

Display

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Introduction

The Display module allows image data to be reviewed interactively in 2D and 3D.

- Select the dataset from the main AnalyzePro workspace and click the Display module.

2D Images

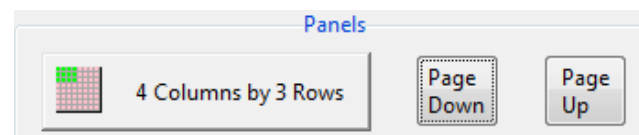
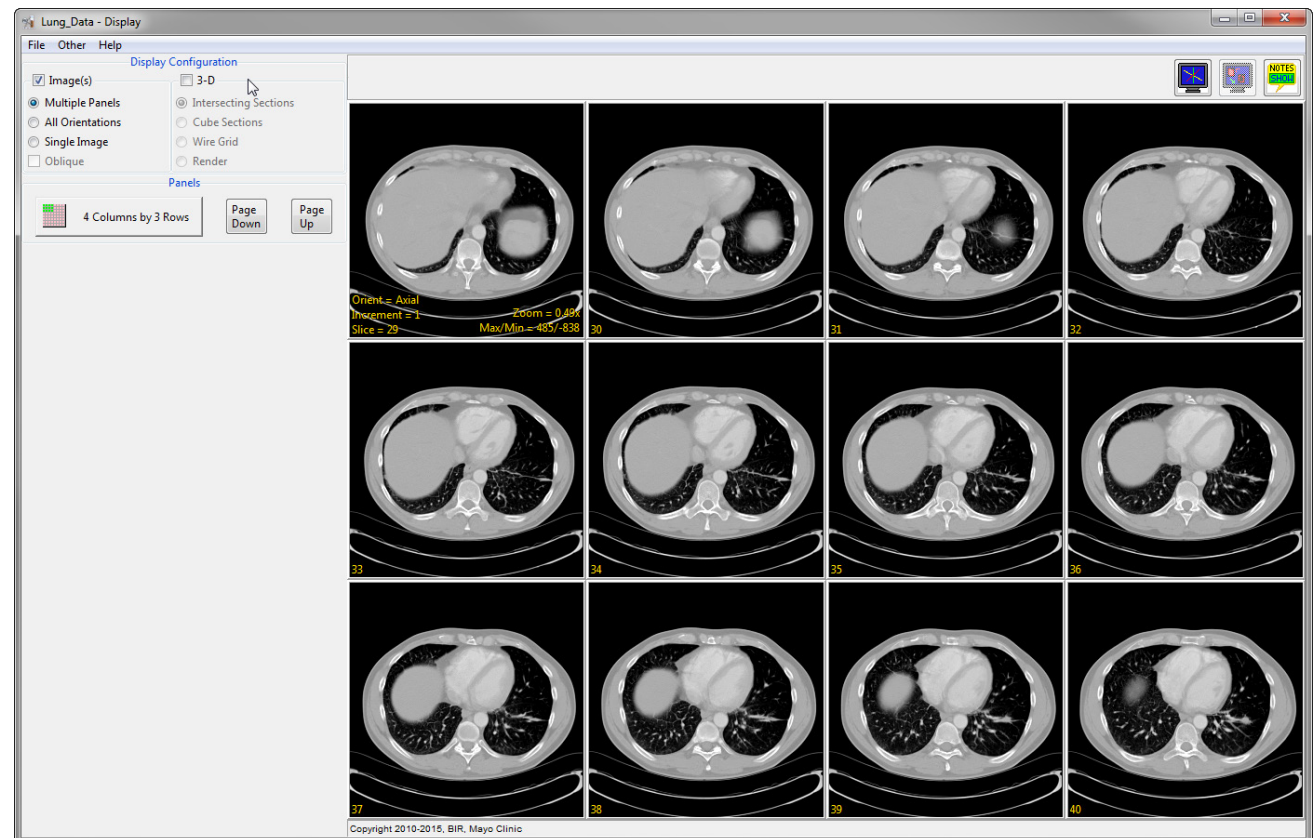
Multiple Panels

When Display is first opened, the data set will be shown as a panel of sections from a single orthogonal orientation.

- The number of panels shown can be controlled using the Columns/Rows button. Use the Page Up/Page Down keys to change the slices shown.



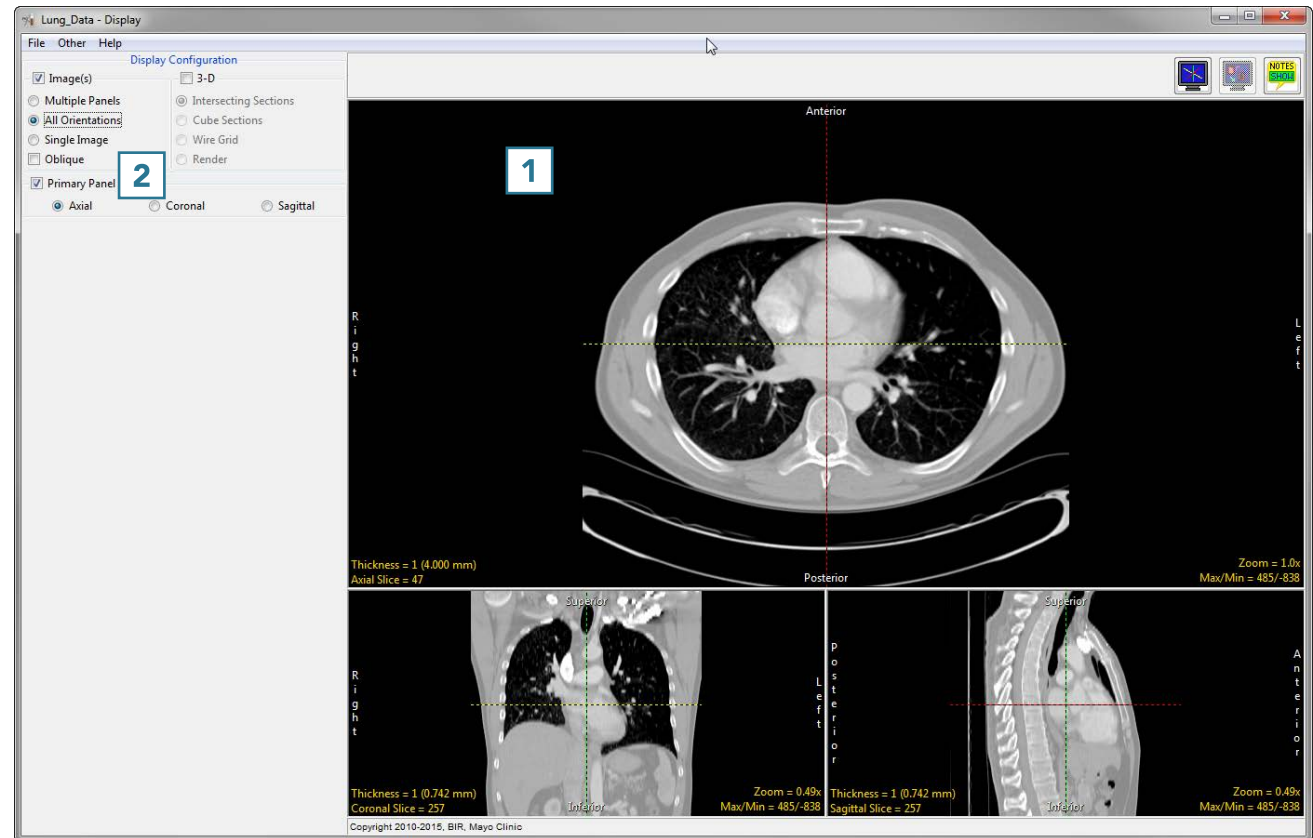
Download the Lung_Data data set to follow along
<http://analyzedirect.com/data/>



Note: AnalyzePro will remember the most recent display settings when you exit and reopen modules.

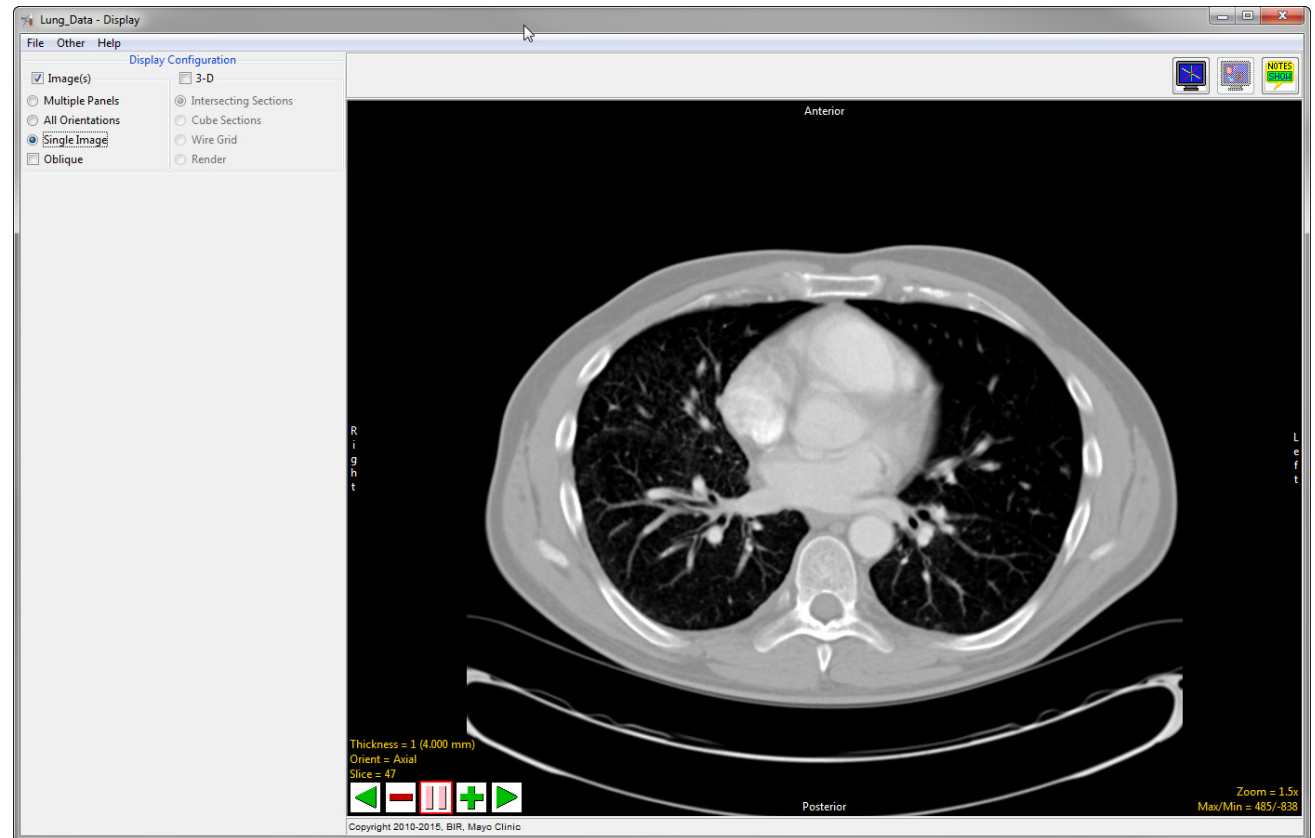
All Orientations

Images can be shown as a 3-panel display depicting all orthogonal orientations using the All Orientations option. In this view, the larger Primary Panel **1** can be set to any of the orthogonal orientations by selecting the radio buttons under Primary Panel options **2** or by double-clicking the desired image.



Single Image

The Single Image option shows an image from a single orthogonal orientation, with sequential image display options shown as buttons in the lower left of the image display. Note this is the default mode if a movie file is loaded.

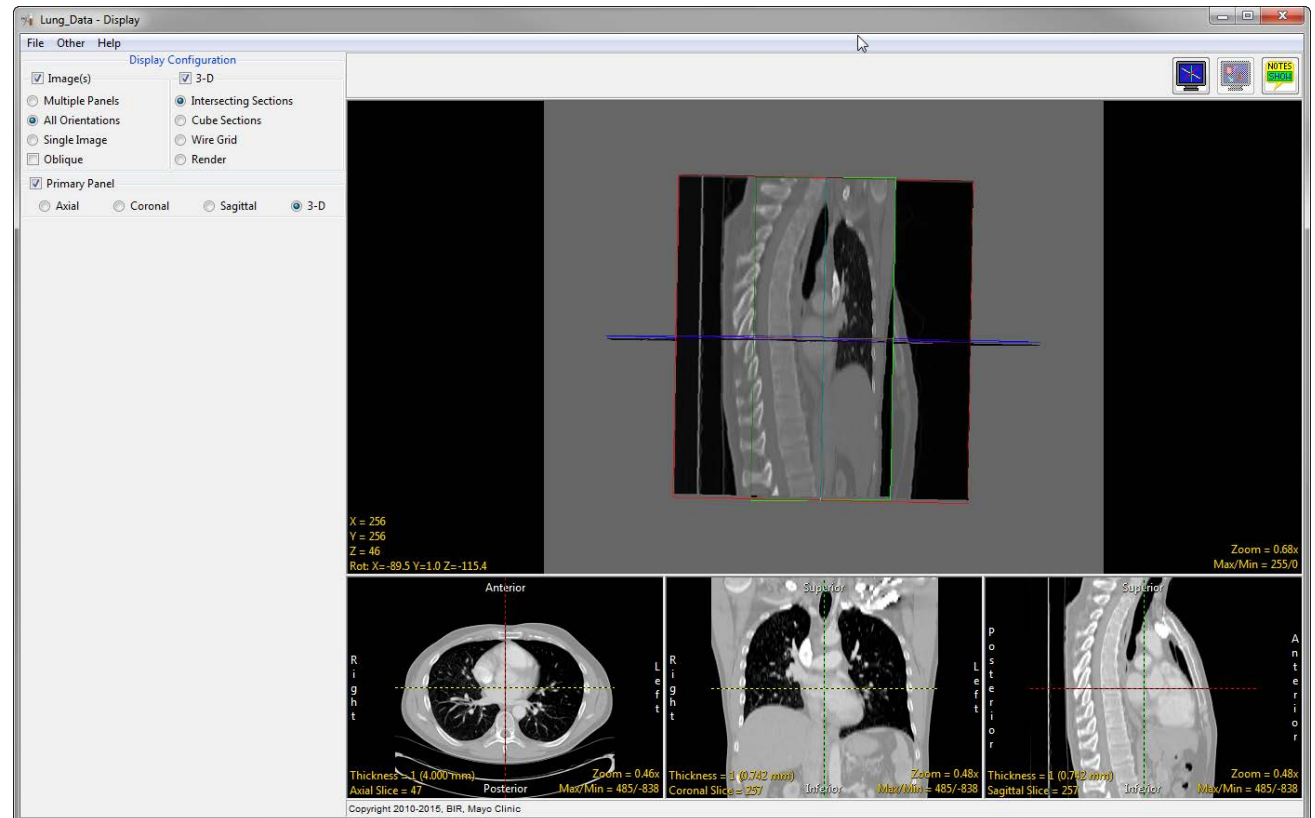


3D Images

The 3D checkbox adds a 3D display window to the current collection of displays and enables the selection of the type of 3D visualization depicted in the 3D display window.

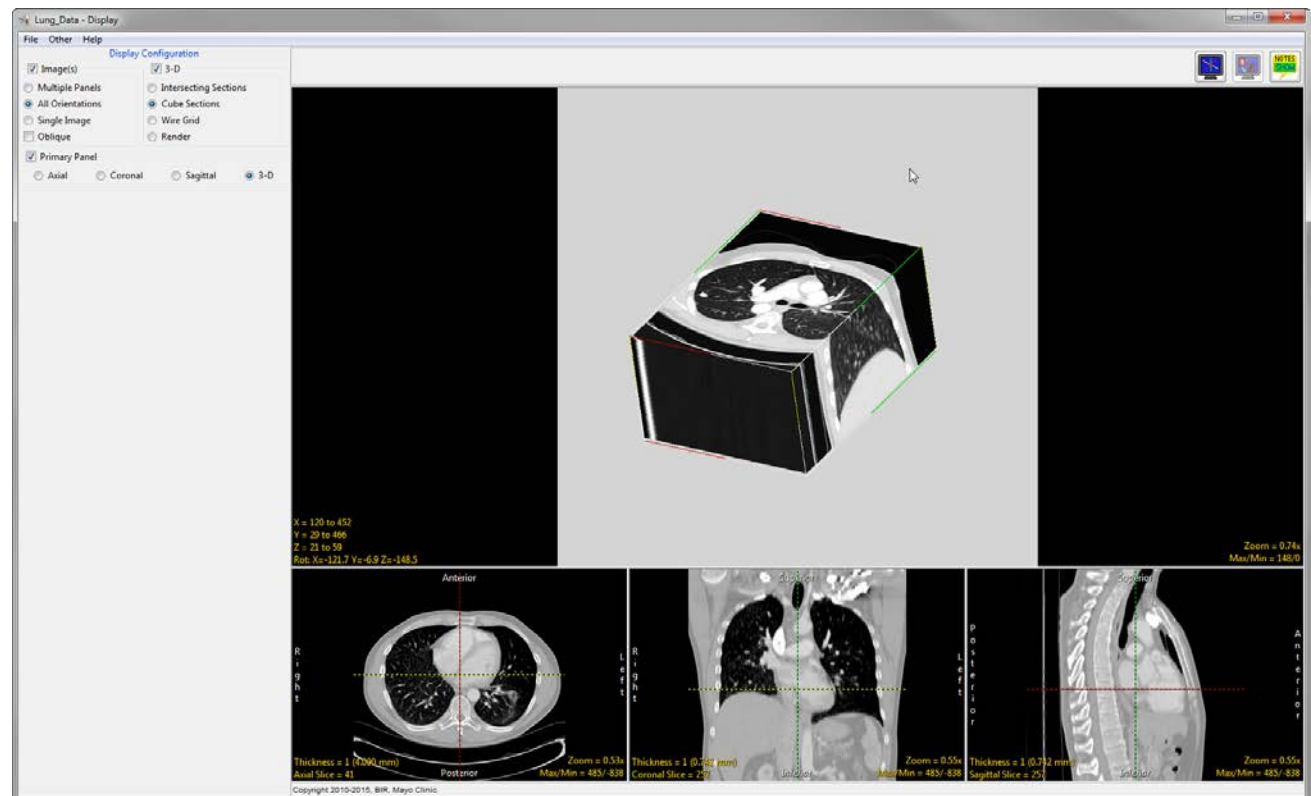
Intersecting Sections

The Intersecting Sections option displays a 3D data set via orthogonal section displays. Intersecting Sections shows three slices that can be controlled using the X/Y/Z values in the image display or interactively selected by choosing the planes in the intersecting sections display.



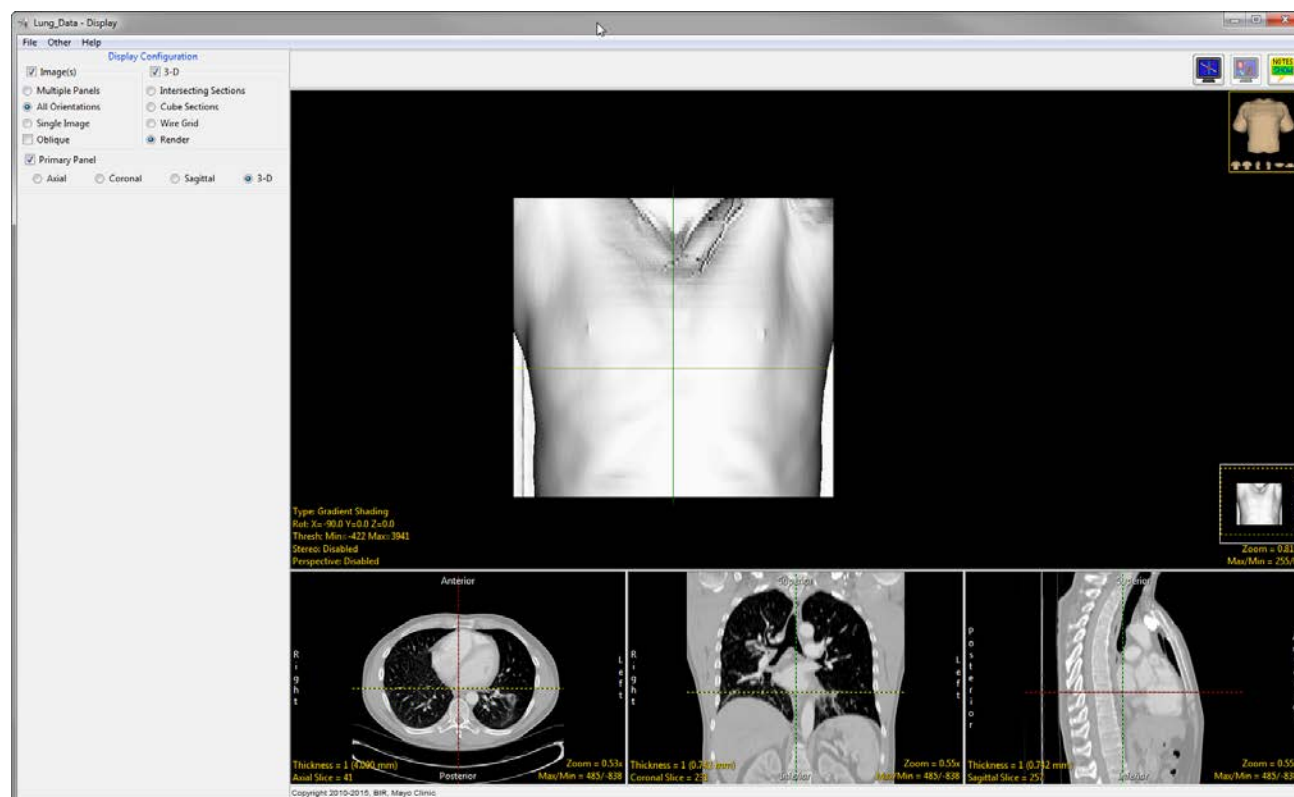
Cube Sections

The Cube Sections option shows images on the face of a cube representing the data set, with controls to select the slices numerically in the window or by interactively grabbing an image on the cube.

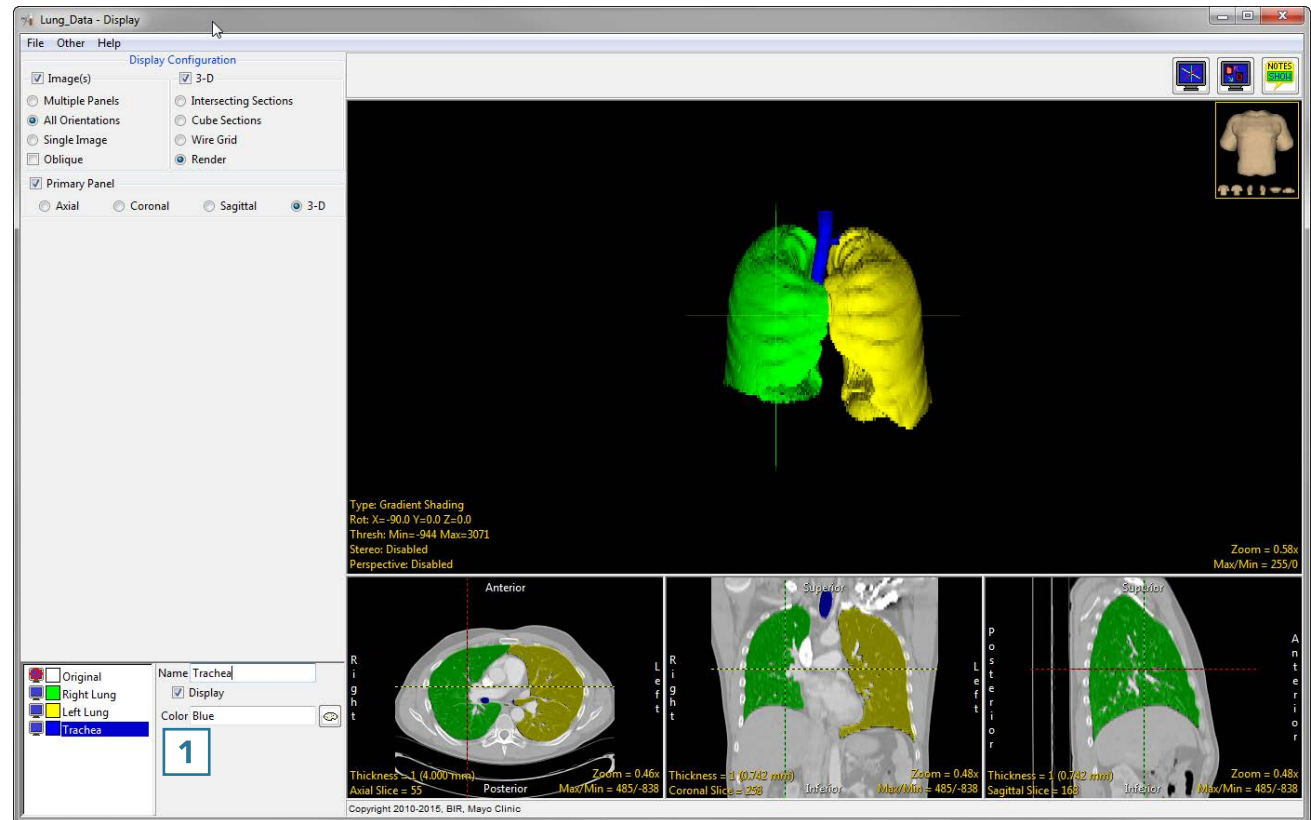


Render

The Render option enables a 3D volume rendering in the 3D display window. By default, a voxel gradient shaded rendering is shown, with controls for threshold selection and rotation angle. Clicking and dragging the rendering with the middle mouse button controls rotation angle.



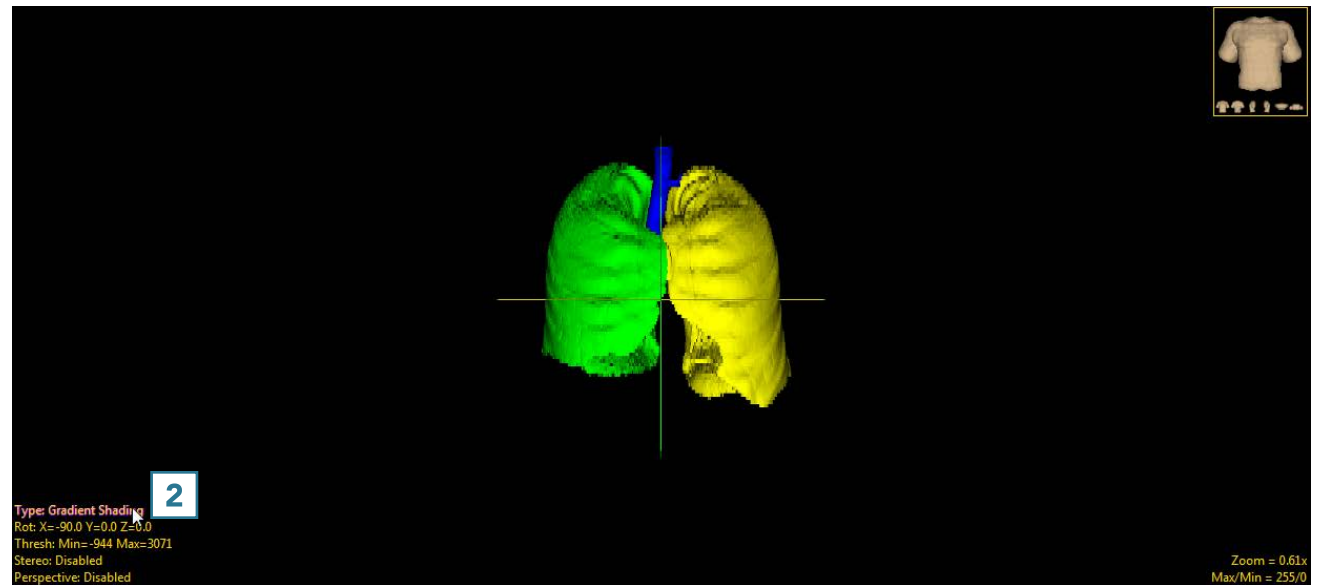
If an object map was assigned to the volume or loaded using File > Load Object Map, all images will be displayed with the associated objects. The controls **1** for the object map name, colors and visibility will be available at the bottom left of the module window.





Alternative 3D render types can be selected by clicking the Type **2** text in the bottom left corner.

For more information about Render Types, refer to [Table 4.1: Display Rendering Types](#).



**Table 4.1: Display Rendering Types**

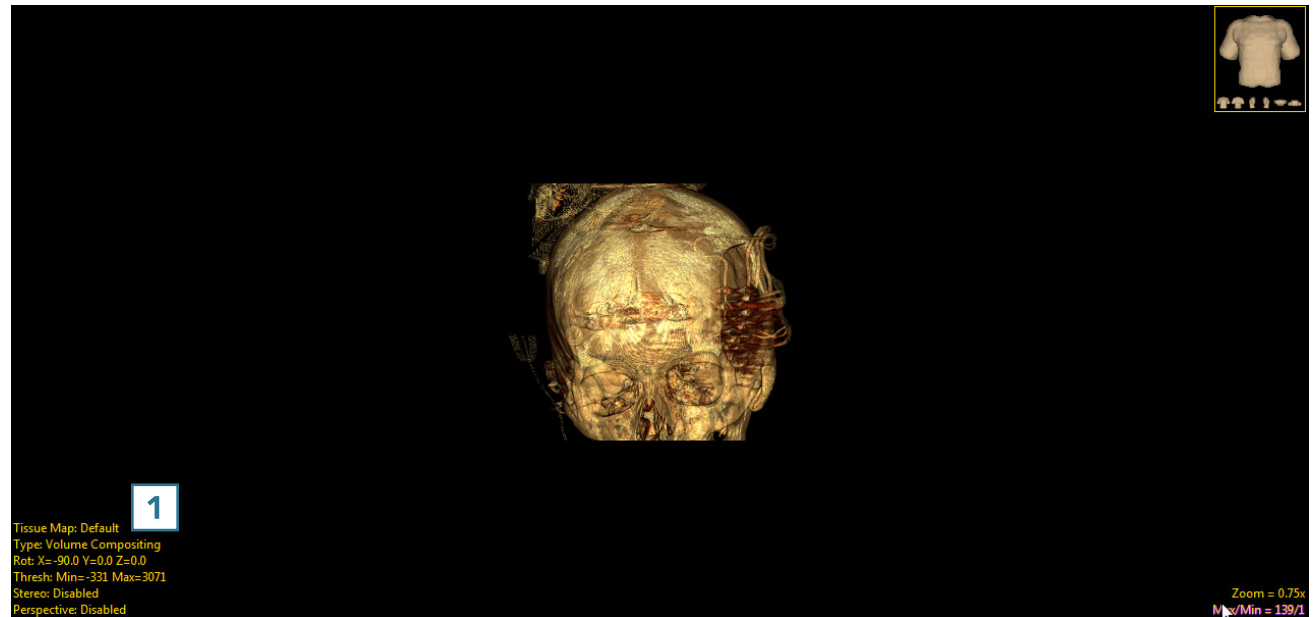
Render Type	Description
Depth Shading	The value of each output pixel is a function of depth only. The depth of the first renderable voxel found along the ray path is used to determine the brightness of that voxel. Closer voxels will appear brighter than more distant voxels.
Gradient Shading (Default)	The grayscale gradient vector is computed using a 3D neighborhood about the surface voxel. The value projected at each output location is the dot product of the gradient vector and an independently specified light source vector. This simulates the appearance of a reflective surface under uniform-field illumination.
Volume Compositing	Volumetric compositing integrates the gradient-shaded value of all voxels along the ray path. The contribution of each gradient-shaded voxel value is weighted by color and opacity values. The color and opacity information for each intensity is specified using the Alpha map window.
Maximum Intensity Projection	The maximum voxel intensity along the ray path is used.
Summed Voxel Projection	The average of all voxels along the ray path is used.
Surface Projection	The algorithm searches down the ray for a voxel that is within the current threshold range. Then, it skips the first S voxels along the ray, where S is specified by the Surface Skip value. Last, it returns the average of the next T values, where T is specified by the Surface Thickness. The surface projection rendering can be limited to enabled objects if an object map is loaded.
Object Compositing	Available only when an object map is loaded with the data set. Produces 24-bit color renderings where the voxel mapping along each ray path is controlled by the Composite Type yellow text.



1. Tissue Maps

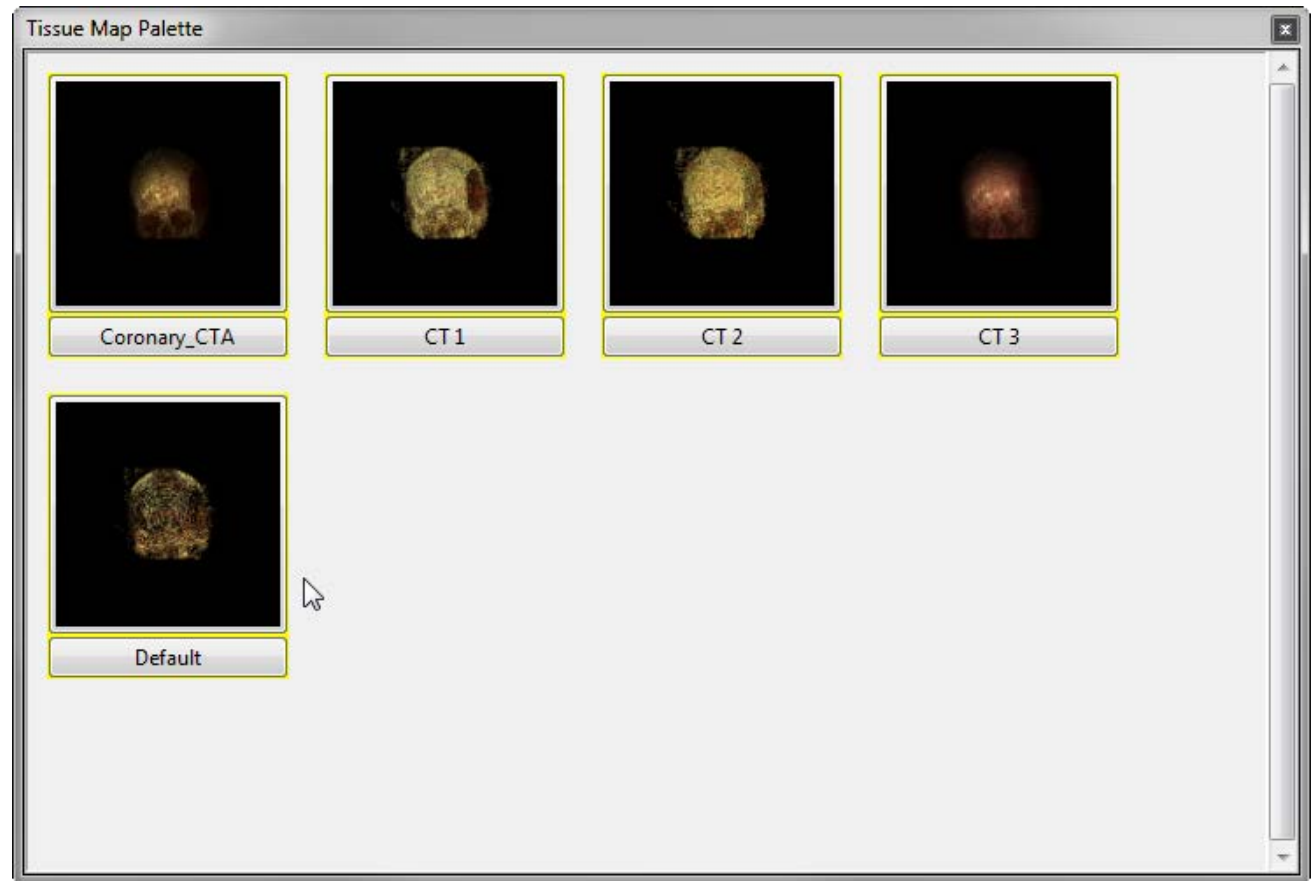
Each rendering type will have specific visual attributes and some will have additional type-specific controls. For example, the following exercise uses the Volume Compositing Render type with a tissue map.

- In the render pane, right-click the yellow Type text and select Volume Compositing.
- The render type will be changed and the data will be displayed using a default tissue map.
- Click the yellow Max/Min text and use the cursor to adjust the intensities, if necessary.
- Right-clicking on the yellow Tissue Map text **1** will provide a menu that contains several options.



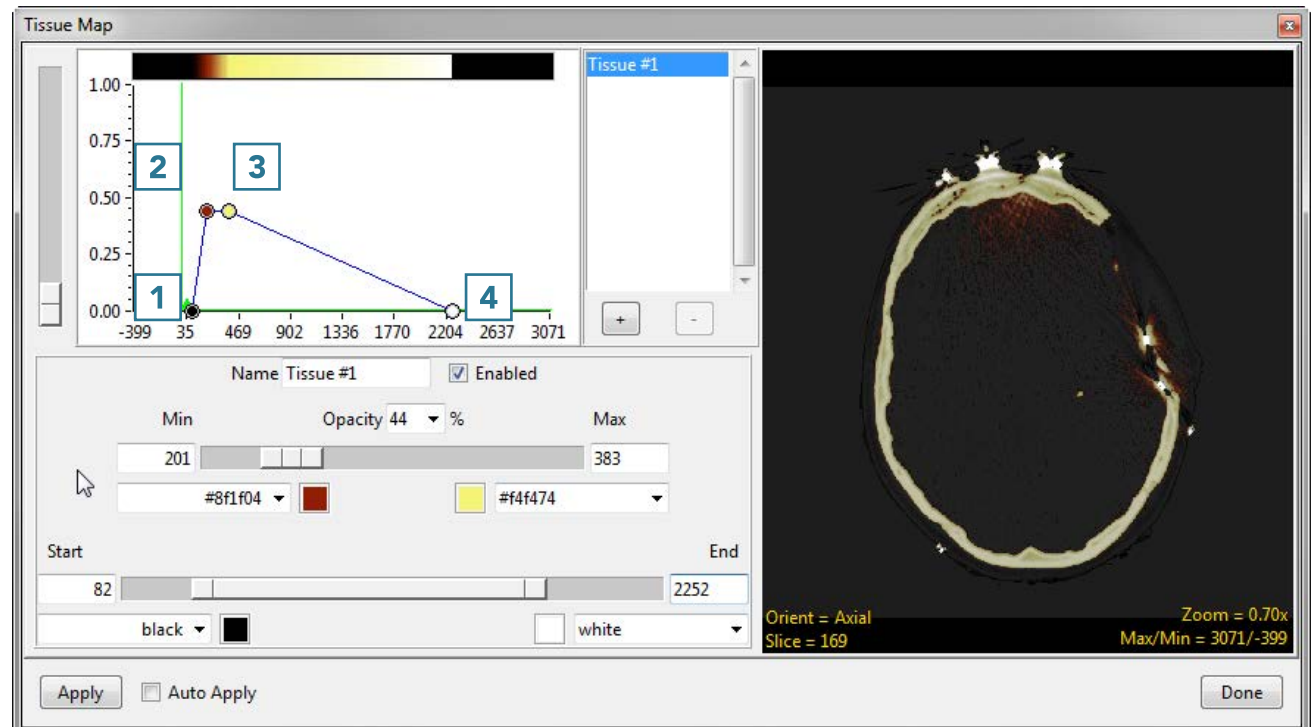
Select Palette

A number of existing tissue maps can be quickly selected using System Tissue Maps. Alternatively, selecting Palette will return a window with thumbnail previews of each tissue.



Customized tissue maps can be generated using the Edit option within the options panel. A Tissue Map tool will open that provides four control points to manipulate which voxel values are mapped to specific colors and to adjust opacity.

- Start: **1** The starting voxel value within the volume mapped to a specific color (chosen from the color drop-down menu).
- Min: **2** The minimum voxel value within the volume that will be mapped to a specific color.
- Max: **3** The maximum voxel value within the volume that will be mapped to a specific color.
- End: **4** The ending voxel value within the volume mapped to a specific color.



Additional tissues can be added by clicking the + button. Once you are satisfied with the tissue map, click Apply. The tissue map can be saved by right-clicking within the point graph and then selecting Save Tissue Map.

