

# Image Display

## Controls and Customization

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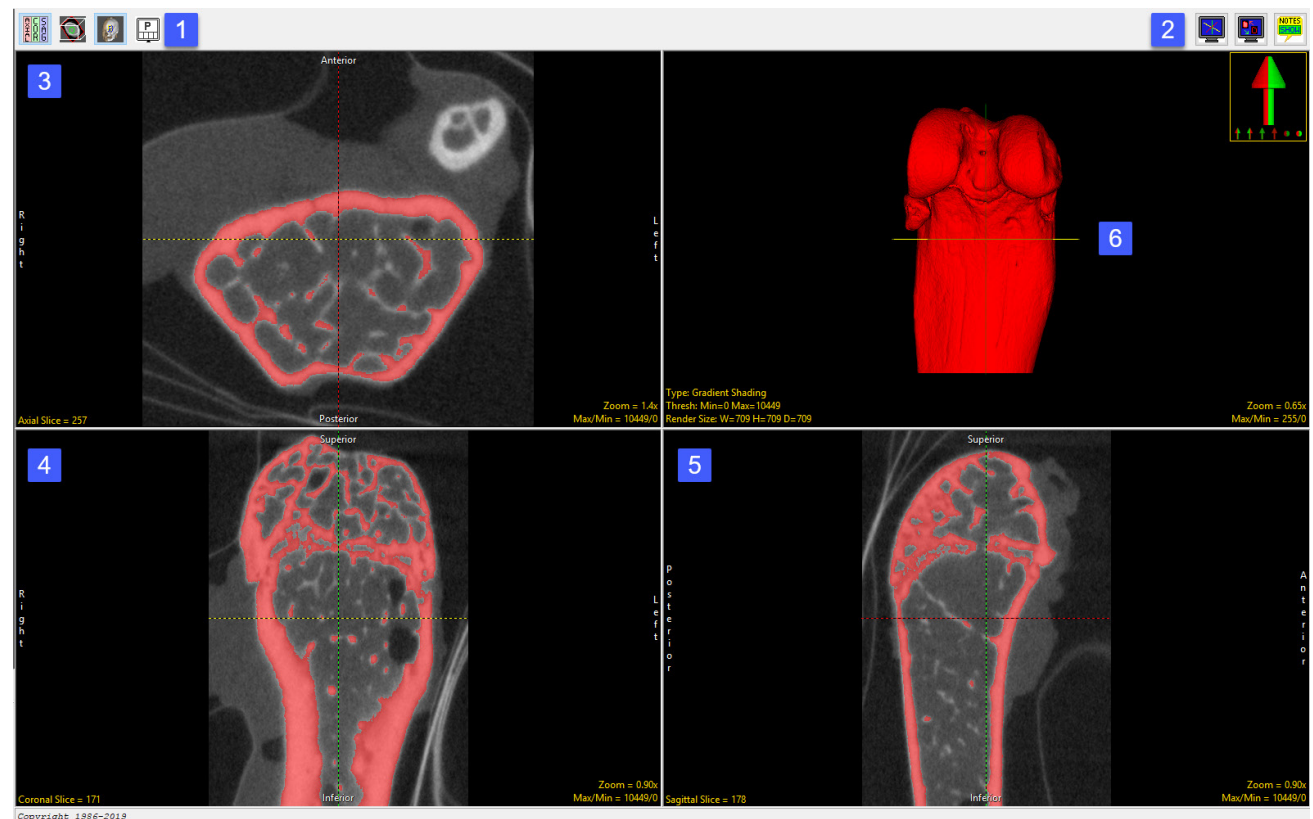
# Introduction

Analyze 14.0 provides common image display windows with interactive image controls across all modules. The following display options and controls are present in all sections of the software, but certain modules will contain additional functions. The implementation of the image display tools are similar for the Display, Transform, Segment, and Measure modules, implementation varies slightly for the Process and Register modules. For additional information on the Process and Register module display tools please refer to the Process and Register sections of this user's guide.

## Image Display Window

The image display window is divided into several areas:

- (1) Display controls
- (2) Tools
- (3) Axial slice display
- (4) Coronal slice display
- (5) Sagittal slice display
- (6) Rendering window





## Display Controls

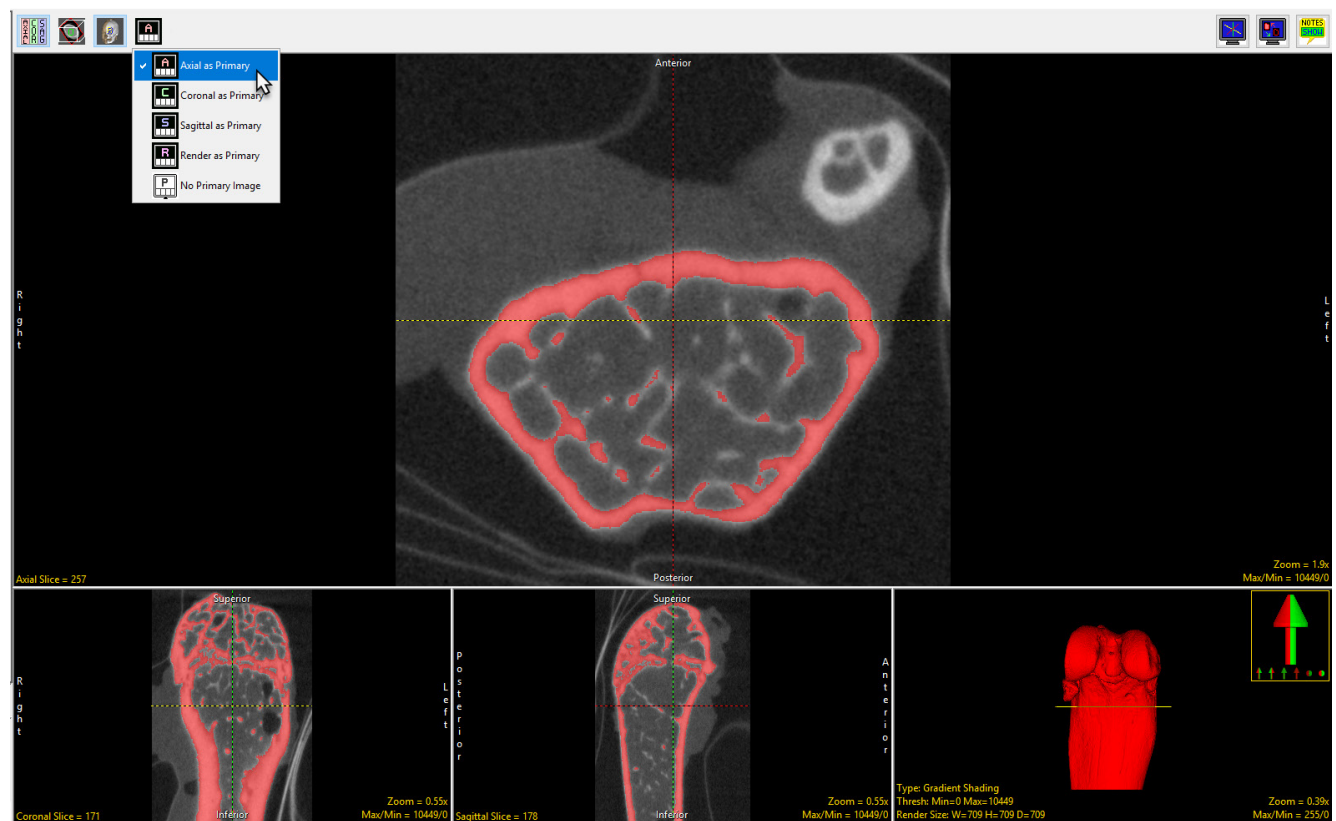
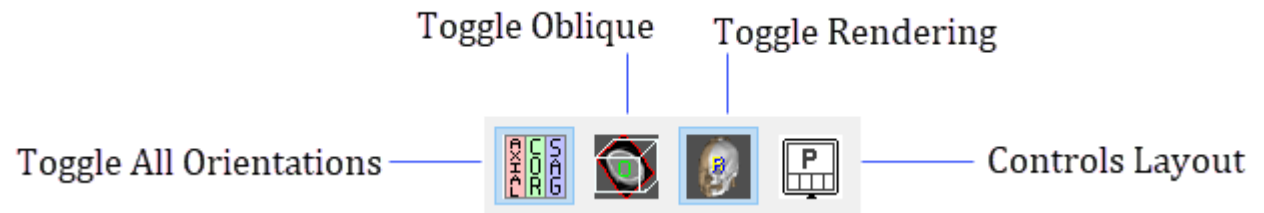
The Display Controls allow users to control and customize the layout of the display window.

**Toggle All Orientations:** Allows users to switch between the display of all three orthogonal displays (the axial, coronal and sagittal) to a single orientation display.

**Toggle Oblique:** Allows users to switch the oblique display window on and off.

**Toggle Rendering:** Allows users to switch the Render window on and off.

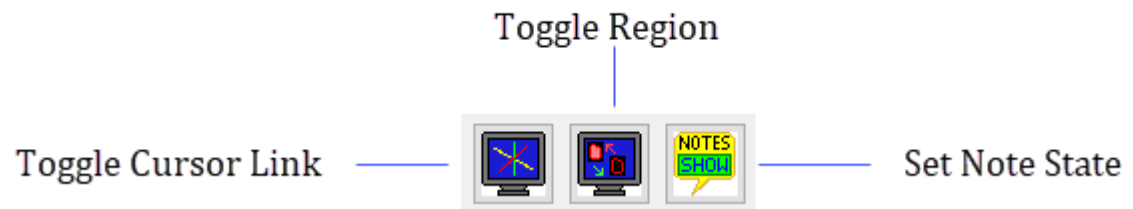
**Controls Layout:** This option allows users to control the layout of the display window. Choose to set the Axial as Primary, Coronal as Primary, Sagittal as Primary, Render as Primary or specify No Primary image (default option).



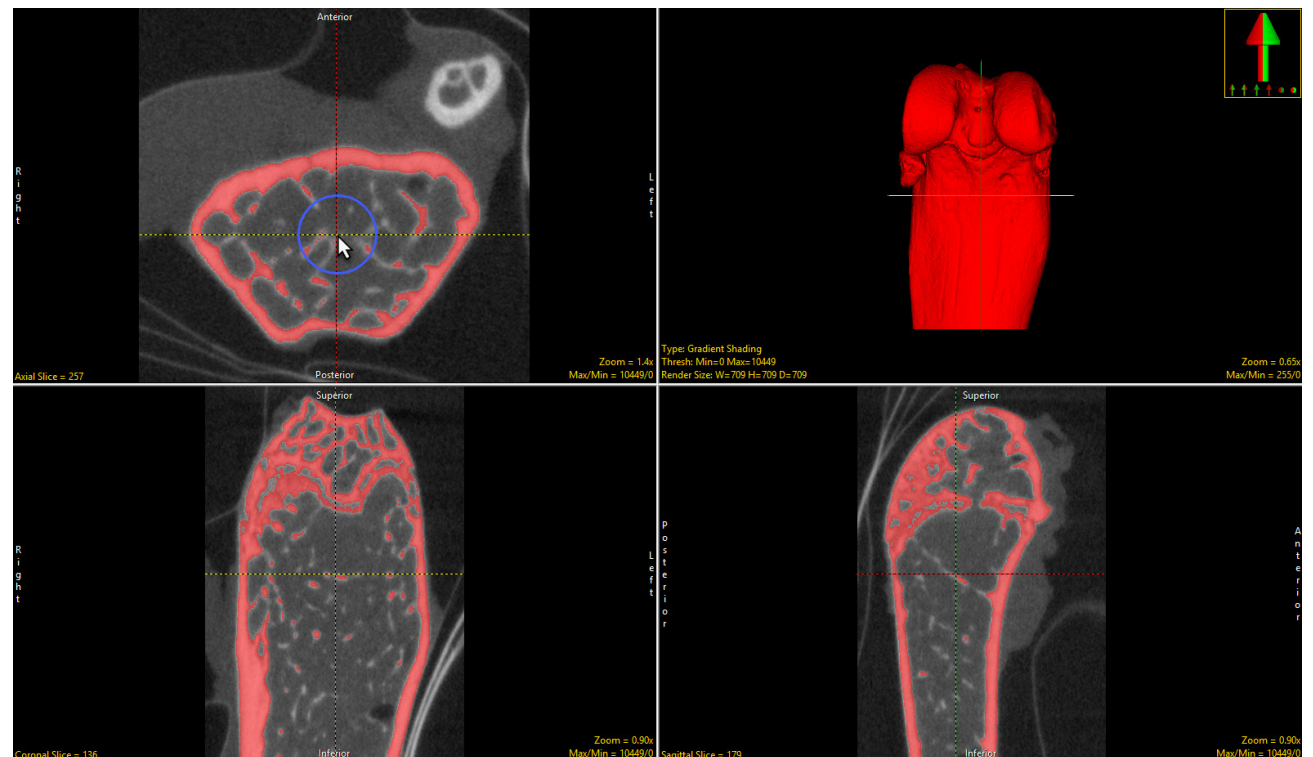


## Tools

The Tools options in the upper left-hand corner of the Display Window, allow access to control tools for image navigation, display, and notation.

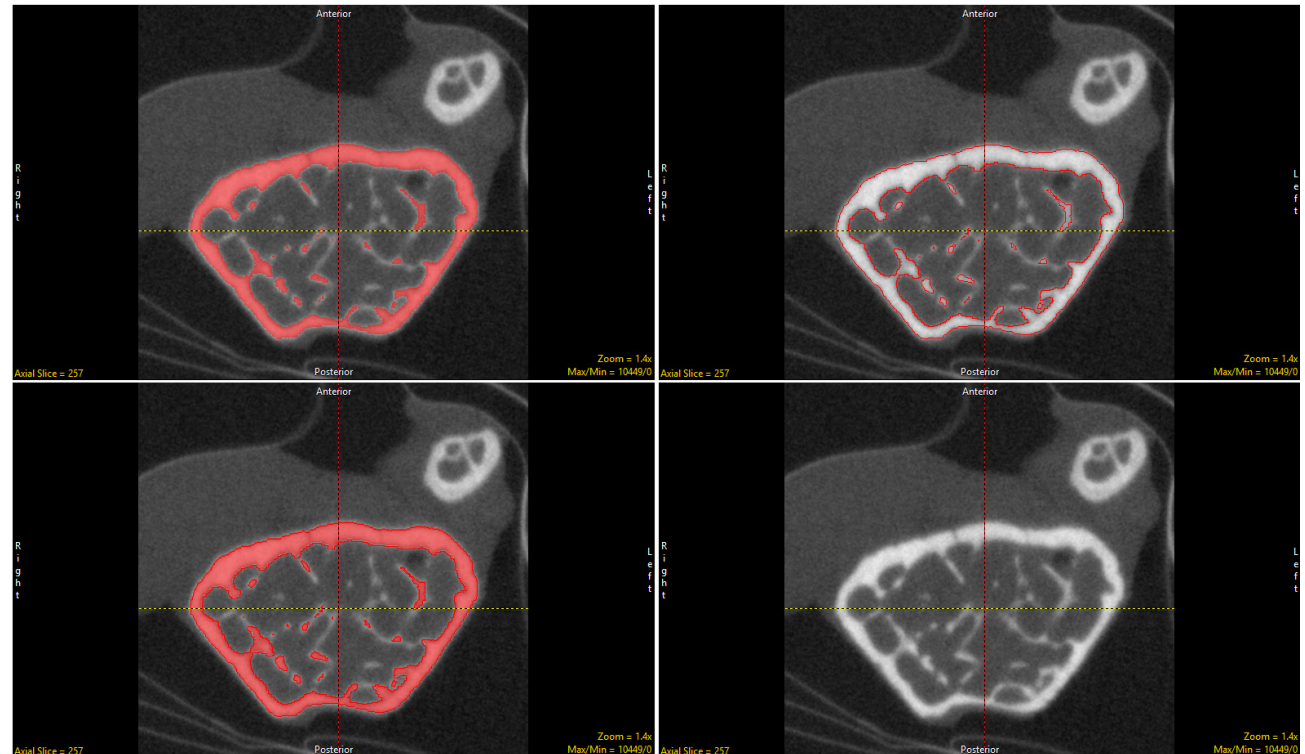


**Toggle Cursor Link:** Allows enabling and disabling of the Cursor Link tool. The Cursor Link tool allows users to interactively navigate through the image data. Moving the Cursor Link in any of the displays will interactively update the other displays. See the Cursor Link tool in the Slice Display and Render Window sections for additional information.

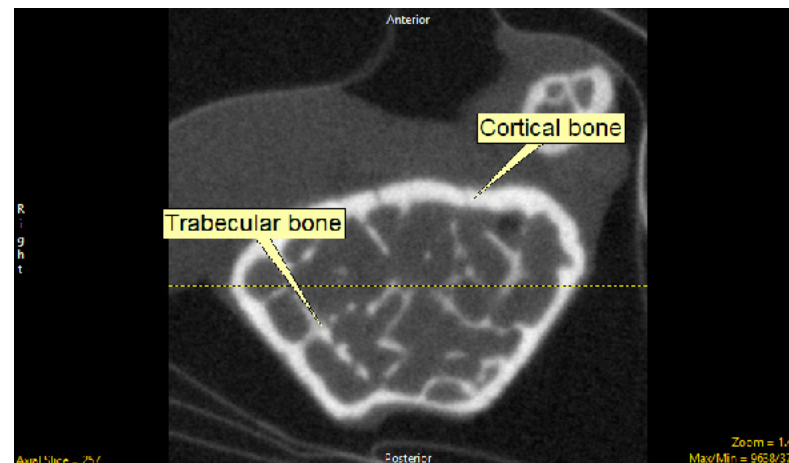




**Toggle Region Display:** The Toggle Region Display option allows users to quickly switch between the display of the overlaying regions on the slice displays. The display options are; Filled Regions, Region Edges, Both, and Regions Off. Note the keyboard shortcut to toggle regions displays is the **t** key.



**Set Note State:** Enables the Notes tool. The Notes tool allows users to annotate the 2D slice data or 3D rendering. Notes are automatically associated with the data set and can be displayed in other modules. Notes can be hidden or deleted at any time.





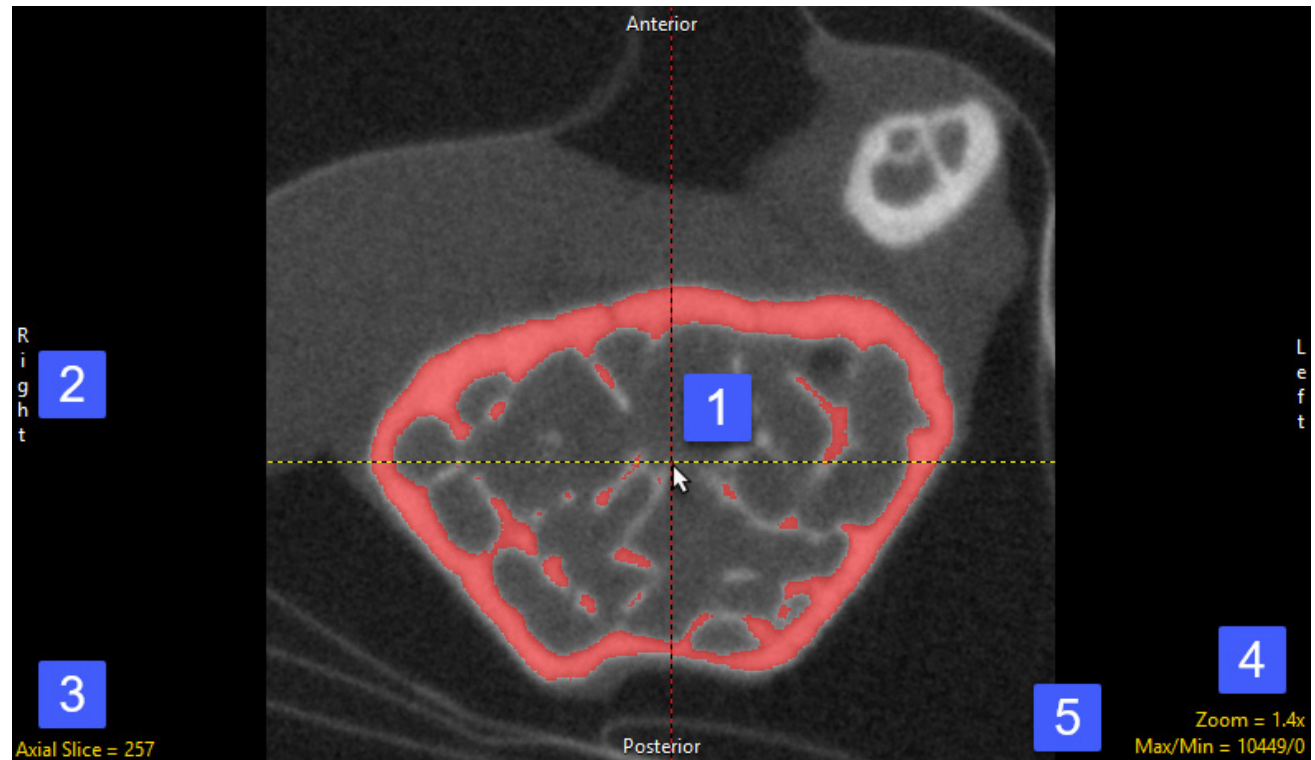


## Slice Display

The Slice Display windows displays the 2D slice data in each of the three orthogonal orientations. In the default display mode the upper left window displays the axial orientation, the lower left the coronal orientation, and the lower right the sagittal orientation.

The Slice Display window includes several tools for viewing and navigating through the image data, these include:

**Cursor Link:** allows users to interactively navigate through the image data. The tool can be controlled from any of the 2D orientations or from the 3D rendering. Moving the tool will interactively update the corresponding slice displays. The linked cursor can be enabled or disabled using the Toggle Cursor Link button.



*The Axial Slice Display window, showing 1) Cursor Link, 2) Orientation labels, 3) Slice tool, 4) Zoom tool, and 5) Max/Min tool.*

**Arrow Keys:** can also be used to move the linked cursor. The keys will move the linked cursor in the corresponding direction (up, down, left and right) for the active orientation.

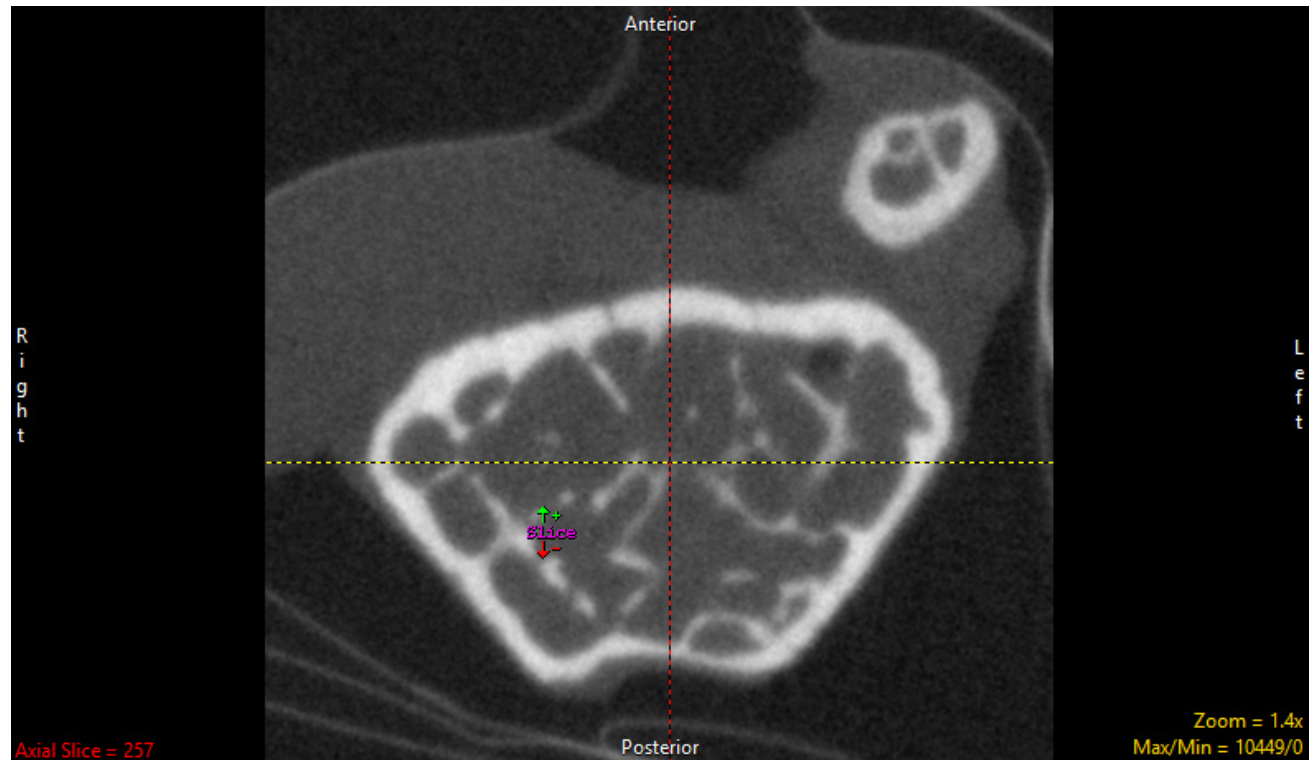
**Page Up and Down Keys:** used to move through the slices in the active orientation.

**Orientation Labels:** displays helpful orientation labels. The labels can be abbreviated by right-clicking on them.



**Slice Tool:** Users can navigate through image slices using the slice tool. Click the yellow Slice text in the lower left-hand corner of the image pane. An up/down slice cursor will appear. Hold down the left mouse button, and slide the cursor upward to move to a higher slice number and downward to move to a lower slice.

Users can quickly navigate to the First, Middle and Last slice by right-clicking the yellow Slice text. A specific slice number can be chosen by double-clicking the yellow Slice text and typing in the desired slice number.





**Zoom Tool:** Users can increase and decrease the display size of the data using the Zoom tool. Click on the yellow Zoom text in the bottom right corner of the image pane. A zoom cursor will be displayed. While clicking and holding the left mouse button, move the mouse upward to zoom in and downward to zoom out. Let go of the left mouse button when the desired zoom factor is reached.

Right-click on the Zoom tool to reveal additional options:

Zoom Presets — Right-click the yellow Zoom text and the following options will appear:

Zoom levels — 0.25x, 0.33x, 0.50x, 1.00x, 2.00x, 3.00x, 4.00x

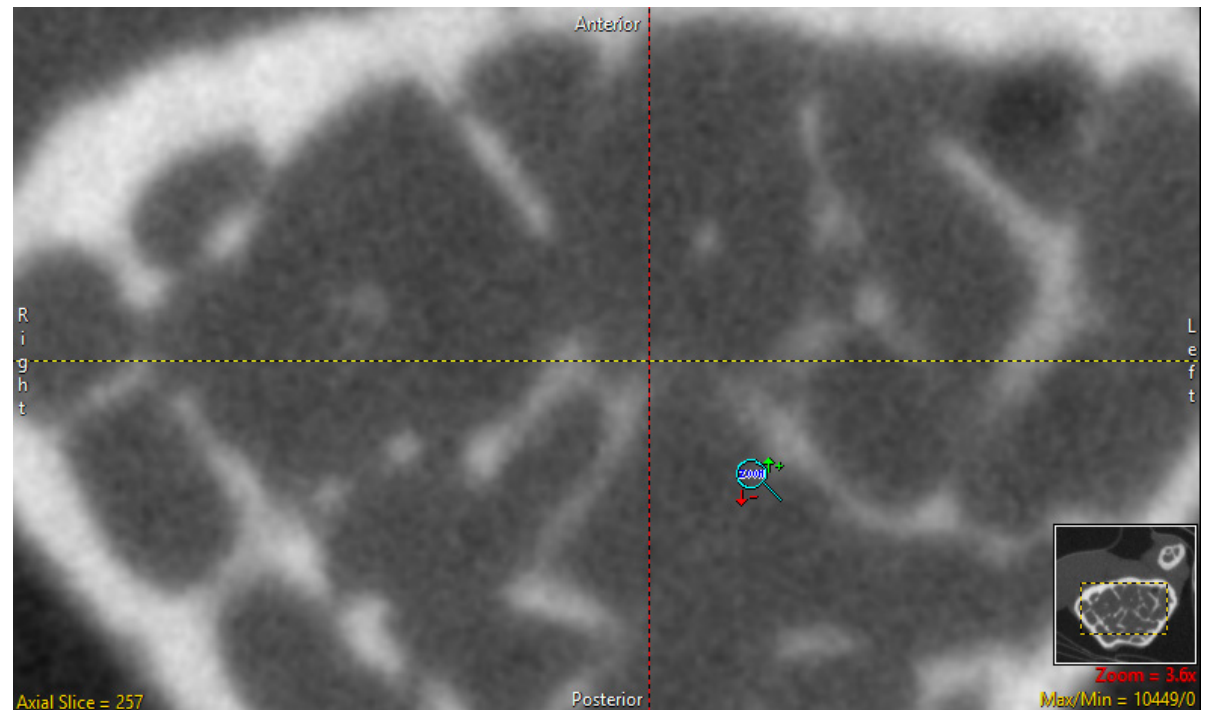
Fit Window — Uses a zoom factor that allows the data to fill the image pane.

Fit Width — Uses a zoom factor that allows the data to fit the width of the image pane.

Fit Height — Uses a zoom factor that allows the data to fit the height of the image pane.

Interpolation — Allows the interpolation method to be changed for the display of the data. The default is Bicubic (Input Driven). Users can switch to Linear (ID), Nearest Neighbor (Output Driven), Linear (OD), Bicubic and Windowed Sync.

Zoom Center - Uses the center of the image to set as the zoom point.



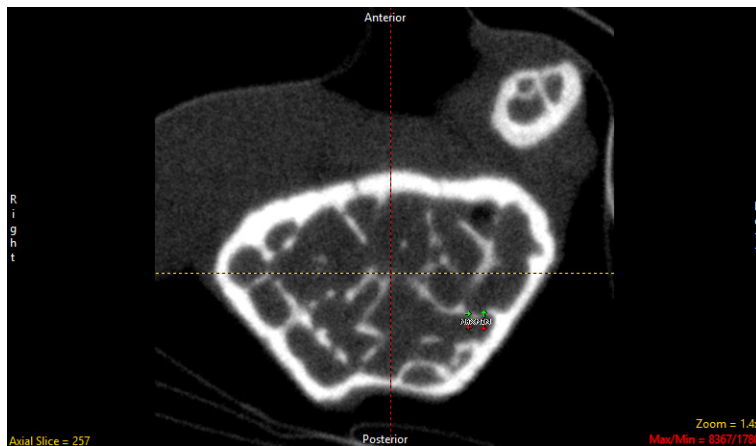




**Pan tool:** The Pan tool is automatically enabled when the Zoom size of the image is larger than the current window. Clicking in the tool allows users to Pan the zoomed area over the current display. To enable the Pan tool without zooming right-click on Zoom and select Options and then check Show Pan.

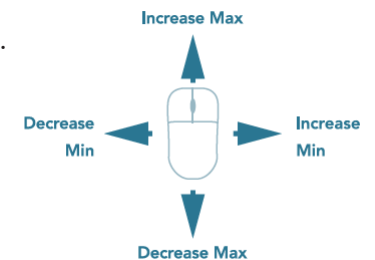
**Show Transforms:** Transforms (Flips and Rotations) can be enabled for the display window, providing the user with the ability to flip and rotate the image display. To enable transforms right-click on the Zoom tool and then choose Options > Show Transforms, select Enabled and then select Flips and/or Rotates.

**Max/Min tool:** The Maximum and Minimum display intensities can be changed by clicking on the yellow Max/Min Tool at the bottom right corner of the image window. A cursor will return that allows the values to be manipulated. Hold down the left mouse button and move the mouse up/down or left/right.



To change only the Max value, hold the Shift key while using the Max/Min cursor. The Min values can also be edited independently by holding the Ctrl key while moving the Max/Min cursor. Note [Shift] + Right Mouse Button can be used to adjust Max/Min in any window without having to first select the Max/Min option.

Right-click on the yellow Max/Min text to reveal the Preset Intensity options for the following list of modalities:



CT — Soft Tissue, Chest, Abdomen/Pelvis, Lung, Brain, Bone, Head/Neck

MR — Brain T1, Brain T2, Sag T2, Head/Neck, Spine, Abdomen/Pelvis T1, Abdomen/Pelvis T2 US — Low Contrast, Medium Contrast, High Contrast

Data — Volume Max/Min, Image Max/Min, Range Max/Min

User — Declare specific Max/Min values with a label. Once a label is saved, it can be accessed within the user menu.



**Auto** — Automatically calculates the Max/Min voxel intensity for each slice. Note that the Max/Min values change from slice to slice.

**Invert** — When selected, inverts the display intensities in a single orientation. To change the intensity display from Max/Min to Window/Level right click on the Max/Min tool and choose Options > Intensity Display and choose between Max/Min or Window/Level. Note that selecting the Change option provides you with the ability to change the apply these changes to All Modules (default), This Module, or This Display Window only.

**Manual Intensity Input:** Users can type in a Max/Min value by double clicking on the yellow Max/Min text. A box that contains editable fields will be returned. Input the desired values and press enter or click outside the box.

Max = 3071 Min = 1024

**Right Menu Options:** Right-clicking in the Slice Display window reveals additional options.

**Middle Button Action:** Allows users to set the action of the middle mouse button. Choose from:

**Change Slice (default)** – Allows users to change the slice display by clicking the middle mouse button and moving the mouse forward, to move slice display forward, or backwards, to move the slice display backwards.

**Change Zoom** – Allows users to change the zoom display by clicking the middle mouse button and moving the mouse forward, to zoom in, or backwards to zoom out.

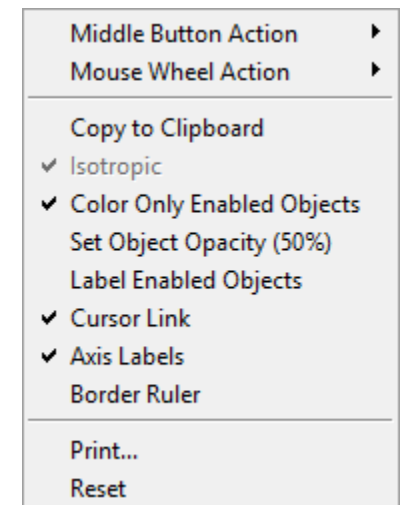
**Change Intensity** – allows max/min intensity values to be adjusted using the middle mouse button. Holding the middle mouse button and moving the mouse forward or backwards will adjust the maximum intensity value. Moving left and right will adjust the minimum intensity value.

**Default** – returns middle mouse button action back to the system default.

**Annotate Changes** – Enables and disables the annotations associated with changing slices, zoom, or intensities.

**Mouse Wheel Action:** Allows users to set the action of the middle mouse wheel. Choose from:

**Change Slice (default)** – Allows users to change the slice display by scrolling the middle mouse button forwards, to move slice display forward, or backwards, to move the slice display backwards.



**Mouse Wheel Action (continued):**

**Change Zoom** – Allows users to zoom display by scrolling the middle mouse button forwards, to zoom in, or backwards, to zoom out.

**Change Intensity Minimum** – Allows users to adjust the minimum intensity value by scrolling the middle mouse wheel forwards or backwards.

**Change Intensity Maximum** - Allows users to adjust the maximum intensity value by scrolling the middle mouse wheel forwards or backwards.

**Choose Middle Button Action** – Allows users to scroll through the display tools (Slice, Zoom, or Intensity) for the Middle Button action. Selecting a tool will modify the action of the middle mouse button instantly.

**Default** – returns middle mouse button action back to the system default.

**Annotate Changes** – Enables and disables the annotations associated with changing slices, zoom, or intensities.

**Other Right Menu Options:**

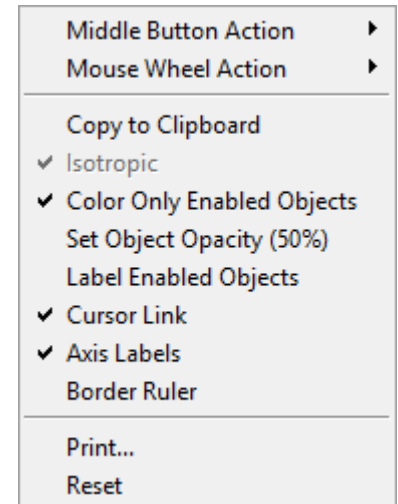
**Copy to Clipboard** – Copies the current slice display to memory.

**Isotropic** – Active only for anisotropic data. Allows users to toggle between an isotropic or anisotropic display of the data.

**Show Enabled Object Only**- Available when Region Display is set to Both - Filled Regions and Region Edges. Ignores object Display Off setting.

**Color Only Enables Objects** – Available when Region Display is set to Filled Regions. The option allows users to enable the display of the object color overlay in the current orientation even if the display of the object is switched off in the Object Control Window. Option updates to Traces or Objects depending on the Region Display setting selected.

**Trace Only Enabled Objects**- Available in Segment only when Region Edges is enabled. See Segment for further information.





### Other Right Menu Options (continued):

**Set Object Opacity (50%)**- Allows users to adjust the alpha blend of the object color overlay on the grayscale image data. When enabled an Opacity slider is enabled below the current image allowing for interactive adjustment.

**Label Enabled Objects** – Allows users to enable/disable the display of object names on the slice display. Note, the keyboard short cut to enable/disable labels is Shift + L.

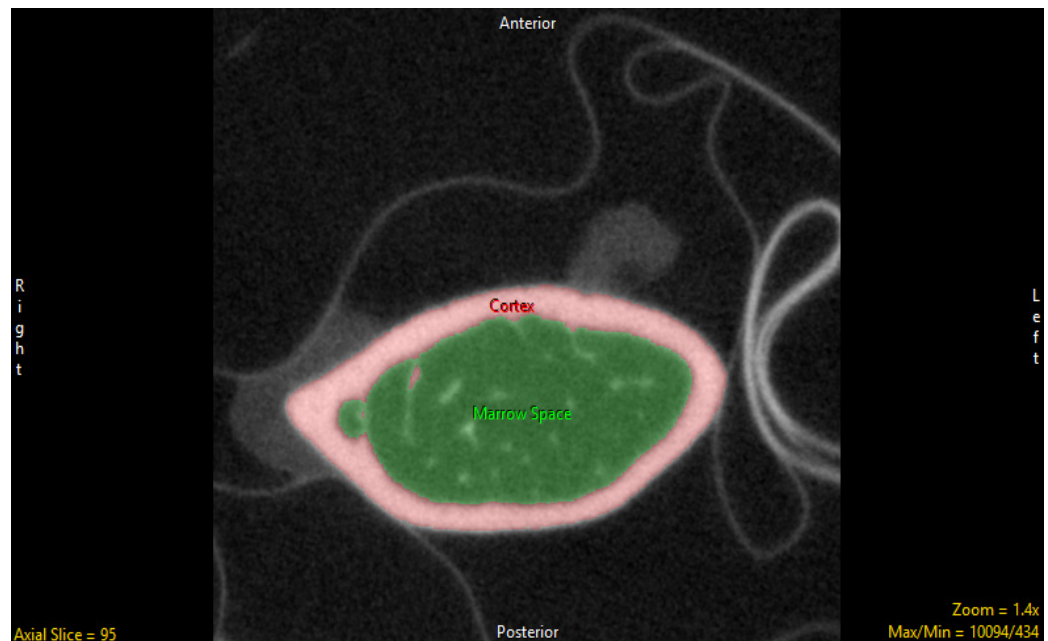
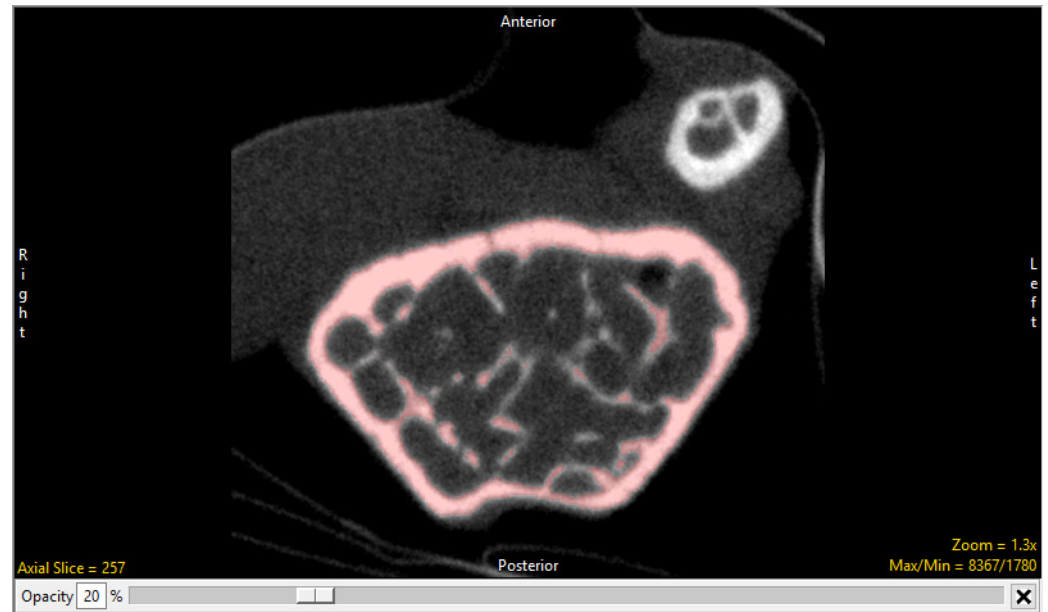
**Cursor Link** – Toggles the Cursor Link tool Off/On in the current display.

**Axis Labels** – Allows users to enable or disable the display of the axis labels on the perimeter of the slice display window.

**Border Ruler** – Enables/Disables the border ruler tool.

**Print** – Sends capture of current slice display to printer.

**Reset** – Resets all options to default.





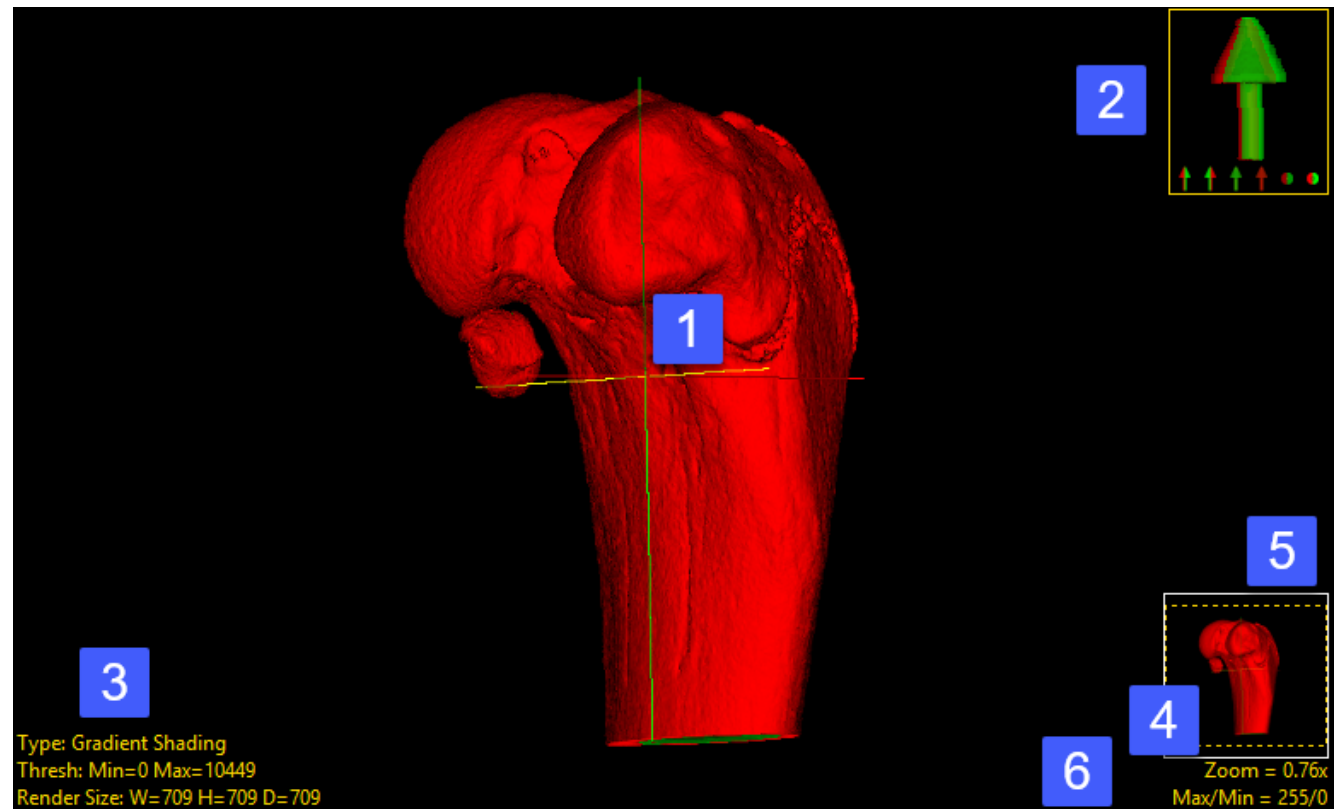
## Rendering Window and Tools

The default upper right pane of the Image Display Window is the Rendering Window. This window displays a 3D rendering of the image volume

The Rendering Window includes several tools for viewing and navigating through the image data:

- (1) Cursor Link tool
- (2) Navigation Icon tool
- (3) Rotation tool
- (4) Zoom tool
- (5) Pan tool
- (6) Max/Min tool

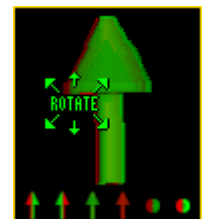
**Cursor Link tool:** As described in the Slice Display section above, the cursor link allows users to interactively navigate through the image data. The tool can be controlled from the 3D rendering or from any of the 2D orientations. Moving the tool on the



rendering will interactively update the orthogonal slice displays. The cursor link can be enabled or disabled using the Toggle Cursor Link button.

**Navigation Icon tool** — The Navigation Icon is a reference for the current orientation of the 3D image data, and also allows users to rotate the data or specify a standard view: front, back,

top, bottom. To rotate the data, left-click on the Navigation Icon and hold the left mouse button down. The cursor will update to the **Rotation tool** enabling interactive rotation of the rendering viewpoint. Releasing the left mouse button will dismiss the rotate cursor.







**Zoom tool:** As with the Zoom tool for the 2D Slice Display, the Zoom tool in the Rendering Window allows users to increase and decrease the display size of the data. For more information refer to the Zoom tool description in the Slice Display section.

**Pan tool:** The Pan tool is automatically enabled when the Zoom size of the rendering is larger than the current window. Clicking in the tool allows users to Pan the zoomed area over the current display. To enable the Pan tool without zooming right-click on Zoom and select Options and then check Show Pan.'

**Max/Min tool:** The Maximum and Minimum display intensities for the rendering can be changed by clicking on the yellow Max/Min Tool at the bottom right corner of the window. A cursor will return that allows the values to be manipulated. Hold down the left mouse button and move the mouse up/down or left/right.

**Right Menu Options:** Right-clicking in the Rendering Window reveals additional options. Most of these options, if available, are described in the Slice Display section, however, there are few additional configuration options specific to the Rendering window.

**Middle Button Action:** Allows users to set the action of the middle mouse button. See the Slice Display section for additional information.

**Mouse Wheel Action:** Allows users to set the action of the middle mouse wheel. See the Slice Display section for additional information.

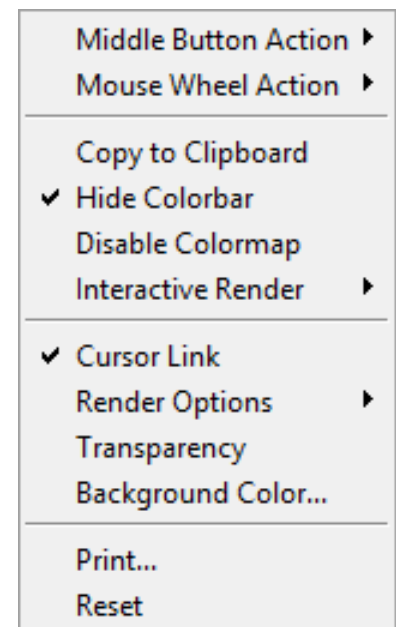
**Copy to Clipboard:** Copies the current rendering display to memory.

**Hide Colorbar:** Toggles the Colorbar Off/On in the current display.

**Disable Colormap:** Disables/Enables the Colormap in the current display.

**Interactive Render:** Allows users to select between Reduced Quality (useful for interactive rotation of extremely large image volumes) and Full Quality.

**Cursor Link:** Toggles the Cursor Link tool Off/On in the current display.





**Render Options:** Allows users to enable/disable the following rendering options:

**Show Render Type:** Allows users to view and change the rendering algorithm used to render the image data, choose from Depth Shading, Gradient Shading (default option), Volume Compositing, Maximum Intensity Projection, Summed Voxel Projection, Surface Projections, and Object Compositing. Double click on the Render Type option to cycle through the render types or right-click and choose a specific render type from the right mouse menu. For more information about render types and the render type specific options please refer to the 3D Rendering section of Display.

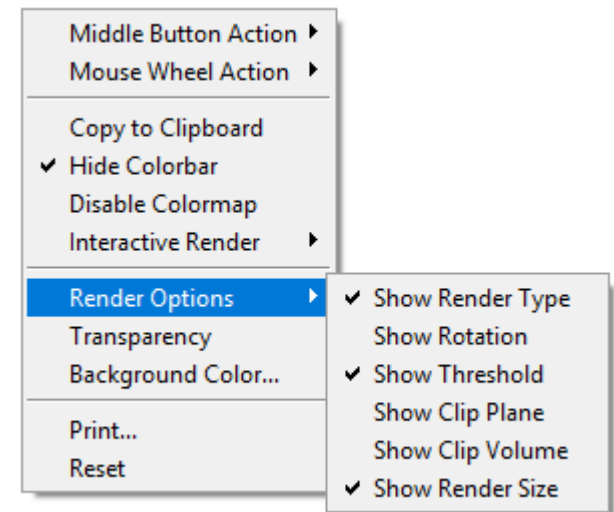
**Show Rotation:** Reports the current XYZ rotation angle coordinates. When selected, enables the rotate cursor. Right-click on the tool to choose from rotation default options; Front, Back, Left, Right, Top, and Bottom

**Show Threshold:** Displays the current Threshold maximum and minimum threshold values. Double clicking allows users to enter values. Right-click to specify Preset values or choose from Analyze Default, Calculated Max/Min, and DataType Max/Min.

**Show Clip Plane:** Enables the Clip Plane tool allowing users to specify the maximum and minimum depth along the ray path between which voxels are rendered. Clipping is particularly helpful when you need to observe the cross section of a 3D object.

**Show Clip Volume:** Enables the Clip Volume tool, allowing users to clip the volume with six clip planes (X low, X high, Y low, Y high, Z low, and Z high).

**Show Render Size:** Displays the current rendering size and allows the user to enter the rendering Width, Height, and Depth. Right click to choose from Default, Maximum Diagonal, Double Diagonal, Axial, Coronal, and Sagittal.



**Right Menu Options (Continued):**

**Transparency:** The Transparency option turns transparent rendering on or off. The transparency rendering mode is useful for visualizing objects contained within objects or objects with views obscured by other objects. Object opacity levels can be set using the Opacity options in the Object Control window.

**Background Opacity:** The Background Opacity option is only available when Transparency rendering is enabled. The option allows users to specify the background opacity for the transparency rendering.

**Background Color:** Allows users to set the color of the rendering background. The option opens a Color selection window enabling selection of desired color.

**Print:** Sends capture of current slice display to printer.

**Reset:** Resets all options to default.

