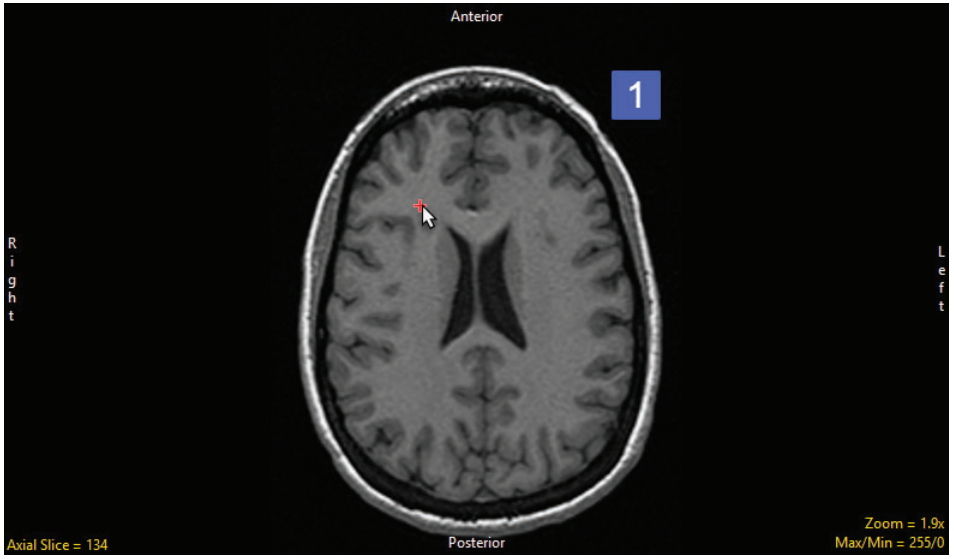
Auto Trace

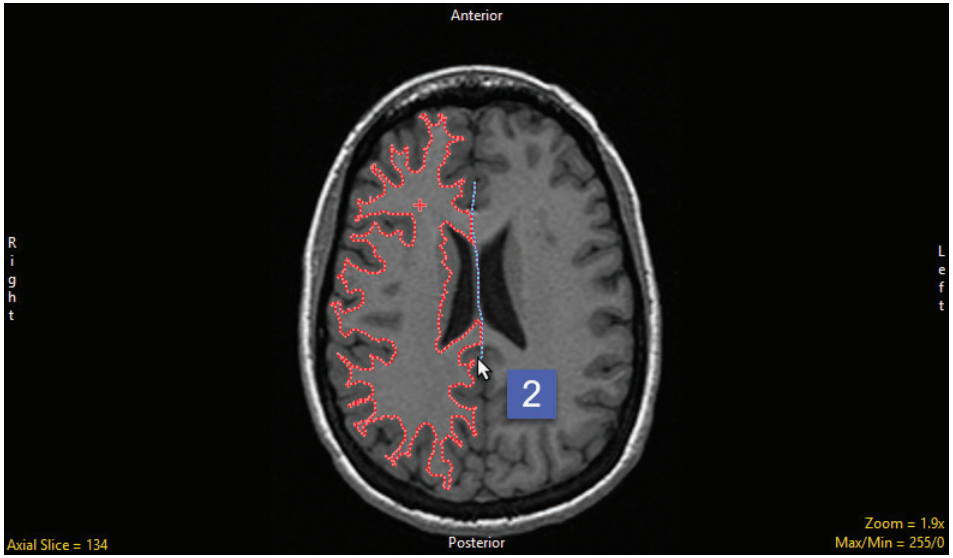
The Auto Trace tool enables the user to define and extract regions of interest from the image data using 2D seeded region growing. Region definition begins with a seed pixel, manually set by the user, on a structure of interest. Next, a threshold range is established by the user to define the boundary of the structure. The 2D region is defined by all the pixels in the threshold range that are connected to the seed pixel.

The following options are available:

Select Seed: The select seed mode is the default mode the Auto Trace tool will open in. Select seed allows users to set a seed point on the image data [1] to enable the Auto Trace tool options.

Draw Limit: The draw limit mode allows users to manually define limits on the image data to limit the auto trace region [2].



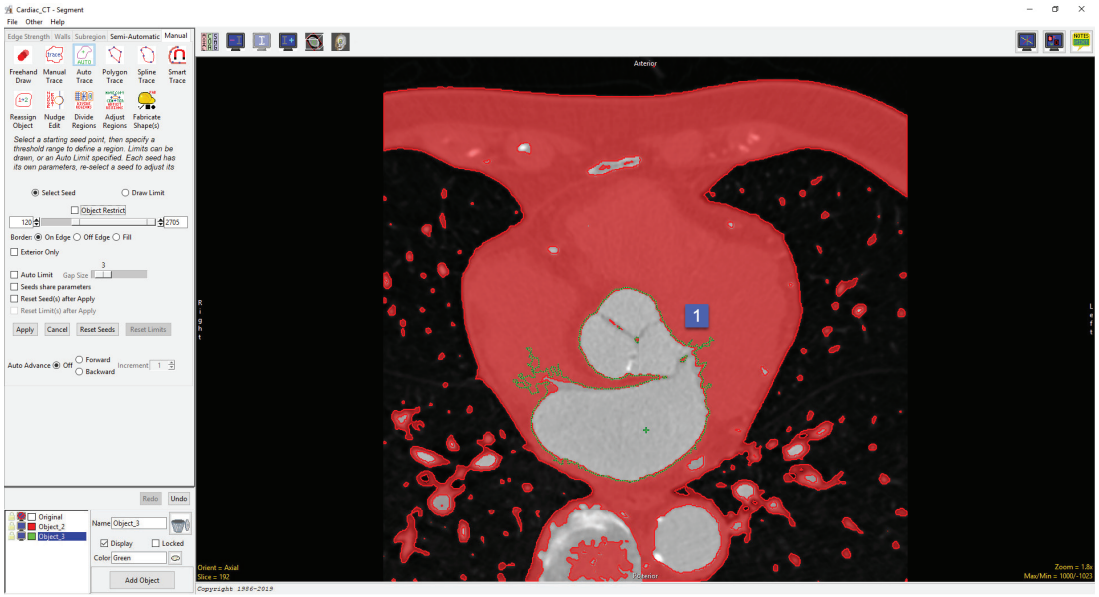


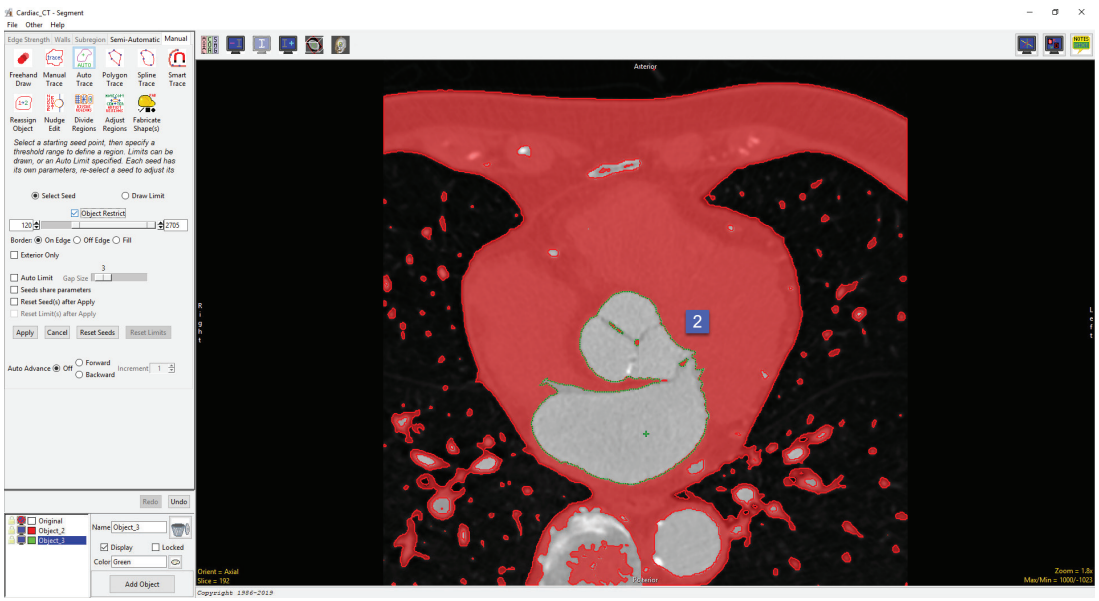
Auto Trace Options (continued)

Object Restrict: The Object Restrict options allows users to restricts the definition of the current object with the boundaries of any established objects. When disabled traces are not limited by object boundaries [1]. However, when the option is enabled traces are restricted [2].

Threshold slider: The Threshold double-ended slider bar allows users to specify a range of threshold values using the minimum and maximum ends of the threshold slider. Minimum and Maximum values can be entered in the text entry fields while the arrow up and down keys to the right of the minimum and left of the maximum text entry fields can be used to increase or decrease values 1 point at a time. Click left and right of the text entry boxes

Tip: Clicking in the trough to either side of the minimum or maximum end of the slider will advance the value by 1. Shift-click will decrease the value by 1.



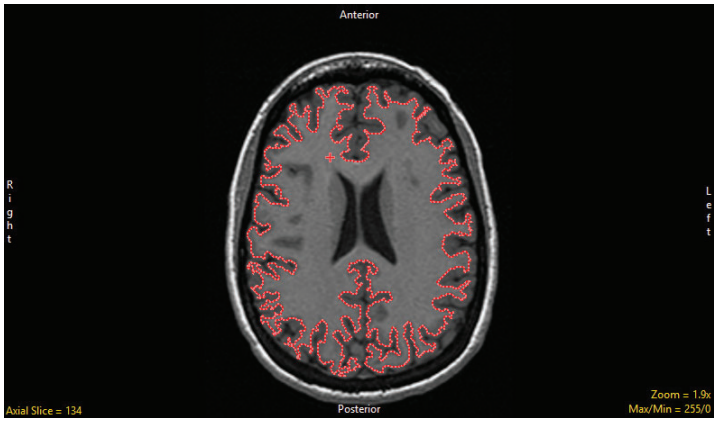


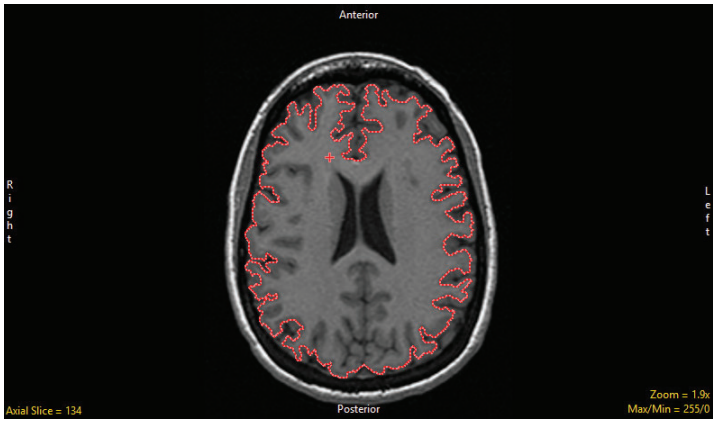
Auto Trace Options (continued)

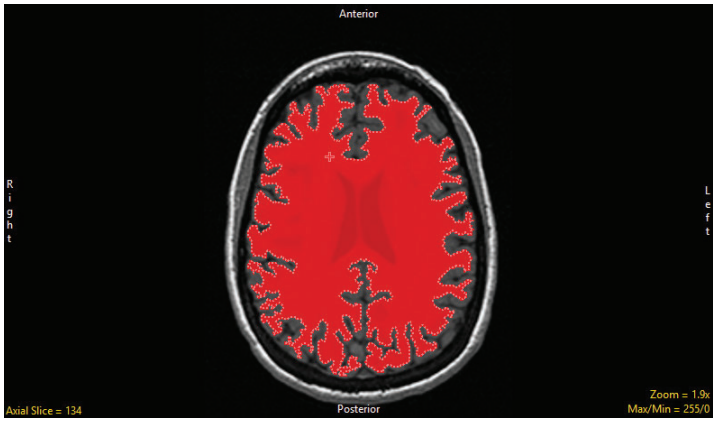
Right clicking options: Right clicking on the threshold slider will provide access to threshold presents. The Presets option allows users to select predefined thresholds or define new threshold values for specific areas of interest. For more information on Presets, including how to configure presents refer to the Threshold Volume.

Border: The Border options allows users to specify how the border of the trace will be displayed on the image, choose from:

- On Edge: The auto trace will be positioned exactly on the edge of the thresholded region (top image).
- Off Edge: The auto trace will be positioned one pixel off the edge of the thresholded region (middle image).
- Fill: The auto trace will display On Edge with a filled interior (bottom image).



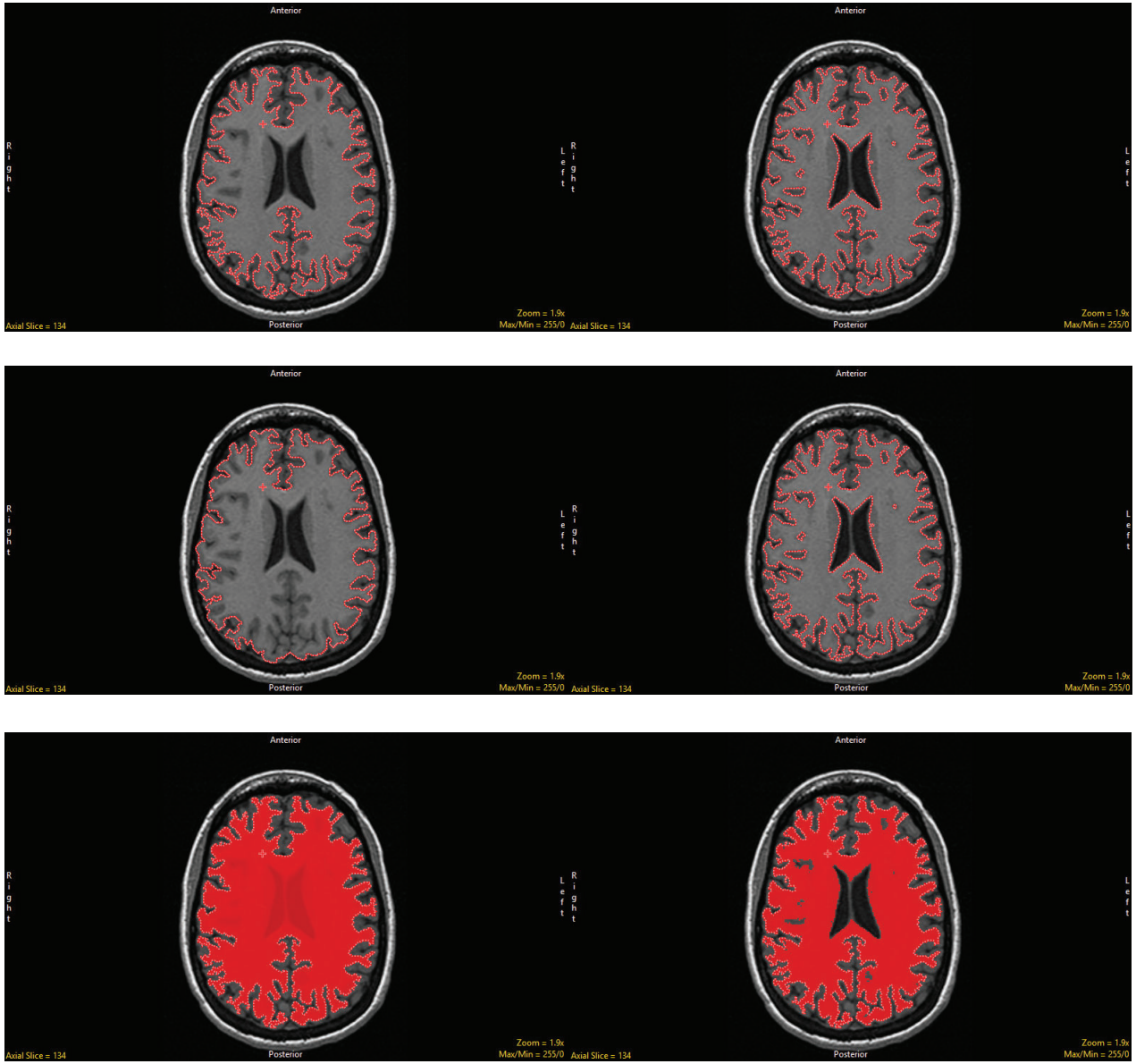




Auto Trace Options (continued)

Exterior Only: The Exterior Only option allows users to enable (default) or disable the display of the exterior border only. Enable the option if you only wish to see the exterior borders of the trace, uncheck and disable the option if you wish to view the exterior and interior borders. The option is compatible for all Border displays.

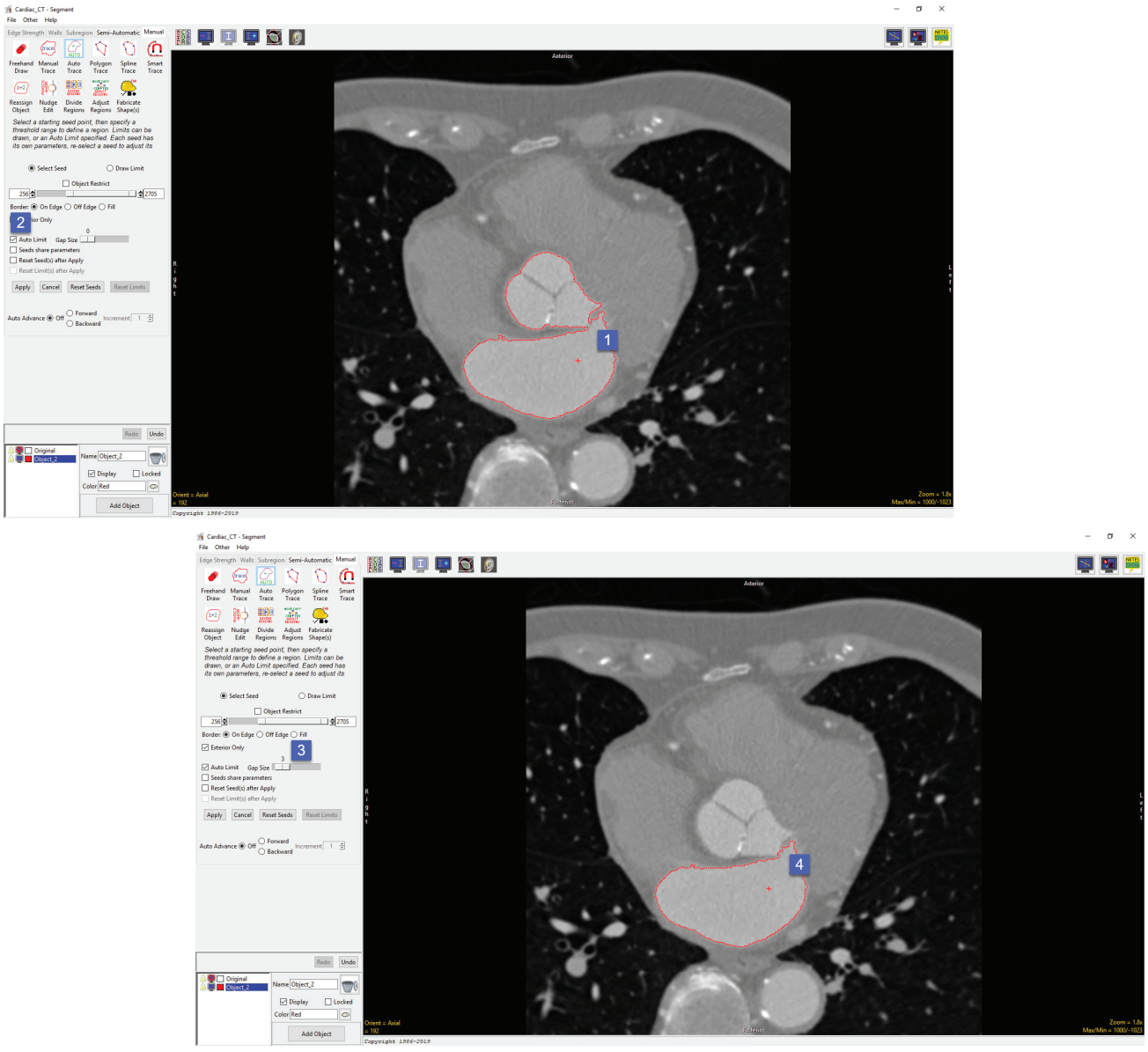
- Top image: Exterior Only disabled with On Edge selected
- Middle Image: Exterior Only disabled with Off Edge selected
- Bottom image: Exterior Only disabled with On Fill selected



Auto Trace Options (continued)

Auto Limit: The Auto Limit option applies a post processing step to the auto trace to eliminate thin portions of the auto trace. This option performs a morphologic open using the Gap Size value, defined by the user, to define the number of layers to be removed from the trace and then added back.

To use the option, after setting a seed point and appropriate threshold criteria to define a region [1], click the Auto Limit check box [2], then set the Gap Size using the slider, [3] review the impact on the defined region. [4] Note that the Gap Size of 0 is the same as having no Auto Limit set. This option helps eliminate the need for manually defining limits in some situations.



Auto Trace Options (continued)

Seeds share parameters: The Seeds share parameters option allows users to enable or disable (default) seeds from sharing the same auto trace options including threshold range, border settings, auto limit, and object information. Enable this option if you wish to define multiple separate regions with the same parameters, keep this option disabled if you wish to define multiple separate regions with different parameters.

Reset Seed(s) after Apply: After applying the trace all seeds will be reset (deleted).

Reset Limit(s) after Apply: After applying the trace all limits will be reset (deleted).

Apply: Applies the trace to the slice.

Cancel: Cancels the Auto Trace, resets all defined seed points and limits.

Reset Seeds: Resets all seeds.

Reset Limits: Resets all limits.

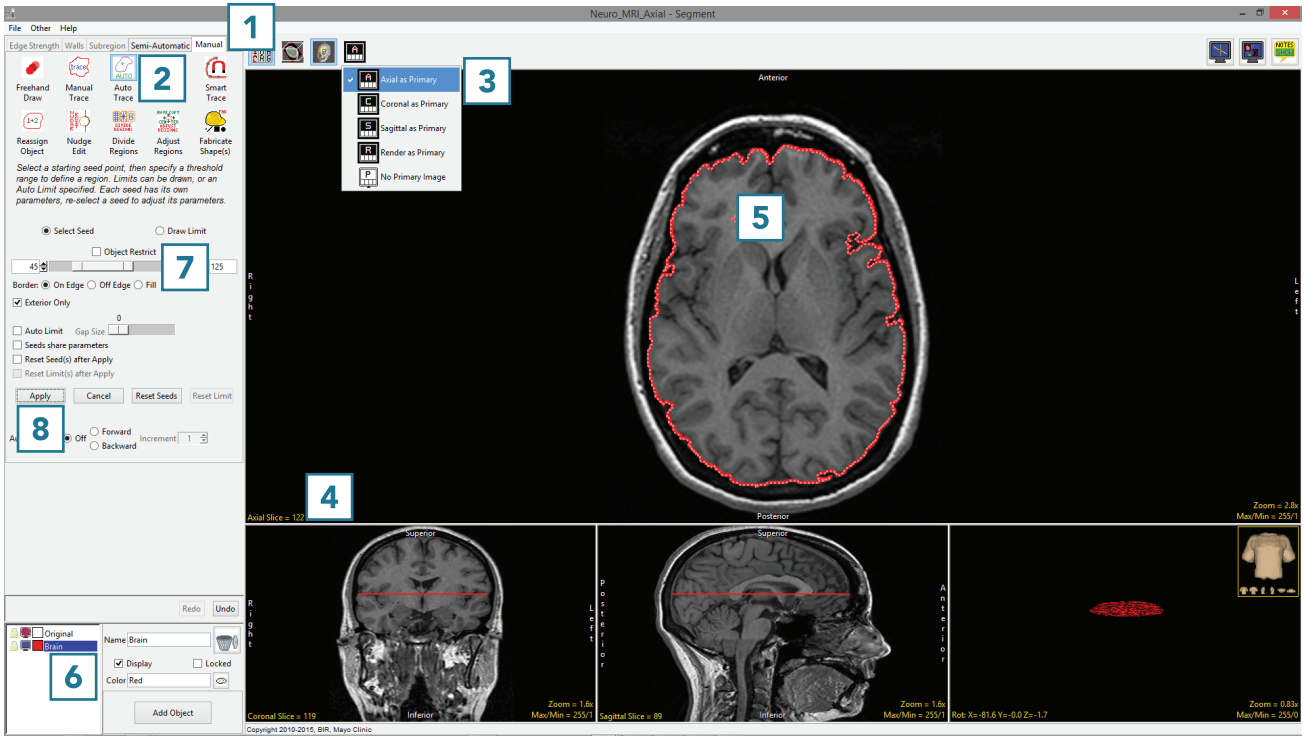
Auto Advance: The auto advance option automatically moves users to a new slice, as defined by the auto advance options, once the current edit is defined. Note the auto advance will occur after the user releases the left mouse button and the edit is applied to the current slice. The auto advance option is a productivity tool allowing users to move through the image data without having to move the cursor from the current orientation window that regions are being defined on. The following options are available.

- Off: Off is the default option for auto advance. When off is selected auto advance is disabled.
- Forward: Specifies that auto advance will move forward through the image data (slice number increases).
- Backwards: Specifies that auto advance will move backwards through the image data (slice number decreases).
- Increment: Specifies the number of slices the auto advance will move forward or backwards.

Using Auto Trace to Define a 2D Region of Interest

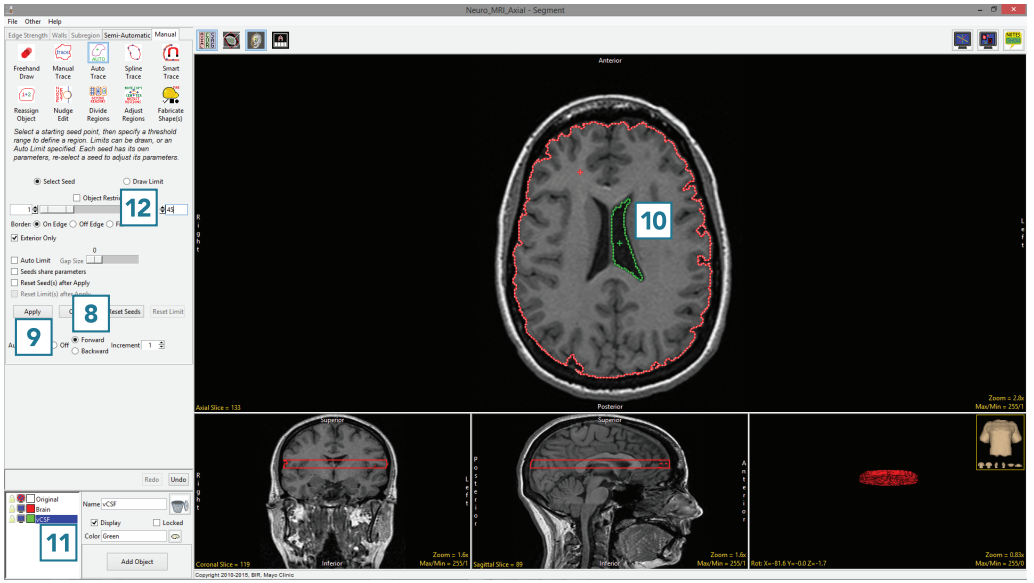
To follow along, download the data set MRI_3D_Head from analyzedirect.com/data and load into Analyze using Input/Output.

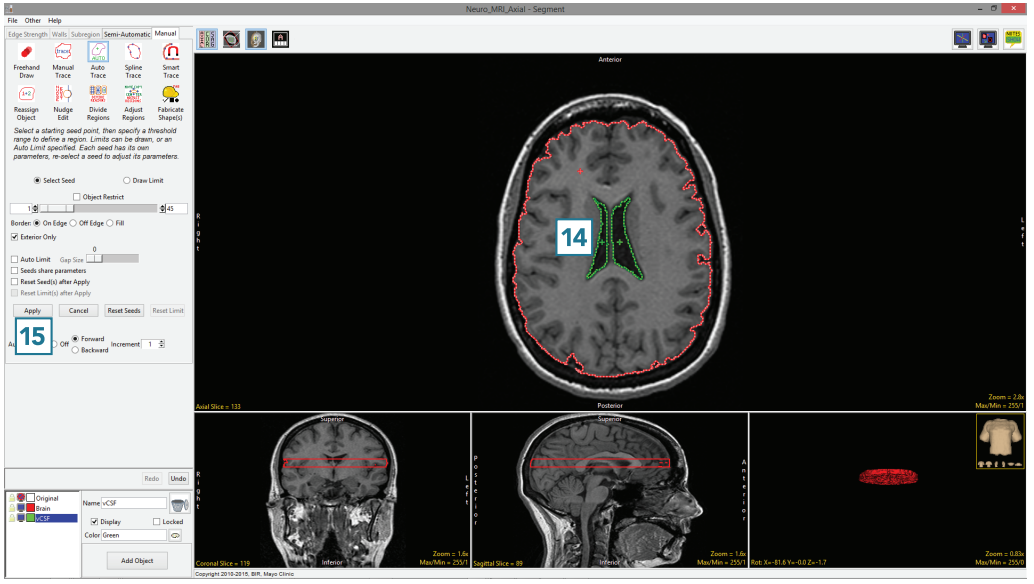
- Select the data set and open Segment.
- Select Manual [1] and choose Auto Trace [2].
- Set the primary display to Axial [3] and double-click Slice [4] to move to axial slice 122.
- Set a seed pixel in the white matter [5].
- Rename Object_2 to Brain [6] and then adjust the minimum and maximum threshold values [7] to define the brain.
- Click Apply [8] to trace the brain on this slice.
- Scroll forward to slice 123. The + key can also be used instead if your mouse has no scroll wheel.
- As the seed point and threshold range are carried forward, the brain will be redefined on this slice.



Using Auto Trace to Define a 2D Region of Interest (continued)

- Set the Auto Advance option to Forward [8] and click Apply [9]. The brain will be traced on this slice and the display will automatically move forward to slice 124.
- Continue to apply the auto trace to the brain up to slice 133. If the initial seed point is copied to a slice where it does not fall within the brain, reset the seed point and threshold range and click Apply to set a new auto trace on that slice.
- Click in the ventricular CSF to set a seed point [10].
- Add a new Object and rename it vCSF [11]. Note that the second seed point will change color to match the color of the new object. Adjust the threshold range to define the vCSF object [12].
- Set a second seed point to define the remaining vCSF [14] and click Apply [15].





Using Auto Trace to Define a 2D Region of Interest (continued)

- Continue clicking Apply to trace the Brain and vCSF objects. If a seed point is copied to a location where it is no longer on the target object [16], move the seed point back onto the object [17] and continue to apply the auto trace.
- Stop defining objects at slice 137.
- Select File > Save Object Map to save your work.