery tools, e.g. Relativity
3. Page Vault Capture Summary.csv to view data in Excel, Google Sheets, etc.
4. Page Vault Capture Summary.html to view data in a web browser and navigate the document archive.

The .dat, .csv and .html all contain the below fields:

Field Name	Description
control_number	An identifier generated by Page Vault.
begattach	An identifier generated by Page Vault to establish a parent-child link between captures created in various formats stemming from the same original_capture_url
file_path	A relative file path to the capture. Used by the load-file.dat to determine the file to be loaded into a eDiscover tool, and by the .html file to make captures "clickable" so they may be opened directly when viewing that file in a web browser.
capture_url	The URL that the capture was created from.
original_capture_url	The URL that the capture_url was derived from. A common use case for this is social media captures, where the capture_url revealed videos to be downloaded from another URL. In that case, the capture_url would contain the URL of the downloaded video, and the original_capture_url would contain the URL of the social media post that contained the video.
filename	The name of the file when saved. This is most often a derived name based on the site being captured and the type of capture, but may be overridden by the user who created the capture for Page Vault Browser users.
document_title	The title of the document, if any, as reported by the site from which the capture was created.
capture_time	The exact date and time, in UTC, that the capture was recorded.
hash	A SHA256 hash of the capture file.
file_size	The size in bytes of the capture file on disk.
unique_id	An alternate identifier generated by Page Vault.
file_download_type	The MIME type of the captured file.
screenshot_server_ip	For "snapshot" item_type, the IP address of the server through which the capture was made.

screenshot_load_time	The date and time, in UTC, that a webpage was loaded before a capture was created.
screenshot_page_length	For "snapshot" item_type, the number of PDF pages in the captured file.
file_uploaded_at	For "file_capture" item_type, some sites report a date and/or time that the file was uploaded.
file_description	For "file_capture" item_type, some sites report a description of the content.
post_datetime	For social media captures, an attempt is made to parse the datetime associated with a social media post, if the URL captured pertains to a single post. The dates and times are estimates only.
parent_est_post_datetime	For social media captures, in cases where there is a parent-child relationship between captures, this field provides the est_post_datetime of the parent content.
post_author	For social media posts (post_datetime), the author of the post.
post_reaction_count	For social media posts (post_datetime), a count of reactions to the post.
post_comment_count	For social media posts (post_datetime), a count of comments to the post.